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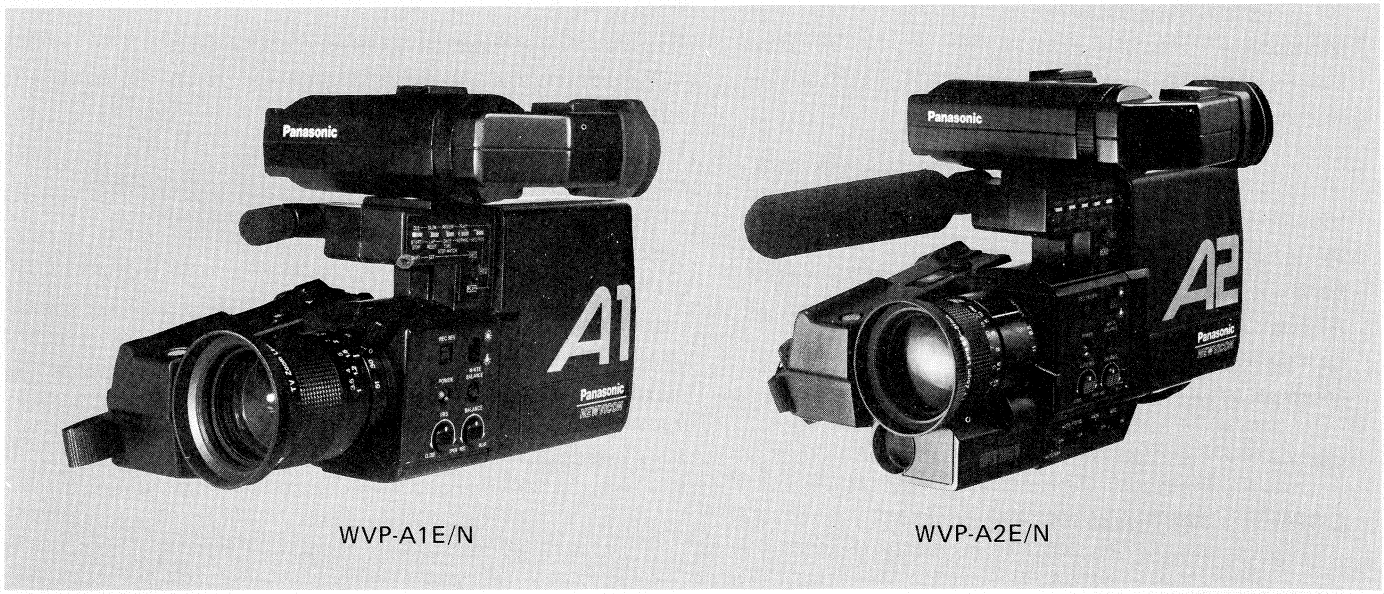
Service Manual

Vol. 1

Circuit Description

Colour Video Cameras

WVP-A1E/WVP-A1N
WVP-A2E/WVP-A2N



WVP-A1E/N WVP-A2E/N

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National/Panasonic

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

SPECIFICATION

CAMERA WVP-A1E/N

Power Source:	12V DC
Power Consumption:	Approx. 4.2 Watts
Scanning:	625 lines/50 fields/25 frame per second
Pick-up System:	Single tube frequency separation system
Pick-up Tube:	One high-band (3.9MHz) 1/2" integral stripe filter NEWVICON™ tube
Video Output Level:	1.0 Vpp PAL composite/75 ohms
Horizontal Resolution (Luminance):	280 lines at centre
Single to Noise Ratio (Luminance):	45 dB
Illumination Required:	1400 lux
Required Minimum Illumination:	7 lux at F1.2
Microphone:	Omnidirectional Electret Condencer Microphone
External Microphone Input:	–72 dB 600 ohms unbalance M3 Jack for Stereo Microphone
Audio Output:	–20 dB/1K ohms
Lens:	Built-in 6:1 Automatic Light/Iris Control, Power zoom; 8.5 –51mm F1.2, Filter Diameter/ϕ49mm
Viewfinder:	1" B/W Electric Viewfinder with graphics display
White Balance:	Automatic Control
Ambient Operating Temperature:	0°C – 40°C
Ambient Operating Humidity:	Less than 90%
Camera Mounting:	One 1/4" –20 threaded hole standard camera tripod
Dimension:	193(W) x 160(H) x 236(D) mm 7-5/8"(W) x 6-5/16"(H) x 9-5/16"(D)
Weight:	1.1 kg (2.4lbs)

CAMERA WVP-A2E/N

Power Source:	12V DC
Power Consumption:	Approx. 4.7 Watts
Scanning:	625 lines/50 fields/25 frame per second
Pick-up System:	Single tube frequency separation system
Pick-up Tube:	One high-band (3.9MHz) 1/2" integral stripe filter NEWVICON™ tube
Video Output Level:	1.0 Vpp PAL composite/75 ohms
Horizontal Resolution (Luminance):	280 lines at centre
Single to Noise Ratio (Luminance):	45 dB
Illumination Required:	1400 lux
Required Minimum Illumination:	7 lux at F1.2
Microphone (Detachable) :	Unidirectional Electret Condencer Microphone
External Microphone Input:	–72 dB 600 ohms unbalance M3 Jack for Stereo Microphone
Audio Output:	–20 dB/1K ohms
Lens:	Built-in 6:1 Direct Image Auto Focus Power Zoom Lens with Automatic Light/Iris Control. 8.5 –51mm F1.2, Filter Diameter/ϕ49mm
Viewfinder:	1" B/W Electronic Viewfinder with graphics display
White Balance:	Automatic Control
Ambient Operating Temperature:	0°C – 40°C
Ambient Operating Humidity:	Less than 90%
Camera Mounting:	One 1/4" –20 threaded hole standard camera tripod
Dimension:	193(W) x 180 (H) x 236(D) mm 7-5/8"(W) x 7-1/16"(H) x 9-5/16"(D)
Weight:	1.3 kg (2.86 lbs)

1 Principle of Single Carrier Frequency Multiplexing System using a Single Tube

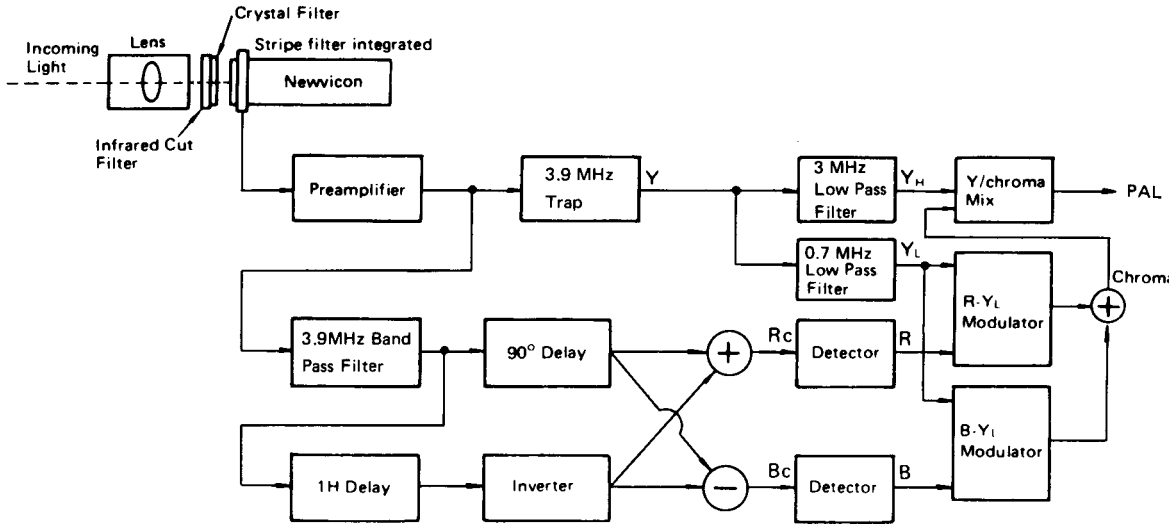


Fig.1-1 Principle of Single Carrier Frequency Multiplexing System using a Single Tube

The incoming light to the camera which passes through the automatic iris control (AIC) lens, the infrared (IR) cut filter and the crystal filter reaches the surface of the integrated stripe filter in a 1/2" pick-up tube (YFS4161PKIT).

Color Temperature Conversion Filter

Generally, the human eye is sensitive to electromagnetic waves from 380mμ(mμ=nm) to 780mμ in wavelength (the visible region). In addition, the human eye also discerns the wavelength difference as a color difference. The human eye responds to the light between 400mμ to 500mμ wavelength as predominantly blue information, the light between 500mμ to 600mμ as green information, and the light between 600mμ to 700mμ as red information. The entire light in the "visible" range of wavelength from 380mμ to 780mμ is seen as different amount of white light.

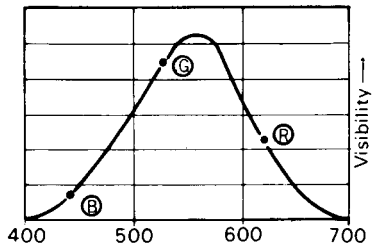


Fig. 1-2 Standard Luminosity Curve

When a carbon is burned, it emits light of a different quality depending on how hot it is. Various natural light can be expressed in terms of a color temperature which may be referred to a light emitted from the burning carbon used as a standard. A light source of 3200°K (K=Kelvin: -273°C corresponds to 0°C an absolute temperature) color temperature, which is used in studios, implies that its quality (color) is the same as that emitted from the carbon burning at 3200°K (2927°C) The relationship between the color temperature of light sources used for illumination and weather conditions are shown in Fig. 1-4. The color temperature goes up as the weather turns rainy from clear. This may be related to the burning carbon(charcoal) as follows. When the charcoal is heated and begins to glow (at low temperature), it emits a reddish light. But when it is so-called white hot (at high temperature), a bluish light is emitted. In other words, the light at a low color temperature is considered reddish and at high color temperature is considered bluish.

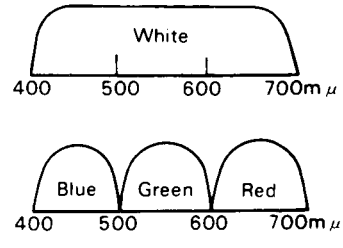


Fig. 1-3 The Visible Spectrum

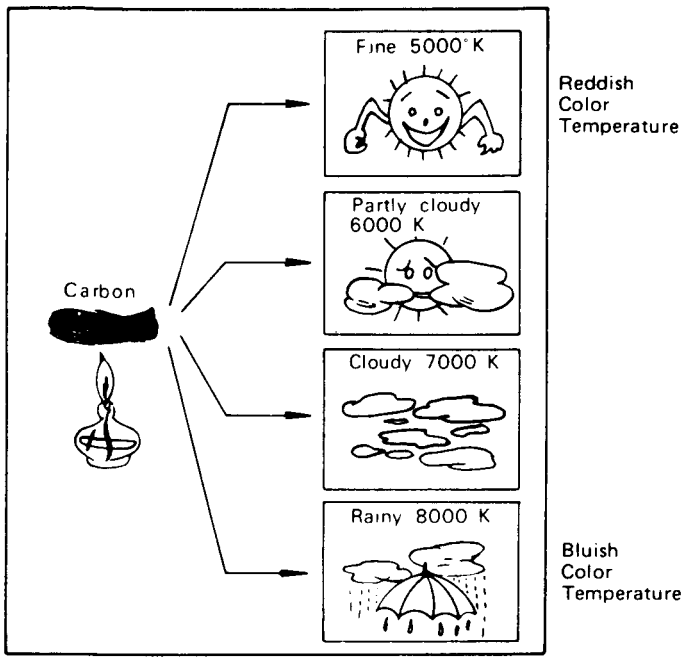


Fig. 1-4 Color Temperature and Weather Conditions

When a color camera is pointed at an object illuminated by a light of low color temperature, it reproduces a reddish picture.
When a color camera is pointed at an object illuminated by a light of high color temperature, it reproduces a bluish picture. The color camera has the indoor/outdoor switch which corrects for the color reproduction of the camera. When the switch is set to the outdoor position, the red and blue signal level are changed to correct the color temperature from 5100°K to 3200°K.
In addition to the indoor/outdoor selection switch utilizing the correction of red and blue signal level, this camera is designed so that the level of red and blue signals can be changed to meet the color temperature of the light source in order to ensure proper color reproduction.

Infrared Cut Filter

As shown in Fig. 1-5, the pick-up tube has some sensitivity in the infrared region beyond the visible range. The infrared(IR) cut filter cuts off the infrared light rays which the human eye does not see as light. If the color signal is made by using the video signal corresponding to the infrared rays which the human eye can not normally see, the color of pictures on the monitor and that seen with the naked eye would differ substantially.

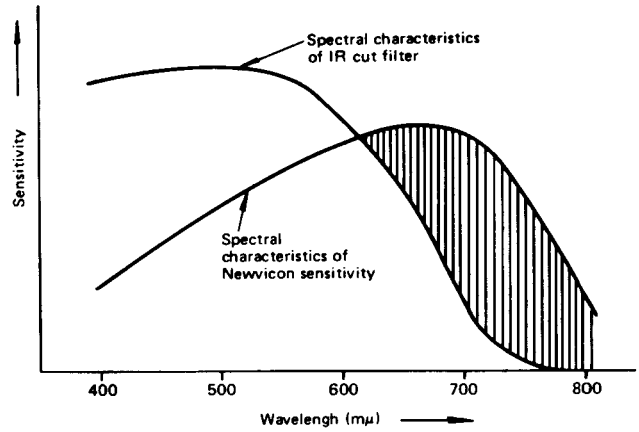


Fig. 1-5 IR Cut Filter Response

Crystal Filter

As described later, since the red and blue images are modulated by the fine stripe filter built into the pick-up tube , false signals could develop due to interference between the stripe filters and fine detail objects. The crystal filter is an optical low pass filter which prevents the occurrence of such false signals by blocking the high frequency components of images.

Pick-up Tube

Different from that of the black and white camera, the pick-up tube used in this color camera has a built-in stripe filter, a metallic stripe called the optical black(OB) located on the face-plate. The video signal's black level is set in reference to the signal from the optical black.

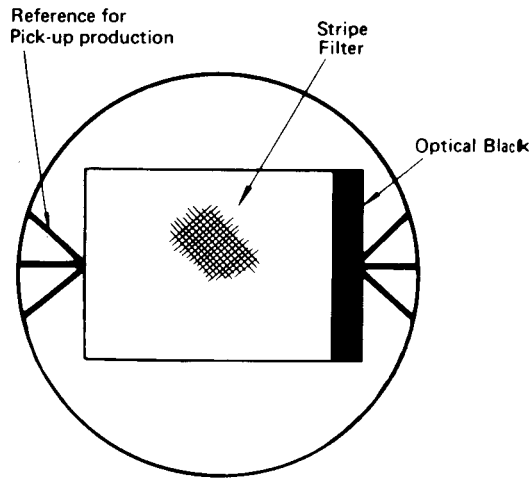


Fig. 1-6 Front View of Newvicon®

Principle

As shown in Fig.1-9 Ⓑ , the stripe filter integrated into the pick-up tube consists of a cyan/transparent stripe filter section and a yellow/transparent stripe filter section. These stripe filters are so arranged as to be of the same pitch in the horizontal scanning direction, and have equal angles with respect to the vertical. The pick-up tubes even and odd scanning lines pass the tracks of the stripe filters that are arranged in the same way. In other words, the even and odd scanning lines are spaced "a" apart.

For easy understanding, let' assume that light of uniform level containing green(G), red(R), and blue(B) reaches the pick-up tube(Fig. 1-9' Ⓐ), and that the crosspoint of cyan and yellow stripe filter is scanned as shown in Fig. 1-9 Ⓑ .

Let's consider the light output from the stripe filter. The cyan filter cuts off the red(R) light which is complementary to it, and the yellow filter cuts off the blue(B) light which is complementary to it. (Fig. 1-7).

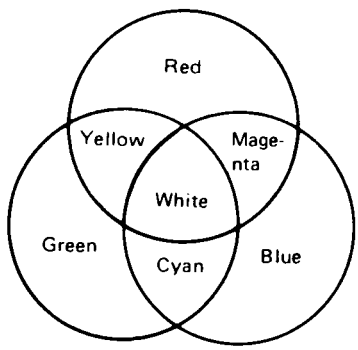


Fig. 1-7 Complementary Color

The light output Ⓒ , which corresponds to the Nth scanning line contains the modulated R and B components, riding on top of unmodulated G component. The light output Ⓓ , which corresponds to the N+1st scanning line contains the modulated R and B components, riding on top of the unmodulated G components. Light output Ⓔ , Ⓕ , and Ⓖ correspond to N+2nd, N+3rd and N+4th scanning lines respectively. The light Ⓒ for the Nth line and the light Ⓖ for the N+4th line are exactly same.

The stripe filters have the same pitch in the horizontal scanning direction, and the same angle in the vertical directions so that there is a phase difference of 90° among modulated components.

The pick-up tube produces the video signal whose waveform is same as that of the light which comes from the stripe filter.

The modulation frequency for the R and B signals can be calculated from the following equation.

$$W \times 10^3 : t\ (= 1H - H.BL) = P : \frac{1}{f}$$

$$f = \frac{W \times 10^3}{p \times t} \quad (MHz)$$

Here, f : Modulation frequency (MHz)

W : Horizontal width of effective scanning area of pick-up tube (mm)

p : Stripe filter pitch (μm)

t : Horizontal video signal duration (line duration (1H)-horizontal blanking duration (H.BL)) (μs)

Specially;

W = 6.16mm

p = 30.4 μm

t = 1H - H.BL = 64 − 12.03 = 51.97μs

$$f = \frac{w \times 10^3}{p \times t} = \frac{7.95 \times 10^3}{30.4 \times 51.97} = 3.9\ MHz$$

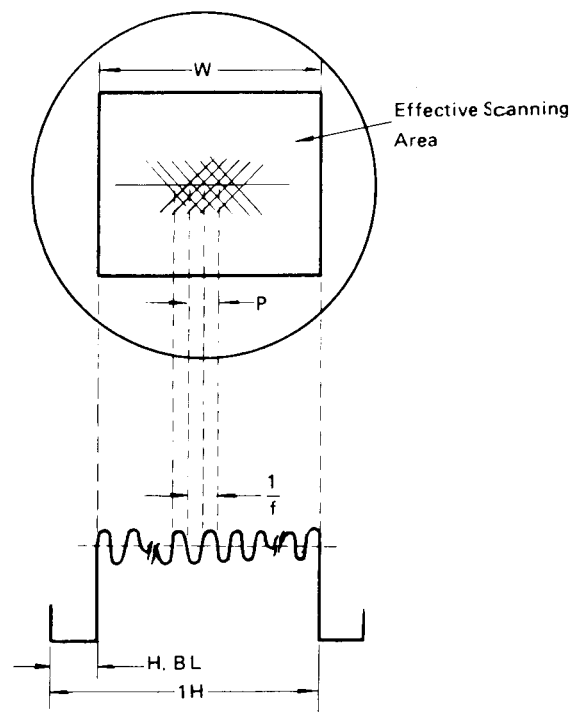


Fig. 1-8 Modulation Frequency

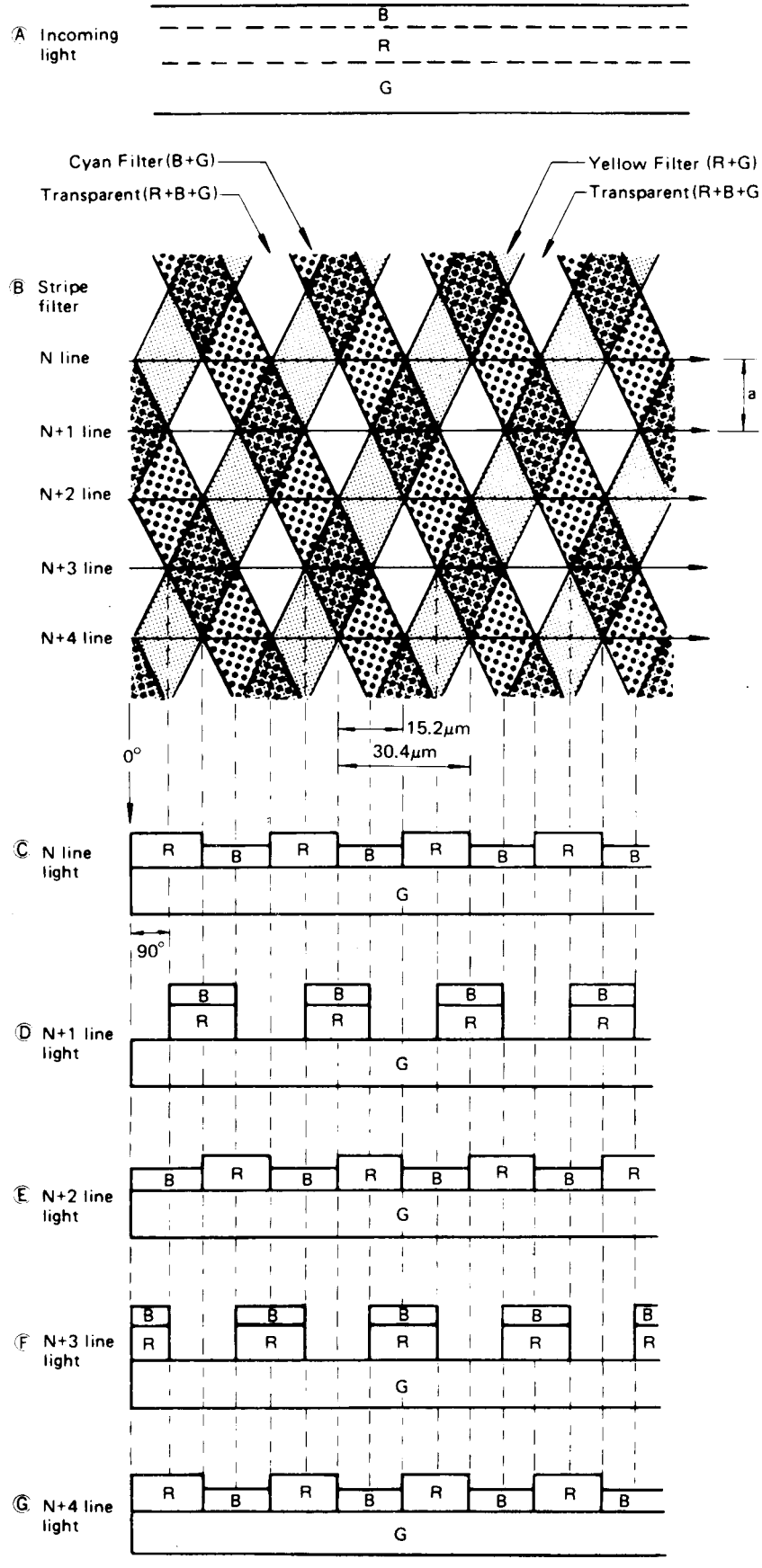


Fig. 1-9 Light from Stripe Filter

The incoming light is thus converted by the integrated stripe filter into a signal which contains R and B signals modulated by 3.9 MHz, and the G signal.

This signal is sent to the preamplifier, where it is amplified. The amplified signal Ⓗ (see Fig. 1-11) from preamplifier is sent to the 3.9 MHz trap circuit, which passes only the luminance(Y) signal ① comprising the G signal and the mean value of the modulated R and B signals. The mean value of modulated R and B signals on adjacent scanning lines are equal so that the luminance signal corresponding to two successive lines is also equal (see Fig. 1-10) due to the characteristics of the trap circuit.

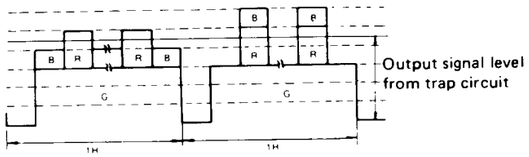


Fig. 1-10 Detection of Y signal

The Y signal thus obtained is supplied to the 3 MHz low pass filter and the 0.7MHz low pass filter. The luminance(YH) signal having high frequency response and the luminance signal (YL) having low frequency response come out from these low pass filters.

The YH signal is supplied to the Y/chroma mix circuit and the YL signal to the R-YL and B-YL modulator circuits.

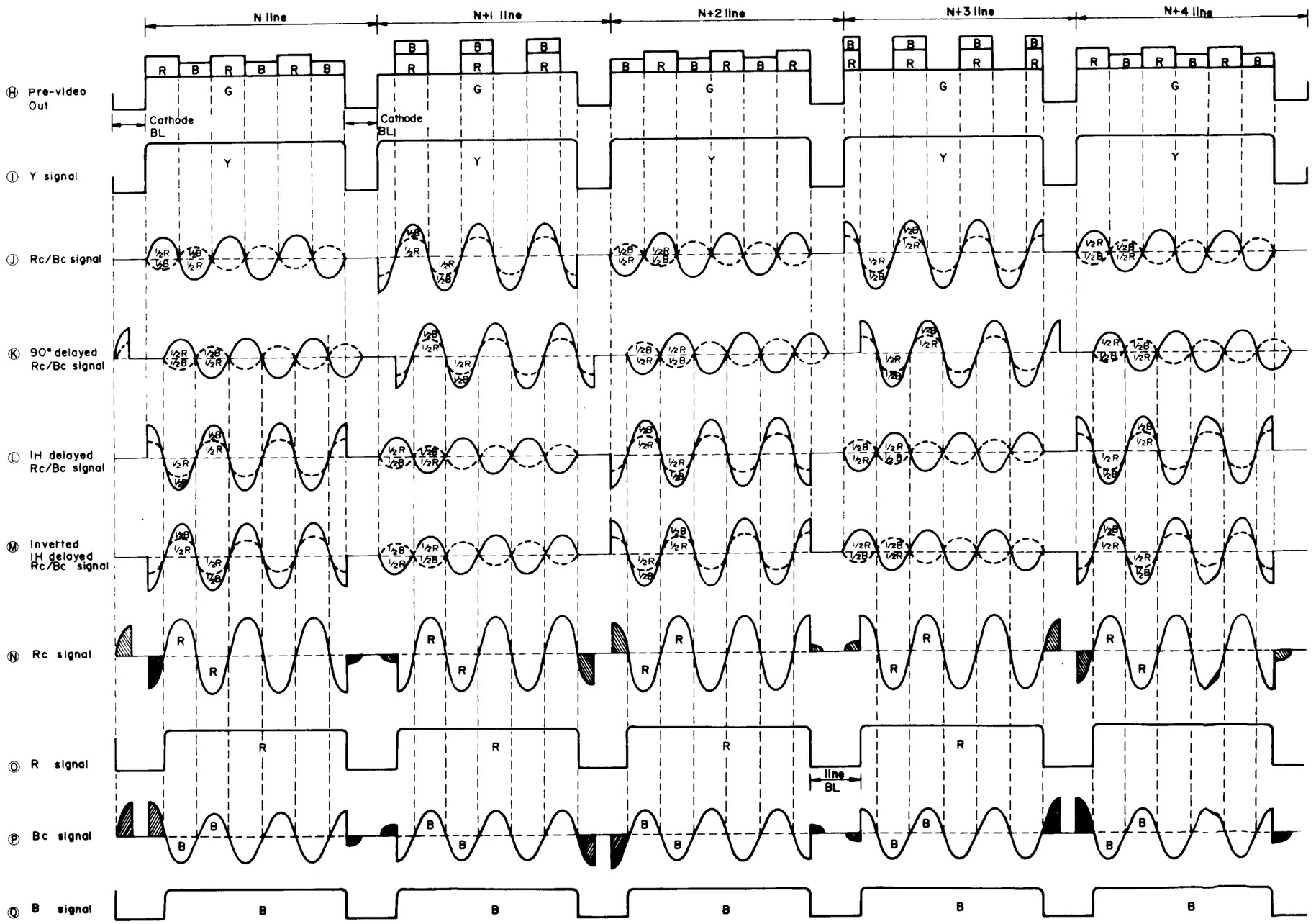
The amplified signal Ⓗ is also supplied to the bandpass filter (B.P.F.) whose center frequency is 3.9 MHz and through which only the 3.9 MHz modulated signal Ⓙ passes.

The modulated signal Ⓙ is sent to the 90° phase shift circuit and the 1H(1 line) delay circuit, from which 90° phase shifted and 1H delayed modulated signals Ⓚ and Ⓛ are obtained.

The 1H-delayed modulated signal Ⓛ is inverted and the signal Ⓜ is obtained. The modulated R(Rc) signal Ⓝ is obtained by adding the modulated signals Ⓚ and Ⓜ, and the modulated B(Bc) signal Ⓟ is obtained by subtraction of the modulated signals Ⓚ and Ⓜ. The shaded portions on the signals Ⓝ and Ⓟ are removed by mixing the line blanking pulse.

The Rc and Bc signals obtained by addition and subtraction are supplied to detectors, from which R signal Ⓞ and B signal Ⓠ are obtained. The R signal and B signal thus obtained,are fed to the R-YL and B-YL modulator circuits respsectively.

The chrominance signal obtained by mixing the R-YL and B-YL modulated signals is supplied to the Y/chroma mix circuit where it is mixed with the luminance(YH) signal to result in an NTSC signal.



*Shaded portions are removed by mixing the line blanking pulse.

Fig. 1-11 Detection of Y, R and B Signals

2 Preamplifier Board

Outline

This circuit amplifies the signal current Is(0.2uA - 0.3uA) from the pick-up tube.

The amplified video signal is delivered to the signal processing circuit in the Process board.

The preamplifier is a low output impedance and negative feedback amplifier which uses a low noise FET at the input.

To maintain the low noise in the signal, a so-called Percival circuit is used. It improves the S/N ratio at relatively high frequencies (where color components are located).

Details

The signal current from the pick-up tube, comprising the modulated red(R) and blue(B) components, and the green(G) component, is supplied to the target terminal of the preamplifier circuit and converted to the video signal by R2 through L1 Percival coil. This video signal is amplified approx. 30dB by the amplifier which consists of Q1 FET and Q2. The amplified signal is then fed to Q3 and Q4 which amplify the input signal approx. 66dB.

The signal at the collector of Q4 is negatively fed back to the gate of Q1 through a feedback circuit which consists of R8, R12, C8 and C9.

The CT1 adjusts the frequency response of the feedback signal and corrects the frequency response of video signal.

The video signal whose frequency response is shaped by the negative feedback is converted to the low impedance video signal with the use of buffer Q5. It is then supplied to the Process board.

The target voltage for the pick-up tube is supplied from the Deflection board to pin 4 (TARGET VOLTAGE IN) of the connector BI1 through the Process board.

The target voltage, controlled due to the pick-up tube temperature drift, is supplied to the pick-up tube target through R17, R1 and L1.

Percival Circuit

The pick-up tubes output is a low noise signal, so that the video S/N is determined by the noise of the pre-amplifier.

The S/N of the modulated R and B signal is lower than that of the non-modulated signal G in the low frequency range due to effects of the pick-up tube output capacitance and the input capacitance of the preamplifier. Percival circuit is adopted to reduce the effects of these capacitances and improve the S/N.

The beneficial effects of the Percival circuit are shown in Fig. 2-1. The equivalent circuit is also shown in Fig. 2-2.

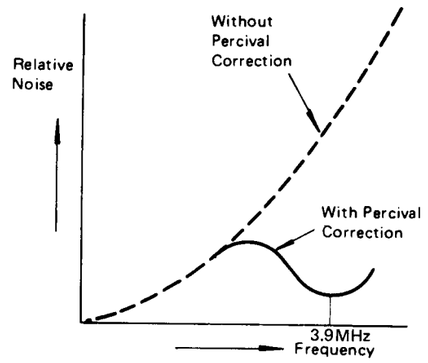


Fig. 2-1 Percival Correction

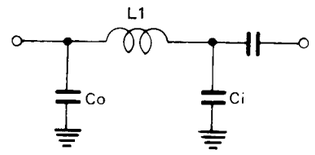


Fig. 2-2

Where : L1 ; Percival coil
Co ; Output capacitance of pick-up tube
Ci ; Input capacitance of preamp

3 Power Board

The Power supply board contains following circuits.

3-1 +7.6V/+5V DC Regulator Circuit 9
3-2 +4.8V DC Regulator Circuit 10
3-3 +8.6V DC Regulator Circuit 10
3-4 Microprocessor Power Supply Circuit 10
3-5 Standby Circuit 12
3-6 Playback Control Circuit 12
3-7 Automatic Iris Control Circuit 13
3-8 Zoom Control Circuit 13

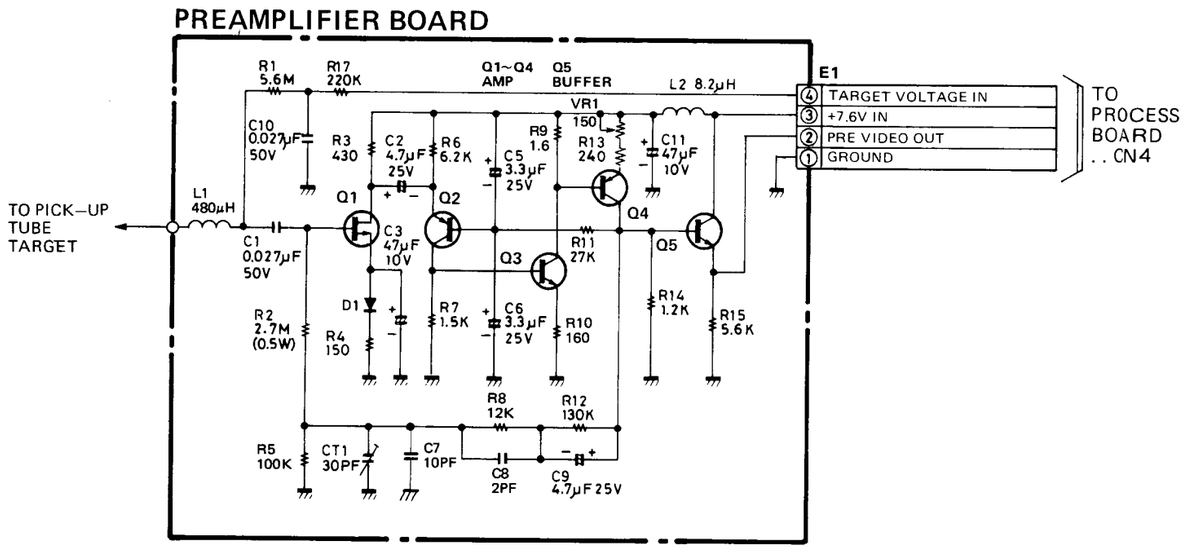


Fig. 2-3 Preamplifier Circuit

3-1 +7.6V/+5V DC Regulator Circuit

Outline

The +7.6V/+5V DC regulator circuit generates regulated +7.6V DC and +5V DC from +12V unregulated DC power from the portable VTR or the power supply unit. The +7.6V DC regulator is a switching type regulator and the output voltage is controlled as follows in order to save the battery life.

+7.6V --- STANDBY switch is ON position

+5.0V --- STANDBY switch is STANDBY position

Details

The +12V DC power from the portable VTR or the power supply is applied through pin 10 of VTR connector CN101, pin 1 of CN1 and L1 to the emitter of Q1 and pin 1 of IC1 respectively.

+5V DC is generated inside IC1 and used as sub-power inside IC1.

Approx. 120KHz triangular signal is generated in triangle oscillator (OSC) inside IC1 and fed to the switching amplifier inside IC1.

The reference DC voltage whose level is set by VR1 (+7.6V ADJ) supplied to pin 11 of IC1 and +7.6V output DC supplied to pin 10 of IC1 are compared by the error amplifier inside IC1. The error output DC voltage corresponding to the +7.6V DC voltage error and triangular signal supplied from triangle OSC are compared by the switching amplifier and the pulse whose width is controlled by the error DC voltage appears at pin 9 of IC1.

This pulse is applied through buffer Q2 and Q3 to the base of switching transistor Q1 switching ON and OFF Q1.

As a result, the DC voltage whose level is set by the pulse duty of switching pulse width is obtained at the output of switching regulator circuit consisting of Q1, D1, L2 and C5. The generated DC voltage is fed back to pin 10 of IC1 and compared with the triangular signal to maintain the output voltage constant.

VR1 is a control for +7.6V output voltage.

The regulated +7.6V is then supplied to other circuits as a power supply through another filter consisting of L3 and C8.

The standby control section inside IC1 sends out +5V DC voltage to pin 7 of IC7 when the STANDBY switch is set to the ON position and 0V when the STANDBY switch is set to the STANDBY position since the DC voltage at pin 5 of IC1 becomes +7.6V in the ON position and it becomes 0V at the STANDBY position. As a result, the +7.6V DC voltage drops to +5.0V due to dropping the reference voltage at pin 11 of IC1.

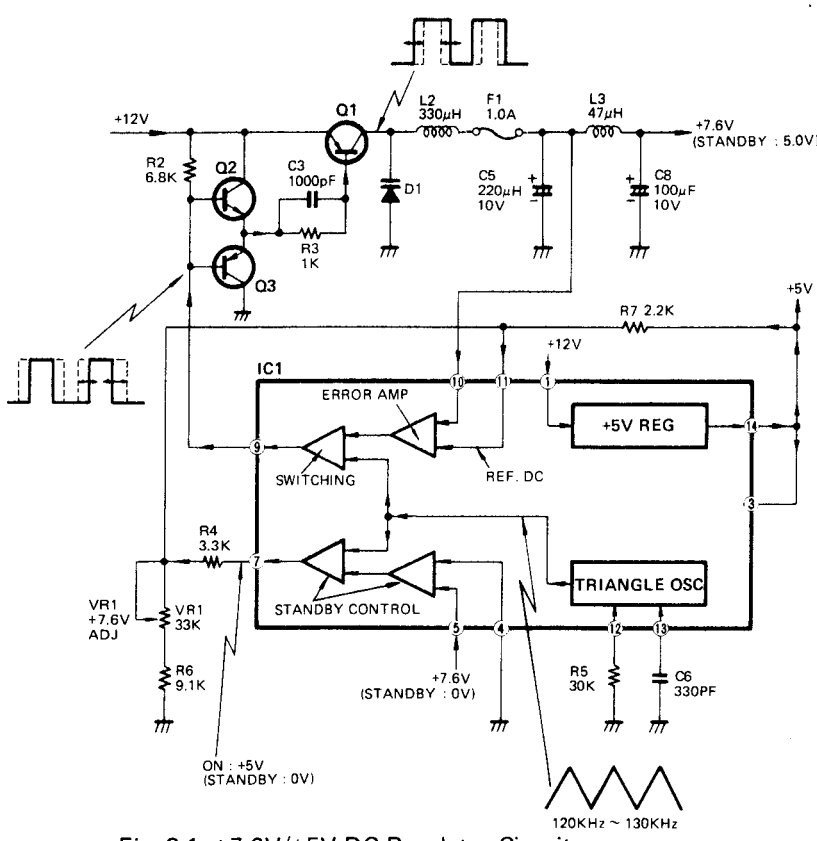


Fig. 3-1 +7.6V/+5V DC Regulator Circuit

3-2 +4.8V DC Regulator Circuit

Outline

+4.8V DC is generated by regulating +7.6V generated in the +7.6V regulator circuit.
This +4.8V is used as power supply for other circuits. The +4.8V DC voltage drops to +2.6V at the STANDBY for saving battery life.

Details

The +4.8V DC voltage is generated by regulating +7.6V DC power using IC2, Q8 and Q9.
The output voltage of Q8/Q9 is applied to pin 6 of IC2 to form a feedback loop, and thus stabilizing the output voltage. The reference voltage is obtained by dividing the +7.6V using R11 and R12.
Since the reference voltage drops to approximately +2.6V at STANDBY position due to the drop of +7.6V DC, +4.8V DC drops to +2.6V at STANDBY.

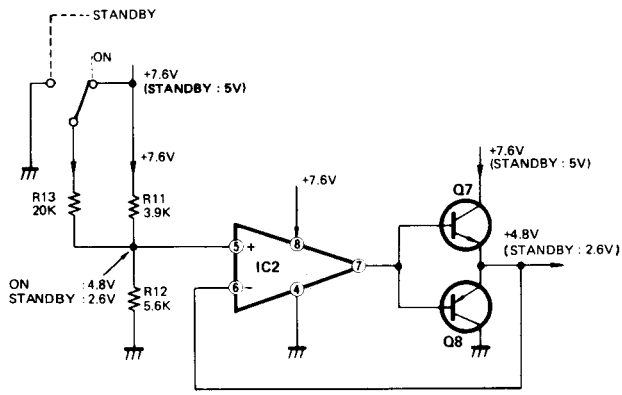


Fig. 3-2 +4.8V DC Regulator Circuit

3-3 +8.6V DC Regulator Circuit

Outline

+8.6V DC voltage is generated from unregulated +12V DC power and the +8.6V is used as power supply for other circuits.
The +8.6V DC drops to +0V at the STANDBY position.

Details

The +8.6V DC voltage is produced by IC3(b) and Q10 and obtained at the collector of Q10.
The +4.8V regulated DC is supplied to pin 6 of IC3 for the reference voltage.
The output voltage is divided by R14 and R15 and fed back to pin 5 of IC3(b) for stabilization.
If the circuit is stabilized and the voltage at pin 5 becomes +4.8V, the voltage at the collector of Q10 becomes +8.6V.

The +4.8V DC voltage at pin 6 of IC3 changes to 0V at STANDBY position. Therefore, +8.6V DC voltage is shifted to 0V at STANDBY position.

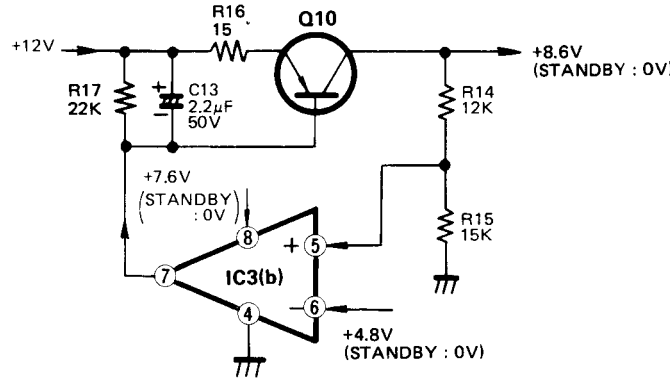


Fig. 3-3 +8.6V DC Regulator Circuit

3-4 Microprocessor Power Supply Circuit

Outline

This circuit sends the power to the microprocessor. When the power switch on the portable VTR or the power supply is turned OFF, this circuit generates the back-up power for microprocessor from the +1.5V dry battery to maintain the function of microprocessor. The reset pulse for resetting the microprocessor is also generated, in this circuit. This circuit produces the back-up battery warning signal and sends it to Micro-processor board in order to indicate that the backup battery level becomes too low.
When the new (full charged) +1.5V backup battery is installed, it lasts long 1 year.

Details

WHen the STANDBY switch is placed to ON position, +7.6V DC voltage is applied to the collector of Q7, +5V DC voltage is sent to the base of Q6 and +4.8V DC voltage is fed to the collector of Q6 and Q6 & Q7 turn ON. Therefore, +5V DC voltage obtained at the emitter of Q7 is sent to the microprocessor as a power souce. However, +7.6V DC drops to +5V and +4.8V DC drops to +2.6V when the STANDBY switch is placed STANDBY position. As a result, +4.3V DC obtained at the emitter of Q7 is sent to the microprocessor.
In these cases, the 2.7V zener diode D2 is turned ONby +5V or +4.3V and Q12 is also turned ON. Therefore, Q13 which oscillates the signal for the backing up the microprocessor stops oscillating.
When the +12V DC power from the VTR or power supply is turned OFF, the oscillator consisting of Q13, C16, R22 and T4 oscillates approx. 200 - 300KHz using +1.5V dry battery and it is boosted by T2.

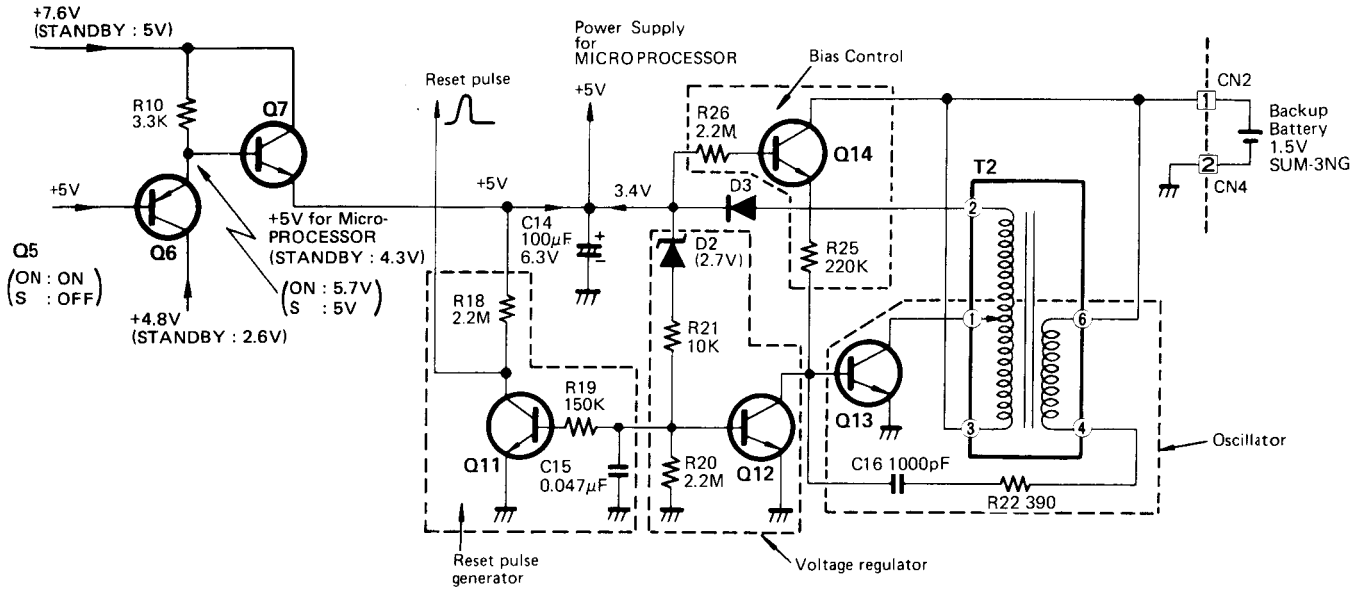


Fig. 3-4-1 Power Supply for Microprocessor

The boosted switching pulse obtained at pin 2 of T2 is rectified by D3 and C10 and converted in to +3.4V DC. This +3.4V DC is supplied to the microprocessor to maintain its function while no +12V DC power is supplied.

The +3.4V DC voltage drifts according to the 1.5V backup battery voltage. Therefore the voltage regulator Q12, D2, R21 and R20 controls the base bias voltage of Q13 to control the ON/OFF duty of Q13 for keeping the +3.4V DC voltage constant.

When no +12V DC is supplied to camera and +1.5V back-up battery is completely discharged, if the new +1.5V backup battery is installed, approx. 5 - 10 times more current flows to the microprocessor comparing to that in the normal back-up mode due to the microprocessors characteristic. In this case, the backup battery DC-DC converter circuit can not supply the +3.4V DC to the microprocessor because of small capacity of output current. Therefore, the base of Q14 becomes low and Q14 is turned OFF to stop the oscillation by cutting the base bias voltage of Q13.

The Q11 generates the reset pulse for the microprocessor when the +12V DC power is supplied to the camera after replacing the backup battery. It is fed to the microprocessor and all information such as calendar, (title 1, 2 for WVP-A2), automatic white balance (AWC) level etc. are cleared.

IC3(a) compares the +1.5V backup battery voltage and the reference voltage obtained by dividing +7.6V with R23 and R24.

When the backup battery voltage is higher than 1.1V, the output voltage at pin 1 of IC3 is low(L) and this is sent to microprocessor as information which indicates the battery level is OK. If the backup battery is discharged and its voltage becomes lower than 1.1V, the output of IC3 changes to high(H) and this is sent to microprocessor for blinking the graphics BACK UP on the electronic viewfinder (EVF).

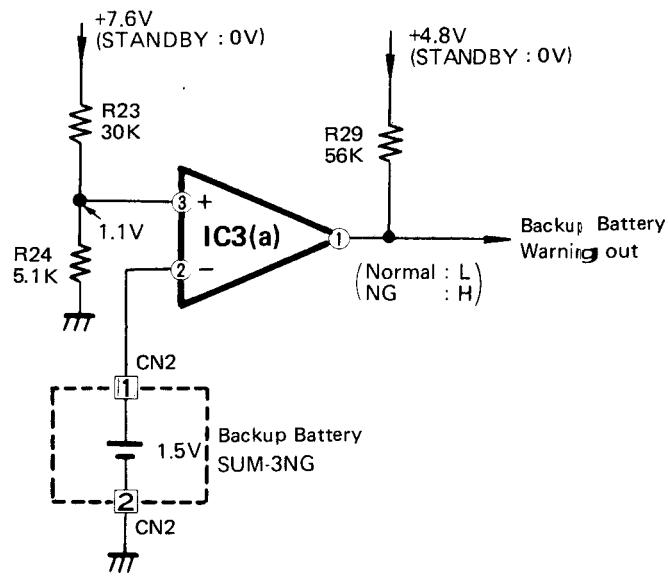


Fig. 3-4-2 Back-up Battery Warning Circuit

3-5 Standby Circuit

Outline

When recording outdoors, using camera and VTR, the power reserve of the battery must be conserved as much as possible, which is the exact function of the standby circuit.

Details

When the standby switch SW4 on the Standby board is set to ON position, practically all circuits in the camera and the VTR are operational, that is, the power sources are supplied to all electric circuits in the Deflection, Process-1 & 2, Microprocessor, Lens and EVF boards in the camera and +12V is consumed in the VTR.

When the standby switch SW4 on the rear of the hand-held grip is set to the STANDBY position, the heater voltages go only to the heater of pick-up tube and cathode ray tube (CRT). At the same time a standby signal (approx. +3V) generated in the Process-2 board is supplied to the portable VTR through pin 5 of VTR connector to set the VTR to the standby mode.

+5V DC power is also applied to microprocessor to maintain the all functions of microprocessor.

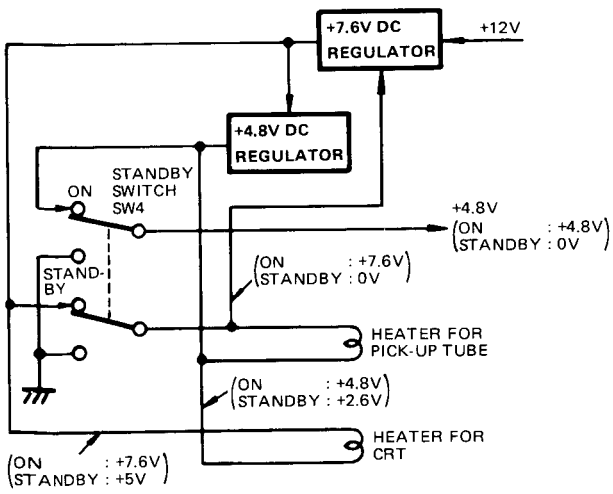


Fig. 3-5 Standby Circuit

3-6 Playback Control Circuit

Outline

When the portable VTR is set to the playback mode, the playback picture can be seen on the viewfinder instead of the picture picked up by the camera (It is controlled by the Playback detect circuit in the Process-1 board.). This circuit shuts off the horizontal(H) and vertical(V) deflection and high voltage circuit for pick-up tube in order to prevent these interference to the playback picture on the viewfinder.

Details

When the portable VTR is set to the recording mode, no DC bias is applied to the emitter of Q15 and Q15 remains ON, and Q5 & Q4 are also ON so that the +7.6V at the collector of Q4 is supplied to the Deflection board and lens to function these circuits normally.

When the portable VTR is set to the playback mode, the playback signal which is riden on top of +6V DC is supplied from the VTR to the playback detect circuit in the Process-1 board. +4.8V DC generated at the playback detect circuit is applied to the Microprocessor board and the Microprocessor board sends +5V DC to the emitter of Q15 so that Q15 is turned OFF and the +7.6V at the collector of Q4 is not supplied to the Deflection board and the auto iris lens to stop generating the deflection signal and high voltages for the pick-up tube (The high voltages are made from the horizontal pulse from the Deflection board.) and closing the lens iris.

In this way, the interference due to the deflection circuit to the playback picture is avoided.

When the standby switch is set to the STANDBY position, same operation takes place.

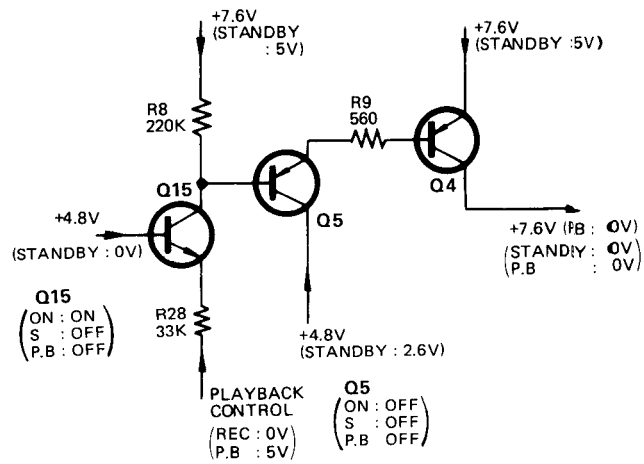


Fig. 3-6 Playback Control Circuit

3-7 Auto Iris Control Circuit

Outline

The circuit receives AIC (automatic iris control) detect signal from Process-1 board and drives lens iris in order to keep video output level constant.

Details

The AIC detect DC voltage corresponding to the incoming light intensity is supplied from the signal processing circuit on the Process-1 board to pin 6 (–) of IC4(b) and compared with the +1.8V supplied to pin 5 (+) of IC4(b). The voltage in comparison is sent from pin 7 of IC1(b) to the drive coil of lens iris in order to open/close the lens iris. In addition to this, the beam detect signal from deflection board is fed to pin 6 of IC4(b) in order to close the lens iris while the beam current is insufficient after turning the power switch. The induced voltage (It is occurs inside the damper coil by moving the lens iris.) is fed from the lens damper coil to pin 3 (+) of IC4(a) and amplified by IC4(a). Then amplified signal is fed from pin 1 of IC4 to pin 6 of IC1 to damp the lens iris hunting.

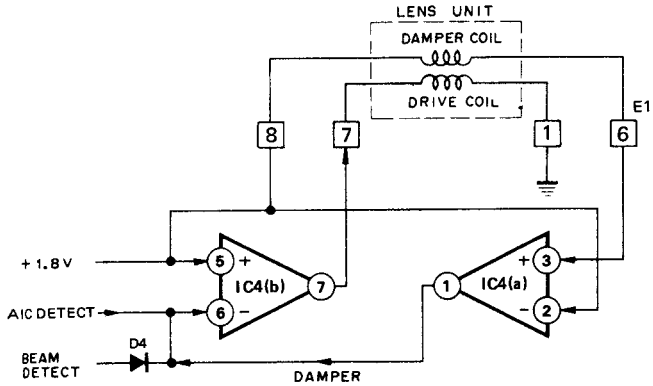


Fig. 3-7 Auto Iris Control Circuit

3-8 Zoom Control Circuit

Outline

This circuit drives zoom lens motor.

Details

When the TELE switch SW1 on the handheld grip is depressed, the base of Q17 is shorted to the ground and Q17 and Q18 turn ON . Therefore, the current flows into the zoom motor through Q18 and Q17 for zoom-in (telephoto) operation.

When the WIDE switch SW2 is depressed, Q19 and Q16 turn ON. Therefore, the current flows into the zoom motor (in the reverse direction) through Q13 and Q19 for zoom-out (wide angle) operation.

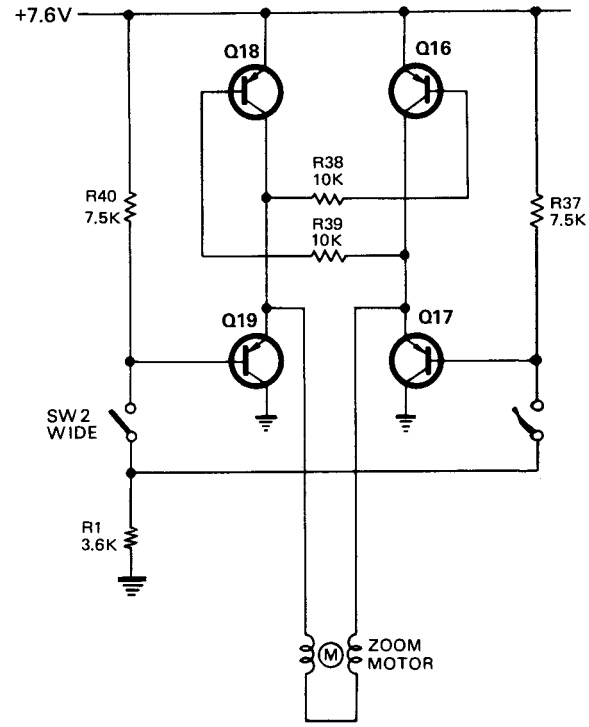


Fig. 3-8 Zoom Control Circuit

4 Deflection Board

The Deflection board contains the following circuits.

4-1 Horizontal Deflection Circuit 14
4-2 Vertical Deflection Circuit 15
4-3 Cathode Blanking/Beam Detect Circuit 16
4-4 Target Voltage Circuit 17
4-5 Lag Compensation Circuit 18

4-1 Horizontal Deflection Circuit

• Horizontal Deflection Circuit

Outline

This circuit generates the sawtooth current for the horizontal(H) beam deflection inside the pick-up tube, supplying it to the pick-up tube H. deflection coil.

Details

The horizontal scanning start(Hs) pulse supplied from the Process-1 board goes via inverter Q2 to horizontal deflection output Q3. When Q3 is switched ON by the Hs pulse from Q2, the collector current pulse at Q3 resonates with L1 and C5, and the resultant horizontal sawtooth current is generated and supplied to the pick-up tube horizontal deflection coil through pin 4 of CN1.

VR1 (H. SIZE) is a control for adjusting the horizontal scanning size.

• Horizontal Linearity Correction Circuit

Outline

The horizontal (H) deflection circuit is of a switching type, so that the generated sawtooth current waveform has poor linearity.

By feeding the sawtooth current to the deflection coil, the intensity of the magnetic field generated in the deflection coil is not linear as the pick-up tubes electron beam is deflected.

If a linear sawtooth current (A) is sent to the deflection coil, however, the magnetic field in the scanning start portion is distorted (B) due to the effect of the pick-up tubes electrodes, coil hysterisis, etc. As a result, the linearity of the scanning start portion deteriorates, and a shading (unevenness of amplitude) appears on the left edge of the picture.

Therefore, in order to generate a linear magnetic field intensity (D) and to correct the linearity and shading of the scanning start portion, it is necessary to feed a nonlinear sawtooth signal (C) to the deflection coil. This circuit generates a waveform to correct the linearity of horizontal sawtooth current waveform and its starting portion.

The horizontal deflection circuit is connected to one end of the horizontal deflection coil, and the horizontal linearity correction circuit to the other end.

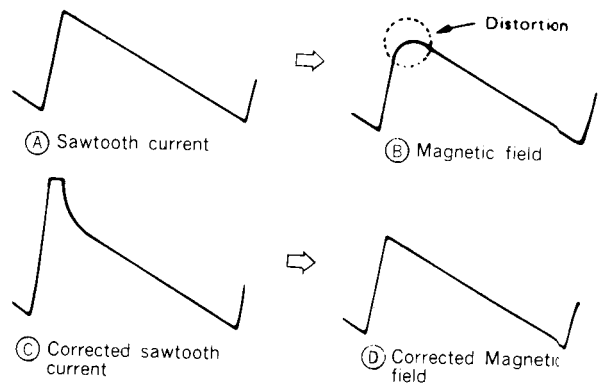


Fig. 4-1-2 Horizontal Linearity Correction-1

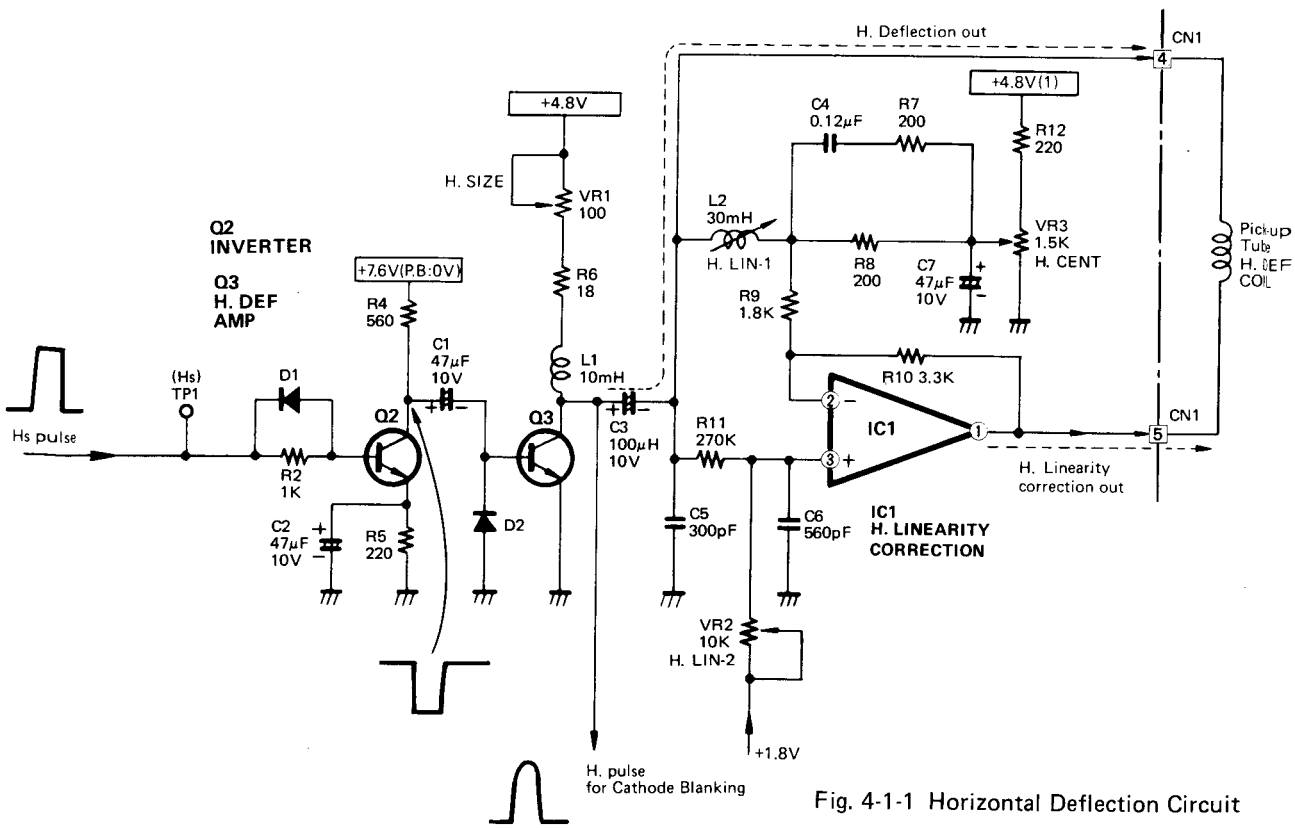


Fig. 4-1-1 Horizontal Deflection Circuit

Details

The horizontal(H) pulse (E) produced from the collector of Q3 in the H. deflection circuit is integrated by L2 and R8 into a sawtooth signal (F).

This sawtooth signal is again integrated by L2, R7 and C4 into a parabola signal (G), which is applied through R9 to pin 2 of differential amplifier IC1 (a) as a H. linearity correction signal.

The H. pulse (E) from Q3 is integrated by R11 and C6 into a linearity correction signal (H) for correcting the linearity of the starting portion of the horizontal sawtooth current waveform. The starting portion linearity correction signal (H) is applied to pin 3 of IC1 where the linearity correction signal (G) and the starting portion linearity correction signal (H) are mixed and amplified. The mixed signal (I) of these linearity correction signals at pin 1 of IC1 is fed to the H. deflection coil to correct the linearity of the horizontal sawtooth current waveform.

VL2 (H. LIN-1) is a control for adjusting the overall linearity of sawtooth current.

VR2 (H. LIN-2) is a control for adjusting the linearity of the starting portion.

VR3 (H. CENTERING) is a centering control which controls the negative input potential of IC1 to change the direct current flowing to the H. deflection coil, and thus sets the horizontal scanning position on the pick-up tube.

When the portable VTR is set to the playback mode, the +B voltage for Q2 drops to 0V. Therefore, the horizontal deflection sawtooth current is not generated. The preblanking pulse sent from the Process-1 board is applied to the high voltage circuit in the Microprocessor board through inverter Q10 as the drive pulse for generating the high voltages. When the portable VTR is set to the playback mode, the bias for Q10 is not supplied. As a result, the high voltages are not generated.

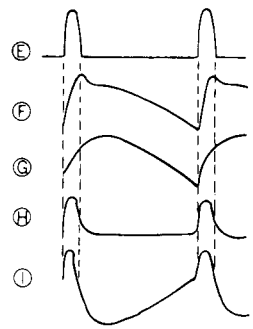


Fig. 4-1-3 Horizontal Linearity Correction-2

4-2 Vertical Deflection Circuit

Outline

This circuit generates a sawtooth current for the vertical(V) beam deflection inside the pick-up tube, feeding it to the pick-up tube V. deflection coil.

Details

The vertical scanning start(Vs) pulse sent from the Process-1 board is fed to sawtooth generator Q4 through buffer Q1 which converts it into a vertical rate sawtooth. This sawtooth signal is applied to pin 2 of amplifier IC1, which produces an amplified vertical sawtooth signal from its output pin 1. This amplified signal is sent to the pick-up tube vertical deflection coil.

The sawtooth current flowing to the vertical deflection coil is detected by R20 which is connected in series with the deflection coil, and fed back to sawtooth generator Q4, thus correcting the linearity of the vertical sawtooth waveform. Therefore, a linear sawtooth current flows into the pick-up tube vertical deflection coil.

VR4 (V.SIZE) is the control for setting the amplitude of the vertical deflection sawtooth waveform to set vertical scanning size.

VR5 (V. CENTERING) is a centering control which controls the direct current flowing to the vertical deflection coil through buffer IC2(b) to set the vertical scanning position on the pick-up tube.

When the portable VTR is set to the playback mode, the +B voltage for Q1 drops to 0V. Therefore, the vertical deflection sawtooth current is not generated.

The V. sawtooth signal detected by R20 is applied to the center arm of VR8 (V. SAW). The V. parabola signal obtained by integrating the V. sawtooth signal with the integrator R21 and C13 is also fed to the center arm of VR7 (V.PARA). The center arm of VR6 (Y PED) is grounded. These signals are mixed through the variable resistors and sent to the Process-1 board through pins 1 and 4 of E1. These controls adjust the vertical bias light shading and the pedestal of luminance signal.

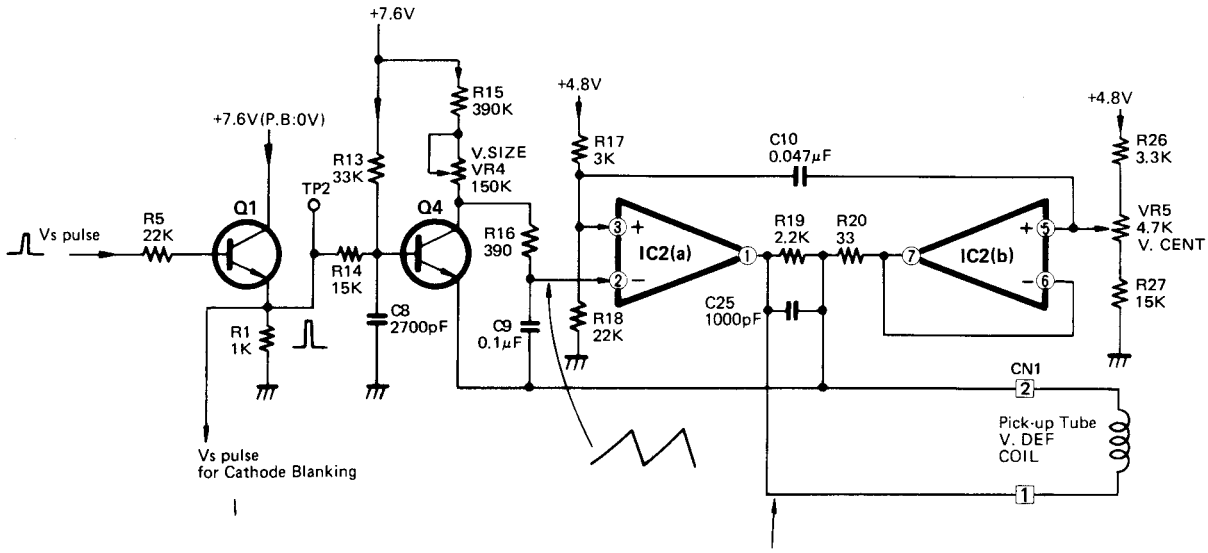


Fig. 4-2 Vertical Deflection Circuit

4-3 Cathode Blanking/Beam Detect Circuit

- Cathode Blanking Circuit

Outline

This circuit generates a cathode blanking pulse and supplies it to the pick-up tube cathode(K) in order to eliminate the retrace scanning lines.

Details

The horizontal(H) pulse at the collector of H.deflection output Q3 and the vertical scanning start (Vs) pulse from the Process-1 board through buffer Q1 and inverter Q5 are supplied to the base of the switching amplifier Q6 respectively.

The mixed signal obtained at the emitter of Q6 is supplied to the cathode(K) of pick-up tube through pin 3 of E2 and the Microprocessor board as a cathode blanking pulse.

- Beam Detect Circuit

Outline

When the power switch is initially turned ON, no video signal is produced from the pick-up tube and the video signal level gradually increases as the heat of pick-up tube is warmed up. Therefore, the auto iris control detect circuit in the Process-1 board detects less signal and the lens iris is fully opened regardless of incoming light intensity.

This circuit detects the current flows from the pick-up tube cathode (K) and generates the control signal which closes the lens iris for a while after turning ON the power switch.

Details

When the power switch is initially turned ON, it takes some times for cathode of the pick-up tube to be heated sufficiently in order to emit electrons at full force. Therefore, during initial period of the time after turning ON the power switch, no current flows from the cathode (K) of the pick-up tube to Q7 and no DC bias is applied to the base of Q8 thus Q8 stays OFF and the potential at the collector of Q8 stays high(H).

This high potential is fed to the auto iris control circuit in the Power board to set the lens iris close in order to protect the pick-up tube from the burning. (Refer to Automatic Iris Control circuit in the Power board.) Also this high potential is supplied to the Microprocessor board to inhibit the automatic white balance setting in the microprocessor. (Refer to Auto White Balance Control circuit in Microprocessor board.)

If the pick-up tube is warmed up, the current flows from the cathode increases and the current detected by R34 turns ON Q8 and the potential at the collector of Q8 becomes low (L).

This low potential is supplied to the Microprocessor board to operate the automatic white balance control circuit normally and the Power board to operate the auto iris lens according to the incoming light intensity.

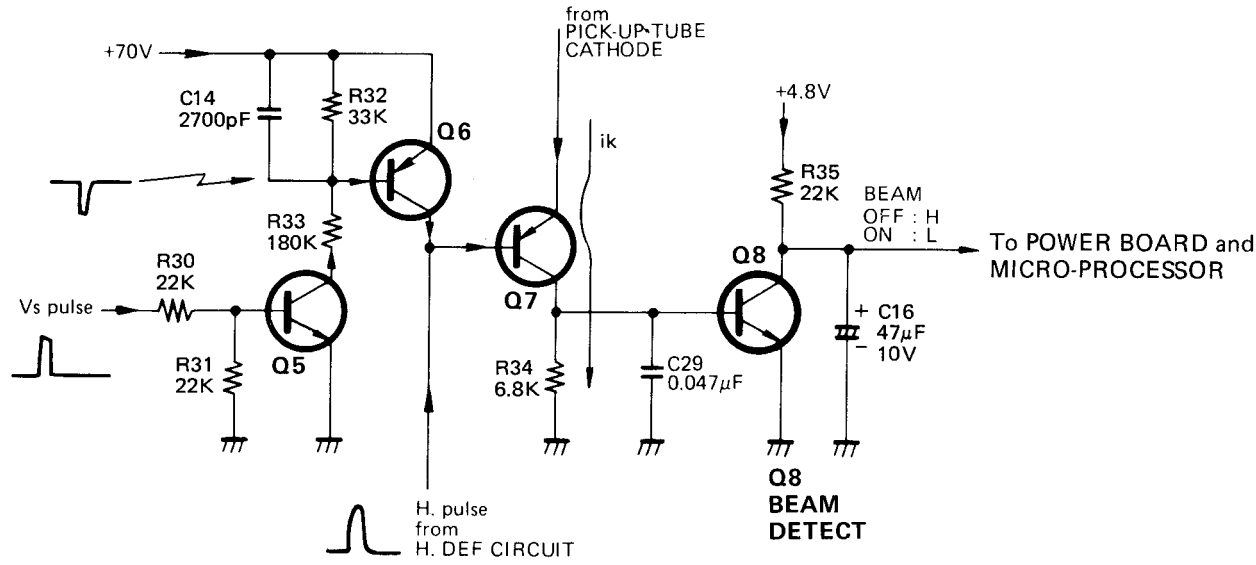


Fig. 4-3 Cathode Blanking and Beam Detect Circuit

4-4 Target Voltage Control Circuit

Outline

Each pick-up tube has optimum target voltage to produce the best performance. The optimum target voltage for the Newvicon® varies according to the Newvicon® temperature.

The target voltage control circuit detects the Newvicon®'s temperature variation, and controls the target voltage according to the temperature drift to meet the optimum target voltage.

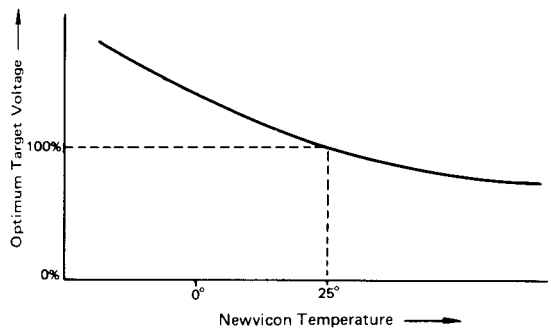


Fig. 4-4-1 Optimum Target Voltage of Newvicon®

Details

The deflection coil assembly has a built-in temperature detecting thermistor which is connected between pin 3 of CN1 and ground.

When the inside temperature of the deflection coil assembly changes (it also changes in the Newvicon®) the thermistor resistance and the collector current of DC amplifier Q9 changes and this changes the collector voltage of Q9.

The target voltage applied to the Newvicon® is set by VR9 (TARGET VOLTAGE).

If the temperature goes up, the resistance of the thermistor decreases so that the total resistance connected between the collector of Q9 and ground decreases. Accordingly, the collector potential of Q9 falls, and the target voltage which is set by VR9 is reduced.

In this way, the target voltage is kept optimum according to temperature variations.

When the temperature falls, the reverse operation takes place.

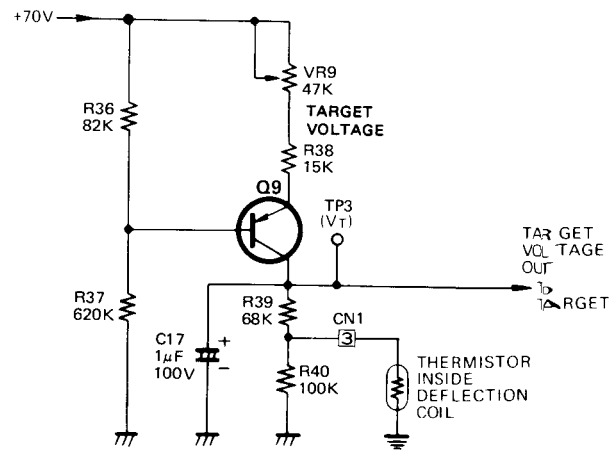


Fig. 4-4-2 Target Voltage Control Circuit

4-5 Lag Correction Circuit

Outline

In order to minimize the lag, the prevideo signal supplied from process-1 board is applied to the cathode of pick-up tube for rising the relative potential of photo-conductive layer.

Details

The prevideo signal fed from process-1 board is supplied to the base and collector of white suppressor Q11 and the white suppressed prevideo signal is amplified and inverted by Q12. The amplified video signal is then mixed with the cathode blanking signal and supplied to the cathode of pick-up tube through D3 and Q7.

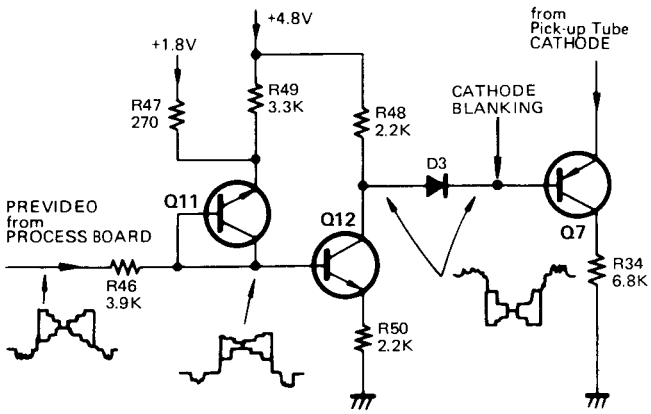


Fig. 4-5 Lag Correction Circuit

5 Process-1 Board

The Process-1 Board contains the following circuits.

5-1 Pulse Generator Circuit 19
5-2 Correction Signal Generator Circuit 20
5-3 Signal Processing Circuit 22
5-3-1 Bias Light Shading Correction Circuit 22
5-3-2 Optical Black Clamp Circuit 23
5-3-3 Gamma Correction Circuit 24
5-3-4 Automatic Iris Control Detection Circuit . . . 24
5-3-5 Automatic Gain Control Circuit 25
5-3-6 Y_H Signal Circuit 25
5-3-7 Y_L Signal Circuit 26
5-4 Horizontal Aperture Signal Generator Circuit 26
5-5 Vertical Edge Signal Generator Circuit 27
5-6 Red and Blue Separation & Chroma Processing Circuit 28
5-6-1 Red and Blue Separation Circuit 28
5-6-2 Vertical Transient Spurious Correction Circuit 30
5-6-3 Shading Correction Circuit 31
5-6-4 Tracking Correction Circuit 31
5-6-5 R-Y_L Signal Circuit 33
5-6-6 B-Y_L Signal Circuit 34
5-6-7 Color Reproduction Correction Circuit 34
5-6-8 Chroma Clip Signal Circuit 35
5-7 Chrominance Encoding Circuit 36
5-7-1 +2.5V Power Circuit 36
5-7-2 Chrominance Signal Generator Circuit 36
5-7-3 Chroma Clip/Suppress Circuit 37
5-7-4 White Set Detection Circuit 37
5-8 Burst Generator Circuit 38
5-9 Video Signal Processing Circuit 38
5-10 Playback Detect Circuit 42
5-11 White Balance Setting Circuit 42

5-1 Pulse Generator Circuit

Outline

This circuit generates all sync pulses used in the camera.

Details

The crystal oscillator which consists of crystal oscillator X1, CT2 (4.43MHz ADJ) and C27 connected between pin 2 and pin 3 of sync generator IC8 oscillates 17.7MHz.

The voltage controlled oscillator (VCO) composed of VL5, C32, C33, D3 and D4 is connected to pin 9 and pin 10 of IC8 and phase-compared with the frequency oscillated by the crystal oscillator.

The phase detected output from pin 8 of IC8 is sent to variable capacitance diodes D3 and D4 through R36 to drive them and controls the VCO frequency. This phase lock loop (PLL) circuit always keeps interleaving relationship among subcarrier, horizontal and vertical frequency generated by IC8.

The following pulses are generated from IC8.

Pin 4 : (B-Y)SC (Subcarrier for B-Y modulation)
Pin 6 : (R-Y)SC (Subcarrier for R-Y modulation)
Pin 15 : W.BL (Wide blanking pulse)
Pin 16 : BFP (Burst flag pulse)
Pin 17 : SYNC (Composite sync pulse)
Pin 18 : BL (Composite blanking pulse)
Pin 19 : Vs (Vertical scanning start pulse)
Pin 20 : PRE BL (Preblanking pulse)
Pin 21 : CP1 (Clamp pulse-1)
Pin 22 : Hs (Horizontal scanning start pulse)

The timing information for each pulse is shown in Fig. 5-1-2.

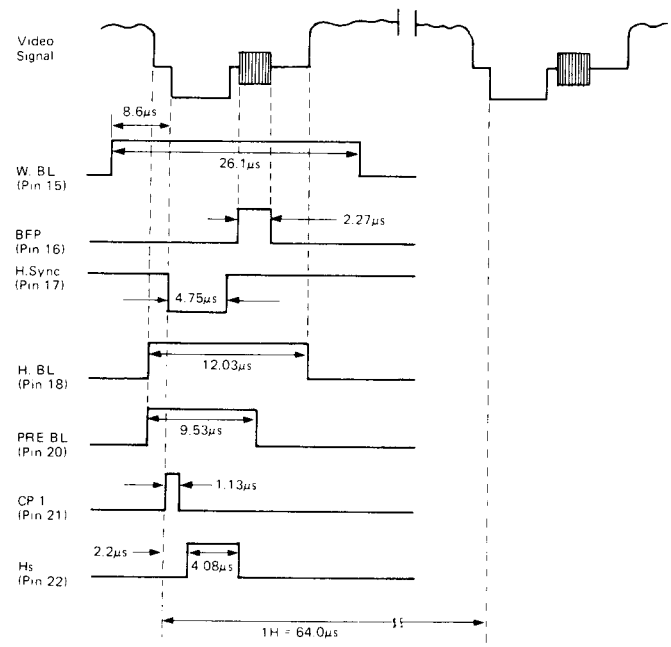


Fig. 5-1-2 Pulses

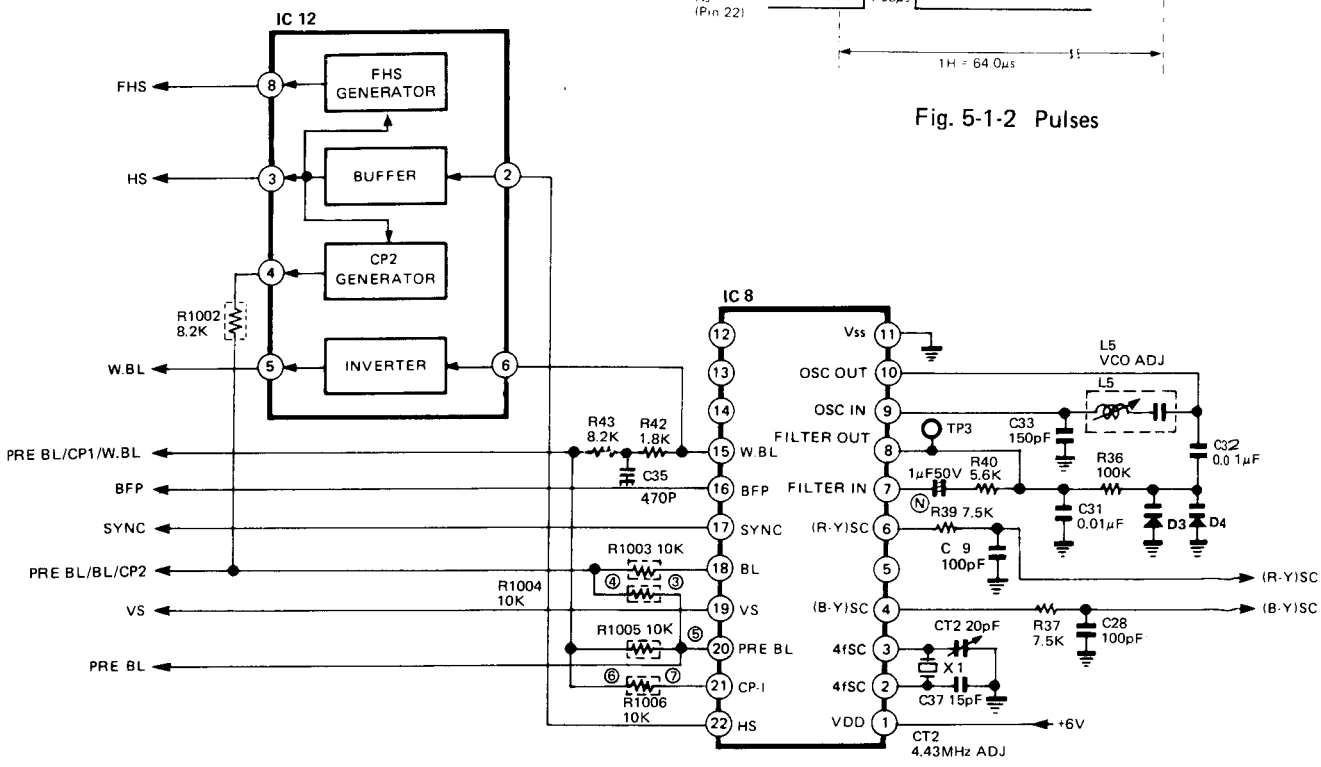


Fig. 5-1-1 Pulse Generator Circuit

CT2 (4.43MHz ADJ) is a control for setting the sub-carrier frequency. The (B-Y)SC and (R-Y)SC are supplied to other circuit respectively through integrators consisting of R37 and C28, R39 and C29. The pre-blanking (PRE BL) pulse is fed to other circuit. The PRE BL pulse (A) is mixed with the clamp pulse-1 (CP1) (B) and wide BL pulse (W.BL) (C) through R1005, R1006 and R42/R43 and the multiplexed pulse (D) is made. The PRE BL pulse (A) is also mixed with the blanking (BL) pulse (E) and the clamp pulse-2 (CP2) (F) comes from pin 4 of IC12 and the multiplex pulse (G) is made. The multiplexed signals (D) and (G) thus made are supplied to other circuits.

The Hs pulse (H) is fed to the Deflection board through pin 3 of IC12.

The Hs pulse (H) at pin 2 of IC12 is differentiated inside IC12 and clamp pulse-2 (CP2) (F) is made. The CP2 is mixed with the PRE BL pulse (A) and the BL pulse (E) as previously explained.

The vertical scanning start (Vs) pulse is supplied to the Deflection board. It is also fed to other circuit.

The wide BL (W.BL) pulse is fed to other circuit through IC12.

The burst flag pulse (BFP) is fed to other circuit.

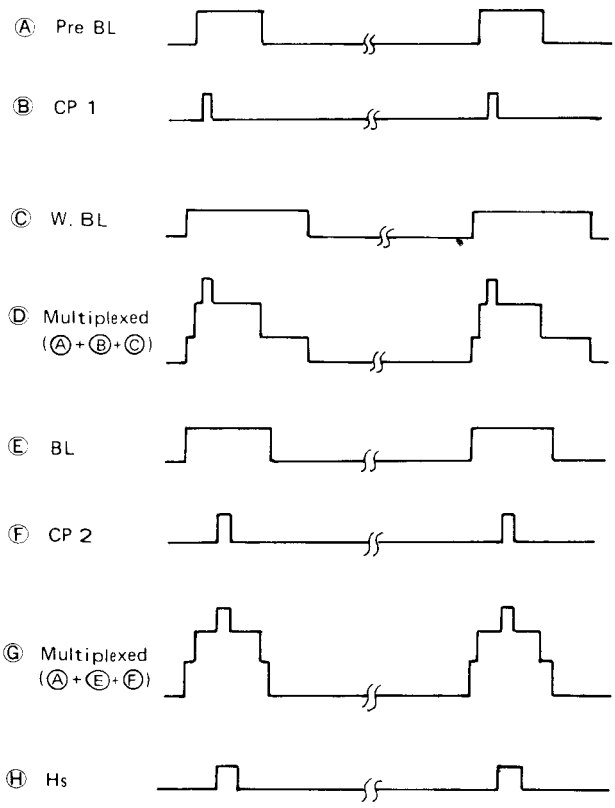


Fig. 5-1-3 Mixed Signals

5-2 Correction Signal Generator Circuit

Outline

This circuit generates the bias light shading correction signal, the dynamic focus correction signal and the shading correction signal using EP-ROM. These signals are supplied to the respective correction circuit.

• Bias light shading correction signal

The light intensity by the bias light LEDs is not uniform along the entire target surface. Therefore, the bias current which is produced by the pick-up is not uniform, but has a shading (A).

As described in the section on the principles of single carrier frequency multiplexing, the red and blue signals are obtained by detecting the modulated signals from the preamplifier output using a band pass filter. Therefore, the red and blue signals are free from bias light shading.

However, the luminance signal is obtained by removing the modulated signal using a trap circuit. Therefore, the luminance signal receives undesirable bias light shading. The bias light shading correction signal which contains the horizontal sawtooth and parabola signals (B) are fed to the signal processing circuit to mix it to the pre-amplifier output signal for correcting color shading at low illumination levels (C).

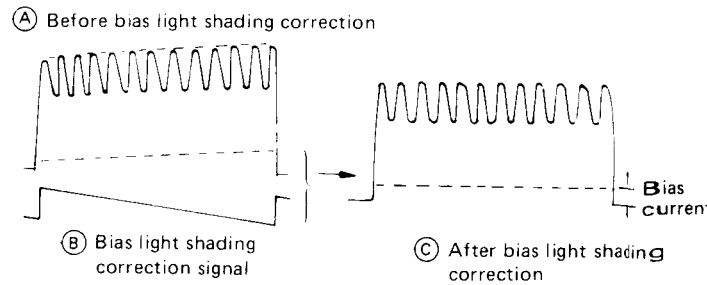


Fig. 5-2-1 Bias Light Shading Correction

• Dynamic focus correction signal

Generally, the focus voltage which brings the beam in focus in the center part of the pick-up tube is different in level from the voltage which brings the edge portions of the pick-up tube into best focus so that the modulation depth for the center part and the edge portions of the pick-up tube differ. When the camera is directed at an evenly illuminated white object, the red and blue signals modulated at 3.9MHz do not have a uniform level, and as a result, a color shading appears (D).

The dynamic focus correction signal which contains the horizontal and vertical sawtooth and parabola signals is supplied to the pick-up tubes focus electrode (grid-4) together with the DC focus voltage to focus the electron beam along the entire scanning area for correcting unevenness of modulation depth (E).

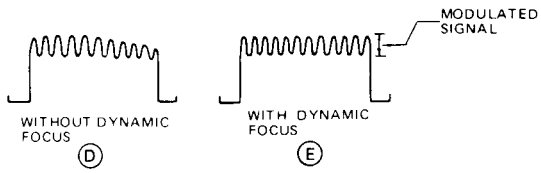


Fig. 5-2-2 Dynamic Focus Correction

● **Shading correction signal**

Even when dynamic focus correction is applied to grid-4 of pick-up tube, the non-uniformity of modulation due to uneven focus on the target can not be completely eliminated.

Modulation un-uniformity also occurs due to non-uniform structure in the photoconductive layer of the pick-up tube (manufacture tolerance).

The shading correction signal which contains the horizontal and vertical sawtooth and parabola signals is fed to the shading correction circuit to compensate for residual picture shading (Refer to Shading Correction Circuit).

Details

The subcarrier signal is fed from the pulse generator circuit to pin 10 of IC9 as clock pulse. The vertical scanning (Vs) and horizontal scanning (FHS) are also sent to pins 8 and 9 of IC9 to synchronize the correction signal with the vertical and horizontal rate.

The horizontal bias light shading correction signal obtained at pin 20 of IC9 is sent to the signal processing circuit and mixed with the prevideo signal through R46.

The horizontal dynamic focus correction signal and the vertical dynamic focus correction signal obtained pins 19 and 7 of IC are mixed at pin 2 of IC11(a) and amplified by IC11(a). The amplified dynamic focus correction signal at pin 1 of IC11(a) is then applied to the focus gride (G4) of the pick-up tube through the Micro-processor board.

The horizontal and vertical shading correction signal for the red signal obtained at pins 18 and 6 of IC9 are resistance-mixed through R6 and R5 and fed to the chroma processing circuit. Similarly, the horizontal and vertical shading correction signal for the blue signal obtained at pins 17 and 5 of IC9 are resistance-mixed through R7 and R4 and fed to the chroma processing circuit.

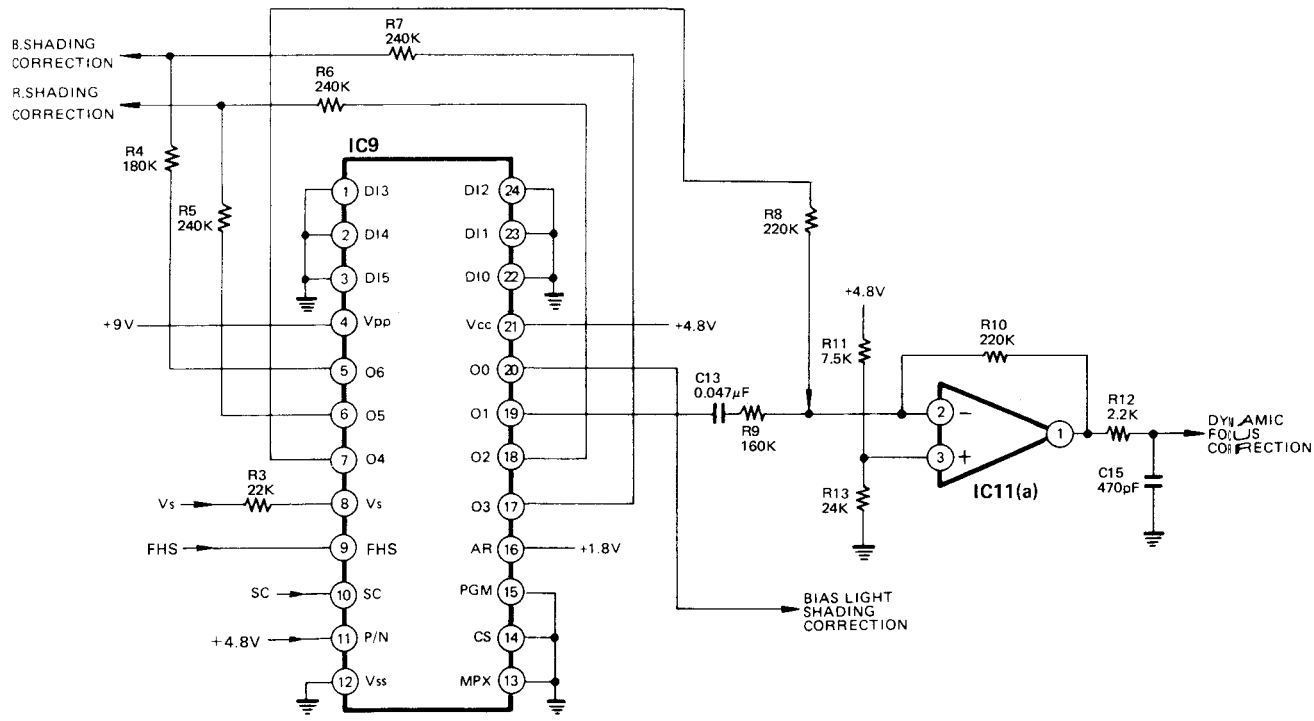


Fig. 5-2-3 Correction Signal Generator Circuit

5-3 Signal Processing Circuit

This circuit contains the bias light shading correction circuit, optical black clamp circuit, gamma correction circuit, automatic iris control detection circuit and automatic gain control circuit.

5-3-1 Bias Light Shading Correction Circuit

Outline

The bias light LEDs are located at the rear portion of the pick-up tube for minimizing the lag by increasing the light intensity reaches the pick-up tube as described in the Microprocessor board. The light intensity from the bias light LEDs are not uniform in actual scanning area and the shading (unevenness of amplitude) appears. The bias light shading correction circuit equalizes the output of the pick-up tube uniformly.

The horizontal bias light shading correction signal supplied from pin 20 of IC9 (FAMOS IC) corrects the horizontal bias light shading. Also the vertical bias light shading correction signal made by VR7 (V.PARA) and VR8 (V.SAW) on the Deflection board and the bias light correction inside IC1 on the Process-1 board corrects the vertical bias light shading.

Details

The output signal of the Preamplifier board is mixed with the horizontal bias light shading correction signal supplied through R46 from pin 20 of IC9 and it goes to the amplifier inside IC1 through pin 5. The amplified prevideo signal from the amplifier is mixed with the modulated preblanking (PRE BL) pulse for vertical bias light shading.

The vertical(V) sawtooth (A) and parabola (B) signals are fed to the wiper arms of VR8 (V.SAW) and VR7 (V.PARA) respectively in the Deflection board.

These waveforms are applied from the Deflection board to both the non-inverted (pin 3) and inverted (pin 4) inputs of bias light shading correction circuit in IC1, where a positive or negative mixed signal (C) of V.saw-tooth and parabola signals is made depending on the position of these controls.

VR7 (Y PED) on the Deflection board controls the positive or negative input potential of bias light shading correction circuit to change the DC level of mixed signal (C).

The multiplexed signal of the clamp pulse-1 (CP1), PRE BL pulse and W.BL pulse is fed from the pulse generator circuit to the pulse separator inside IC1 through pin 22, where the CP1, PRE BL pulse and W.BL pulse are separated.

The separated PRE BL pulse is fed to the bias light shading correction circuit inside IC1. The amplified prevideo signal (D) is then modulated by the signal (C) and PRE BL pulse ((E) & (F)).

The corrected prevideo signal is then fed to the OB (optical black) clamp circuit in IC1.

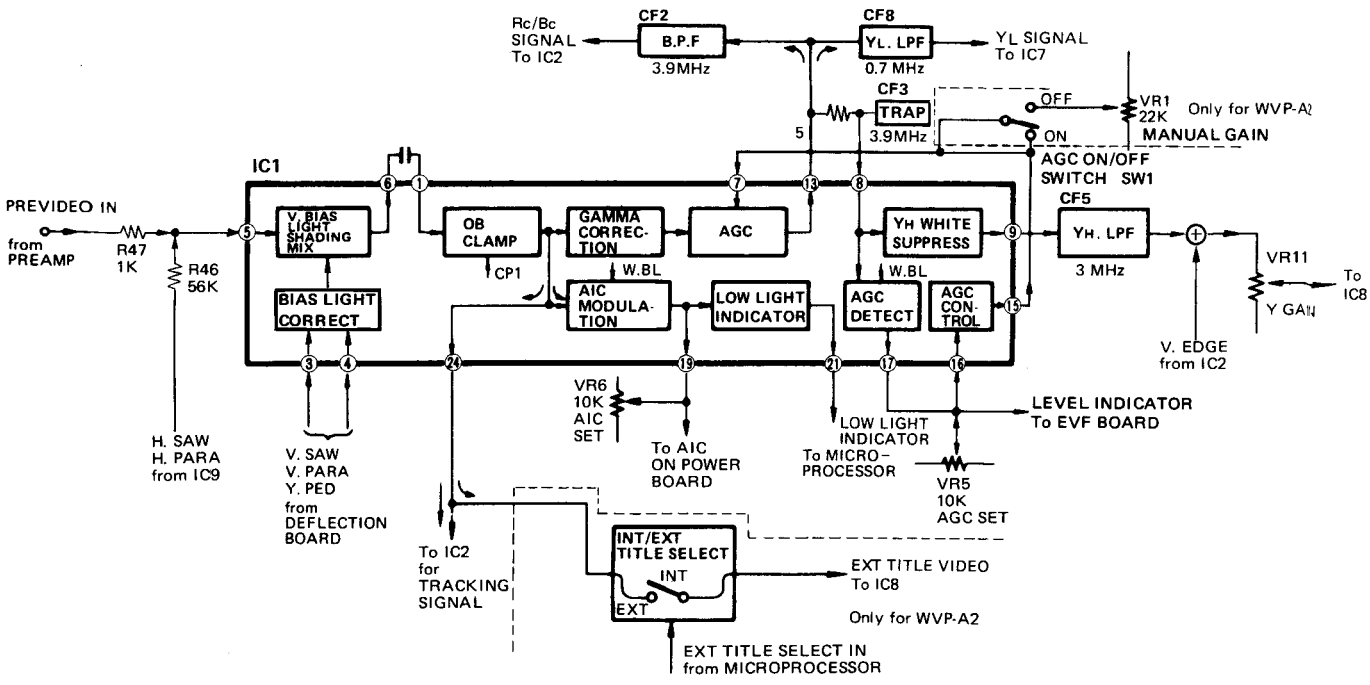


Fig. 5-3-1 Signal Processing Circuit

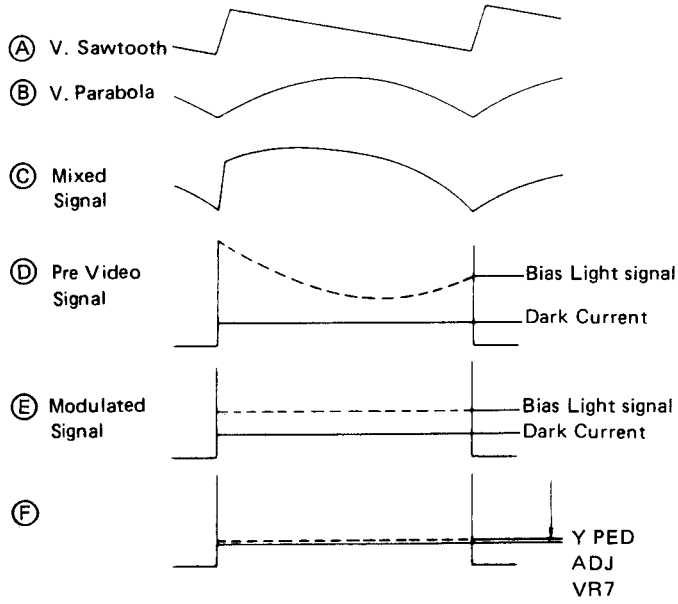


Fig. 5-3-2 Bias Light Correction

5-3-2 Optical Black Clamp Circuit

Outline

The pick-up tube sends an output current corresponding to the incoming light intensity, but even when no light reaches the target, an output current called dark current is obtained.

The dark current of the pick-up tube varies with the temperature of the pick-up tube. In a TV camera using a pick-up tube, the dark level of the output signal is unstable with respect to changing temperature.

In a color camera using the single carrier frequency multiplexing system, the red(R) and blue(B) signals modulated at 3.9MHz are riding on top of the green(G) signal. Thus the black level of the R and B signals are free from temperature variations because they are independent of pick-up tube dark current. However, the black level of the Y signal which is obtained by removing the modulated R and B components from the pick-up tube output increases or decreases according to temperature variations. Therefore, the black level balance between the YL and R signals, and between YL and B signals are lost due to a temperature variations and this causes a change in color reproduction. This circuit receives the prevideo signal from the bias light shading correction circuit and clamps its dark current level for correcting the black level variation.

Details

The prevideo signal which contains the modulated red/blue signals and green signal is fed from the bias light shading correction circuit to the optical black clamp circuit inside IC1. A metallic strip (optical black) for cutting the incoming light at the end of the horizontal scanning period is built into the pick-up tube faceplate. When the beam scans the optical black portion (G), the dark current of the pick-up tube is produced and this signal portion (H) is clamped to a fixed DC potential, so that the black level variation due to a change of dark current is sensed.

In other words, the dark current level (H') of the pre-video signal (H) supplied to the clamp circuit inside IC1 is clamped by the clamp pulse-1 (CP1) (I) separated from the multiplexed signal of CP1, pre BL and wide BL pulses inside IC1. (The multiplexed signal of CP1, pre BL and wide BL pulses is generated in the pulse generator circuit, mixed and then fed to the pulse separator where they are separated.)

Therefore, even if the dark current level drifts due to the temperature variations, the DC potential of the optical black (OB) level is held constant.

In this way, the black level variation is corrected.

The clamped video signal is mixed with the pre BL pulse from the pulse separator and the noise during the blanking period is removed.

The mixed signal is fed to the gamma correction circuit, automatic iris control detection circuit and tracking signal generator through amplifier in IC1.

For WVP-A2, the signal obtained at pin 24 of IC1 is also sent to the Process-2 board through pin 2 of CN6 for the external title.

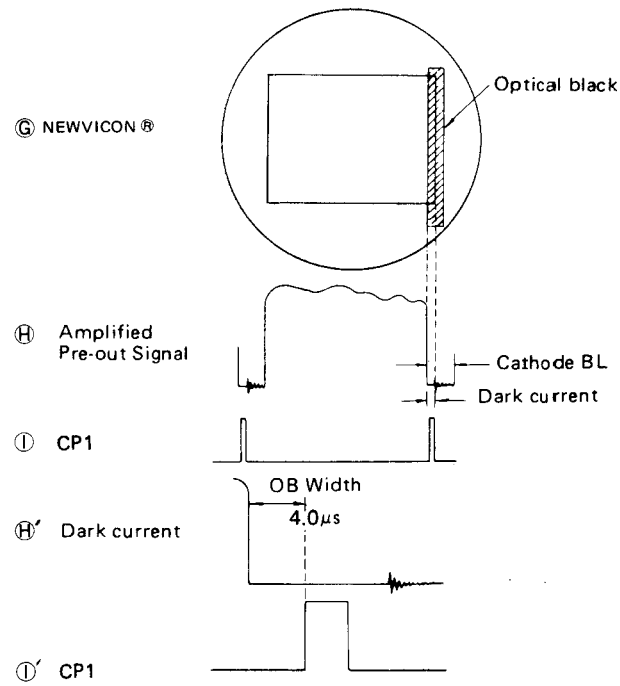


Fig. 5-3-3 OB Clamp

5-3-3 Gamma Correction Circuit

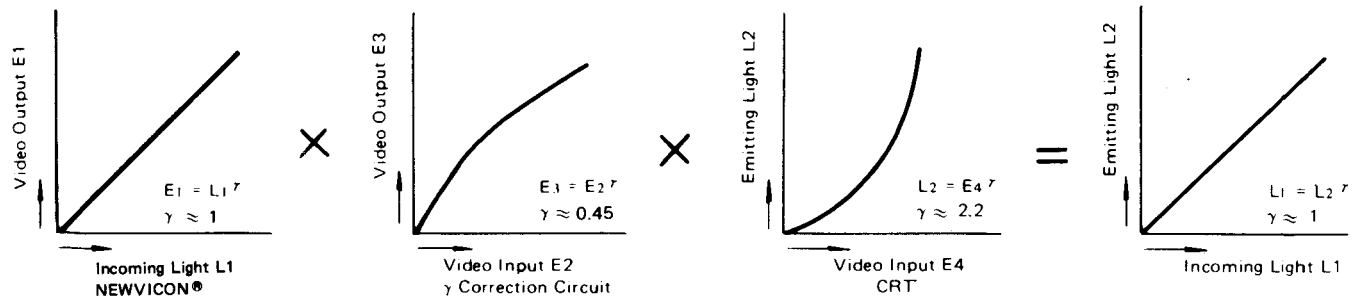


Fig. 5-3-4 Gamma Correction

Outline

This circuit corrects the non-linear photoelectric conversion characteristic of cathode ray tube (CRT) and reproduces a linear picture of high fidelity on the monitor.

In order for a televised picture to have the same contrast gradation as the original scene, the system (including the pick-up tube, signal processing inside camera and monitor, and CRT) gamma must be equal to 1.

The gamma characteristic of Newvicon® is approx. 1.0 and the gamma characteristic of the monitor CRT is approx. 2.2, so that the gamma characteristic of the gamma correction circuit should be approx. 0.45, which makes the total gamma to be approx. 1.0 as shown in Fig. 5-3-4.

Details

The prevideo signal is fed to the gamma(r) correction circuit and undergoes the gamma correction.

Since the modulated red(R) and blue(B) signals are ridden on the green(G) signal, the negative feedback gamma correction circuit is adapted.

5-3-4 Automatic Iris Control Detection Circuit

Outline

This circuit detects the DC voltage corresponding to the light intensity and sends this DC voltage to the automatic iris control circuit in the Power board.

Details

The wide BL (W.BL) pulse (Q) separated from CP1/PRE BL/W.BL mixed signal is supplied to the AIC modulation circuit inside IC1 from the pulse separator. The prevideo signal (R) is fed from the PRE BL mix circuit to the AIC modulation circuit, where the prevideo signal (R) is modulated by the W.BL pulse (Q). The modulated prevideo signal (S) is peak-rectified in the AIC modulation circuit and converted into DC voltage corresponding to the prevideo level i.e., the incoming light intensity. This DC voltage is fed through pin 19 of IC1, pin 4 of CN6 and the Process-2 board to the automatic iris control circuit in the Power board together with the DC voltage set by VR6 (AIC SET) which sets the normal iris stop at the standard light intensity.

The DC voltage is also supplied to the low light indicator circuit in IC1.

When the camera is operated in the normally illuminated scene, the output from the low light indicator at pin 21 of IC1 is low level. However, when the camera is aimed at the weakly illuminated scene, the output becomes high level and it is sent to the Microprocessor board for displaying the graphics in the EVF.

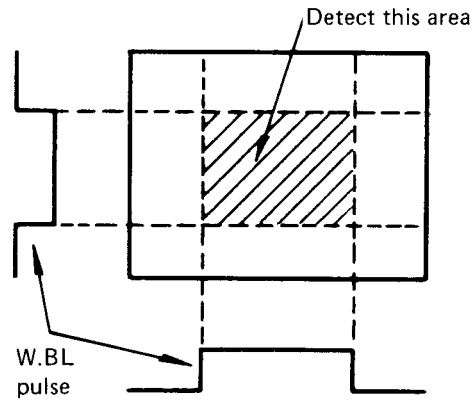


Fig. 5-3-5 Automatic Iris Control Detection and Automatic Gain Control Detection

5-3-5 Automatic Gain Control Circuit

Outline

This circuit amplifies the preamplifier output signal. The amplified signal level is maintained constant by automatically controlling the gain of the amplifier. The gain of the amplifier is controlled only when the lens iris is fully opened.

Details

The prevideo signal from the gamma correction circuit in IC1 is fed through the AGC amplifier and amplifier to trap CF3 which removes the 3.9MHz modulated component and the luminance (Y) signal is obtained. The Y signal is then applied to the AGC detect circuit where the Y signal is modulated by the wide BL pulse from the pulse separator and the modulated Y signal is made for detecting signal level corresponding to the center image. The modulated Y signal is peak-rectified in the AGC detect circuit and converted into DC voltage corresponding to the Y signal level i.e., the incoming light intensity. This DC voltage is fed through pins 17 and 16 of IC1 to the AGC control circuit where it is compared with the reference DC voltage. The error between the DC voltages is fed through (the AGC ON/OFF switch SW1 for WVP-A2 and) pin 7 of IC1 to the AGC amplifier to control its gain.

When the camera is used in the normally illuminated scene, the signal level is maintained constant by automatically adjusting the lens iris. Therefore the gain of AGC amplifier does not change. However, when the camera is aimed at the weakly illuminated scene and lens iris becomes wide open, the Y signal level is decreased. The decreased Y signal level is detected by the AGC detection circuit and converted into the DC voltage. This DC voltage is fed through the AGC control circuit (and the AGC ON/OFF switch SW4 for WVP-A2 to the AGC amplifier to control the gain of amplifier. In this way the signal level corresponding to normal and relatively high illumination is kept constant by the lens iris opening, while the signal level corresponding to relatively low illumination is controlled by the AGC circuit.

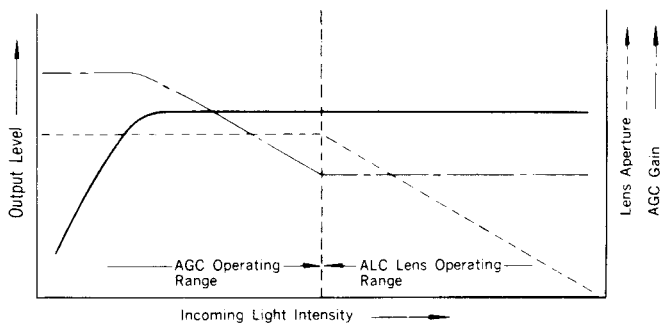


Fig. 5-3-6 AGC Operation

The gain controlled prevideo signal which has the modulated red and blue signal at pin 13 of IC1 is supplied to the luminance signal processing circuit and red and blue separation circuit.

VR5 (AGC SET) sets the gain of the amplifier at the standard light intensity in the automatic gain control mode.

VR4 (MANUAL GAIN) for WVP-A2 sets the gain of the amplifier at the standard light intensity in the manual gain control mode.

5-3-6 YH Signal Circuit

Outline

This circuit receives the amplified prevideo signal from the automatic gain control circuit and generates the luminance (YH) signal having high frequency response characteristic.

Details

The amplified prevideo signal is fed from the AGC circuit through pin 13 of IC1 to trap C31 which removes the 3.9MHz modulated component and luminance (Y) signal is obtained. The Y signal at pin 8 of IC1 is fed to the YH white suppress circuit, where the high level of Y signal is slightly suppressed. The suppressed Y signal is then supplied to 3MHz low pass filter CF5, where the frequency response of Y signal is limited to 3MHz, and the YH signal having high frequency response characteristic is generated.

The YH signal is then mixed with the vertical edge signal supplied from the vertical edge signal generator circuit in IC2. After its level is set by VR11 (Y GAIN), the YH signal is supplied to the horizontal aperture signal circuit in IC7.

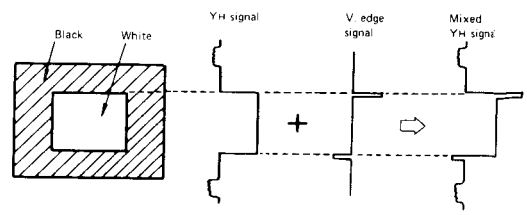


Fig. 5-3-7 Y_H Signal Processing

5-3-7 YL Signal Circuit

Outline

This circuit receives the amplified prevideo signal from the automatic gain control circuit and generates the luminance (YL) signal having low frequency response characteristic.

Details

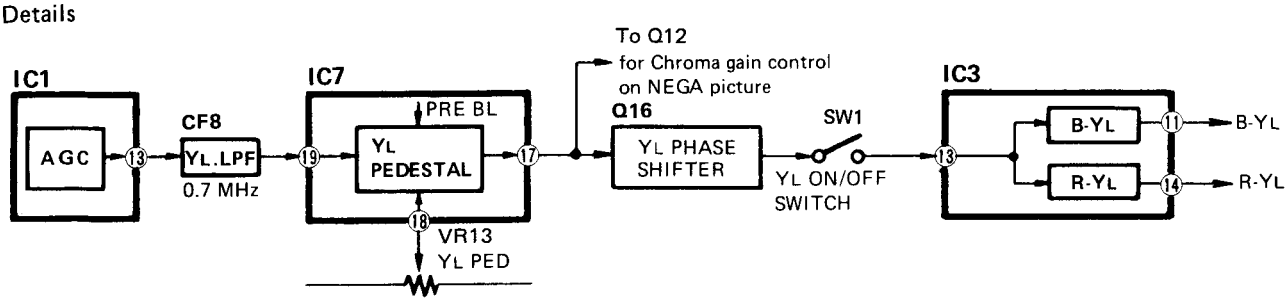


Fig. 5-3-8 Y_L Signal Circuit

The amplified prevideo signal is fed from the AGC circuit through pin 13 of IC1 to 0.7MHz low pass filter CF8, where the 3.9MHz modulated component is removed and the luminance (YL) signal of which frequency response is limited to 0.7MHz is obtained. The YL signal thus made is fed to the YL pedestal circuit inside IC7, where YL signal is mixed with the pre BL pulse and the mixed signal is made. The mixed signals low level pre BL portion is clipped and its pedestal level is set. The clip level (pedestal level) is set by VR13 (YL PED).

The YL signal whose pedestal level is set is supplied from pin 17 of IC7 to the R-YL/B-YL signal circuit in the red and blue separation & Chroma processing circuit through YL phase shifter Q16 and pin 13 of IC3.

CT3 (YL PHASE) is a control for YL phase.

5-4 Horizontal Aperture Signal Generator Circuit

Outline

This circuit generates the horizontal(H) edge (aperture) signal to enhance the horizontal resolution.

Details

The luminance (YH) signal having high frequency response is fed from the YH signal circuit to the H. aperture generator circuit.

When the camera is aimed at an object (A) for example, the signal (B) passed through pin 1 of IC7, signal (C) delayed 0.15 μs by delay line CF6 and amplified in the H.aperture generator circuit and signal (D) which results from the delayed YH signal being reflected back through CF6 and delayed again (0.3 μs) appear at the output of the H.aperture generator circuit where they are mixed in fixed proportions to make up the H.aperture signal (E). The H.aperture signal obtained in this way is applied through pin 23 of IC7 and pin 7 of IC4 to the H.aperture noise suppress/coring circuit, where the noise mixed in the H.aperture signal (F) is removed (G).

The H.aperture signal which undergoes the noise coring is then supplied through pin 4 of IC7 to the Y/chroma/aperture mix circuit, where it is mixed with the luminance and chrominance signal.

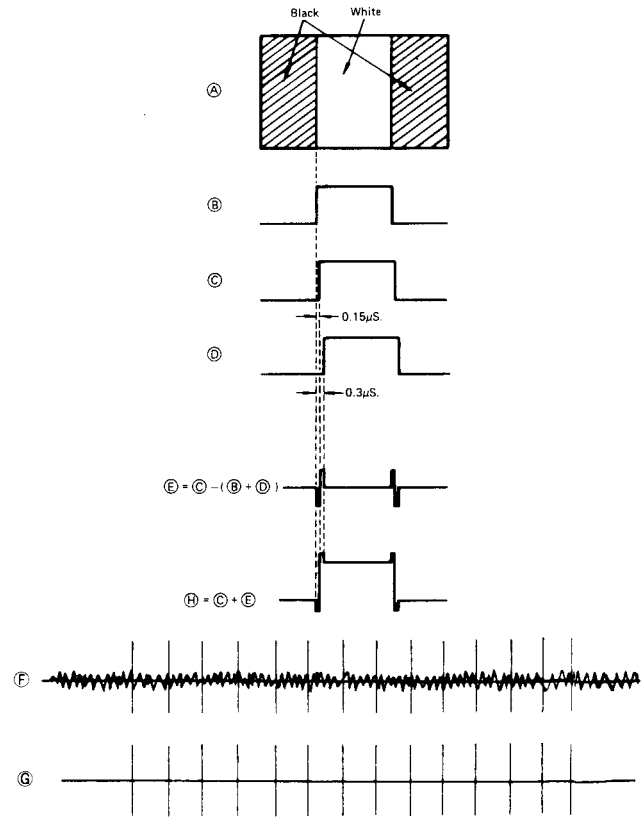


Fig. 5-4-1 Horizontal Aperture Signal

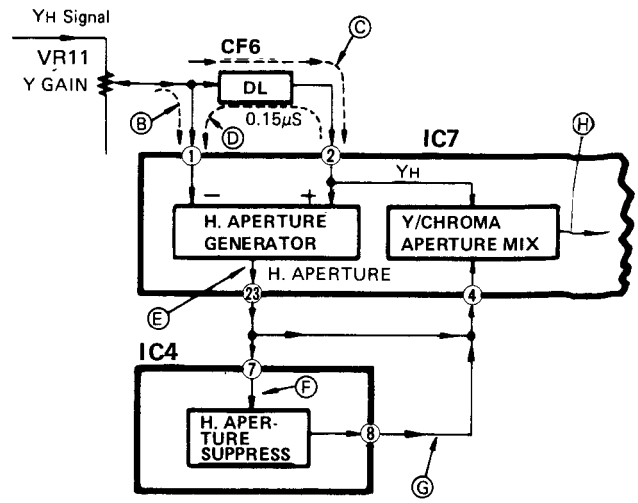


Fig. 5-4-2 Horizontal Aperture Signal Generator Circuit

5-5 Vertical Edge Signal Generator Circuit

Outline

This circuit generates a vertical edge signal for increasing the vertical resolution by enhancing vertical edge contrast.

Details

The luminance (Y(edge)) signal (A), for making the vertical(V) edge signal, supplied from pin 10 of IC1 is fed to the Y(edge) delay circuit IC6 (CCD:charged coupled device) through pin 5. In the Y(edge) delay circuit, the Y(edge) signal is delayed 1H (1 line) by IC6. The 1H delayed signal (B) obtained at pin 2 of IC6 is fed to pin 2 of IC2 through buffer Q17 and low pass filter CF9 and VR18 (V.EDGE BALANCE). Also the undelayed Y(edge) signal is fed from pin 10 of IC1 to pin 4 of IC2. The 1H delayed Y(edge) signal (B) is mixed with the undelayed Y(edge) signal (A) to form a vertical edge signal (C). The vertical edge signal is fed to the V.edge amplifier in IC2. The amplified V.edge signal is fed to the detection circuit in IC2, where the positive V.edge signal (D) is generated. This signal is sent to the chroma gain control circuit to reduce the vertical spurious signal.

The V.edge signal (D) is fed to the mixing circuit in IC2, where it is mixed with the amplified V.edge signal and V.edge signal (E) is made. The V.edge signal (E) is sent to the vertical transient spurious correction circuit inside IC2 through pin 9, and to the YH signal circuit where it is mixed with the YH signal to make sharp picture.

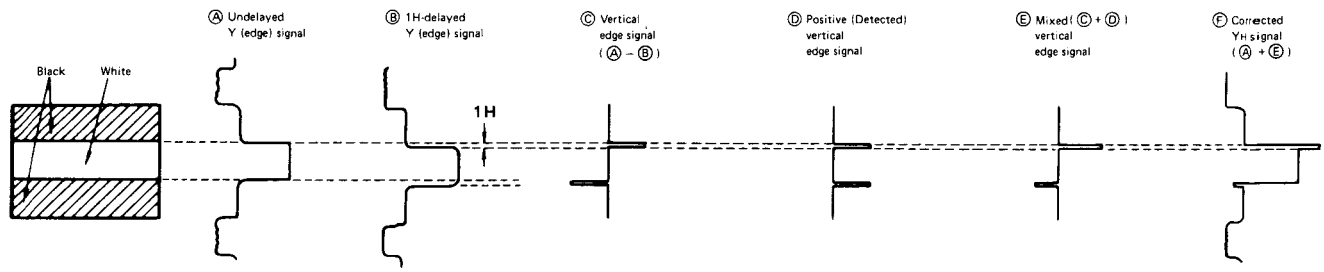


Fig. 5-5-1 Vertical Edge Signal

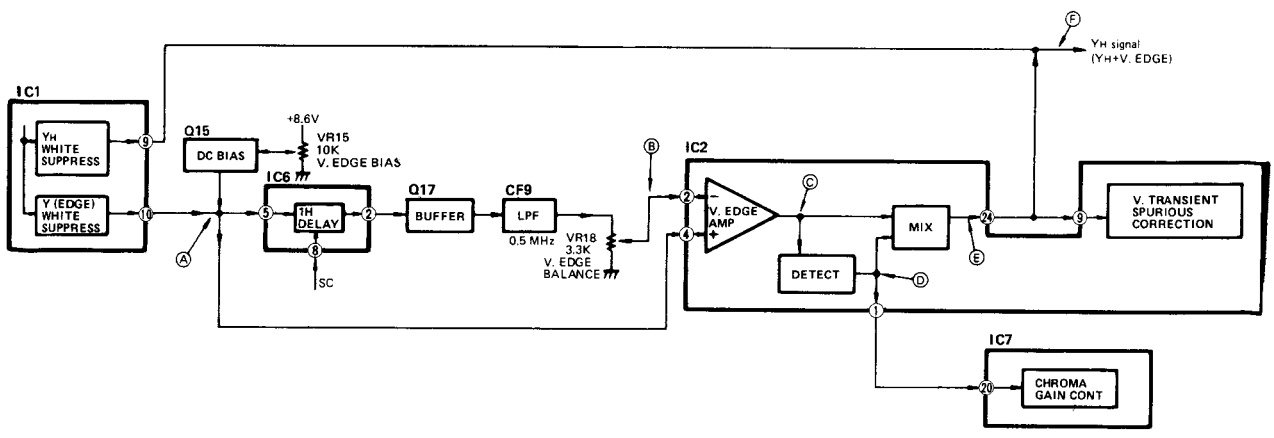


Fig. 5-5-2 Vertical Edge Signal Generator Circuit

5-6 Red and Blue Separation & Chroma Processing Circuit

This circuit consists of the red and blue separation circuit, the vertical transient spurious correction circuit, the shading correction, the tracking correction circuit, the R-YL signal circuit, the B-YL signal circuit and the chroma clip signal circuit.

5-6-1 Red and Blue Separation Circuit

Outline

This circuit takes out the modulated red(Rc) and blue (Bc) signals from the combined preamplifier output signal which is composed of a green(G) signal mixed with 3.9MHz modulated red(Rc) and blue(Bc) signal.

Details

The amplified prevideo signal (A) obtained at pin 13 of IC1 is fed to 3.9MHz band pass filter (BPF) CF2 where the Rc/Bc signal (B) is detected. The detected Rc/Bc signal is then supplied through VR2 (R/B GAIN) to the 90° phase shifter through pre BL mix circuit where the noise on the blanking period is removed. The 90 phase-shifted Rc/Bc signal (C) obtained at pin 11 of IC2 is applied to the R/B separation circuit inside IC3 through pin 2. CT1 (R/B SEPARATION-1) is a control for shifting the phase of Rc/Bc signal by 90°.

The Rc/Bc signal (B) at pin 6 of IC2 is supplied to 1H delay line DL1 where it is delayed one horizontal line (64 μsec). 1H delayed Rc/Bc signal is then sent to the vertical transient spurious correction circuit inside IC2 through VR1 (R/B SEPARATION-2) and pin 18. (The vertical transient spurious correction circuit will be described later.)

The Rc/Bc signal (D) undergoes the vertical transient spurious correction and inverted in the correction circuit is applied to the R/B separation circuit inside IC3 through pin 24.

In the R/B separation circuit, the 90° phase-shifted Rc/Bc signal (C) and the inverted 1H-delayed Rc/Bc signal (D) are added forming the Rc signal (E), and the Rc/Bc signal (C) and the Rc/Bc signal (D) are subtracted each other forming the Bc signal (F).

The Rc and Bc signals thus separated are fed to the respective shading/tracking correction circuits.

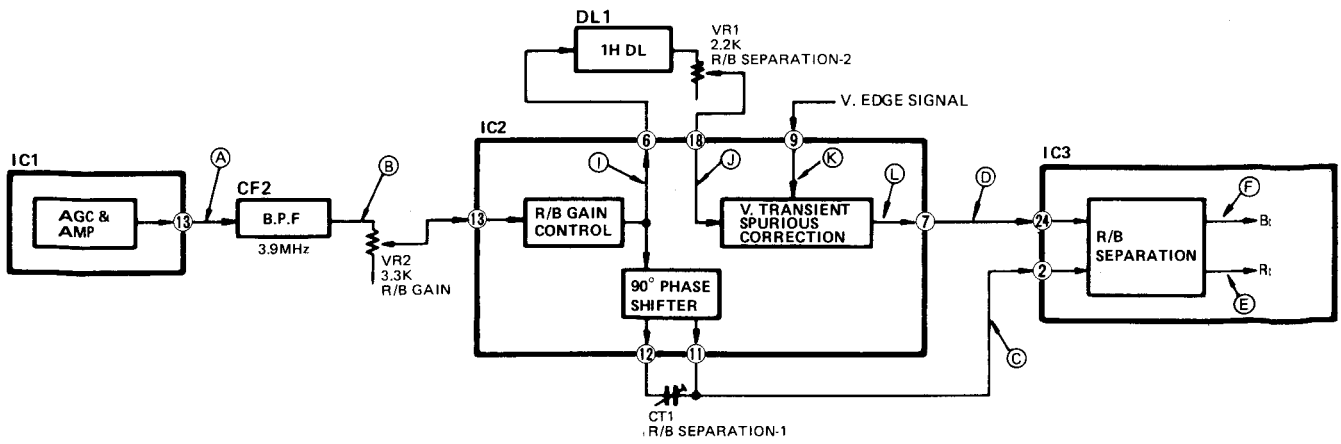


Fig. 5-6-1 Red and Blue Separation Circuit

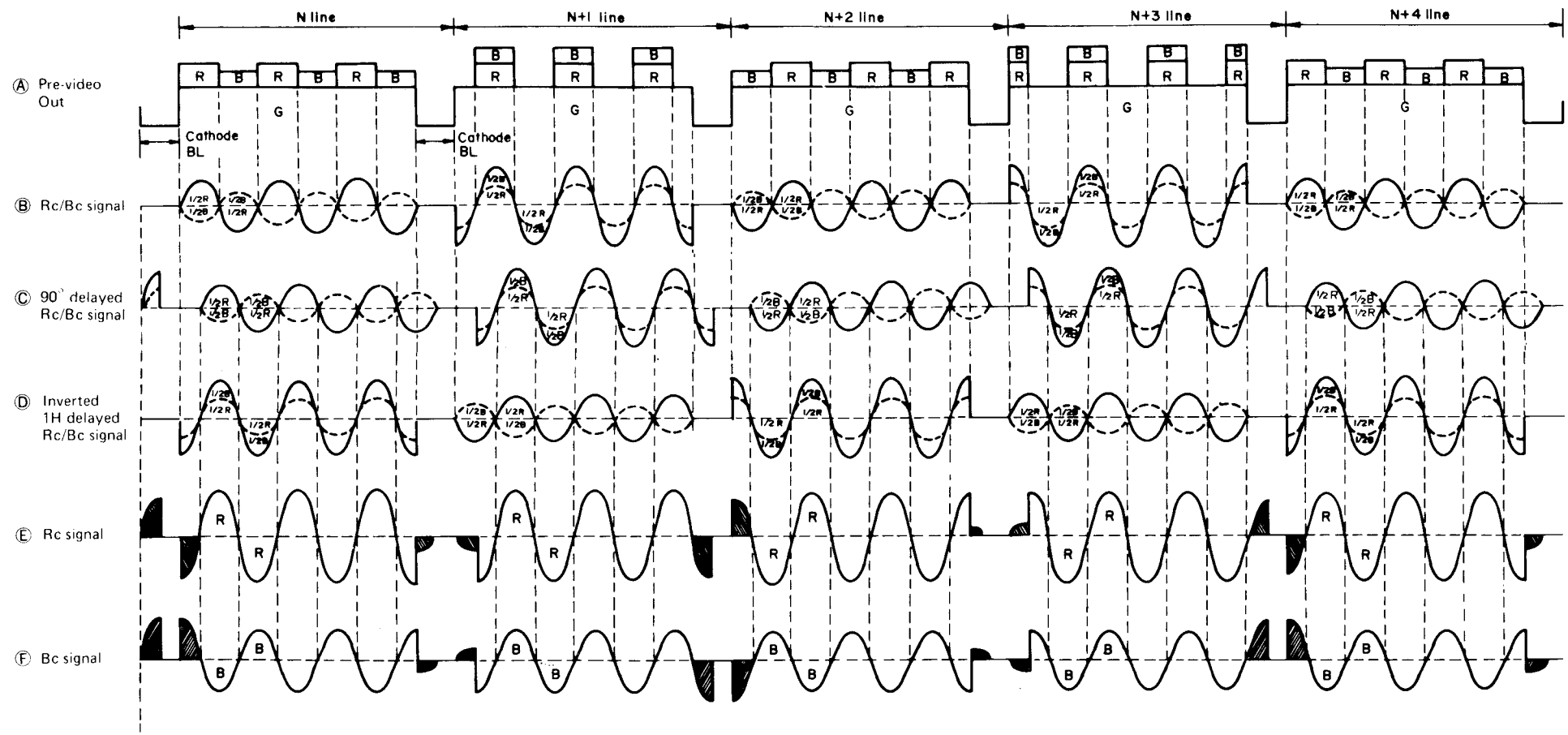


Fig. 5-6-2 Red and Blue Signal Separation

5-6-2 Vertical Transient Spurious Correction Circuit

Outline

As described previously in red and blue separation circuit, the Rc and Bc signals are separated from each other by addition or subtraction of the Rc/Bc signal delayed one line(1H) and the 90° phase-shifted Rc/Bc signals but not delayed.

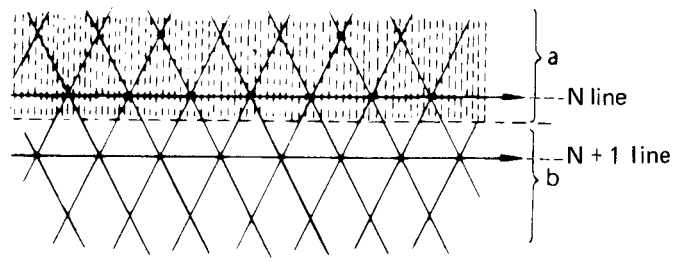
When a pattern such as shown in Fig. 5-6-3 is seen by the camera, the Rc/Bc signal which is not delayed appears as in (I), and the Rc/Bc signal delayed one line(1H) becomes as in (J).

Therefore, it is impossible to secure vertical correlation between Rc/Bc signals of N+1 line, and a spurious signal differing in level of Rc and Bc signals against Y signal (H) is generated, and the vertical(V) edge of the object is unnaturally colored by this spurious signal.

The vertical transient spurious correction circuit controls the amplitude of 1H-delayed Rc/Bc signal (J) corresponding to the N+1 line with vertical(V) edge signal (K) and the signal (L) is made. This provides vertical correlation between Rc/Bc signals (I) and (L) prior to color separation.

Details

The vertical edge signal (K) is sent from the vertical edge signal generator circuit to the vertical transient spurious correction circuit inside IC2 through pin 9 of IC2. In this circuit, those parts of the 1H-delayed Rc/Bc signal (J) which do not correlate with the Rc/Bc signal (I) (not 1H-delayed) are controlled in level by the vertical edge signal (K). The corrected Rc/Bc signal (L) is fed to the R/B separation circuit inside IC3 through pin 7 of IC3 and pin 24 of IC3.



a : Dark object
b : Bright object

Fig. 5-6-3

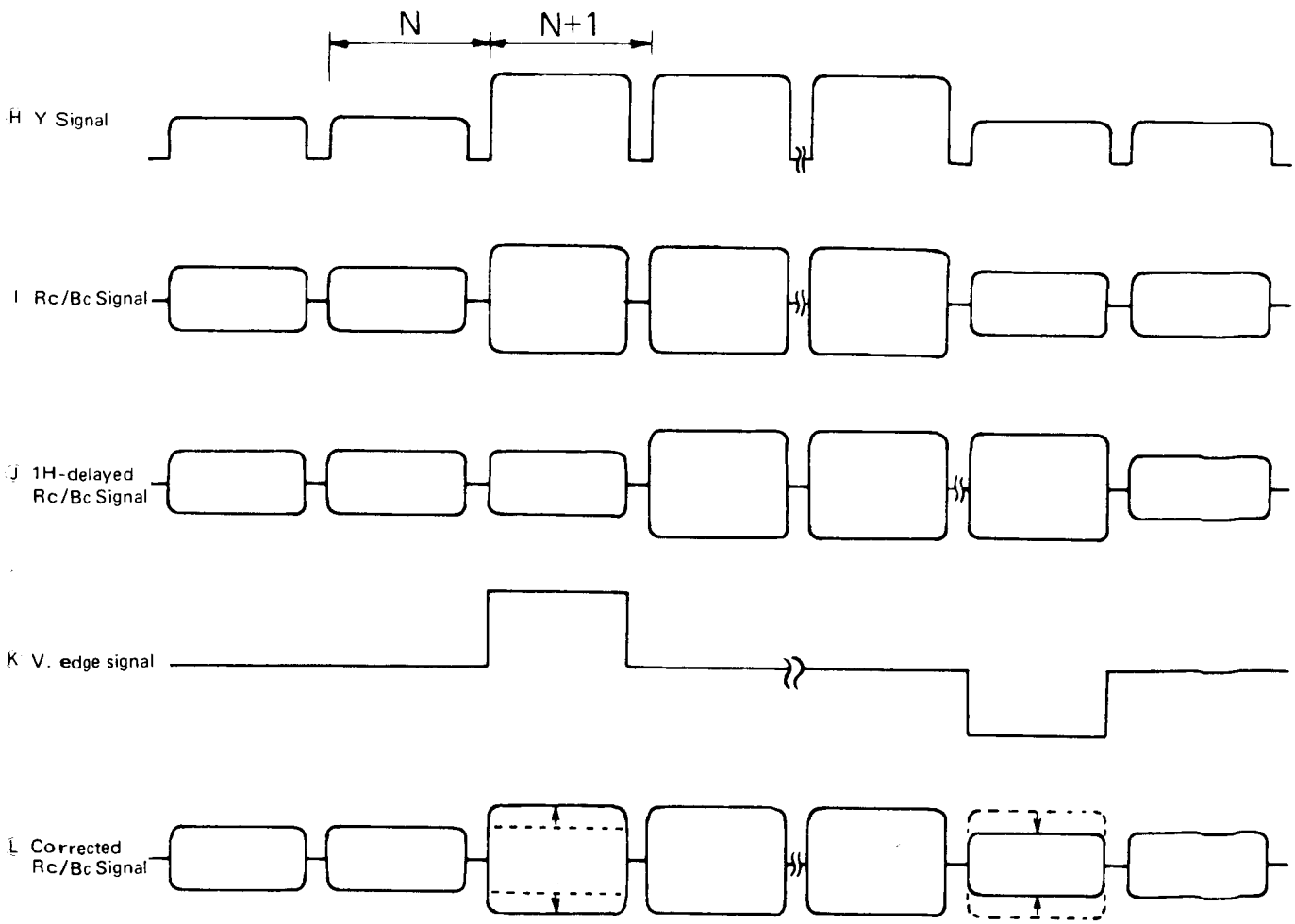


Fig. 5-6-4 Vertical Transient Spurious Correction

5-6-3 Shading Correction Circuit

Outline

Even when dynamic focus is applied to grid-4(G4) of pick-up tube, the non-uniformity of modulation due to uneven focus on the target can not be completely eliminated.

Modulation non-uniformity also occurs due to non-uniform structure in the photoconductive layer of the pick-up tube (manufacture tolerance).

The shading correction circuit compensates for residual picture shading using horizontal(H) and vertical(V) sawtooth and parabola signals written in the FAMOS (EP-ROM) IC.

Details

● Red shading correction

The horizontal shading correction signal obtained at pin 18 of FAMOS IC IC9 and the vertical shading correction signal obtained at pin 6 of IC9 are mixed and supplied to the red shading/tracking correction circuit inside IC3 through pin 21.

Suppose a uniformly illuminated white object is seen by the camera and the Rc signal has a shading (unevenness of amplitude) (M). This is sent to the shading/tracking correction circuit from the Rc/Bc separation circuit inside IC4. In this case, the shading correction signal (N) is written in IC9 in the factory and it is applied to the correction circuit.

The Rc signal (M) is modulated by the shading correction signal (N) and the corrected signal (O) is produced. The shading of the Rc signal (O) is removed in the correction circuit and the Rc signal (P) is obtained. In this way, the shading of the Rc signal is corrected.

The corrected Rc signal is then fed to the R-YL signal circuit inside IC3.

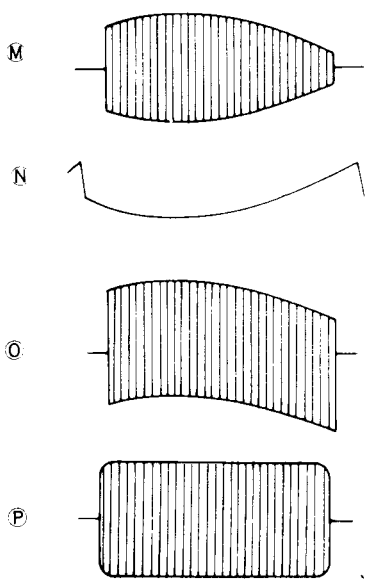


Fig. 5-6-5 Shading Correction

● Blue shading correction

As in the case of red shading correction, the horizontal shading correction signal obtained at pin 17 of IC9 and the vertical shading correction signal obtained at pin 5 of IC9 are mixed and fed to the shading/tracking correction circuit inside IC3 through pin 4, where it modulates the modulated blue(Bc) signal (supplied from the R/B separation circuit) for the shading correction. The shading-corrected Bc signal is then applied to the B-YL signal circuit inside IC3.

5-6-4 Tracking Correction Circuit

Outline

In this color camera, the red(R) and blue(B) signals modulated at 3.9MHz (high frequency component) are riding on top of the green(G) signal (low frequency component) when they are extracted from the pick-up tube.

The photoelectric conversion characteristic of the pick-up tube is different between the high frequency component and low frequency component.

The modulation depth of Rc and Bc signals corresponding to the weakly illuminated scene is reduced due to the over-beam in the pick-up tube.

As a result, the R and B signals obtained by detecting the Rc and Bc signals do not track with the YL signal. This circuit generates the tracking signals for correcting the characteristic of the R and B signals, and tracks them with the YL signal.

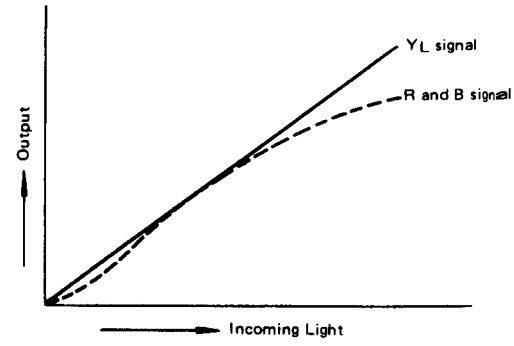


Fig. 5-6-6 Mistracking of YL and R/B Signal

Details

The amplified prevideo signal (Q) (which contains the modulated red and blue signals as well as the green signal) obtained at pin 24 of IC1 is fed to the low pass filter consisting of L6 and C41, where the 3.9MHz modulated component is removed and a luminance (Y) signal (R) is made.

The Y signal (R) is fed through pin 19 to the tracking signal generator inside IC2 where a tracking-1 signal (S), a tracking-2 signal (T) and a tracking-3 signal (U) is generated respectively.

The tracking-1 signal (S) at pin 16 of IC2 is supplied to VR92 (B. TRACKING-1) and VR102 (R. TRACKING-1) for correcting the relatively low level of R and B signals.

The tracking-2 signal (T) at pin 17 of IC2 is fed to VR93 (B. TRACKING-2) and VR103 (R. TRACKING-2) for correcting the relatively higher portion of R and B signals.

The tracking-3 signal (U) at pin 15 of IC2 is sent to VR91 (B. TRACKING-3) and VR101 (R. TRACKING-3) for correcting the high level of R and B signals. These tracking correction signals are supplied through the tracking controls to the R. shading/tracking correction circuit and B. shading/tracking correction circuit inside IC3, where they modulates the Rc and Bc signals (V) come from the R/B separation circuit for correcting the linearity of Rc and Bc signal (V). In this way, the R and B signals (W) match the YL signal.

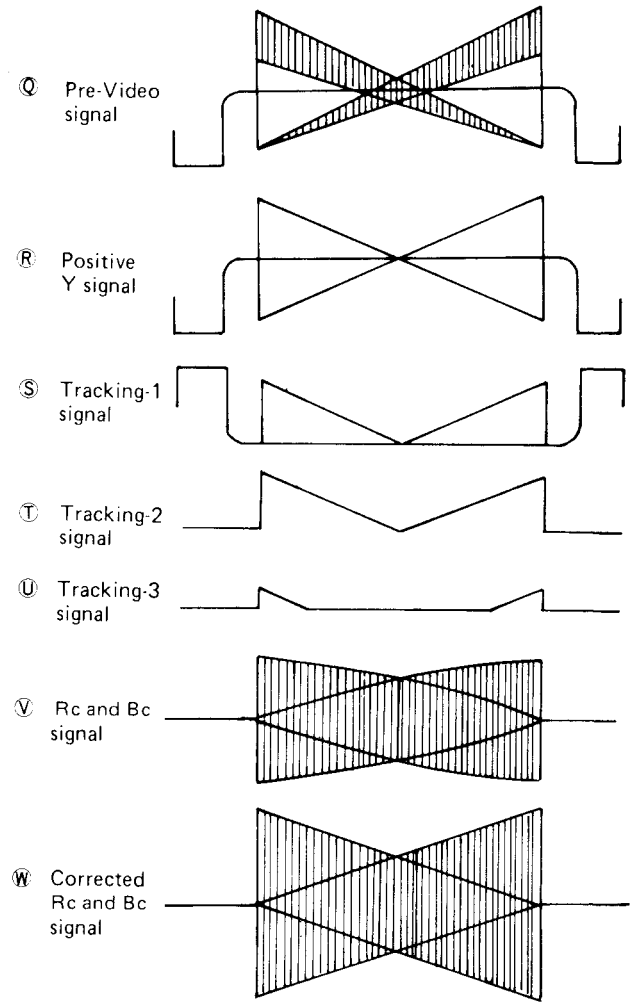


Fig. 5-6-8 Tracking Correction-1

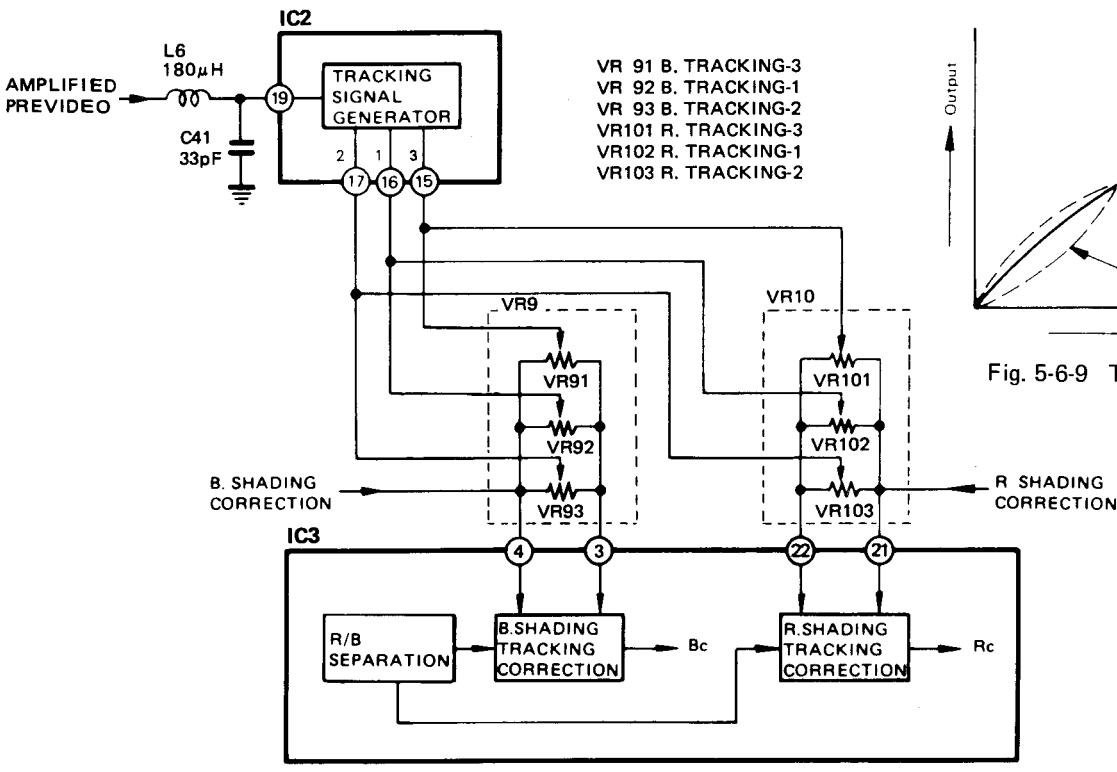


Fig. 5-6-7 Tracking Correction Circuit

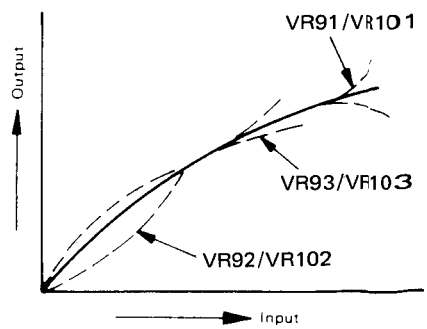


Fig. 5-6-9 Tracking Correction-2

5-6-5 R-YL Signal Circuit

Outline

This circuit receives the modulated red(Rc) signal from the red shading/tracking correction circuit and detects the red signal. The detected red signal and the YL signal supplied from the YL signal circuit make the R-YL color difference signal. The R-YL signal is fed to the chroma encoding circuit.

Details

The Rc signal (A) from the red shading/tracking correction circuit is fed to the gain control circuit whose gain is controlled for the automatic white balancing. The gain controlled Rc signal is sent to the amplifier through the PRE BL mixing circuit where the noise during the blanking period of Rc signal is removed. The positive Rc signal (B) and negative Rc signal (C) are obtained at the output of amplifier and they are forwarded to the detector and the Rc signal (D) is detected. The detector which extracts the red signal produces a unwanted 7.8MHz ripple signal (D). The 7.8MHz component is removed by the low pass filter leaving only the red signal (E).

The R signal (E) is then fed to the R-YL amplifier. The YL signal from the YL signal circuit is also supplied through YL phase shifter Q16 to the R-YL amplifier where the R-YL color difference signal is made.

The resultant R-YL signal is fed through pin 14 of IC3 to the color reproduction correction circuit.

VR2 (COLOR BALANCE) which is located on the side of camera is a control for fine adjustment of the color balance. VR7 (R. GAIN) is a presetting control for the red signal level. VR8 (R. PED) is a control for setting the red pedestal.

SW1 is the YL ON/OFF switch for disconnecting the YL signal.

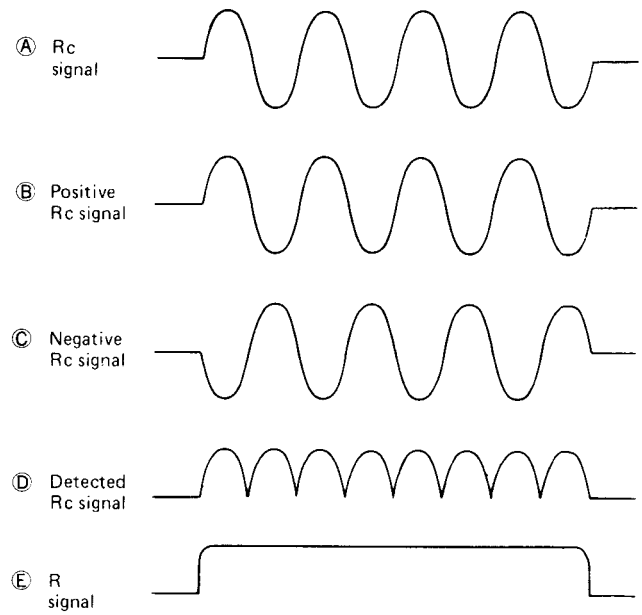


Fig. 5-6-11 Red Signal Detection

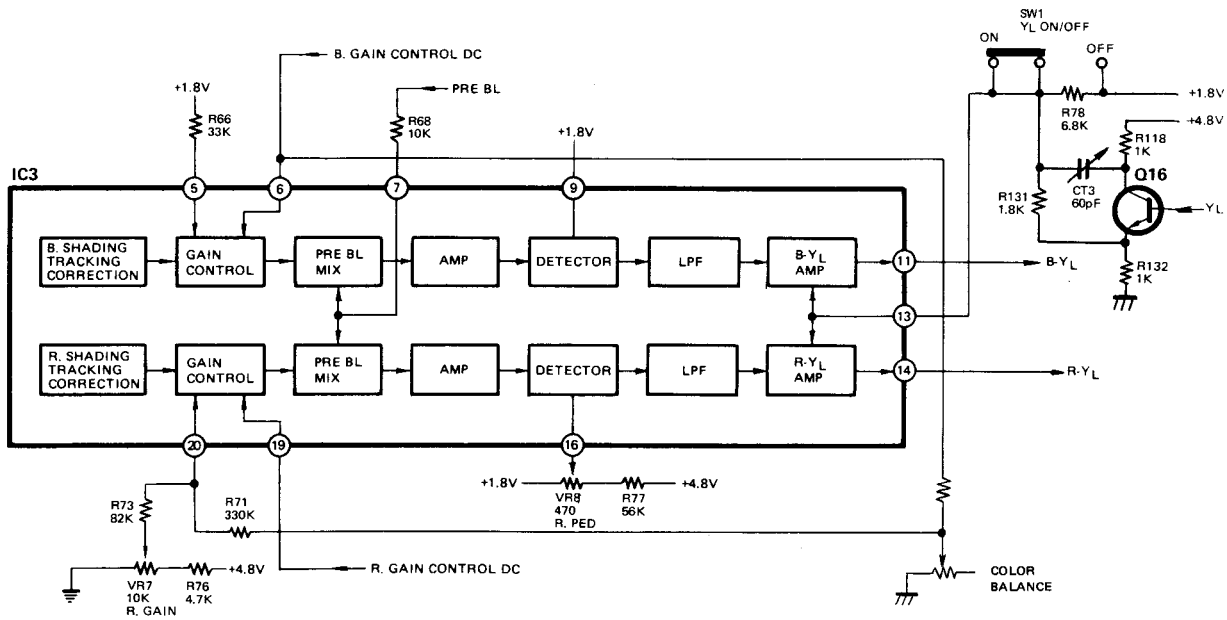


Fig. 5-6-10 R-YL/B-YL Signal Circuit

5-6-6 B-YL Signal Circuit

Outline

This circuit uses the same design as the R-YL signal circuit. The circuit receives the modulated blue(Bc) signal from the blue shading/tracking correction circuit and converts it to the blue signal. The B-YL signal is made by the detected blue signal and YL signal supplied from the YL signal circuit, and fed to the color reproduction correction circuit.

Details

The Bc signal from the blue shading/tracking correction circuit in IC3 is sent to B-YL amplifier after it undergoes the gain control, the preblanking mixing, the amplification and detection. The low pass filter (LPF) removes unwanted 7.8MHz component which is generated by the detection. The B-YL signal is then fed to the color reproduction correction circuit.

5-6-7 Color Reproduction Correction Circuit

Outline

This circuit receives the R-YL and B-YL color difference signals from the R-YL and B-YL signal circuit respectively and sends them to the chroma encoding circuit after correcting the color reproduction. The amount of color reproduction differs according to the position of Indoor-Outdoor Selection Switch.

Details

The R-YL signal obtained at pin 14 of IC3 is applied to the chroma encoding circuit through clamp circuit Q23, buffer Q24 and another buffer Q20. Q22 and Q25 supplies the base bias of Q20.

The R-YL signal is also sent to phase splitter Q11 and the inverted and non-inverted R-YL signal are obtained at its collector and emitter. When the Indoor-Outdoor Selection Switch is set to the INDOOR position, the control terminal (pins 9 - 11) of analog switch IC5 becomes high level and pin 4 and pin 3 of IC5 are connected. Therefore, the inverted R-YL signal is mixed through VR10 (R.PHASE) with YL signal supplied from the YL signal circuit to compensate the red color reproduction. When the Selection Switch is set to the OUTDOOR position, pins 4 and 5 of IC5 are connected and the inverted R-YL signal mixed with the YL signal is reduced by adding the non-inverted R-YL signal.

VR10 (R.PHASE) adjusts the red color reproduction by setting the R-YL signal level mixed with the YL signal.

The B-YL signal obtained at pin 11 of IC3 is sent to the chroma encoding circuit through buffer Q19. The B-YL signal is also fed to inverter Q2 and the inverted B-YL signal is mixed with main B-YL signal through D10 regardless of the Indoor-Outdoor Selection Switch in order to compensate for the better blue color reproduction.

In the INDOOR position of Selection Switch, the inverted R-YL signal is mixed with the YH signal through pins 1 and 15 of IC5 to compensate the brightness of blue color. The inverted B-YL signal is added with the YH signal through pins 2 and 15 of IC5 in the OUTDOOR position of Selection Switch.

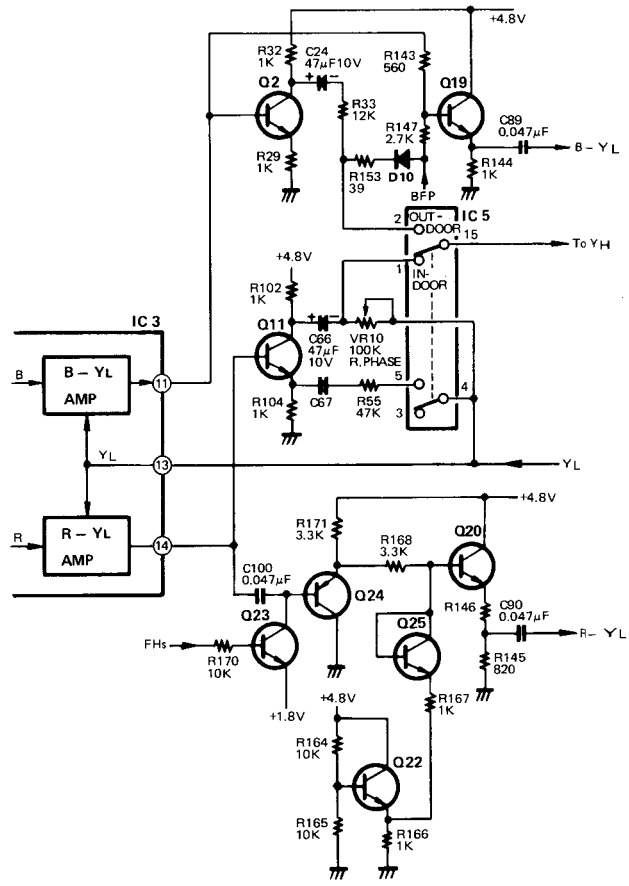


Fig. 5-6-11 Color Reproduction Correction Circuit

5-6-8 Chroma Clip Signal Circuit

Outline

When the over input signal level is fed to the amplifier or the beam of pick-up tube is insufficient to discharge the target due to excessive light reflected from a brightly illuminated object, the modulated red/blue signal components riding on to top of the green signal become saturated ((G) and (H)).
Therefore, the bright picture parts turn into an unnatural green color due to lack of red and blue.

This circuit receives the luminance(Y) signal and makes the chroma clip signal for clipping the unnatural green color. The chroma clip signal is sent to the chroma encoding circuit.

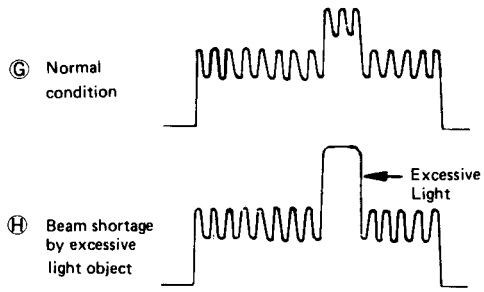


Fig. 5-6-12 Beam Shortage

Details

The prevideo signal at pin 24 of IC1 is fed to low pass filter which consists of L6 and C41 and the luminance(Y) signal (I) is made. The Y signal (I) is fed through pin 19 of IC2 to the white clip circuit where the high Y signal level (J) is detected. The detected high Y signal (J), signal (K) delayed 0.5 μs by delay line CF1 and signal (L) which results from the delayed signal (K) being reflected back through CF1 and delayed again (1 μs) appears at the input of NAM (non-additive mixing) circuit.
The mixing signal (M) ((J) + (L)) is non-additively mixed with the signal (K) and a chroma clip signal (N) is made. The chroma clip signal (N) is fed from the NAM circuit to the chroma encoding circuit through the pulse separator/buffer and pin 23 of IC2, and to the video signal processing circuit through R17 together with the positive vertical edge signal comes through R18 (Refer to Vertical Edge Signal Generator Circuit.) to minimize unnatural green color around the bright object.

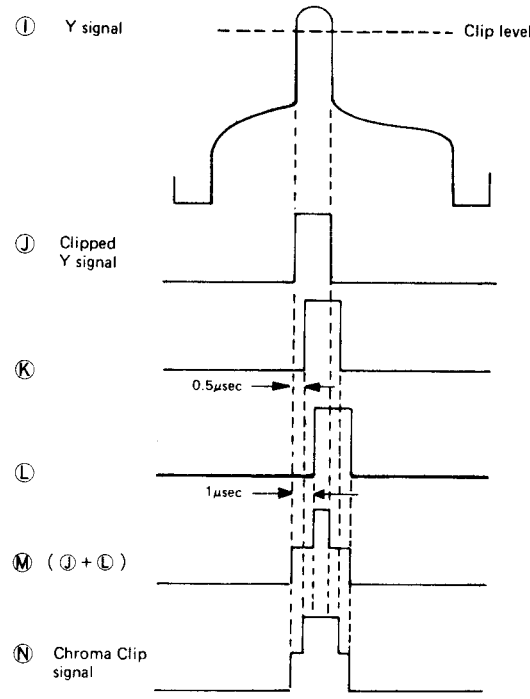


Fig. 5-6-13 Chroma Clip Signal

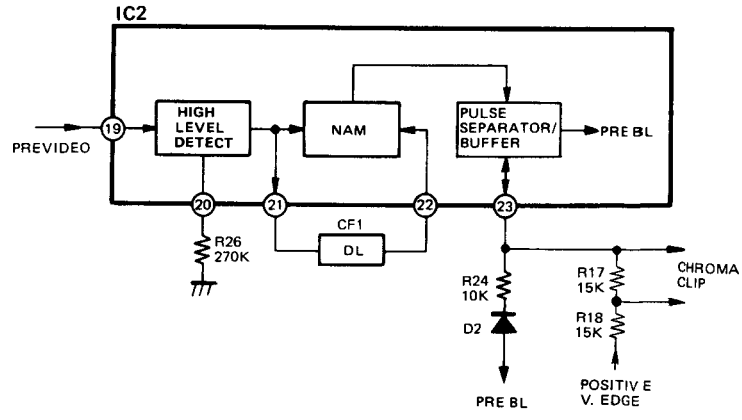


Fig. 5-6-14 Chroma Clip Signal Circuit

5-7 Chroma Encoding Circuit

This circuit contains the +2.5V power circuit, the chrominance signal generator circuit, the chroma clip/ suppression circuit and the white set detection circuit.

5-7-1 +2.5V Power Circuit

Outline

This circuit generates the regulated +2.5V DC which is used as power supply for IC4.

Details

+1.8V DC generated inside IC2 is fed through pin 5 and L12 to the emitter of Q21 which is used as a diode. The +2.5V DC obtained at the collector of Q21 is supplied to pin 6 of IC4 as a power supply.

5-7-2 Chrominance Signal Generator Circuit

Outline

This circuit receives the R-YL and B-YL color difference signals and modulates these base band color difference signal on two subcarrier differing in phase by 90° to generate a chrominance signal. The burst signal is also generated in this circuit.

Details

The R-YL color difference signal is fed from the color reproduction correction circuit to the R-YL clamp circuit in IC4 through pin 3, where the blanking period of R-YL signal is clamped by the clamp pulse-2(CP2) from the pulse separator in IC4. The clamped R-YL signal is then supplied to the R-YL balance modulator where it is mixed with the burst flag pulse (BFP) applied from the pulse generator circuit through pin 2 of IC4 and clamp circuit. The R-YL signal with the burst flag pulse (BFP) modulates the R-Y subcarrier applied to the modulator from the pulse generator circuit through pin 14 of IC4. The modulator produces an amplitude modulated (suppressed carrier) signal.

Similarly, the B-YL color difference signal is fed from the color reproduction correction circuit to the B-YL balance modulator circuit in IC4 through pin 4 of IC4 and the B-YL clamp circuit, where the B-YL signal is mixed with the burst flag pulse (BFP) supplied through pin 2 of IC4 and BFP clamp circuit. The B-YL signal with the burst flag pulse (BFP) and the B-Y subcarrier applied to the modulator through pin 16 of IC4 undergo suppressed carrier amplitude modulation. The R-YL modulated signal and the B-YL modulated signal are added forming the chrominance signal with the burst. The chrominance signal is then forwarded to the chroma clip/suppress circuit.

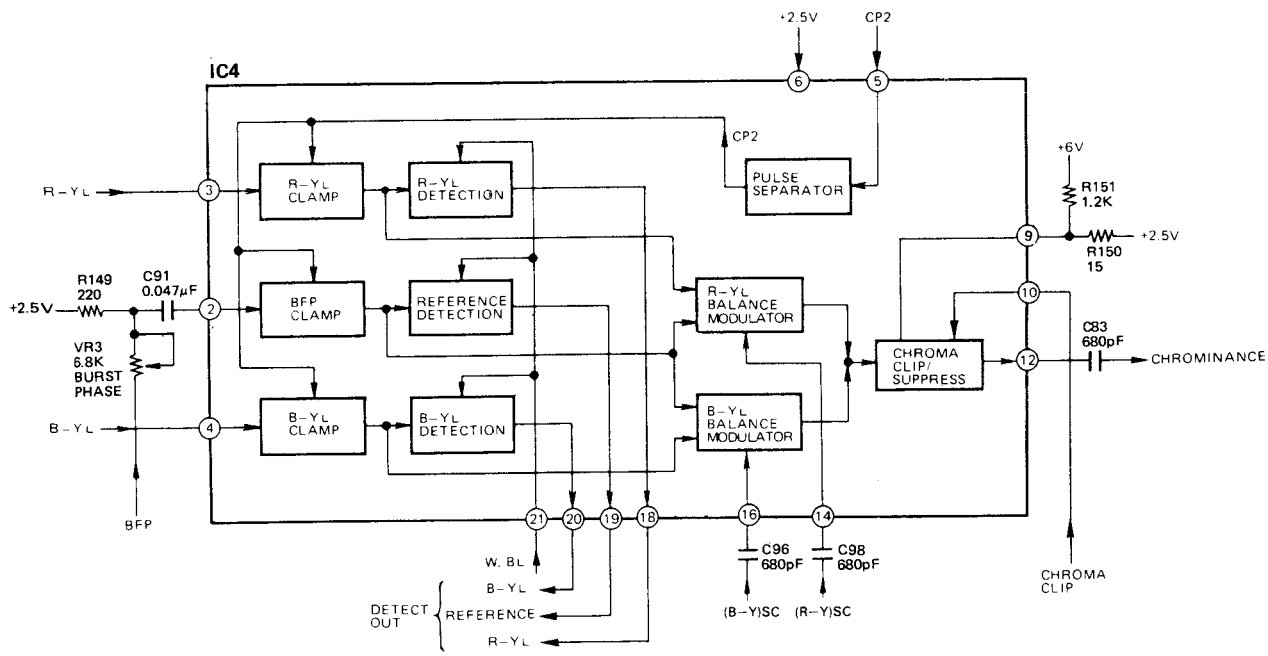


Fig. 5-7-1 Chroma Encoding Circuit

5-7-3 Chroma Clip/Suppress Circuit

Outline

This circuit contains the high Y level chroma clip circuit and low level chroma suppress circuit.

The high Y level chroma clip circuit clips the green color which results when an excessively bright object is shot with the camera. (Refer to Chroma Clip Signal Circuit for details.)

The low level chroma suppression circuit enhances color reproduction in low light condition by improving the white balance, when the color of the object is faint.

Details

The chrominance signal with the burst (A) is supplied to the chroma clip/suppress circuit from the R-YL and B-YL balance modulator circuits. The chroma clip signal (B) which is made in the chroma clip signal circuit in IC2 is supplied through pin 10 of IC4 to the chroma clip/suppress circuit where the chrominance signal corresponding to the excessive bright object is clipped (C) and does not reach the video output.

The chroma clip signal also suppresses the chrominance signal around the unnatural green color.

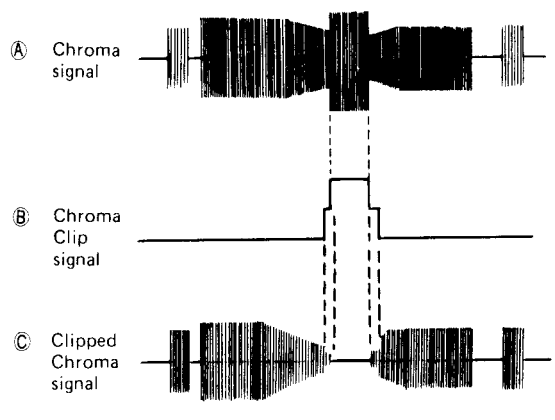


Fig. 5-7-2 Chroma Clip

The DC voltage obtained by dividing the voltage between +6V and +2.5V with R150 and R151, and fed to the chroma clip/suppress circuit through pin 9 of IC4 determines the low suppression level of chroma signal. This DC voltage is applied to the chroma clip/suppress circuit and clips the low chrominance level.

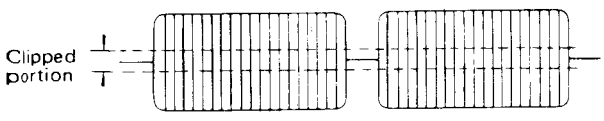


Fig. 5-7-3 Chroma Suppress

5-7-4 White Set Detection Circuit

Outline

This circuit receives the R-YL, B-YL and reference DC voltage from the respective clamp circuits and converts them to the DC voltages. The detected DC voltages are sent to the white balance setting circuit.

Details

The clamped R-YL, the clamped B-YL and the clamped burst flag pulse (BFP) are respectively fed to the detection circuits and their center portions are gated by the wide blanking (W.BL) pulse supplied through pin 21 of IC4 in order to set the white balance with the signal corresponding to the center image. When the clamped burst flag pulse is gated by the W.BL pulse, the burst flag pulse is removed and only the clamp DC voltage is detected as a reference DC voltage. The gated signals are converted into the DC voltage in the detection circuit and fed through pins 18, 19 and 20 of IC4 to the white balance setting circuit.

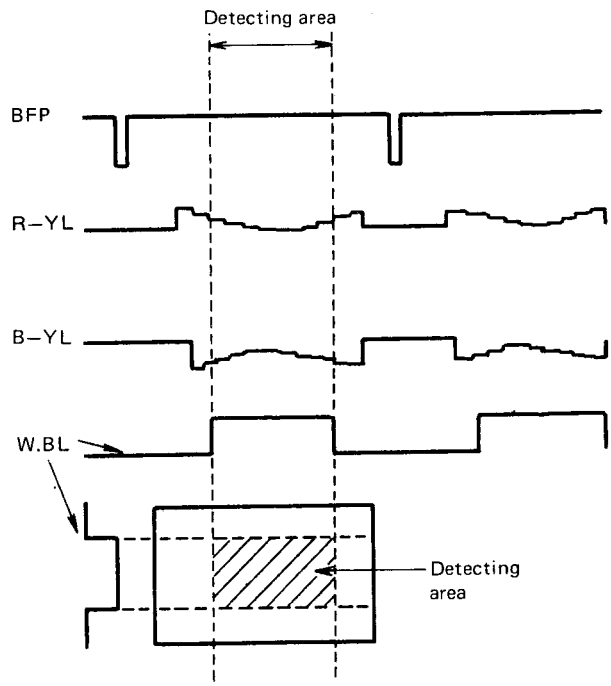


Fig. 5-7-4 White Set Detection

5-8 Burst Generator Circuit

Outline

This circuit gates the burst signal from the mixed signal of the chrominance and burst signals supplied from the chroma encoding circuit and phase-shifted burst is generated. The burst signal is fed to the video processing circuit together with the sync signal.

Details

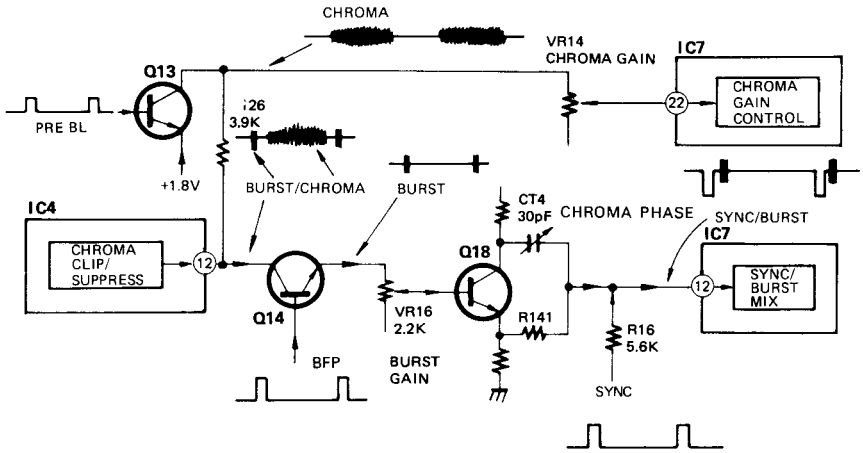


Fig. 5-8 Burst Generator Circuit

The mixed signal of chrominance and burst signal is fed from pin 12 of IC4 to the collector of burst gate Q14. The burst flag pulse (BFP) is fed from the pulse generator circuit to the base of Q14 through buffer Q3 to gate the burst signal. The gated burst signal at the collector of Q14 is then fed to phase shifter Q18 through VR16 (BURST GAIN). The phase-shifted burst signal at the junction point of CT4 (BURST PHASE) and R141 is then mixed with the sync pulse comes from the pulse generator circuit. The mixed signal is supplied to the video processing circuit to form a composite PAL signal.

5-9 Video Signal Processing Circuit

Outline

In this circuit, the chrominance signal, the luminance signal, the character signal, title character signal (for only WVP-A2), the blanking signal, the burst signal and the sync signal are mixed to produce a composite PAL signal.

The negative colored PAL signal, and fade-in/out effect (for only WVP-A2) are also made in this circuit. The PAL signal is applied to the portable VTR, or a desk-top type VTR through the power supply.

Details

The chrominance signal is supplied from the chrominance signal generator circuit to the chroma gain control circuit inside IC7 through VR14 (CHROMA GAIN) and pin 22 of IC7. The positive vertical edge signal from the vertical edge signal generator, AGC detect DC signal and the chroma clip signal from the chroma clip signal circuit are mixed together through R18, R58/R57 and R17 and fed via pin 20 to the chroma gain control circuit, where these signals control/reduce the chrominance signal level of the edge of white object.

In the chroma clip/suppress circuit previously explained, the green color which results when the excessively bright object is shot with the camera is clipped by the chroma clip signal. (Refer for the detail to Chroma Clp/ Suppress Circuit.) The chroma clip signal supplied to the chroma gain control circuit minimizes the remaining chrominance signal corresponding to the excessively bright object.

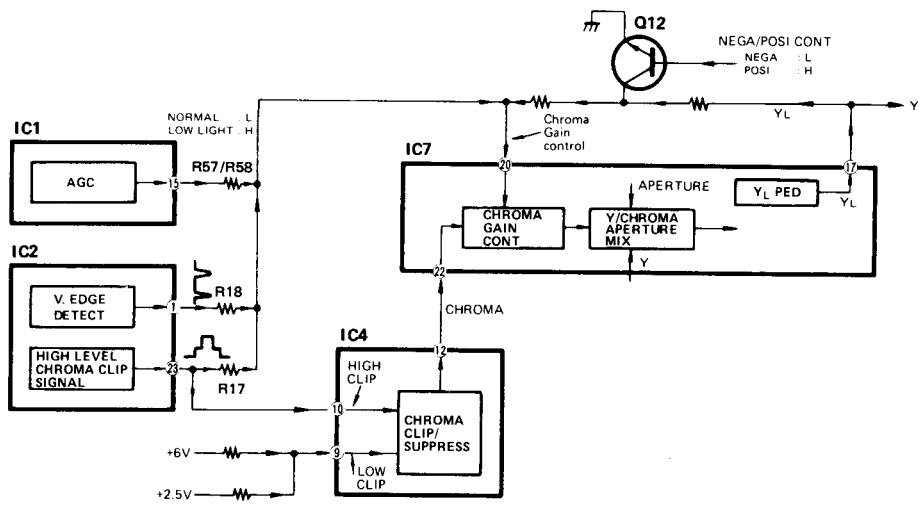


Fig. 5-9-1 Chroma Gain Control Circuit

The vertical transient spurious correction circuit previously described minimizes the unnatural color appears at the vertical edge of object. (Refer for the detail to Vertical Transient Spurious Correction Circuit.) The positive vertical edge signal supplied to the chroma gain control circuit decreases the chrominance signal corresponding to the unnatural color at the vertical edge. The chrominance signal undergoes the chroma gain control is fed to the Y/chroma/aperture mixing circuit inside IC7. The mixed signal of the luminance (YH) signal and the vertical(V) edge signal is fed to the Y/CHROMA/APERTURE mixing circuit through pin 2 of IC7.

The horizontal aperture signal from the horizontal(H) aperture generator circuit and the H.aperture suppress circuit is fed to the mixing circuit through pin 4 of IC7. In the mixing circuit, these signals are mixed.

The mixed signal is supplied to the fade control circuit. The signal level of WVP-A2 is controlled by the fade control signal supplied from the fade/recording control circuit in the Process-2 board through pin 24 of IC7. (Refer for the details to fade/recording control circuit in the Process-2 board.)

The mixed signal is then supplied to the NEGA/POSI select circuit.

When the camera is used in the positive picture condition, the high level of nega/posi control signal is fed from the Microprocessor board through pin 5 of E1 and pin 21 of IC7 to the negative/positive select circuit for selecting the positive position and the normal picture is observed.

If the nega/posi select switch on the side of camera is pressed, the nega/posi control signal is converted from the high level to the low level and the negative picture condition is selected. Therefore when the camera is used for shooting the negative film, the normal picture can be observed by pressing the nega/posi select switch on the side.

However, since the color reproduction characteristic of negative film is different, the chrominance signal amplitude corresponding to the high Y level is extremely high. Q12 suppresses the chrominance signal when the camera is used in the negative picture mode. In the negative position, the low level of nega/posi control signal is fed to the base of Q2 turning OFF Q2. When the Q12 is turned OFF, the YL signal obtained at pin 17 of IC7 is fed through R113, R109 and pin 20 of IC7 to the chroma gain control circuit where the YL signal suppresses the chrominance signal corresponding to the high Y level. In the positive position, the high level is sent to the base of Q12 and Q12 is turned ON. Therefore, the YL signal is not fed to the chroma gain control circuit. The mixed signal is then applied to the title mixing circuit for WVP-A2. The title signals are not mixed for WVP-A1.

- **Title mixing circuit for WVP-A2**

The title 1 & 2 character signals generated in the Microprocessor board is mixed with Y/Chroma signal. The title color/chroma signal is also mixed with it.

All character signal generated in character generator IC2 in the Microprocessor board are sent from pin 41 of IC2 to the character select circuit consisting of Q1 and Q6 - Q8. The character select signal is sent from pin 59 of microprocessor IC1 to the base of Q1 and Q8.

Title 1 & 2 character signals are selected by select circuit Q6 - Q8 and supplied through pin 4 of CN4 and the Process-2 board to pin 9 of IC7 in the Process-1 board. The character signals except title 1 & 2 are selected by character select circuit Q1 and sent to the EVF board. At the ext video neg/pos cont section in IC7, the polarity of character signal is selected by the title polarity select signal supplied from pin 28 of IC1 on the Microprocessor board to pin 5 of IC7 on Process-1 board. When the title polarity signal is high, the title is in color and the picture is inserted into the background.

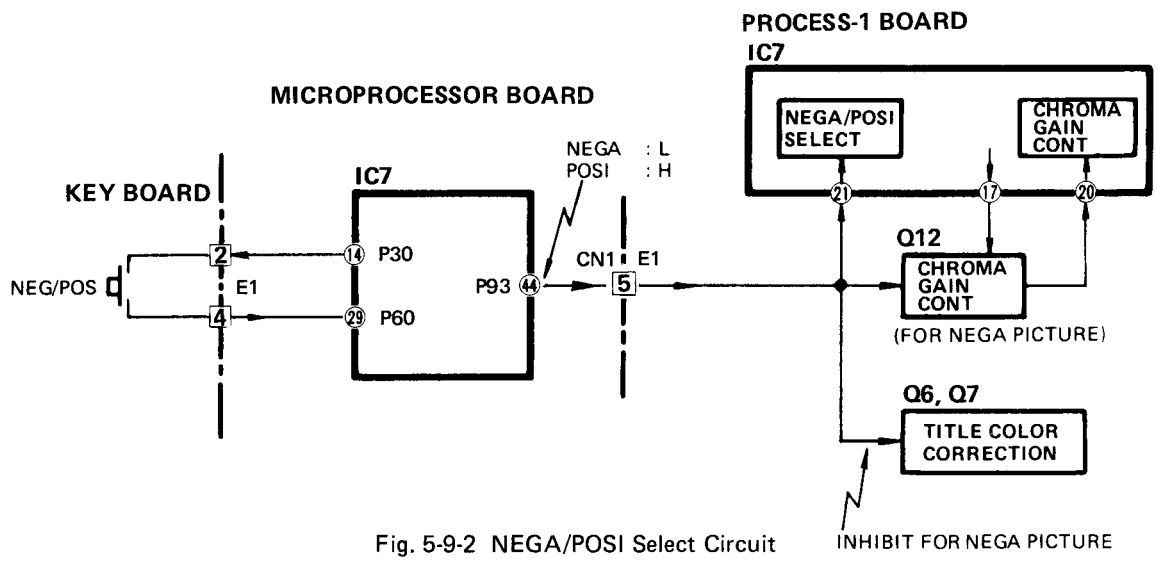


Fig. 5-9-2 NEGA/POSI Select Circuit

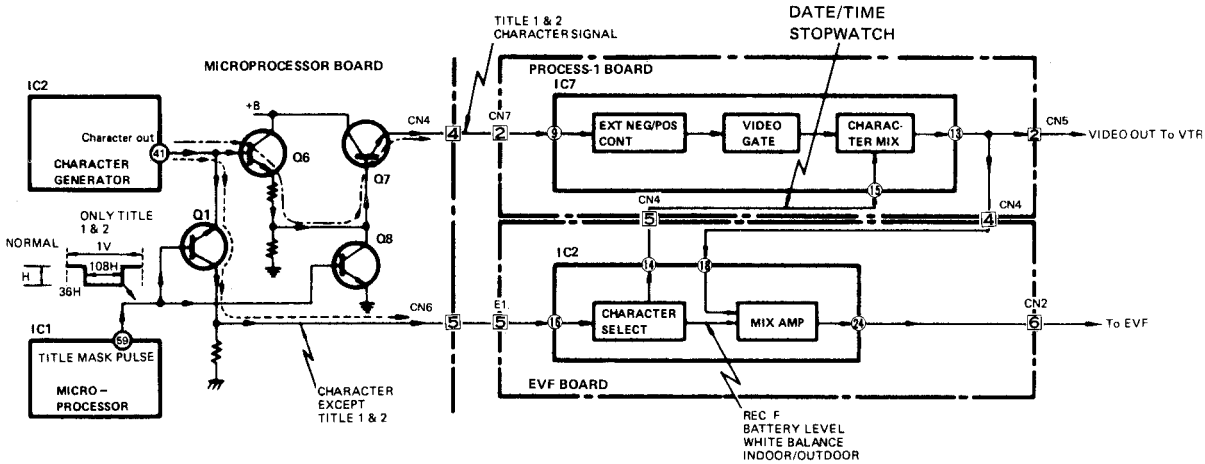
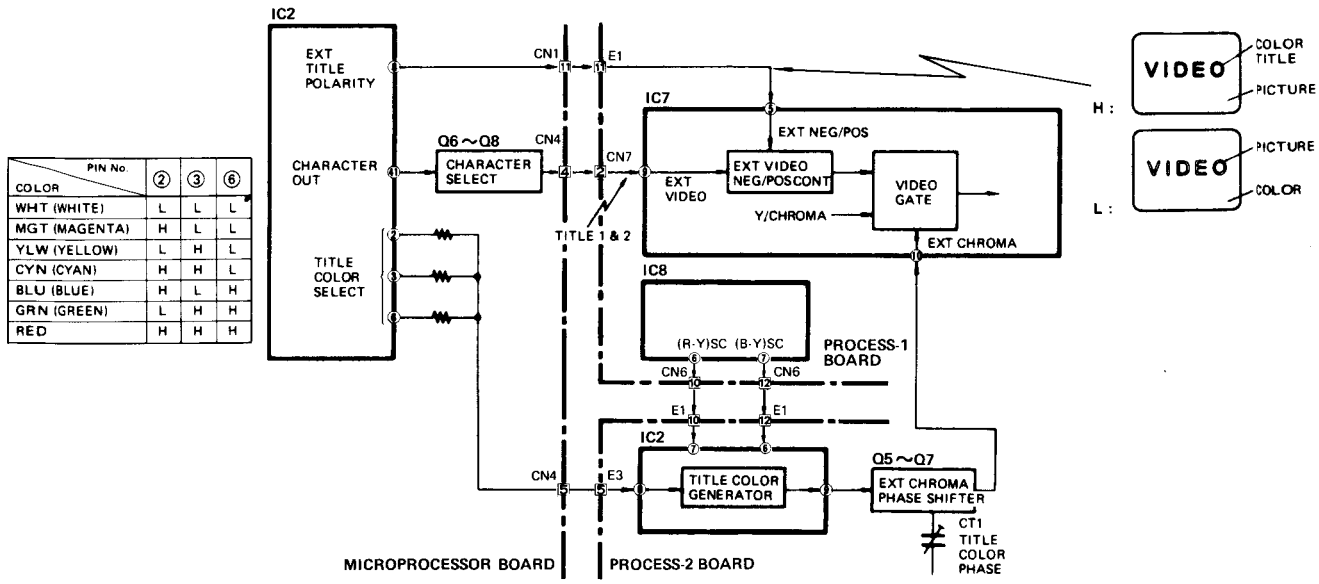


Fig. 5-9-3 Title 1 & 2 Character Signal Circuit-1



PIN No. / COLOR	②	③	⑥
WHT (WHITE)	L	L	L
MGT (MAGENTA)	H	L	L
YLW (YELLOW)	L	H	L
CYN (CYAN)	H	H	L
BLU (BLUE)	H	L	H
GRN (GREEN)	L	H	H
RED	H	H	H

Fig. 5-9-4 Title 1 & 2 Character Signal Circuit-2

When the title polarity signal is changed to low by pressing the KEY button on the title card, the picture is inserted into the title and background becomes in color. The polarity-selected character signal is then sent to the video gate circuit in IC7 in Process-1 board.

At the video gate circuit, the Y/chroma signal corresponding to the title character signal is removed by the character signal and the title color chroma signal supplied to video gate circuit through pin 10 of IC7 is inserted to the portion where the Y/chroma signal is removed.

The title color/chroma signal is generated in IC2 on process-2 board by supplying the (R-Y)SC and (B-Y)SC signal from sync generator IC8 to pins 7 and 6 of IC2 and its color is selected by changing the title color selection voltage made from the title color selection signals at pins 2, 3 and 6 of IC2 with digital/analog converter in the Microprocessor board and supplied to pin 8 of IC2 in the Process-2 board.

The generated title color/chroma signal obtained at pin 9 of IC2 in the Process-2 board is applied to title color phase shifter consisting of Q5 and Q6 on the Process-2 board and its phase is adjusted by CT1 (TITLE COLOR PHASE) to set specified phase. Q7 generates the DC voltage and it is mixed with the title color/chroma signal to set the Y level. The title color/chroma signal is fed through pin 10 of IC7 in the Process-1 board to video gate circuit to insert it to Y/Chroma mixed signal. When the external title mode is selected by pressing the EXT TITLE button on the title card, the int/ext title select signal from pin 53 of IC1 on the Microprocessor board is changed from high (INT) to low (EXT) level and it is supplied to both the bases of Q10 and Q11 on the Process-2 board so that Q11 is turned ON and Q10 is turned OFF.

The prevideo signal from pin 24 of IC1 on the Process-1 board is fed through Q8 and Q9 on the Process-2 board to pin 9 of IC7 on the Process-1 board as a external title signal and the signal produced by the pick-up tube becomes title signal.

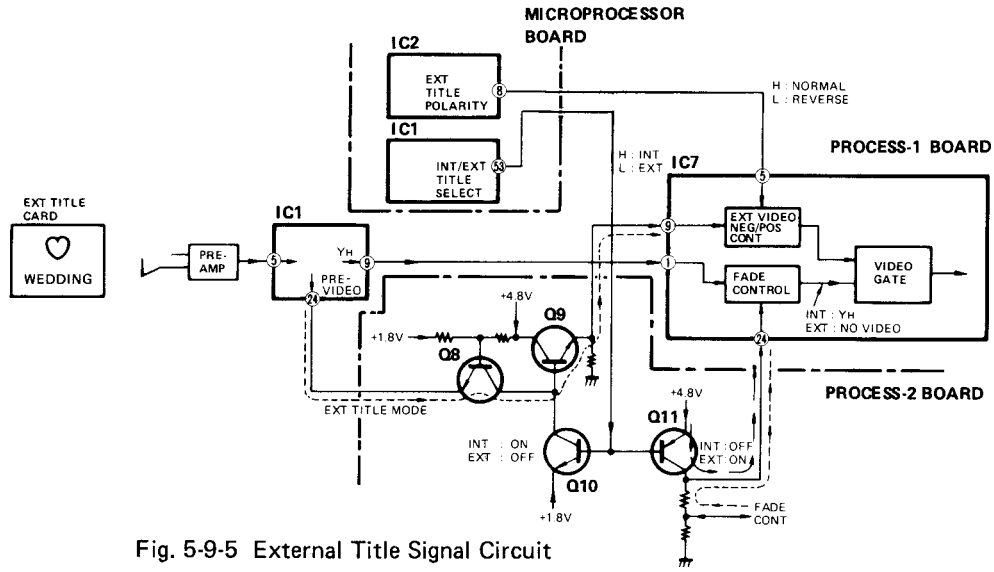


Fig. 5-9-5 External Title Signal Circuit

The external title signal is then supplied to ext neg/pos cont circuit in IC7 and processed as in the case of the internal title signal.

In this case, the fade function is inhibited since Q11 on the Process-2 board turns ON.

If the EXT TITLE button is pressed again, the internal title mode is selected and Q10 turns ON and Q11 turns OFF. As a result, the fade function operates while the external title function is defected.

When red or blue title color is selected, the high level of title color correction signal is supplied from pin 27 of Microprocessor IC1 to the base of Q6 so that Q6 turns OFF and Q7 turns ON. The positive blanking (BL) pulse obtained at pin 18 of sync generator IC8 is converted into the negative pulse by Q7 and is mixed to the base of Q8. The negative BL pulse is mixed with the negative mixed signal of Y/chroma and title color signal and the Y signal level of picture and title is reduced. However, the negative BL pulse is also mixed with the positive Y signal through R89. As a result, the Y signal of picture does not change by the selection of the title color while the Y signal of red and blue color is reduced.

The mixed signal is then fed to the character mix circuit where the characters/graphics signals such as stopwatch and date are superimposed onto the PAL signal. The characters/graphics signals are sent from the EVF board through pin 15 of IC7. The mixed signal is forwarded through pin 6, Q8 (only for WVP-A2) and pin 7 of IC7 to the clamp circuit, where the blanking level of the mixed signal is clamped by the clamp pulse-2 (CP2) supplied from the pulse separator inside IC7. The clamped signal is then sent to the BL mix/high clip/low clip circuit, where it is mixed with the blanking(BL) pulse. The high clip circuit clips the signal exceeds 0.85V and the low clip circuit clips the low level portion of mixed signal for setting the pedestal level. The mixed signal of chrominance and luminance signals which undergoes the high and low clip is mixed with the mixing signal of sync and burst signal in the video output circuit forming a composite PAL signal.

The PAL signal at pin 13 of IC7 is supplied to the VTR. The PAL signal is also supplied to 4.43MHz trap CF7 where the chrominance signal is removed and the luminance signal remains. The luminance signal is then fed to the electronic viewfinder (EVF) board.

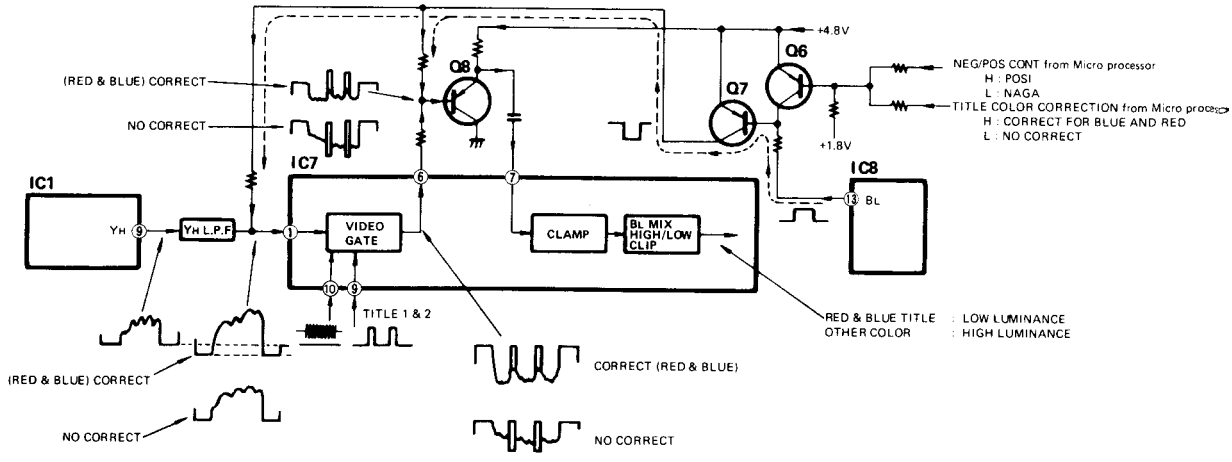


Fig. 5-9-6 Title Color Correction Circuit

5-10 Playback Detect Circuit

Outline

This circuit detects the recording or playback mode of the portable VTR and sends the detected information to the auto iris control circuit on the Power board together with the DC voltage corresponding to the incoming light intensity.

The detected information is also sent to the Microprocessor board.

When the portable VTR is set into the recording mode, the camera supplies the PAL output signal to the viewfinder and the portable VTR for recording.

When the portable VTR is set into the playback mode, the camera is shut OFF and the playback video signal from the VTR is displayed in the viewfinder. The lens iris is also closed during playback mode to protect the pick-up tube from burning.

Details

When the portable VTR is set into the recording mode, no DC voltage is applied through R99 to the base of Q10 so that Q10 and Q9 turn OFF. The low level obtained at the collector of Q9 is fed to the anode of D7 and D7 turns OFF. As a result, the potential at pin 12 of IC7 becomes +1.8V and the video output circuit works properly and the video output signal is sent to the viewfinder and the portable VTR for recording.

When the portable VTR is set into the playback mode, the playback video signal which rides on the +6V DC is supplied from the VTR through pin 2 of CN5. The playback signal is removed by C65 and the remaining +6V DC is fed to the base of Q10 so that Q10 and Q9 turn ON.

The high level obtained at the collector of Q9 is fed to the anode of D7 turning ON D7.

Approximately +4V at the cathode of D7 is supplied to the video output circuit through playback control in IC7 to shut it OFF. In this way the video signal is not sent out from the video output circuit in IC7 and only the playback signal from the portable VTR is supplied to the viewfinder through trap CF7.

At the same time, high level at the collector Q9 is fed to the auto iris control circuit to close the lens iris and the low level at the collector of Q10 is sent through D5 to the Microprocessor board to shut OFF the deflection circuits. The DC voltage which drives the vertical position of level indicator in the viewfinder is grounded through D6.

5-11 White Balance Setting Circuit

Outline

This circuit automatically sets the white balance of picture by controlling the amplitude of red and blue signals respectively when the white set button is pressed. (Proper white balance or color balance means that the camera will reproduce a white object in the picture as white.)

When the set button is pressed, the automatic cycle in the camera increases or decreases R and B signals instep and stops when each of these levels is equal to the green (YL) level. At this point, the R-YL and B-YL signals are both 0(zero), the picture is white and white balance has been achieved.

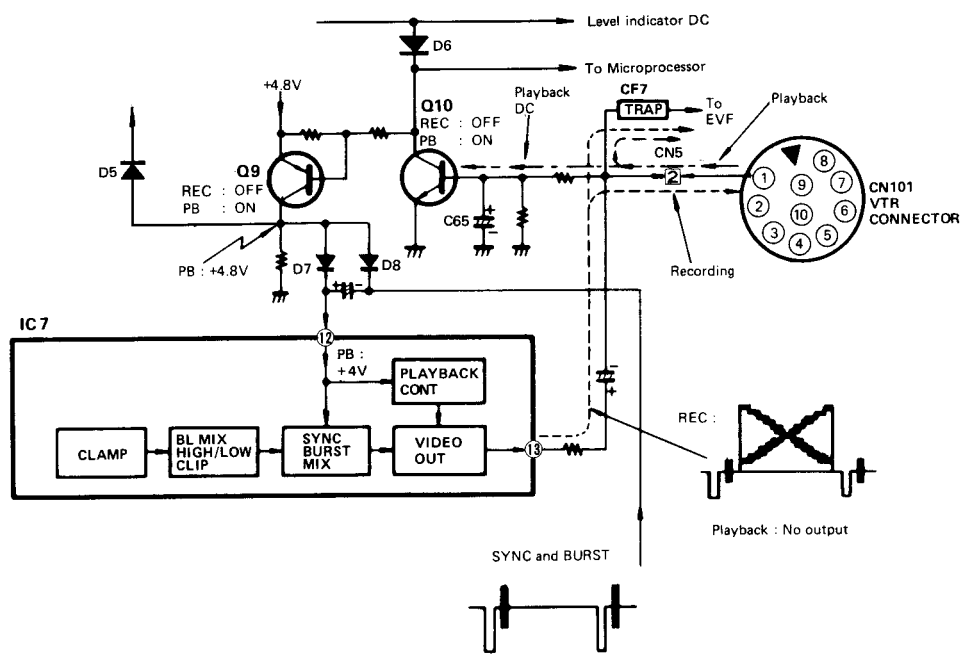


Fig. 5-10 Playback Detect Circuit

This is indicated by the graphics displayed in the viewfinder. The blinking graphics WHITE will be displayed after the power switch is initially turned ON and while the white balance is being set. The blinking WHITE disappears when the automatic white balance processed is finished. The graphics W displayed on the viewfinder indicates that the white balance set previously is backed up and memorized.

Details

When the power switch is turned ON, the positive reset pulse is generated in the microprocessor power supply circuit on the Power board. This reset pulse is fed through pin 3 of CN7 and inverter Q5 to pin 9 of IC1 on the Microprocessor board and IC1 is reset. The DC voltage made by the resetting and obtained at crosspoint of R22 and R23 and crosspoint of R60 and R61 on the Microprocessor board are supplied to the gain control circuit in the R-YL and B-YL signal circuits through pin 2 and pin 3 of E1 to set the initial gain of R and B signals respectively. As a result, the R signal and B signal levels are set and camera will produce average white balance. When the Indoor-Outdoor Selection Switch on the side of camera is set to the INDOOR position, high level is supplied from the Control board for WVP-A1 or the Control-1 board for WVP-A2 to the base of Q21 on the Microprocessor board through pin 3 of CN3 and the camera will produce preset white balance for 3200°K illumination. If the Selection Switch is set to the OUTDOOR position, low level is sent to the base of Q21 and camera will produce preset white balance for 5100°K illumination.

At this time, the blinking graphics WHITE is displayed on the viewfinder. When the graphics are displayed, the white balance should be set by depressing the white set button SW1 on the side of camera while aiming the camera at the white object or white paper.

When the white set button SW1 is depressed, pin 5 of IC3 on the Microprocessor board is connected to ground, the 7-bit up/down counters in the Microprocessor IC1 start counting up or down depending on the levels at pin 1 and pin 4 of IC5 on the Microprocessor board. As the counters count up or down the digital/analog (D/A) converter consisting of Z1/Z2 and Z4/Z5 produce staircase signals. The voltage levels of these D/A converter will set the R and B gain.

These DC voltages are sent to the gain control circuit in IC3 on the Process-1 board and control the R and B signal levels which were initially set for 3200°K or 5100°K illumination depending on position of the Indoor-Outdoor Selection Switch. As the increasing or decreasing voltages made by the stairsteps raise the gain of R and B channels, the levels of R-YL and B-YL signal increase or decrease at pins 14 and 11 of IC3. To determine for the up/down counters counting up or down, an Op-amp for each channel (IC10 pins 1, 2, 3 for red, pins 5, 6, 7 for blue) compares the detected signal levels (DC) which appear at IC4 (pin 18 : R-YL detected DC, pin 20 : B-YL detected DC, pin 19 : reference detected DC). The outputs of comparison at pin 10 and pin 7 of IC10 are sent to the microprocessor board through pins 6 and 7 of E1.

If the output of comparator at pin 1 is high when the R signal level is below the YL signal (The R-YL detected DC level is below the reference detected DC level.), the counter in IC1 on the Microprocessor board starts counting up. The increased DC voltage from the D/A converter is fed to the red gain control circuit to increase the red signal level.

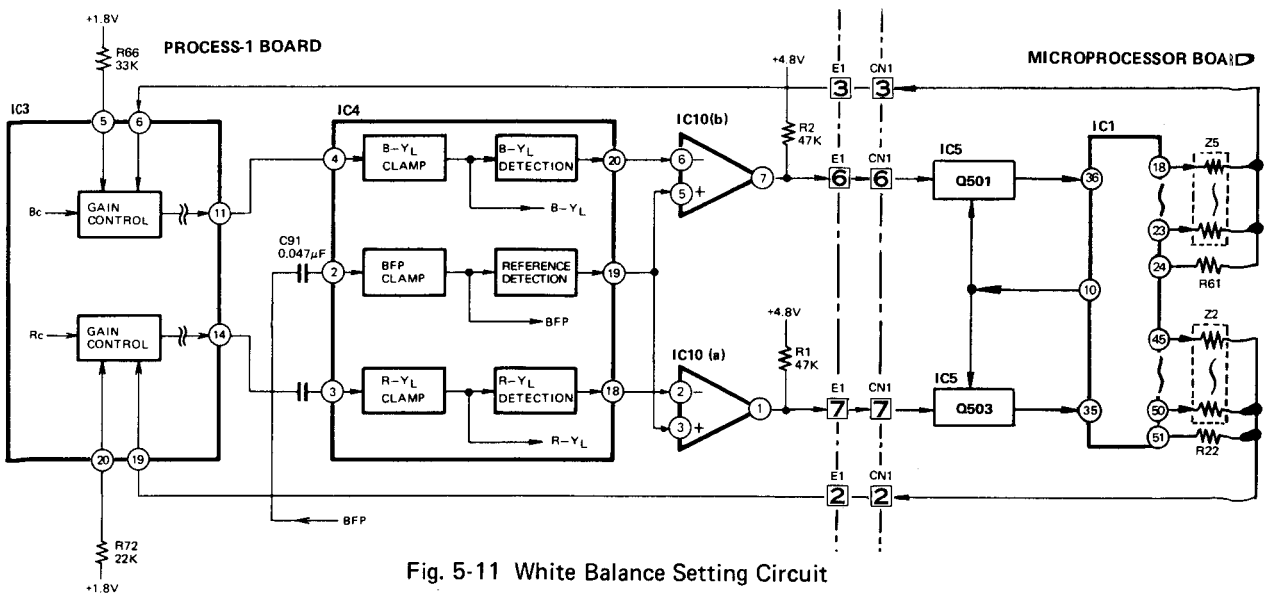


Fig. 5-11 White Balance Setting Circuit

When the R signal just exceeds the YL signal, the comparator switches its output to low and the counter starts counting down. The decreased DC voltage reduces the R signal level. This loop works until the R signal level is equal to the YL signal. The B channel works in a similar fashion.

The counters stop counting automatically about 2 seconds after the white set switch SW1 is depressed and white balance has been achieved. At the same time, the blinking graphics WHITE goes OFF from the viewfinder. The Indoor-Outdoor Selection Switch is changed one position to another, the white balance previously set is reset and the camera produces preset white balance depending upon the position of Selection Switch. When the backup battery is installed into the battery compartment, the white balance previously set is kept even if the power switch is turned OFF. When the power switch is turned ON again in this case, the graphics W is displayed in the viewfinder to indicate that the white balance previously set is produced.

6 Process-2 Board

The Process-2 board contains following circuits.

6-1 Audio Amplifier Circuit 44
6-2 VTR Standby Control Circuit 45
6-3 VTR Remote Control/Fade Control Circuit . . 45
6-4 Title Color Circuit for WVP-A2 47

6-1 Audio Amplifier Circuit

Outline

This circuit amplifies the output from the mounted microphone or external microphones.

The amplified audio signal is sends out to the VTR for recording.

Details

The -72dB output for channel-1 (left) or channel-2 (right) from the internally mounted electret condenser microphone, or one/two external microphone(s) is/are supplied to audio amplifier consisting of Q2, Q3, IC1 and IC3 respectively where it/they is/are amplified +52dB.

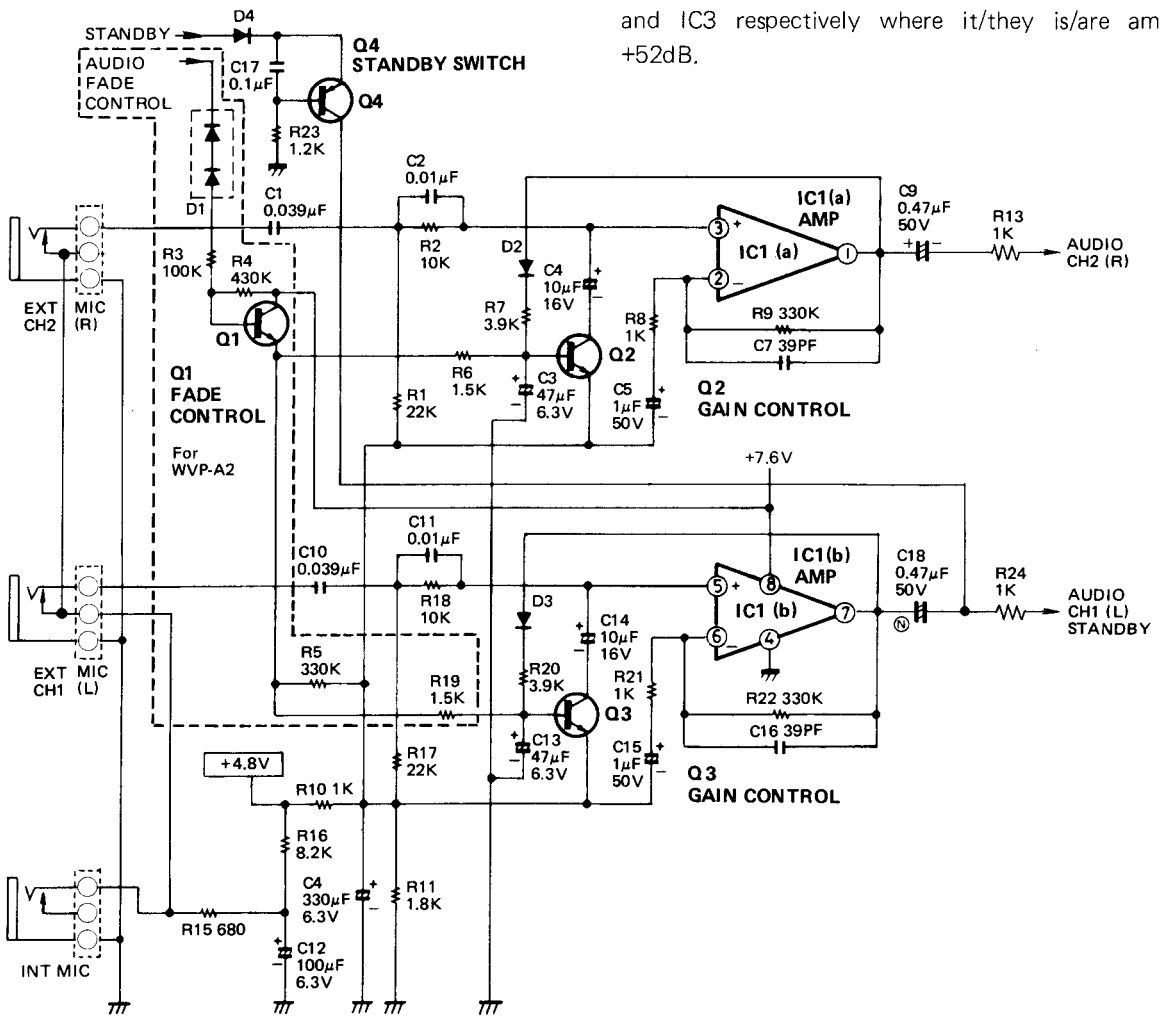


Fig. 6-1 Audio Amplifier Circuit

The -20dB audio output at pins 7 (CH1) & 1 (CH2) of IC1 are sent directly to the portable VTR or via power supply to the table model VTR through pins 3 (CH1) & 4 (CH2) of CN1 and pins 7 (CH1) & 5 (CH2) of camera connector CN101.
The amplified audio signal at pin 7 (CH1) & 1 (CH2) of IC1 are also fed to D3 (CH1) & D2 (CH2) where they are converted into DC voltages.

The rectified DC voltages are supplied to the base of Q3 (CH1) & Q2 (CH2) to control the resistance between the collector and emitter of Q3 & Q2.
When the audio signal level at pin 7 (CH1) & 1 (CH2) of IC1 increases, the DC voltage at the base of Q3 (CH1) & Q2 (CH2) also increases and resistance between collector and emitter decreases. Therefore, the audio signal level at pin 5 (CH1) & 3 (CH2) of IC1 decreases.
When the audio signal level at pin 7 (CH1) & 1 (CH2) of IC1 decreases, the reverse operation takes place.
In this way, the audio signal output level is kept constant.
The audio signal level for WVP-A2 is also controlled by the fade control signal supplied from the fed control circuit through buffer Q1.

6-2 VTR Standby Control Circuit

Outline

This circuit sends the standby signal to the portable VTR together with the audio signal for the channel 1 to set it in the standby mode when the Standby Switch on the camera is placed to the STANDBY position. In the standby mode, the most circuits in the portable VTR are shut OFF while the tape is loaded.

Details

When the Standby Switch is set to the ON position, the microprocessor board sends low level to the anode of D4 through pin 2 of E3 and D4 and Q4 turn OFF.
Therefore, only the audio signal for the channel 1 is sent to the portable VTR through pin 3 of CN1. If the Standby Switch is set to the STANDBY position, however, high level is fed to anode of D4 turning ON D4 and Q4. As a result, approximately 4V is fed to the portable VTR together with the audio signal to set the VTR into the standby mode.

6-3 VTR Remote Control/Fade Control Circuit

This circuit consists of the VTR remote control circuit and the fade control circuit.

6-3-1 VTR Remote Control Circuit

Outline

This circuit generates VTR start/stop (pause) control signal. When the VTR is set to the recording mode, the VTR is started by a high potential from this circuit. If a low potential is sent to the VTR, it stops (pauses). This circuit also has the VTR compatibility switch for other VTR which is started by a low potential and stopped by a high potential.

Details

When the VTR compatibility switch SW1 on the Power board is set in the ⊕ (normal) position and the VTR is set in the recording mode if the power switch is turned ON, the microprocessor IC1 is reset and the high level at pin 52 of IC1 (Microprocessor) is supplied to the base of Q14 so that Q14 turns ON. The low level obtained at the collector of Q14 is supplied to VTR through pin 6 of camera connector CN101 to set the VTR to REC/PAUSE mode.
When the non-lock type VTR start/stop switch SW1 on the handheld grip is depressed, the negative trigger pulse (refer to 1ST TRIGGER) is generated. It is fed to Q502 in IC5 through Q23. The low level is fed through inverter Q14 to the VTR to start recording.
At the same time, the blinking graphics REC is displayed in the viewfinder.
In case of WVP-A2, the reset pulse is sent from the microprocessor IC1 to pin 7 of IC2 in the Process-2 board when the power switch is turned ON and pin 17 of IC1 becomes high (H). The potential at pin 17 of IC1 changed to low (L) by the first trigger and the blinking graphic REC is displayed.

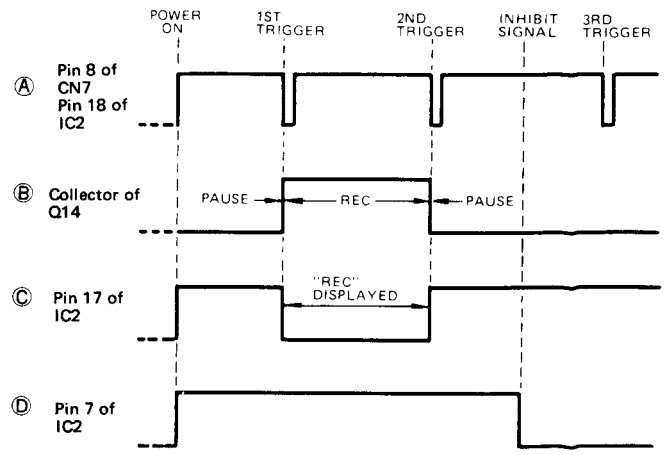


Fig. 6-3-1 VTR Remote Control

When the subsequent trigger pulse is sent to pin 2 of IC5 by depressing SW1 again (refer to 2ND TRIGGER), the potential at pin 52 of IC1 and pin 17 of IC1 is inverted. As a result, the VTR is paused and the blinking REC graphics go OFF.

The VTR compatibility switch SW1 on the Process-2 board inverts the potential of VTR recording control signal at pin 52 of IC1 for other VTR which starts with low potential and stops with high potential.

When the portable VTR is set to the playback mode, an inhibit (Tally) signal (high level) from the VTR is supplied to IC1 to inhibit the trigger pulse from the VTR start/stop switch. Therefore, the REC graphics are not displayed in the viewfinder. This condition is maintained until the playback mode is released and set to the recording mode again.

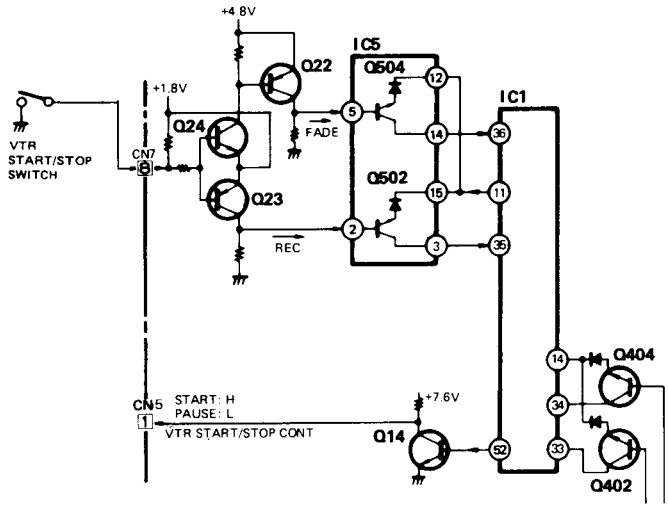


Fig. 6-3-2 VTR Remote Control Circuit for WVP-A1

6-3-2 Fade Control Circuit for WVP-A2

Outline

This circuit generates the fade control signal and sends it to the video signal processing circuit in the Process-1 board and audio amplifier circuit in the Process-2 board to control the fade-in/out effects.

When the VTR is set in the pause mode, if the VTR start/stop switch on the handheld grip is depressed after pressing the fade switch on the side of camera, the picture initially disappears for the fade-in effect. When the picture disappears completely, the recording starts automatically, the picture appears gradually and the fade-in effect is accomplished.

When the VTR is in the recording mode, if the VTR start/stop switch is depressed after pressing the fade switch, the picture gradually disappears to complete the fade-in effect. When the picture disappears completely, the recording stops, the VTR is in the pause and the picture appears again for the next recording.

If the VTR start/stop switch is depressed without pressing the fade switch, no fade effect occurs and the VTR is remote-controlled as described in VTR remote control circuit.

Details

● Fade-in effect

When the momentary fade switch SW2 is depressed (E, 1ST TRIGGER), the DC level at pin 18 of IC2 becomes high. This high level initiates the fade/rec control circuit in IC2. This trigger signal (E) changes the potential at pin 19 of IC1 from high to low J. The low level is fed to the Microprocessor board and the graphics F is displayed in the viewfinder. Then when the VTR start/stop switch SW1 on the handheld grip is depressed (F, 1ST TRIGGER), pin 18 of IC2 goes low and the DC level at pin 22 starts increasing gradually (H).

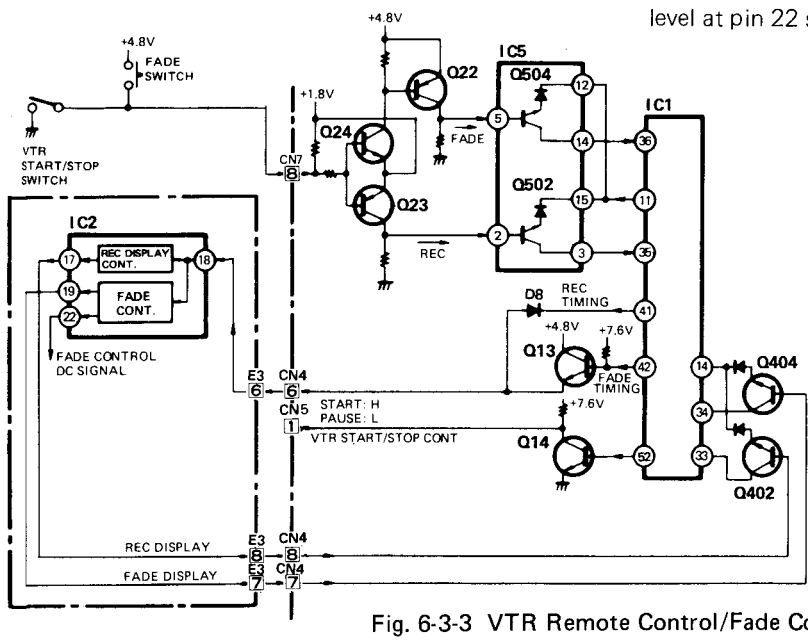


Fig. 6-3-3 VTR Remote Control/Fade Control Circuit for WVP-A2

After about few seconds the potential at pin 52 of IC1 (Microprocessor) becomes low level and the collector of Q14 becomes high to set the VTR starts recording. The potential at pin 17 of IC2 goes low (K) and it is fed to the Microprocessor board to display the blinking graphics REC in the viewfinder. Simultaneously the DC level at pin 22 starts decreasing gradually. This DC level (H) at pin 22 is fed to the fade control circuit in the video signal processing circuit on the Process-1 board and the audio amplifier circuit to control the video and audio signal level (I). This means that the VTR start/stop switch is pressed, the video signal is decreased gradually at first and then appears again gradually (fade-in effect) after recording starts. Therefore the recording proceeds as shown (M).

When the fade-in effect is completed, the potential at pin 19 of IC2 is changed from low to high (J) and the graphics F goes OFF.

If the VTR start/stop switch SW1 is depressed independently after fade-in effect is accomplished (F, 2ND and 3RD TRIGGER), the VTR can be controlled remotely as previously described in VTR remote control circuit.

If the fade switch SW2 is depressed again after it is initially pressed (E, 3RD and 4TH TRIGGER), the initial setting for fade effect will be cancelled.

• Fade-out effect

As in the case of fade-in effect, if the VTR start/stop switch SW1 is depressed (F, 4TH TRIGGER) after pressing the fade switch SW2 (E, 2ND TRIGGER), the DC level at pin 22 of IC2 starts increasing gradually to fade-out the video signal. After few seconds, the potential at pin 52 of IC1 (Microprocessor) changes from low to high and VTR stops (pauses). This DC level decreasing gradually at pin 22 is fed to the fade control circuit and the audio amplifier circuit to control the video and audio signal level.

When the VTR start/stop switch is pressed after depressing the fade switch, the picture disappears at first (fade-out effect), VTR pauses and then the picture appears again gradually for next recording.

When the VTR stops, both the graphics REC and F disappears from the viewfinder.

When the portable VTR is set to the playback mode or the standby switch is set to the standby position, pin 7 of IC2 becomes low and the fade/rec control circuit is reset as described in VTR Remote Control Circuit. Therefore the fade/rec control circuit is not controlled by depressing the VTR start/stop switch and the fade switch.

6-4 Title Color Circuit for WVP-A2

Refer to • Title mixing circuit for WVP-A2 on page 39.

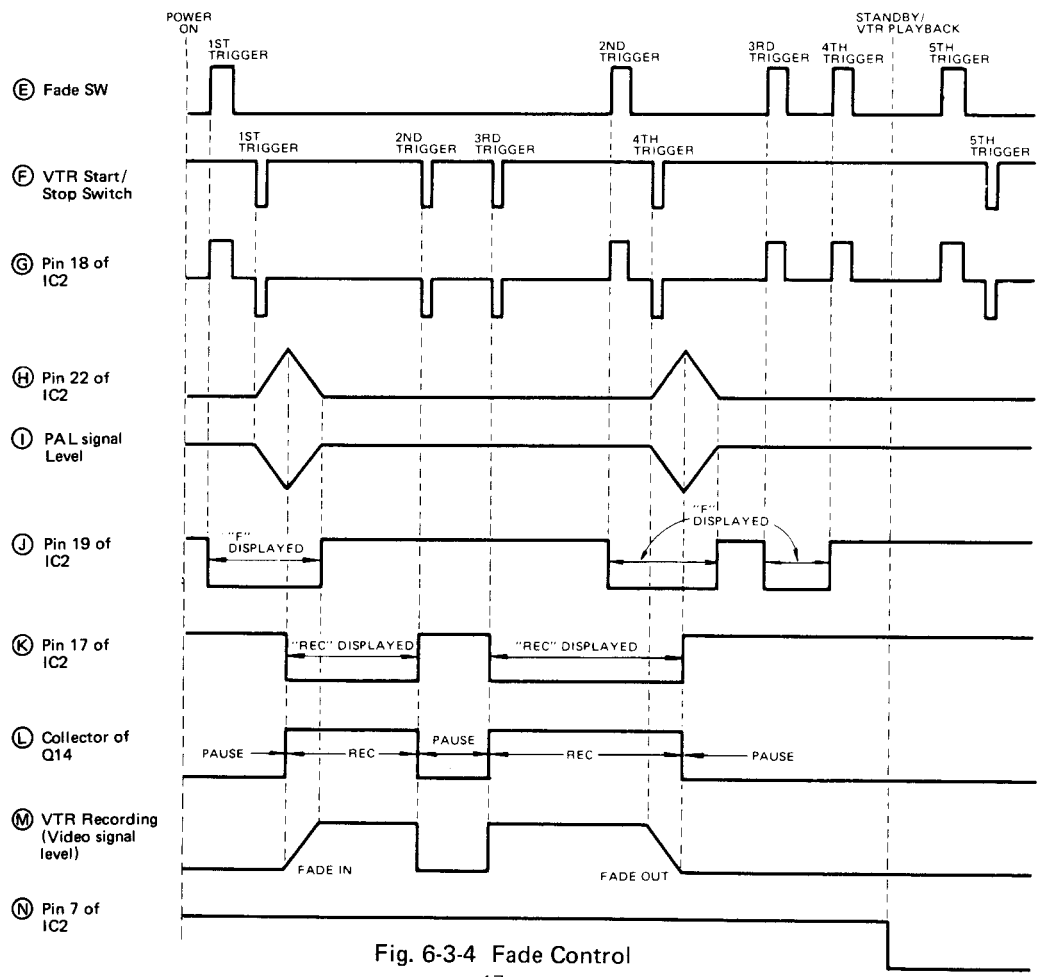


Fig. 6-3-4 Fade Control

7 Microprocessor Board

The Microprocessor board contains following circuit.

7-1 Microprocessor Circuit 48
7-2 Input Interface Circuit 53
7-3 Character Generator Circuit 53
7-4 High Voltage Circuit 53
7-5 Bias Light Circuit 54

7-1 Microprocessor Circuit

Outline

The microprocessor IC1 generates the programmed key scan pulse signals from the output ports of IC1 and receives these signals at the input ports of IC1 through the input interface circuits.

According to the input signals, the microprocessor IC1 supplies the instructional signals to the character generator IC2 and also transmits or receives serial data from/to VTR for VTR remote control and displaying characters.

- **Serial data transmission**

When the portable color video camera WVP-A1/A2 is used with the portable VTR, the serial data transmission system is performed between the both units through 10-pin camera connector.

The signals which are exchanged between the two units through 10-pin connector are shown in Fig. 7-1-1.

Pin	CAMERA	DIRECTION
1	Video OUT (REC) Video IN (P.B)	VTR ⟷ CAMERA
2	GND for pin 1	VTR ⟶ CAMERA
3	Serial Data IN/OUT	VTR ⟷ CAMERA
4	Serial Clock IN	VTR ⟶ CAMERA
5	STANDBY Ⓗ / AUDIO (CH2 (R)) OUT	VTR ⟵ CAMERA
6	CAMERA PAUSE Ⓛ	VTR ⟵ CAMERA
7	Audio (CH1 (L)) OUT	VTR ⟵ CAMERA
8	GND for Audio	VTR ⟶ CAMERA
9	GND for pin 10	VTR ⟶ CAMERA
10	+12V	VTR ⟶ CAMERA

Fig. 7-1-1 10 pin Connector Signal

The serial clock signal is a reference signal which is used to control the timing of the data transmission between camera and VTR.

The serial clock signal is produced by VTR s microprocessor and supplied to camera s microprocessor IC1 as shown in Fig. 7-1-2.

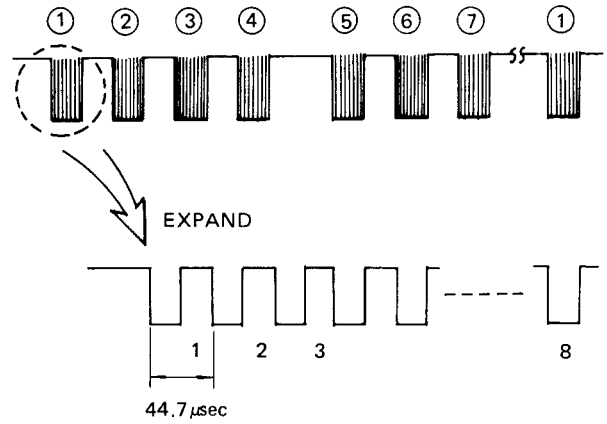


Fig. 7-1-2 Serial Clock

The serial clock signal has seven transmissions, and each transmission consists of 8-bit pulses.

During each transmission, the 8-bit serial data is exchanged as shown in Fig. 7-1-3.

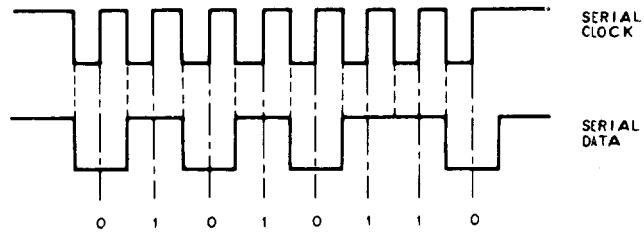


Fig. 7-1-3 Serial Data

The informations are converted into 8 bit logic data inside microprocessor IC1. For example, the coded data (Serial Data) is (0.1.0.1.0.1.1.0) and the timing chart between the serial data and the serial clock is shown in Fig. 7-1-3.

No.	DATA TRANSMISSION	
①	CAMERA ⟶ VTR	
②	TUNER ⟶ VTR	· REC/P.B SELECT
③	WIRED REMOTE CONTROLLER ⟶ VTR	· VTR P.B REMOTE CONTROL
④	INSIDE VTR	
⑤	VTR ⟶ CAMERA / TUNER / WIRED REMOCON	· BATTERY LEVEL
⑥	VTR ⟶ CAMERA	
⑦	VTR ⟶ CAMERA	

Fig. 7-1-4 Serial Data Transmission

The following serial data is supplied from the VTR to the camera during the transmission (5), (6) and (7) as;

- Battery level

The following serial data is supplied from the camera to the VTR during the transmission (1) as;

- Remote control of playback (PLAY, SLOW, CUE, REVIEW)
- REC/Playback selection signal

Details

The pin identifications and functions of the microprocessor IC1 is described in the Table 7-1.

IC1 MN1554 CVH

Pin Identifications

Pin No.	Name	IN/OUT	Descriptions
1	P12	OUT	F-VTR Display (F-VTR = L) F-VTR = Portable VTR with CAMERA SELECT Switch
2	P13	OUT	Tally Cancel Signal (F-VTR only)
3	SYNC	OUT	Not Used
4	SIRQ	IN	V.SYNC Input
5	IRQ	IN	Serial Clock (Inverted) Input
6	SBT	IN	Serial Clock Input
7	SBO	OUT	Serial Data Output
8	SBI	IN	Serial Data Input
9	RST	IN	Reset Pulse Input
10	P20	OUT	Key Scanning Pulse Output Data Output for DAO (20) of MN1237 **(IC2)**
11	P21	OUT	Key Scanning Pulse Output Data Output for DA1 (22) of MN1237 **(IC2)**
12	P22	OUT	Key Scanning Pulse Output Data Output for DA2 (23) of MN1237 **(IC2)**
13	P23	OUT	Key Scanning Pulse Output Data Output for DA3 (25) of MN1237 **(IC2)**
14	P30	OUT	Key Scanning Pulse Output Data Ouptut for DA4 (28) of MN1237 **(IC2)**
15	P31	OUT	Key Scanning Pulse Output Data Output for DA5 (29) of MN1237 **(IC2)**
16	P32	IN	**Not used**
17	P33	IN	**Not used**
18	P40	OUT	Automatic White Balance (B) **6** (LSB)
19	P41	OUT	Automatic White Balance **(B) 5**
20	P42	OUT	Automatic White Balance **(B) 4**
21	P43	OUT	Automaitc White Balance **(B) 3**
22	P50	OUT	Automatic White Balance **(B) 2**
23	P51	OUT	Automatic White Balance **(B) 1**
24	P52	OUT	**Automatic White Balance (B) 0 (MSB)**
25	VDD	IN	+5V DC Power Input
26	PC0	OUT	**Not used**
27	PC1	OUT	Title Color Correction Output (Blue, Red = H, else = L)
28	P53	OUT	INT/EXT Title Select (INT = H, EXT = L)
29	P60	IN	Key Scanning Pulse Input
30	P61	IN	Key Scanning Pulse Input
31	P62	IN	Key Scanning Pulse Input
32	P63	IN	Key Scanning Pulse Input
33	P70	IN	Key Scanning Pulse Input
34	P71	IN	Key Scanning Pulse Input
35	P72	IN	Key Scanning Pulse Input
36	P73	IN	Key Scanning Pulse Input
37	P80	IN	Serial Clock (Tally Detect) Input
38	P81	IN	Camera Power ON/OFF Detect Input (ON = H, OFF = L)
39	P82	IN	Timer Count Pulse (50 Hz = V.pulse) Input
40	P83	IN	Standby Detect Input (ON = L, Standby = H)
41	P90	OUT	REC Timing Pulse Output
42	P91	OUT	FADE Timing Pulse Output
43	P92	OUT	REC RESET Pulse Output
44	P93	OUT	NEGA/POSI Select Output (NEGA =L, POSI = H)
45	PA0	OUT	Automatic White Balance **(R) 6 (LSB)**
46	PA1	OUT	Automatic White Balance **(R) 5**
47	PA2	OUT	Automatic White Balance **(R) 4**
48	PA3	OUT	Automatic White Balance **(R) 3**
49	PB0	OUT	Automatic White Balance **(R) 2**
50	PB1	OUT	Automatic Whtic Balance **(R) 1**
51	PB2	OUT	**Automatic White Balance (R) 0 (MSB)**
52	PB3	OUT	**REC START/PAUSE Control Output (Start = L for PANASONIC)**
53	OSC	OUT	Clock Pulse Generator
54	OSC	IN	Clock Pulse Generator or Clock Pulse Input
55	TCI	IN	H. SYNC or 32.768 KHz Pulse Input (Power ON = H. SYNC)
56	TC1	OUT	Timer Pulse Generator
57	Vss	---	Ground
58	P00	OUT	Timer Count Select Output (ON = L, STBY/Power OFF = H)
59	P01	OUT	Title Mask pulse Output (Title 1,2 only)
60	P02	OUT	V. SYNC Output
61	P03	OUT	Power Control Output (Power OFF = H, ON = L)
62	PC2	OUT	**Playback Control Output (Playback : H)**
63	P10	OUT	**ADM Output for MN1237 (IC2)**
64	P11	OUT	**LDI Output for MN1237 (IC2)**

Table 7-1 Pin Identification of IC1 (Microprocessor)

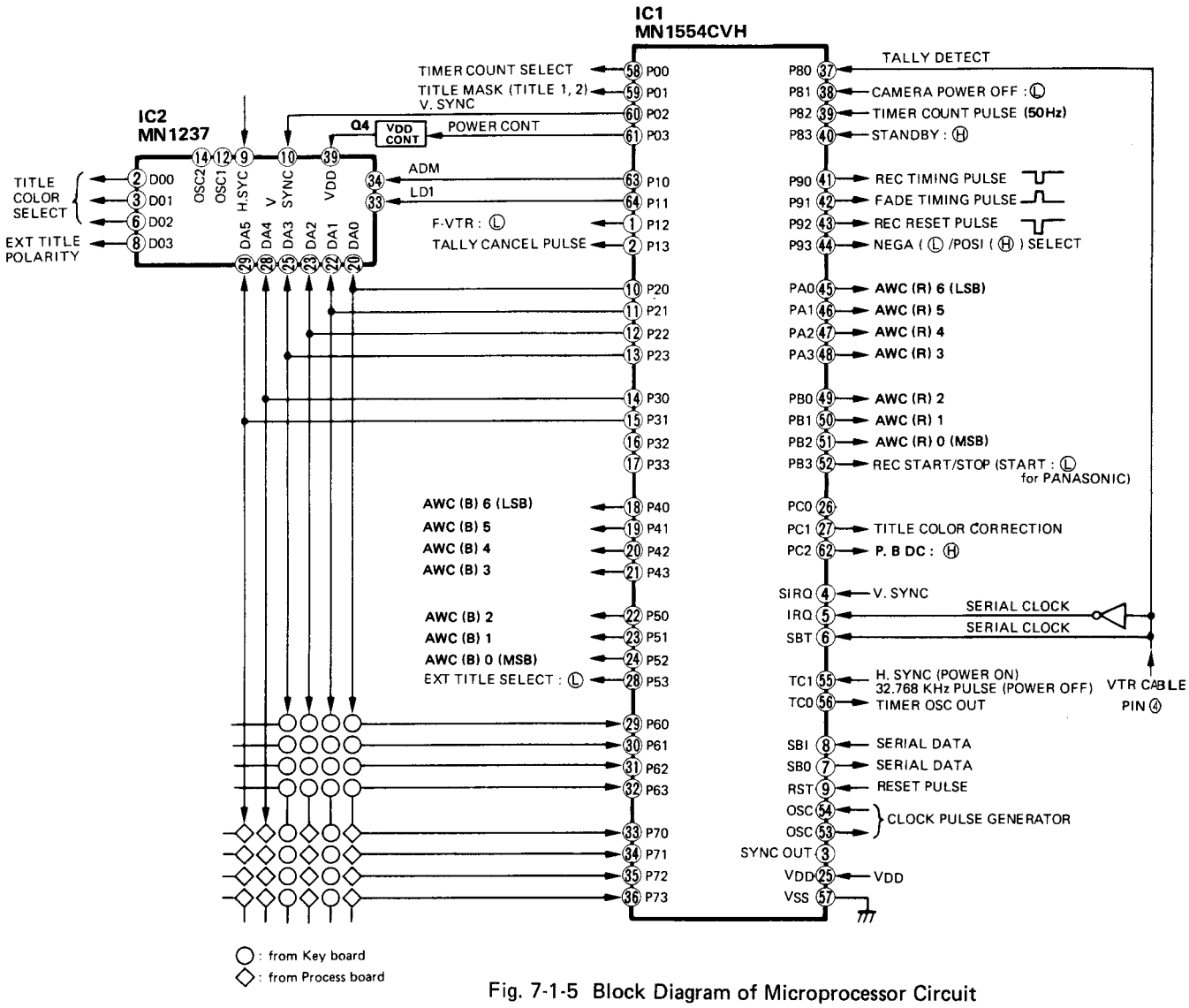


Fig. 7-1-5 Block Diagram of Microprocessor Circuit

IC2 MN1237

Pin Identifications

Pin No.	Name	Description
1	VOB	Character Background Signal Output
2	DO0	Title Color Select-0 Out
3	DO1	Title Color Select-1 Out
6	DO2	Title Color Select-2 Out
8	DO3	Key Polarity Select Out
9	H. SYNC	H. SYNC Input
10	V. SYNC	V. SYNC Input
12	OSC 1	Clock Pulse Generator
14	OSC 2	
15	Vss	Ground
20	DA0	Data Input Bus-0
22	DA1	Data Input Bus-1
23	DA2	Data Input Bus-2
25	DA3	Data Input Bus-3
28	DA4	Data Input Bus-4
29	DA5	Data Input Bus-5
31	DA6	Data Input Bus-6
33	LDI	Strobe Pulse Input
34	ADM	Address Mode Select Input
35	TST	Test Input Concected to Ground
39	VDD	+5V Power Supply Input
41	VOW	Character Signal Output

Table 7-2 Pin Identification of IC1

IC2 MN1237

TITLE COLOR SELECT

DOϕ	DO1	DO2	TITLE COLOR
0	0	0	WHT (White)
1	0	0	MGT (Magenta)
0	1	0	YLW (Yellow)
1	1	0	CYN (Cyan)
0	0	1	(CYN (Cyan))
1	0	1	BLU (Blue)
0	1	1	GRN (Green)
1	1	1	RED (Red)

DO3 (KEY POLARITY OUT (EXT NEGA))
NORMAL : H
REVERSE : L

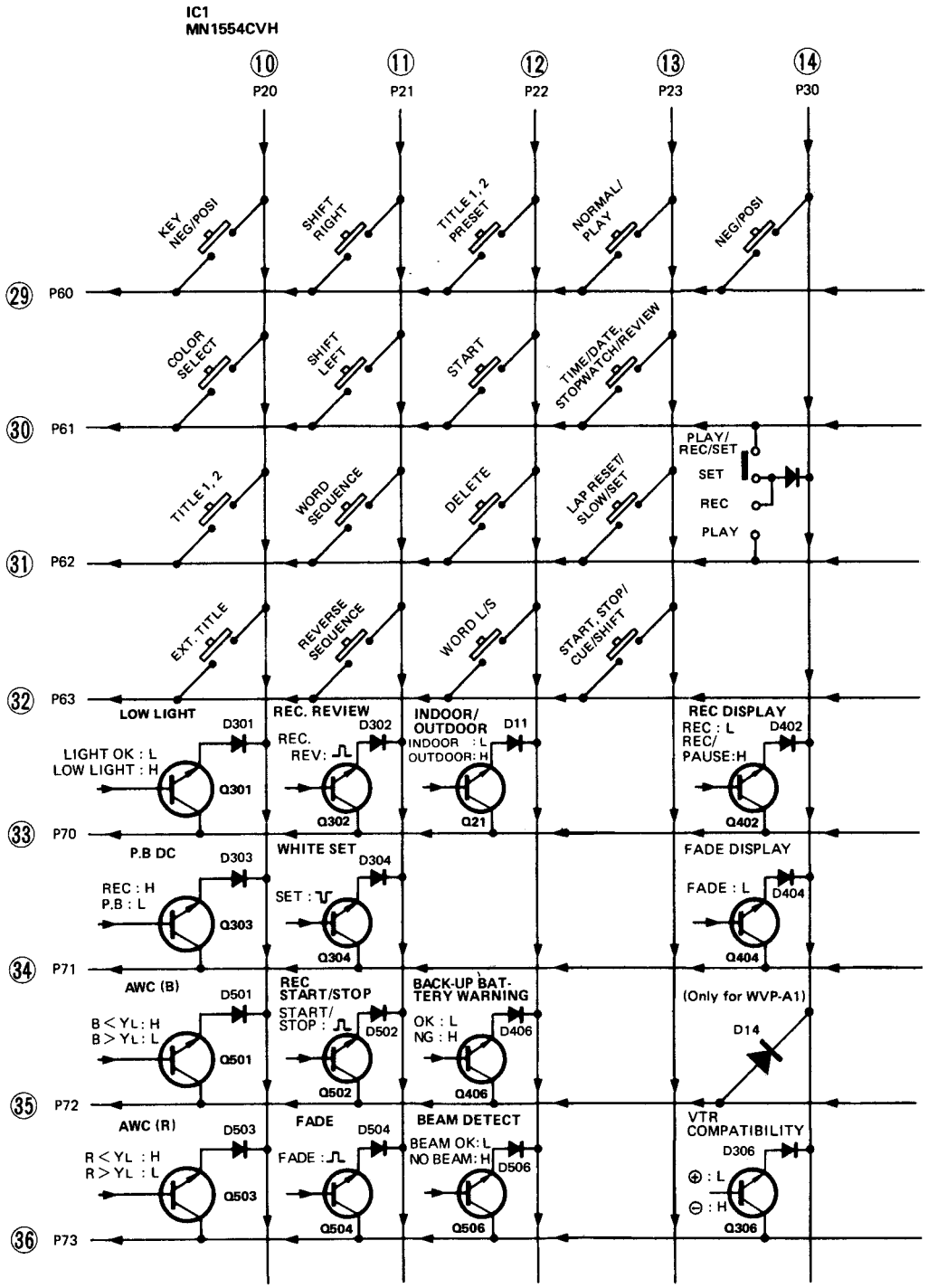


Fig. 7-1-6 Input Matrix Circuit

The programmed signals (key scan pulse) are supplied from output ports P20, P21, P22, P23, P30 and P31 to input interface circuits.
These programmed signals are supplied from the input interface circuits to input port P60, P61, P62, P63, P70, P71, P72 and P73 through switches and transistors. (Refer to 7-2, Input Interface)
According to the programmed signals at input port P60, P61, P62, P63, P70, P71, P72 and P73, and the signal at input port P32 and P33, the microprocessor identifies the instruction with the signal flow route at input interface circuit and supplies the instructional signals (P20 - P23, P30 - P31) to character generator IC2. The serial clock pulse is supplied from VTR through amplifier Q19 and inverter Q18 to pin 5 (IRQ) and pin 6 (SBT) of IC1 to match the timing for data transmitting and receiving to/from VTR.

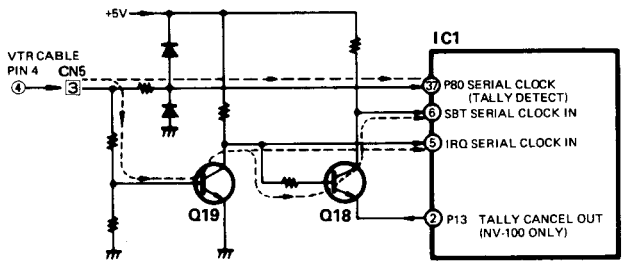


Fig. 7-1-7 Serial Clock Circuit

The serial data is fed from VTR to pin 8 (SBI) of IC1 so that the microprocessor identifies the instruction from VTR. Also the serial data is sent from pin 7 (SBO) of IC1 to VTR through serial data transmission amplifier Q20. (Fig. 7-1-8)

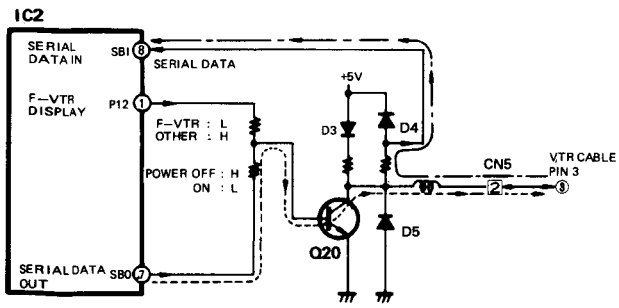


Fig. 7-1-8 Serial Data Circuit

The 50 Hz clock pulse (Timer Count Pulse) generated by the wide blanking (W.BL) pulse in the Process-1 board for the stopwatch function is supplied through inverter Q12 to pin 39 (P82) of IC1 during recording mode. The V. sync pulse is fed from the sync separation circuit on the EVF board through amplifier Q2 to pin 4 (SIRQ) of IC1 to control the vertical timing.

The character select circuit is shown in Fig. 7-1-9. The character select circuits separates the characters generated from the character generator IC2 into two signals, the title character signal and other character signal, according to the vertical position of character/ graphics.

The all character signal is sent to the emitter of Q1 and the base of Q6 from pin 41 of IC2. The title mask signal is supplied from pin 59 (PO1) to both the bases of Q1 and Q8. During the positive period of mask signal, Q1 turns ON and the title-1 & 2 character signal is fed to the Process-1 board. during the negative portion of the mask signal, Q8 turns OFF and the character signal except the title-1 & 2 is sent to the EVF board.

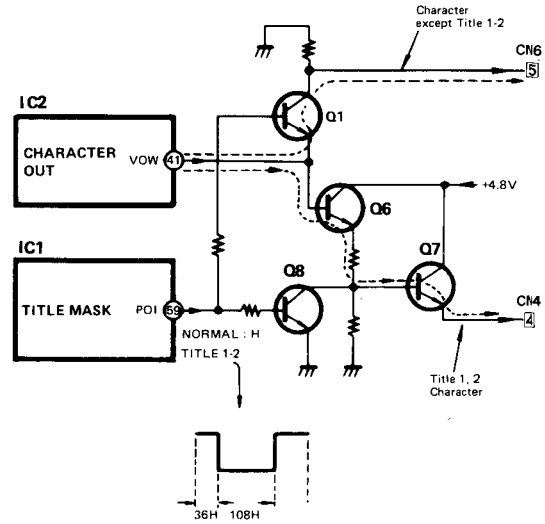


Fig. 7-1-9 Character Select Circuit

The REC timing signal is fed from pin 41 (P90) of IC1 to rec control circuit on the Process-2 board to protect the misoperation of the fade-in/out function by the electrostatics noise by controlling the fade-in/out timing. The fade timing signal is also supplied from pin 42 (P91) of IC2 to rec control circuit on Process-2 board for the same reason and purpose.
The NEGA/POSI control signal is applied from pin 44 (P93) of IC1 to the video signal processing circuit on the Process-1 board to select the positive (normal) or negative picture.
The camera power detect circuit consisting of Q16 and Q17 detects ON or OFF of the camera power and sends the information to pin 38.
IC1 sends out the power control signal from pin 61 to both Q3 and Q4.
When the camera is operated normally, Q3 and Q4 are turned ON and +5V is sent to other circuit. When the camera power is cut off, Q3 and Q4 are turned OFF and +5V is not fed to other circuit for saving the battery life.

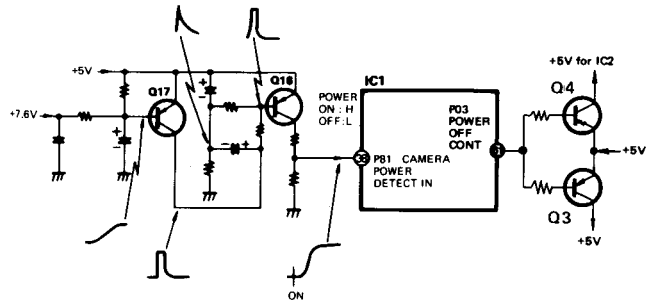


Fig. 7-1-10 Power Control Circuit

7-2 Input Interface Circuit

The input interface circuits consist of the three blocks as;

- EVF Display Board Circuit
- Camera Conditions Sensor Circuit

and these are constructed in the matrix circuit.

The output ports and input ports of the microprocessor are incorporated with the matrix circuit.

The programmed signals (key scan pulses) are supplied from the output ports P20 - P23, P30 - P31 to the matrix circuit so that the programmed signals are returned to the input ports P60 - P63, P70 - P73 through diodes/switches, in the matrix circuit.

The microprocessor IC1 detects the function of the camera by detecting the returned programmed signal. According to the signals at the input ports of the microprocessor IC1, the microprocessor supplies the graphics instructions to the character generator, IC2 and the remote control instructions to VTR.

7-3 Character Generator Circuit

The pin identifications and functions of IC2 is described in Table 7-2.

The clock pulse frequency of IC1 is adjusted by VR1 (CHARACTER SIZE).

The display characters are separated into the three categories as;

(1) A : Cannot be recorded and only displayed on the EVF.

(2) B : Can be recorded and supplied to VTR except title-1 & 2.

(3) C : Title-1 & 2 (can be recorded)

The character (A + B) at pin 41 (VOW) of IC2 is supplied through Q1 to pin 16 of IC1 on the EVF board. The character (A + B) is separated into the graphics (A) and graphics (B) inside IC1 on the EVF board.

The graphics (B) is fed from pin 14 of IC1 on the EVF board to the process-1 board and mixed with the video signal inside IC7 on the the process-1 board. The PAL signal (video + C + B) is supplied from pin 13 of IC7 to VTR through pin 1 of CN101 camera connector cable. Also PAL signal (EVF video + C + B) is supplied from pin 13 of IC7 through the trap (CF7) and pin 18 of IC1 on the EVF board.

The signal (EVF video + C + B) is mixed with the graphics (A) inside IC1 on the EVF board so that the signal (EVF video + C + B + A) is supplied from pin 24 of IC1 to the viewfinder.

7-4 High Voltage Circuit

Outline

This circuit generates high voltages needed for the pick-up tube.

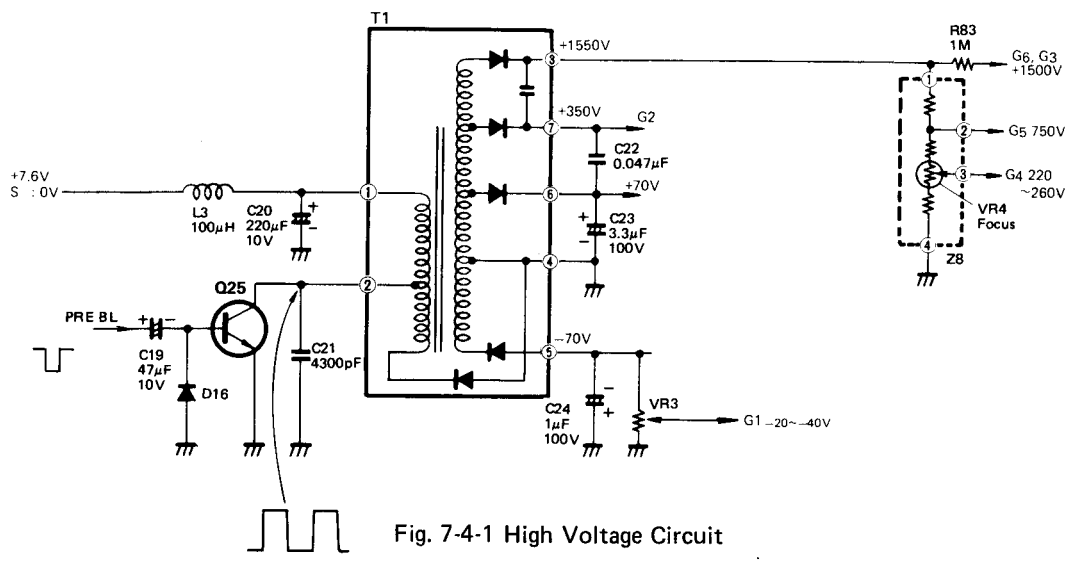


Fig. 7-4-1 High Voltage Circuit

Details

The pre-blanking(PRE BL) pulse fed from the Process-1 board is supplied to the primary winding of step-up transformer in high voltage pack T1 through driver Q25 to step up the PRE-BL pulse to necessary level.

The boosted pulses obtained at the secondary winding of step-up transformer are rectified to generate high voltages.

The high voltages are derived as follows.

The -70V obtained at pin 5 of T1 is fed to grid-1(G1) through Q27. VR3 (BEAM) is a control for the beam amount of pick-up tube.

The +350V at pin 7 of T1 is applied to grid-2(G2) directly.

The +1.5kV obtained at pin 3 of T1 is supplied to grid-6(G6).

The voltages for grid-4(G4) and grid-5(G5) are obtained by dividing +1.5kV by block resistor Z8 and VR4 (FOCUS) in Z8.

The +70V obtained at pin 6 of T1 is fed to the Deflection board.

7-5 Bias Light Circuit

Outline

The pick-up tube produces dark current when the light is blocked by capping the lens for example.

The dark current of Newvicon® is extremely small comparing with vidicon. Therefore, when the camera is aimed at the dark scene, potential at the photoconductive(target) layer of Newvicon® becomes lower than that of vidicon and the electron beam becomes insufficient to discharge the target. As a result, the beam does not respond to the variation of incoming light intensity to the Newvicon® and lag increases. (When a moving object is shot, or when the camera is panned, a trailing image is exhibited. This trailing image is called lag.)

In order to minimize the lag, bias light LEDs are positioned at the rear portion of pick-up tube for increasing the light intensity of the Newvicon®.

Details

The DC current adjusted by VR2 (BIAS LIGHT) flows into bias light LEDs in the bias light assembly through Q26 and pin 2 of CN10 to light them in order to keep the light intensity of the pick-up tube to certain level. VR2 adjusts the brightness of LEDs.

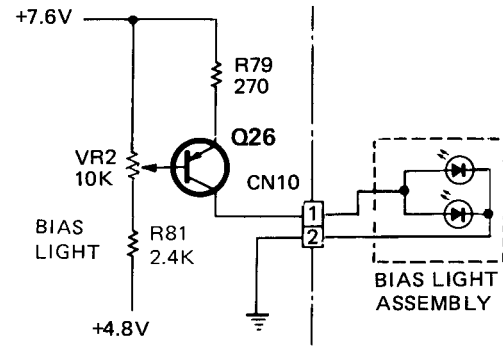


Fig. 7-5 Bias Light Circuit

8 EVF Board

The EVF (Electronic Viewfinder) board contains following circuits.

8-1 EVF Video Amplifier Circuit 54
8-2 EVF Vertical Deflection Circuit 55
8-3 EVF Horizontal Oscillation Circuit 55
8-4 EVF High Voltage Circuit 56

8-1 EVF Video Amplifier Circuit

Outline

This circuit amplifies the video signal supplied from the Process-1 board and fed it to the cathode ray tube(CRT) together with the level indicator signal which indicates the video level and the character signal which is generated in the Microprocessor board for graphics display on the CRT screen.

Details

The PAL signal from the Process-1 board is applied to pin 18 of IC1 through trap CF7 which is located on the Process-1 board for removing the chrominance components in the PAL signal. The video signal is clamped and amplified inside IC1 then mixed with level indicator signal and character signal.

The mixed signal obtained at pin 24 of IC1 is supplied to grid-1(G1) of the CRT through VR4 (CONTRAST) and amplifier Q2 in the Viewfinder board.

The character signal except the title 1 and 2 signal is selected in the Microprocessor board and sent to the character select circuit in IC1 in this board. The characters which are displayed only on the viewfinder such as recording indicator etc. and displayed on both the viewfinder and the external monitor such as time/date and stopwatch graphics are separated by the character select circuit. The character displayed on the viewfinder

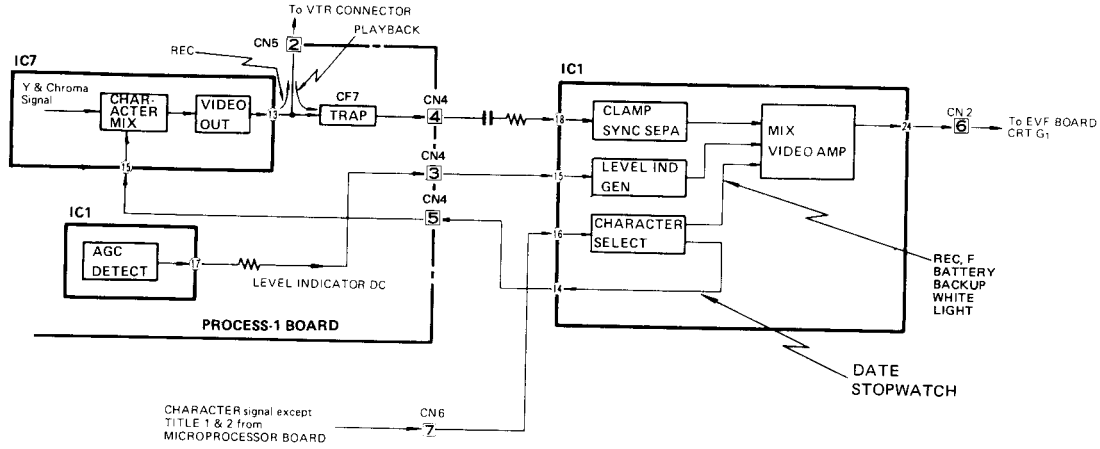


Fig. 8-1 EVF Video Amplifier Circuit

is mixed with the video signal. The other character (time/date and stopwatch) is sent through pin 14 of IC1 to the Process-1 board and mixed with the PAL signal and the title 1 and 2 signal. This mixed signal is fed back to the EVF video amplifier circuit. In this way, the all characters including the title 1 and 2 are displayed on the viewfinder together with the video signal.

8-2 EVF Vertical Deflection Circuit

Outline

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

Details

The video signal from the Process-1 board is supplied to the sync separator in IC1 through pin 18 of IC1.

The sync separator in IC1 detects only sync pulse of video signal and V. sync pulse and H. sync pulse are made.

The vertical(V) sync pulse generated in the sync separation circuit is fed to V. oscillator (V.OSC) inside IC1 as a trigger pulse. the V. OSC is a free-running sawtooth generator whose frequency is approximately 45Hz. When the trigger pulse is supplied to the V.OSC circuit, it generates a 50Hz sawtooth signal.

The V. sawtooth signal obtained at pin 7 is fed to the V deflection circuit through pin 6 of IC1, where it is amplified. The amplified V.sawtooth signal at pin 3 of IC1 is fed to the CRT V. deflection coil through pin No. 1 of CN1.

VR1 (EVF V.SIZE) is a control for vertical scanning size.

The V. sync pulse obtained at pin 13 of IC1 is supplied to the Microprocessor board.

8-3 EVF Horizontal Deflection Circuit

Outline

This circuit generates horizontal deflection sawtooth current for the horizontal scanning of beam inside the CRT.

Details

The horizontal(H) sync pulse from the sync separator is applied to phase comparator inside IC1. The H. oscillation signal from the H. oscillator (H.OSC) circuit inside IC1 is also fed to phase comparator and compared with the H. sync pulse in phase. The DC voltage corresponding to the phase difference is fed to H.OSC to control its oscillation frequency. In this way, the H. OSC is automatically controlled to match its oscillation frequency with that of sync pulse. VR12(H.HOLD) is a control for setting the oscillation frequency in a steady state.

The frequency controlled H. drive(H.D) pulse obtained at pin 22 of IC1 is then fed to the horizontal deflection output Q1 and the H.sawtooth current is fed from the collector of Q1 to the H.deflection coil through L3 (EVF H.SIZE) and pin 3 of CN1.

The H. sync pulse obtained at pin 23 of IC1 is supplied to the Microprocessor board.

The flyback pulse obtained at the collector of Q1 is fed to the high voltage circuit for the CRT.

8-4 EVF High Voltage Circuit

Outline

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

Details

The flyback pulse generated in the horizontal(H) deflection circuit is supplied to primary winding of the flyback transformer (FBT) in high voltage pack T1 to step up the flyback pulse to necessary level. The boosted pulses obtained at the secondary winding of the transformer are rectified to generate high voltages. +4.5KV obtained by rectifying the boosted pulse is supplied to the CRT anode.

+600V obtained by rectifying the boosted pulse is supplied to grid-3(G3) of the CRT through VR3 (FOCUS). The voltage of grid-2(G2) is derived by dividing +600V by VR3, R14 and R15.

The -55V is supplied to G1 through VR5 (BRIGHTNESS) together with the video signal supplied from the video amplifier circuit.

The heater voltage for CRT is supplied +4.8V and +7.6V from the standby circuit through CN2.

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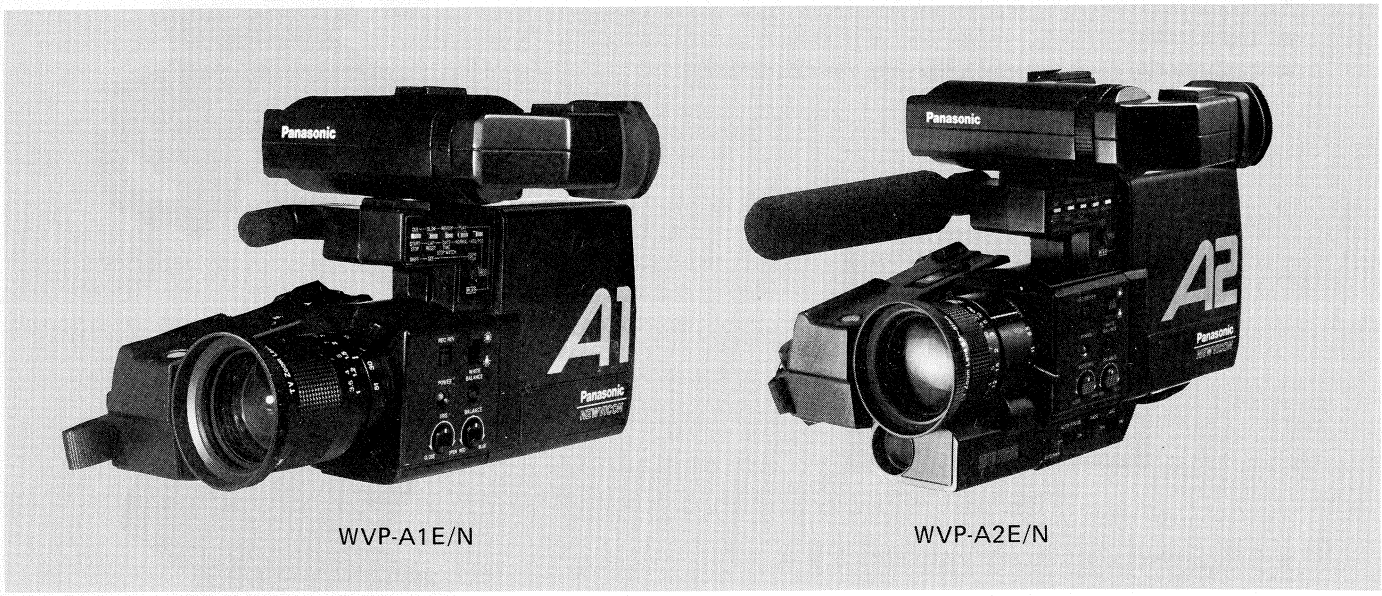
Service Manual

Vol. 2

Adjustment Procedures
Troubleshooting Guides

Colour Video Cameras

WVP-A1E/WVP-A1N
WVP-A2E/WVP-A2N



WVP-A1E/N WVP-A2E/N

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National/Panasonic

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

1. TEST EQUIPMENT REQUIRED

The following equipment is required for adjustment of WVP-A1 and WVP-A2 colour cameras.

- Oscilloscope (dual trace, delayed, 25MHz bandwidth, with three probes)
- Digital voltmeter (DVM)
- Frequency counter
- Vectorscope
- Colour video monitor
- Tripod
- Lighting (140 footcandles (1400 lux), 3200° K)
- Light meter
- Logarithmic gray scale chart (Part No. YWV2310RB99) (Fig. 1-1).

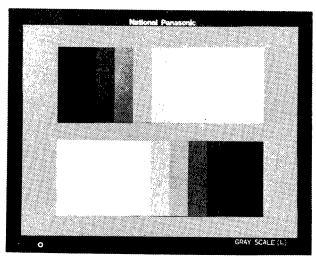


Fig. 1-1

- Colour chart (Part No. YWV2100RB98) (Fig. 1-2)

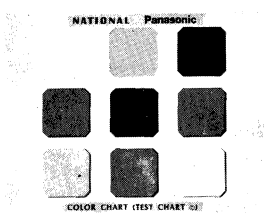
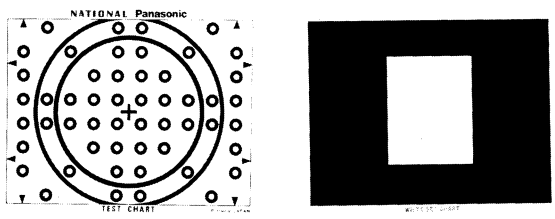


Fig. 1-2

- Ball/White set chart (Part No. YWV2100RB03) (Fig. 1-3)



Ball chart White set chart

Fig. 1-3

Test equipment denoted by shaded outlines are not required if only pick-up tube is replaced.

2. DISASSEMBLY PROCEDURE FOR ADJUSTMENT

2-1 Process-1 board, Process-2 board, Microprocessor board and Deflection board adjustment

- Turn OFF the power.
- Remove three screws on the cover and remove cover by pulling it backward. (Fig. 2-1-1)

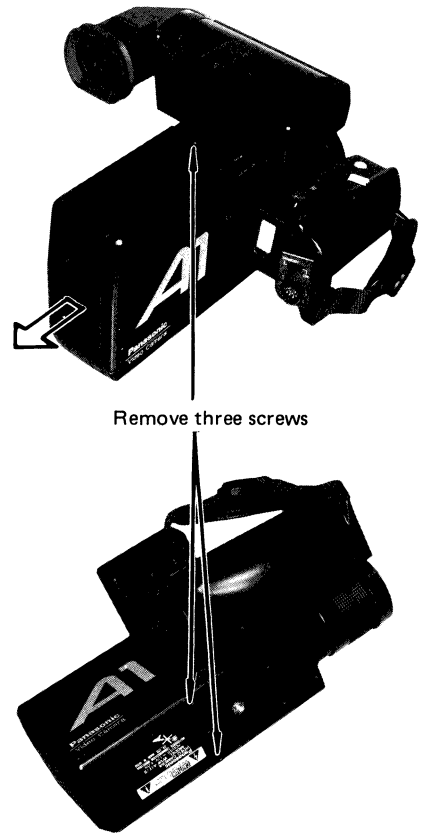


Fig. 2-1-1

- While depressing the PCB lock-pin, open the Microprocessor board and Process-1 board. (Fig. 2-1-2)

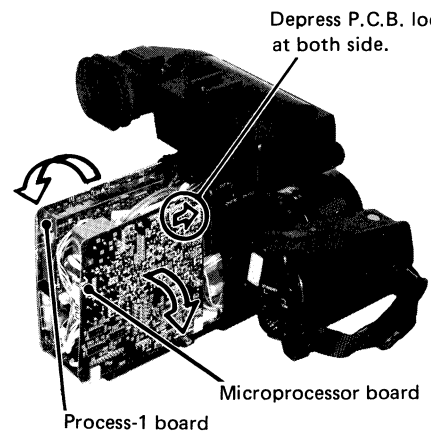


Fig. 2-1-2

2-2 Power board adjustment

- Turn OFF the power.
- Remove two screws on the bottom of handle grip. (Fig. 2-2-1)

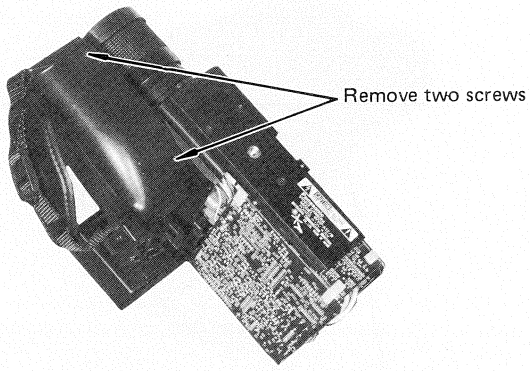


Fig. 2-2-1

- Remove grip assembly from grip base by opening it from bottom.
- Remove two screws holding Power board and take out the Power board from grip. (Fig. 2-2-2)

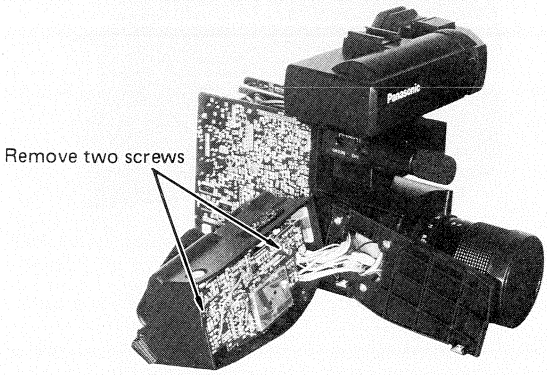


Fig. 2-2-2

2-3 EVF board adjustment

- Turn OFF the power.
- Remove two screws on the bottom of EVF.
- Turn off the EVF ring. (Fig. 2-3-1)

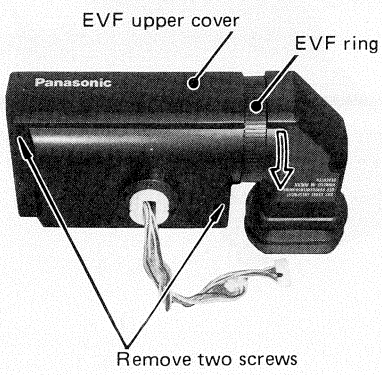


Fig. 2-3-1

- Remove upper cover and take out the EVF board from bottom cover. (Fig. 2-3-2)

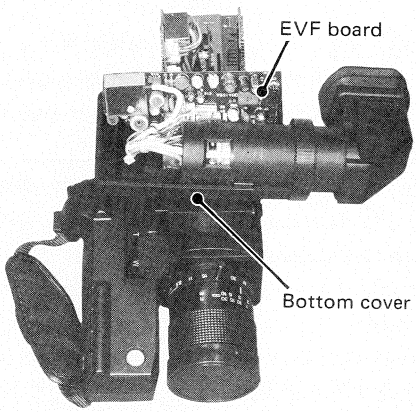


Fig. 2-3-2

Note : After adjustment is finished, reassemble the camera by reverse order of disassembly procedure for adjustment.

3. REPLACEMENT PROCEDURE

3-1 Pick-up tube assembly replacement

Note : Only the pick-up tube can not be replaced. A FAMOS kit which supplies a pick-up tube, a deflection coil and a FAMOS IC in pair should be replaced.

- Disassemble the camera as previously described in section 2-1 on page 1.
- Remove two screws.
- Take out the EVF mounting angle by pulling it backward.
- Disconnect CN6 on the Microprocessor board and CN4 on the Process-1 board.
- Take out the EVF unit by pulling it upward.
- Remove shield plate B. (Fig. 3-1-1)

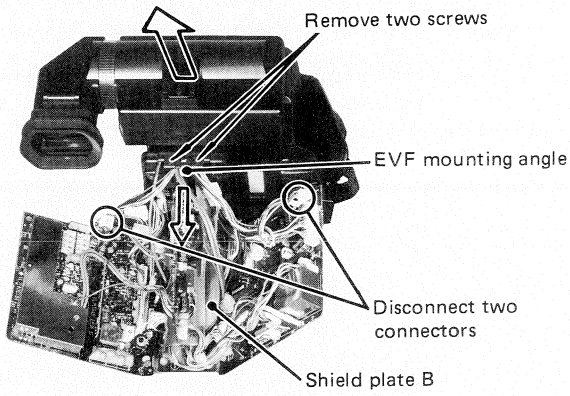


Fig. 3-1-1

- Disconnect CN1 on the Deflection board and transit connector CN103. (Fig. 3-1-2)

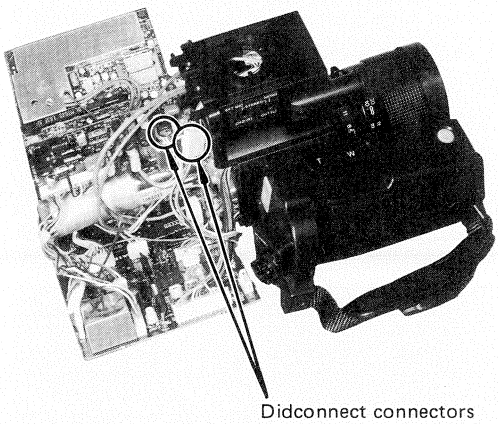


Fig. 3-1-2

- Remove two screws holding right side cover assembly. (Fig. 3-1-3)

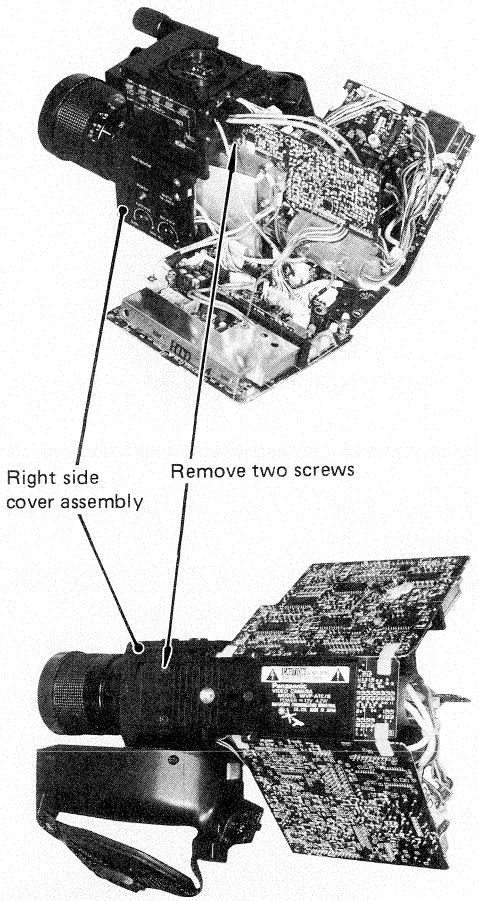


Fig. 3-1-3

- Remove right side cover assembly by pulling it outward while depressing the upper portion (above the lens mount) of the left side cover. (Fig. 3-1-4)

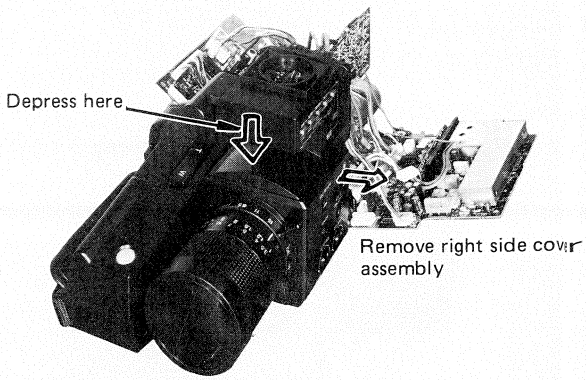


Fig. 3-1-4

- Unsolder the ground wire and shield plate C, and remove shield plate C. (Fig. 3-1-5)

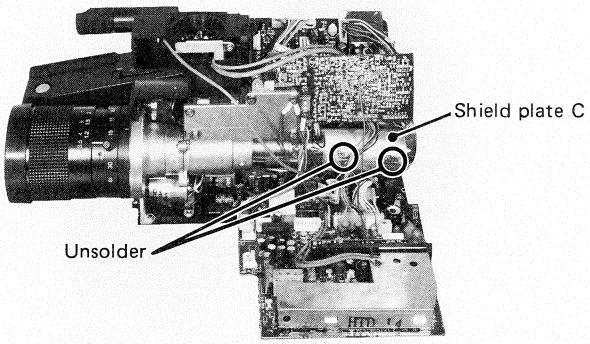


Fig. 3-1-5

- Unsolder the ground wire of pick-up tube socket.
- Disconnect bias light assembly and pick-up tube socket by pulling them backward. (Fig. 3-1-6)

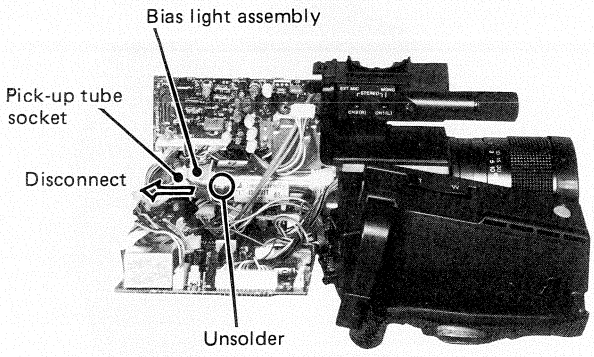


Fig. 3-1-6

- Remove one screw holding ground wire of pick-up tube assembly.
- Remove six screws holding coil holder and remove holder. (Fig. 3-1-7)

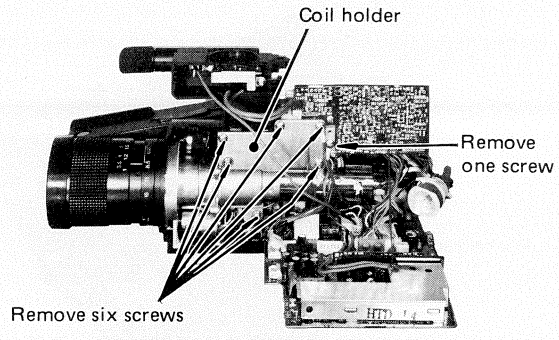


Fig. 3-1-7

- Unsolder the target lead.
- Remove pick-up tube assembly from the chassis. (Fig. 3-1-8)

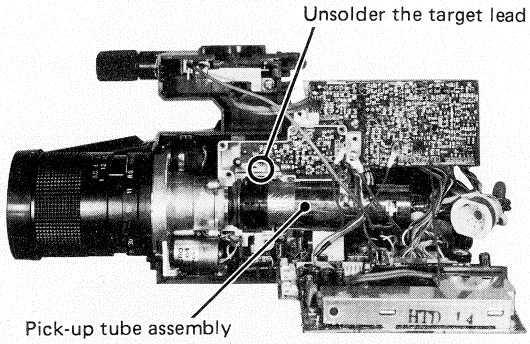


Fig. 3-1-8

- Remove optical filter assembly and earth lug from pick-up tube assembly. (Fig. 3-1-9)

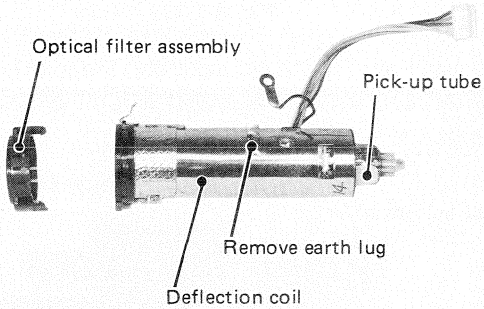


Fig. 3-1-9

- Clean the faceplate of new pick-up tube with the lens cleaning tissue or cloth.
- Reinstall the optical filter assembly. (Fig. 3-1-9)
- Reinstall the pick-up tube assembly into the chassis.

Note : 1. The target lead has to be positioned upward.
2. Make sure that the protruding part of the deflection coil engages the recessed part of the chassis.

- Solder the target lead. (Fig. 3-1-10)

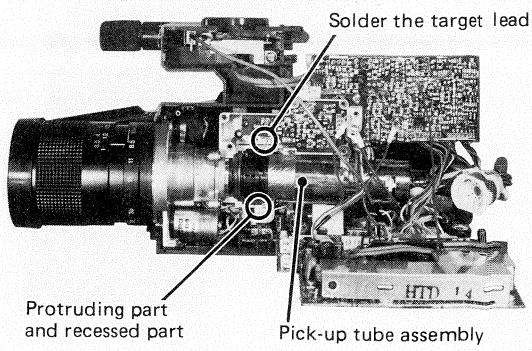


Fig. 3-1-10

- Reinstall the coil holder using six screws.
  Note : 1. Make sure that the protruding part of the deflection coil engages the recessed part of inside preamplifier cover.
  2. Make sure that the ground wires and earth lug are fixed together when coil holder is reinstalled.
- Fix ground wire of pick-up tube assembly using one screw. (Fig. 3-1-11)

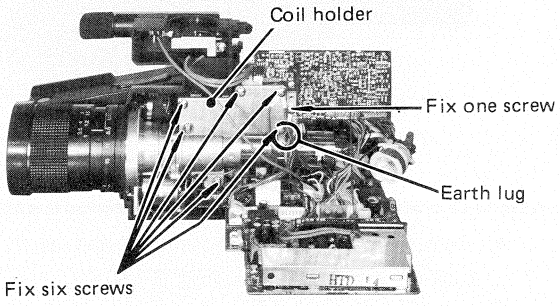


Fig. 3-1-11

- Reinstall the bias light assembly and pick-up tube socket, and solder the ground wire of pick-up tube socket. (Fig. 3-1-12)

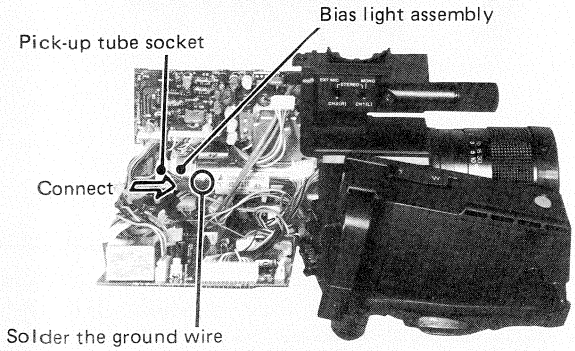


Fig. 3-1-12

- Reinstall the shield plate C and solder the ground wire of shield plate C. (Fig. 3-1-13)

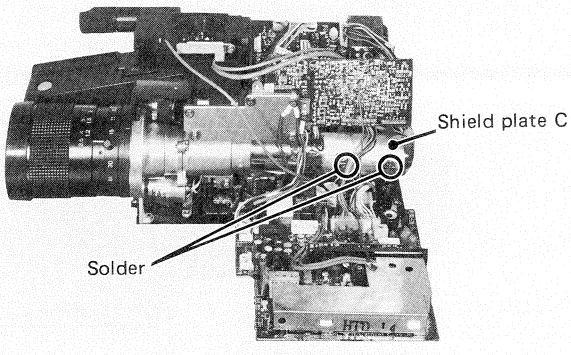


Fig. 3-1-13

- Remove shield case cover A on the Process-1 board. (Fig. 3-1-14)

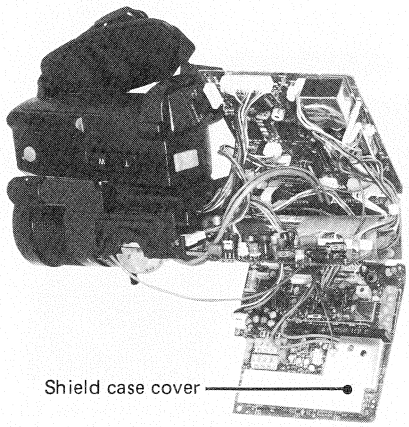


Fig. 3-1-14

- Remove the FAMOS IC, IC9 from socket and replace to the new one. (Fig. 3-1-15)

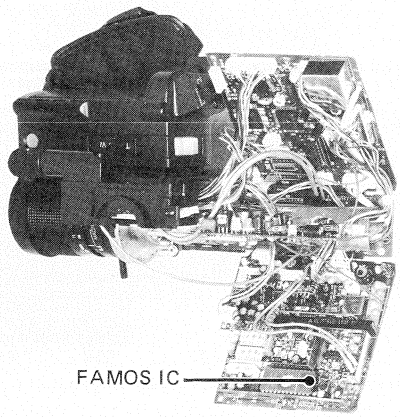


Fig. 3-1-15

- Reinstall the shield case cover.
- Reinstall right side cover using two screws. (Fig. 3-1-16)

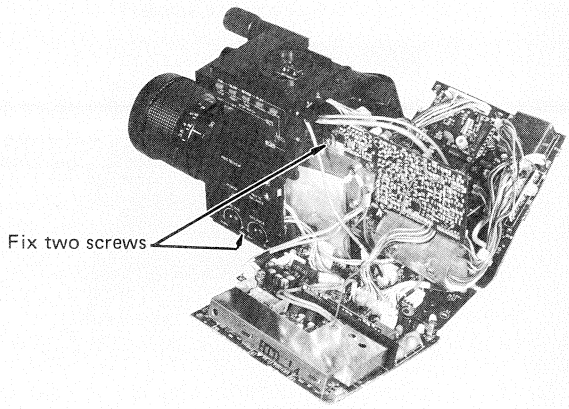


Fig. 3-1-16

- Reinstall EVF unit.
- Connect CN4 on the Process-1 board, CN6 on the Microprocessor board, CN1 on the Deflection board and transit connector CN103. (Fig. 3-1-17)

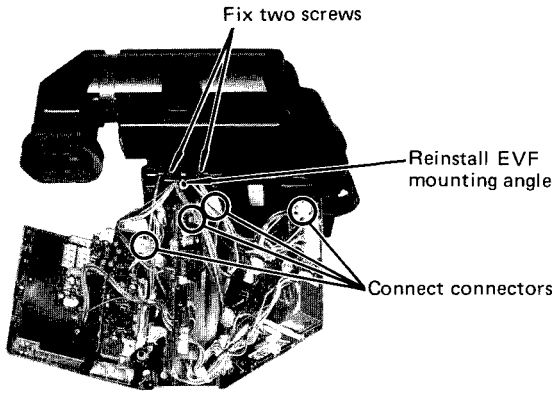


Fig. 3-1-17

- After replacing the pick-up tube assembly and FAMOS IC, adjust the camera according to Section 4 ADJUSTMENT PROCEDURE on page 7.

3-2 Lens replacement procedure

- Disassemble the camera as previously described in Section 2-1 and 2-2 on pages 1 and 2.
- Remove EVF unit and right side cover assembly while refering to the 3-1 pick-up tube replacement on page 3.
- Remove three screws holding grip base and remove grip base.
- Remove two screws holding left side cover and remove left side cover by pulling it outward.

(Fig. 3-2-1)

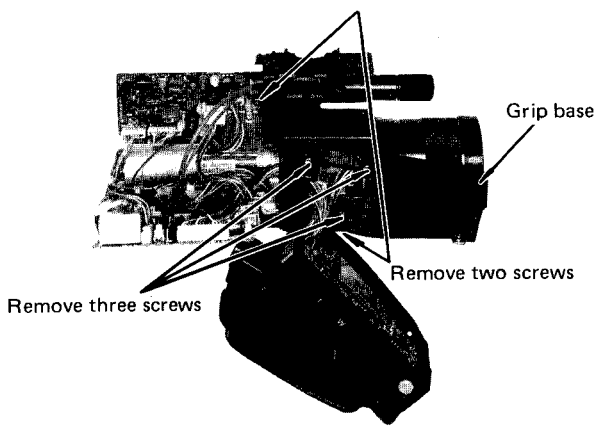


Fig. 3-2-1

- Remove three screws holding lens mount. (Fig. 3-2-2)

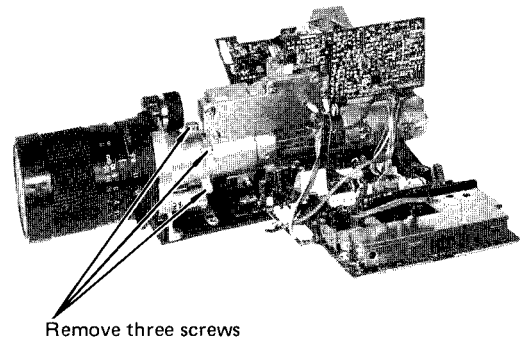


Fig. 3-2-2

- Remove two screws holding lens mounting base.
- Remove the lens assembly by pulling it frontward. (Fig. 3-2-3)

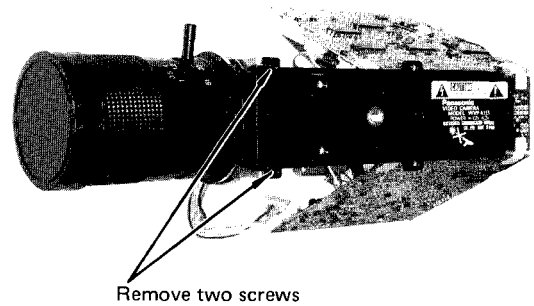


Fig. 3-2-3

- Reinstall the new lens assembly.

  Note: Make sure that the protruding part of the lens assembly engages to the recessed part of the pick-up holder.

- Reassemble the camera by reverse order of the disassemble procedure.
- After replacing the lens assembly, adjust backfocus while referring to 4-2 (7) Backfocus adjustment on page 9.

4. ADJUSTMENT PROCEDURE

4-1 Connection and Setting Up for Adjustment

Connection

- Connect the camera cable from the camera to the power supply.
- Connect the video cable from the power supply to the colour monitor.
- Terminate the colour monitor video input in 75 ohm. (Fig. 4-1-1)

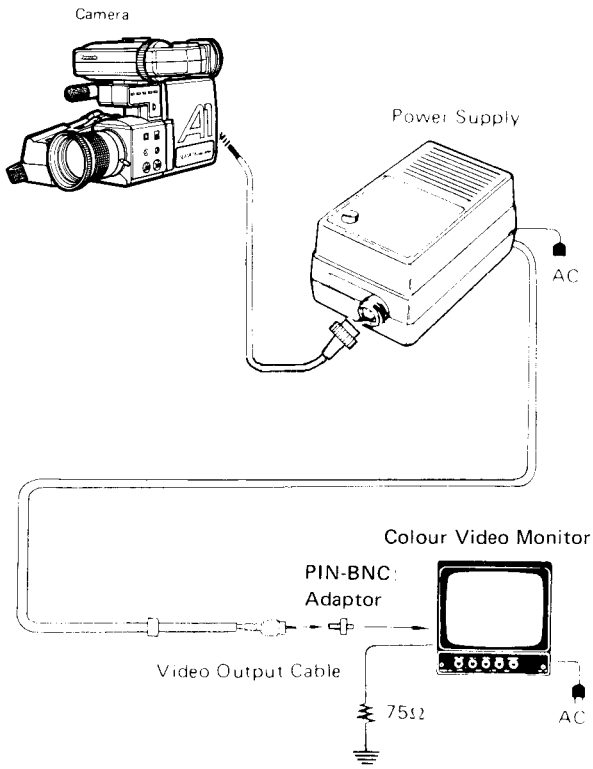


Fig. 4-1-1

Disassembling

- Disassemble the camera while referring to Section 2. "DISASSEMBLY PROCEDURE FOR ADJUSTMENT" on page 1.

Setting up

- Light : Incident light intensity on chart : 140 footcandles (1400 lux)
  Colour temperature: 3200°K
- Test Charts : Logarithmic gray scale chart (YWV2310RB99)
  Colour chart (YWV2100RB98)
  Flat white chart
  Ball/white set chart (Window chart) (YWV2100RB03)

Steps denoted by shaded outlines do not have to be performed if only pick-up tube is replaced.

Position of controls and switches on the camera

Set the controls and switches on the camera as follows,

Indoor/Outdoor switch	Lower (INDOOR) position
White balance switch	OFF
Standby (Power) switch	Right (ON) position
Rec/Standby switch	Rec position
Auto Iris control	Centre (click) position
Colour balance control	Centre (click) position
AGC ON/OFF switch	OFF position (only for WVP-A2)
Auto Focus switch	OFF position (only for WVP-A2)
YL ON/OFF switch (SW1 on process board)	ON position
COMPATIBILITY switch	⊕ position

Note : TP in the manual refers to a test point on the printed circuit board.

4-2 Adjustment

- Refer to page 19 and 20 for the test points and adjusting controls.

  Caution : Do not set the white balance during the adjustment.

(1) +7.6V adjustment

Test point :	TP2 (+7.6V)	Power board
Adjust :	VR1 (+7.6V ADJ)	Power board

- Connect the digital voltmeter to the +7.6V TP2.
- Adjust +7.6V ADJ VR1 for 7.6V ±0.01V.

(2) 4.43MHz adjustment

Test points:	TP6 (4.43MHz)	Process-1 board
	TP7 (VCO)	Process-1 board
Adjusts:	CT2 (4.43MHz ADJ)	Process-1 board
	L5 (VCO ADJ)	Process-1 board

- Connect the frequency counter to the 4.43MHz TP6.
- Adjust 4.43 MHz ADJ CT2 for 4.433619Hz ± 10Hz.
- Connect the digital voltmeter to the VCO TP7.
- Adjust VCO ADJ L5 for 3.0V ± 0.2V.

(3) Horizontal hold adjustment

Test point :	TP1 (AFC)	EVF board
Adjust :	VR2 (H.HOLD)	EVF board

- Connect the digital voltmeter to AFC TP1.
- Adjust H.HOLD VR2 for 2.6V ± 0.1V.

(4) Target voltage adjustment

Test point :	TP3 (VT)	Deflection board
Adjust :	VR9 (TARGET)	Deflection board

- Connect the digital voltmeter to TP3 (VT).
- Adjust VR9 (TARGET) so that the voltage at TP3 becomes following voltage, depends on the room temperature.

Room Temperature	Target Voltage
Less than 5°C	Esj + 11V
Between 5°C and 10°C	Esj + 8.5V
Between 10°C and 15°C	Esj + 6.5V
Between 15°C and 20°C	Esj + 4.5V
Between 20°C and 30°C	Esj + 3.0V
More than 30°C	Esj + 1.0V

Note : Esj value of pick-up tube is stamped on the neck of pick-up tube. (Fig. 4-2-1)

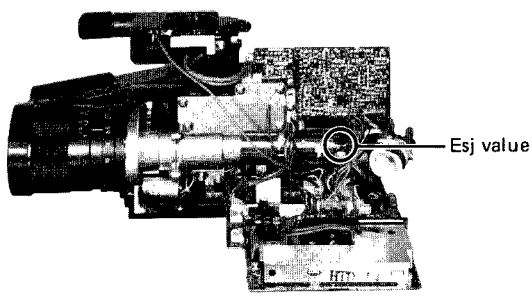
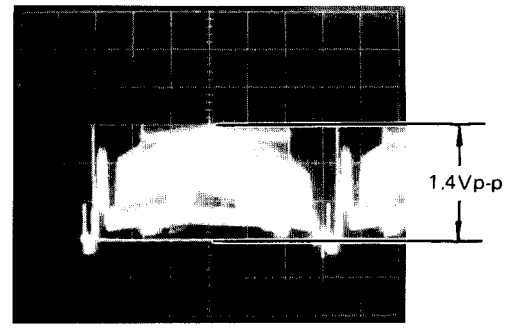


Fig. 4-2-1

(5) Beam current adjustment

Test point :	TP2 (PREAMP OUT)	Process-1 board
	VR3 (BEAM)	Microprocessor board

- Connect the oscilloscope to PREAMP OUT TP2.
- Trigger the oscilloscope at H.rate. (Use Hs TP1 on deflection board.)
- Aim the camera at the gray scale chart and turn the Auto Iris control on the right side cover of the camera to OPEN position.
- Adjust BEAM VR3 so that the waveform becomes $1.4V\ ^{+0.1}_{-0}V$ from blanking level.



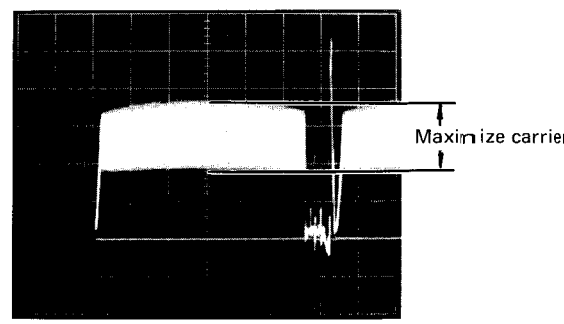
0.5V/DIV, 10μsec/DIV

Fig. 4-2-2

(6) Focus adjustment

Test point :	TP2 (PREAMP OUT)	Process-1 board
Adjust :	VR4 (FOCUS)	Deflection board
Observe :	Colour monitor	

- Aim the camera at white chart.
- Connect the oscilloscope to PREAMP OUT TP2.
- Trigger the oscilloscope at H.rate. (Use Hs TP1 on deflection board.)
- Adjust FOCUS VR4 so that the carrier (3.9MHz) on centre portion of the prevideo signal becomes maximum. (Fig. 4-2-2)
- Make sure that the minimum green colour on the centre portion of monitor screen.



0.5V/DIV, 10μsec/DIV

Fig. 4-2-3

(7) Backfocus adjustment

Adjust :	Backfocus adjusting ring
Observe :	Colour monitor

- Remove two screws on the bottom side of handle grip and open the grip assembly. (Fig. 4-2-4)

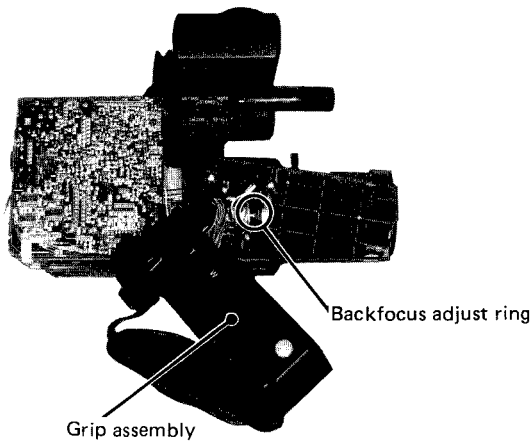


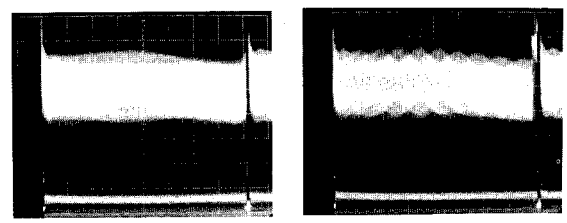
Fig. 4-2-4

- Aim the camera at the dark object further than 6 feet (2m) from the camera.
- Turn the Auto Iris control to the Open position.
- Zoom in (close up/telephoto) and adjust the focus by turning the lens focus.
- Zoom out (Wide angle) and adjust the focus by turning the backfocus adjusting ring. (Fig. 4-2-4)
- Zoom in again and adjust the focus by turning the lens focus.
- Zoom out again and adjust the focus by turning the backfocus adjusting ring.
- Repeat this procedure until the focus tracks throughout the zoom range.
- Reset the Auto Iris control to the centre position.

(8) Vertical size and vertical centring adjustment

Test point :	TP2 (PREAMP OUT)	Process-1 board
Adjusts :	VR4 (V.SIZE)	Deflection board
	VR5 (V.CENT)	Deflection board

- Aim the camera at the white chart.
- Connect the oscilloscope to PREAMP OUT TP2.
- Trigger the oscilloscope at V.rate. (Use Vs TP2 on process board.)
- Adjust V. SIZE VR4 for minimum beat during the vertical period. (Fig. 4-2-5)

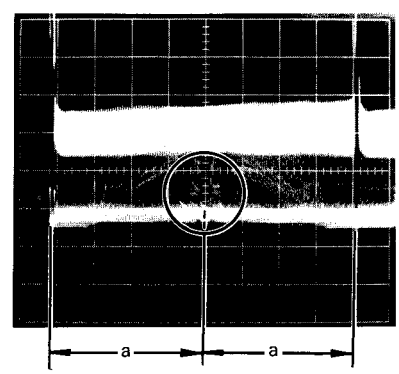


GOOD
0.1V/DIV, 2 msec/DIV

NO GOOD
0.1V/DIV, 2 msec/DIV

Fig. 4-2-5

- Turn H.SIZE VR1 on deflection board fully clockwise. The optical black and arrow maker appear on the oscilloscope.
- While observing the waveform, adjust V.CENT VR5 so that the marker which shows the vertical centre of pick-up tube positions at the centre of video signal waveform in vertical rate. (Fig. 4-2-6)



0.2V/DIV, 2msec/DIV

Fig. 4-2-6

Note : When adjust the vertical centring using with the underscanning monitor, adjust V.CENT VR5 so that the arrow marker shows the vertical centre of the monitor.

- Turn back H.SIZE VR1 to its mechanical centre and H.CENT VR3 until the optical black and arrow marker disappear.

(9) Horizontal size and horizontal linearity adjustment

Test point :	TP5 (YH)	Process-1 board
Adjusts :	VR1 (H.SIZE)	Deflection board
	VR2 (H.LIN-2)	Deflection board
	L2 (H.LIN-1)	Deflection board

- Aim the camera at white chart.
- Connect the oscilloscope to YH TP5.
- Trigger the oscilloscope at H.rate. (Use Hs TP1 on deflection board.)
- Adjust H.SIZE VR1 so that the carrier (3.9MHz) on the centre portion of the YH signal at YH TP5 is minimum. (Fig. 4-2-7)
- Adjust H.LIN-2 VR2 so that the starting portion of YH signal at YH TP5 is flat. (Fig. 4-2-8)
- Adjust H.LIN-1 L2 so that the carrier (3.9MHz) on the YH signal is minimum.
- Repeat adjusting H.SIZE VR1, H.LIN-2 VR2 and H.LIN-1 L5 until the carrier on the YH signal is minimum, the starting portion of YH signal is flat and picture has minimum disturbance on the left side.

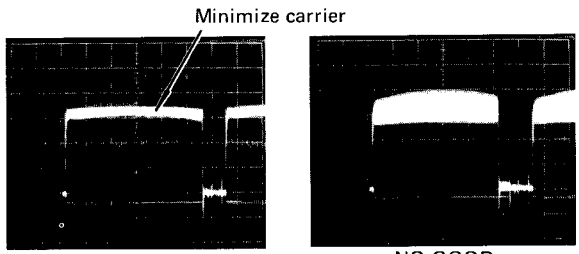


Fig. 4-2-7

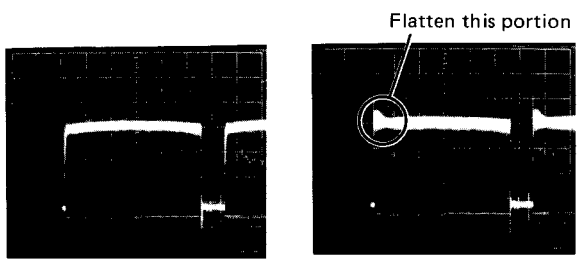


Fig. 4-2-8

(10) Horizontal centring adjustment

Test points :	TP2 (PREAMP OUT)	Process-1 board
	TP1 (Hs)	Deflection board
Adjust :	VR3 (H.CENT)	Deflection board

- Aim the camera at the white chart.
- Connect the oscilloscope to PREAMP OUT TP2 and Hs TP1.
- Trigger the oscilloscope at H.rate. (Use Hs TP1 on deflection board.)
- Expand the horizontal blanking period on the oscilloscope.
- Adjust H.CENT VR3 until the optical black width is 3.5 μsec ±0.1 μsec. (Fig. 4-2-9) If the falling edge of the waveform corresponding to the picture is noisy, adjust for the middle.

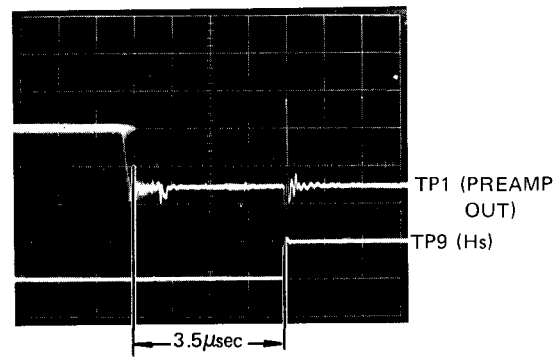


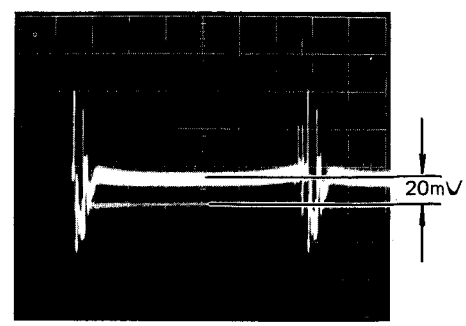
Fig. 4-2-9

(11) Bias light adjustment

Test point :	TP2 (PREAMP OUT)	Process board
Adjust :	VR2 (BIAS LIGHT)	Microprocessor board

- Cap on the lens.
- Connect the oscilloscope to PREAMP OUT TP2.
- Trigger the oscilloscope at H.rate. (Use Hs TP1 on deflection board.)
- Adjust BIAS LIGHT VR2 so that the bias current is 20mV ± 5mV. (Fig. 4-2-10)

Note : If there is bias light (current) shading, adjust the level at the centre of the waveform.



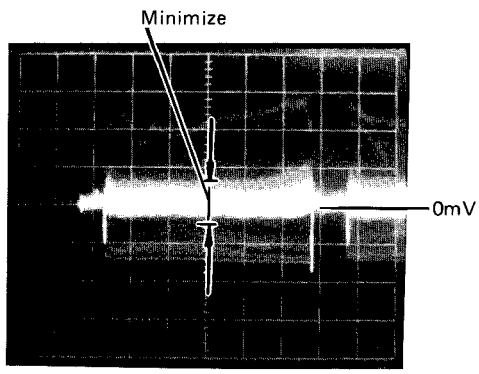
50mV/DIV, 10μsec/DIV

Fig. 4-2-10

(12) Bias light shading (Bs) correction adjustment

Test point :	TP5 (YH)	Process-1 board
Adjusts :	VR8 (Bs V.SAW)	Deflection board
	VR7 (Bs V.PARA)	Deflection board
	VR6 (Y PED)	Deflection board

- Set the AGC switch to ON position for WVP-A2.
- Cap on the lens.
- Connect the oscilloscope to YH TP5.
- Trigger the oscilloscope at H. rate (Use Hs TP1 on deflection board.)
- Adjust Bs V. PARA VR7 and Bs V. SAW VR8 so that the dark signal waveform becomes as narrow as possible.
- Adjust Y PED VR6 so that the pedestal level at YH TP5 becomes 0^{+10mV}_{-0mV}. (Fig. 4-2-11)



0.1V/DIV, 10μsec/DIV

Fig. 4-2-11

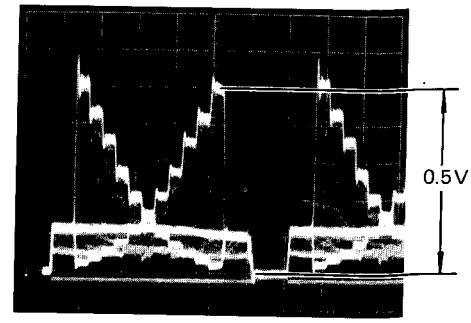
- Confirm that the pedestal level does not change by operating AGC switch ON/OFF. If changed, readjust Y PED VR6 so that the pedestal level does not change by operating AGC switch ON/OFF for WVP-A2.

(13) AIC level adjustment

Test point :	TP3 (TRACKING)	Process-1 board
Adjust :	VR6 (AIC SET)	Process-1 board

- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to TRACKING TP3.
- Trigger the oscilloscope at H.rate. (Use Hs TP1 on deflection board.)
- Adjust AIC SET VR6 so that the waveform is 0.5V ± 0.02V from the blanking level to the top step of the gray scale waveform. (Fig. 4-2-12)

Steps denoted by shaded outlines do not have to be performed if only pick-up tube is replaced.



0.1V/DIV, 10μsec/DIV

Fig. 4-2-12

(14) AGC gain adjustment (for WVP-A1)

Test point :	TP5 (YH)	Process-1 board
Adjust :	VR5 (AGC SET)	Process-1 board

- Aim the camera at the gray scale chart.
- Connect the oscilloscope to YH TP5.
- Trigger the oscilloscope at H.rate. (Use Hs TP1 on deflection board.)
- Adjust AGC SET VR5 for 0.4V ± 0.02V from the blanking level to the top step of the gray scale waveform.

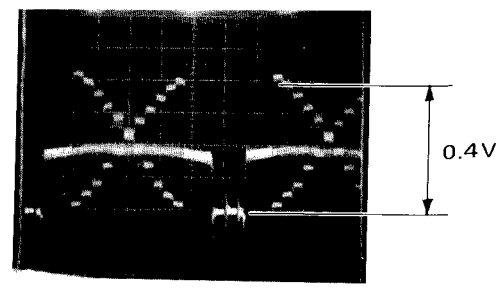


Fig. 4-2-13

(15) AGC/MANUAL gain adjustment (for WVP-A2)

Test point :	TP5 (YH)	Process-1 board
Adjusts :	VR4 (MANUAL GAIN)	Process-1 board
	VR5 (AGC SET)	Process-1 board

- Aim the camera at the gray scale chart.
- Set the AGC switch to ON position.
- Connect the oscilloscope to YH TP5.
- Trigger the oscilloscope at H.rate. (Use Hs TP1 on deflection board.)
- Adjust AGC SET VR5 for 0.4V ± 0.02V from the blanking level to the top step of the gray scale waveform. (Fig. 4-2-14)

- Change the AGC switch to OFF position.
- Adjust MANUAL GAIN VR4 for 0.4V ±0.02V from the blanking level to the top step of the gray scale waveform. (Fig. 4-2-14)
- Confirm that the waveform does not change by operating AGC switch ON/OFF. If change readjust MANUAL GAIN VR4 and AGC SET VR5 so that the waveform does not change by operating AGC switch ON/OFF and its level is 0.4V ± 0.02V.

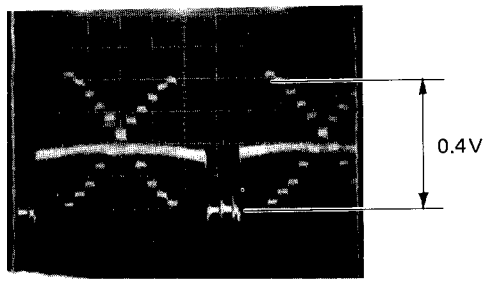
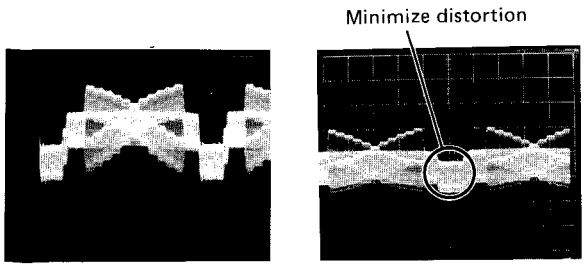


Fig. 4-2-14

(16) Vertical edge balance and vertical edge bias adjustment

Test points :	TP14 (V. EDGE)	Process-1 board
	TP1 (1H VIDEO)	Process-1 board
Adjusts :	VR15 (V.EDGE BIAS)	Process-1 board
	VR18 (V.EDGE BALANCE)	Process-1 board

- Aim the camera at the logarithmic gray scale chart.
- Remove shield case cover.
- Connect the oscilloscope to 1H VIDEO TP14.
- Trigger the oscilloscope at H. rate. (Use Hs TP1 on deflection board.)
- Turn V.EDGE BIAS VR15 counterclockwise and stop it when waveform become flat.
- Turn back V.EDGE BIAS VR15 slowly and stop it at the point where the distortion of the H.BL signal becomes minimum. (Fig. 4-2-15)



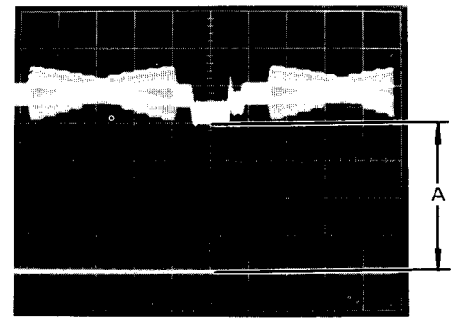
GOOD
0.2V/DIV, 10μsec/DIV

NO GOOD
0.2V/DIV, 10μsec/DIV

Fig. 4-2-15

- Set the input coupling selector on the oscilloscope to DC position.
- Note the DC level of the H.BL portion as (A). (Fig. 4-2-16)

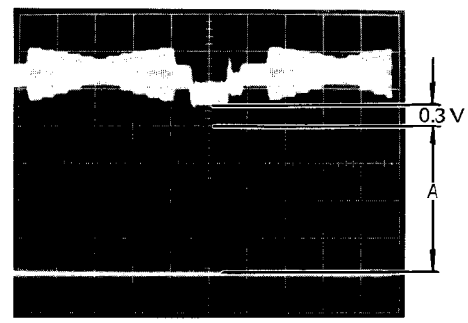
Steps denoted by shaded outlines do not have to be performed if only pick-up tube is replaced.



0.5V/DIV, 10μsec/DIV

Fig. 4-2-16

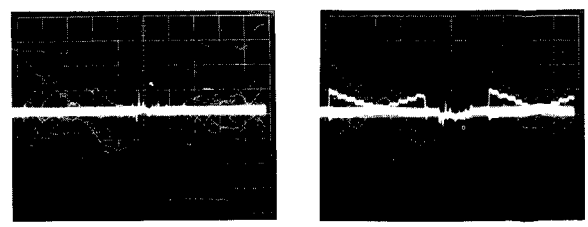
- Adjust V.EDGE BIAS VR15 so that the H.BL DC level becomes (A) +0.3V. (Fig.4-2-17)



0.5V/DIV, 10μsec/DIV

Fig. 4-2-17

- Reset the input coupling selector on the oscilloscope to AC position.
- Connect the oscilloscope to V.EDGE TP1.
- Adjust V.EDGE BALANCE VR18 to cancel the video signal. (Fig. 4-2-18)
- Reinstal the shield case cover.



GOOD
0.2V/DIV, 10μsec/DIV

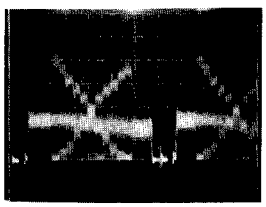
NO GOOD
0.2V/DIV, 10μsec/DIV

Fig. 4-2-18

(17) R and B signal separation adjustment

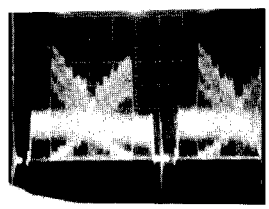
Test points :	Pin 3 of CN1 (B-YL)	Process-1 board
Adjusts :	CT1 (R/B SEPARATION-1)	Process-1 board
	VR5 (R/B SEPARATION-2)	Process-1 board

- Set the YL ON/OFF switch (SW1) on process board to OFF position.
- Aim the camera at the logarithmic gray scale chart.
- Connect oscilloscope to pin 3 of CN13.
- Trigger the oscilloscope at H.rate. (Use Hs TP1 on deflection board.)
- Adjust R/B SEPARATION-1 CT1 for minimum waveform flicker. (Fig. 4-2-19)
- Adjust R/B SEPARATION-2 VR1 for the same condition.
- Repeat adjusting R/B SEPARATION-1 CT1 and R/B SEPARATION-2 VR1 until the flicker in waveform is minimum.



GOOD

0.1V/DIV, 10μsec/DIV



NO GOOD

0.1V/DIV, 10μsec/DIV

Fig. 4-2-19

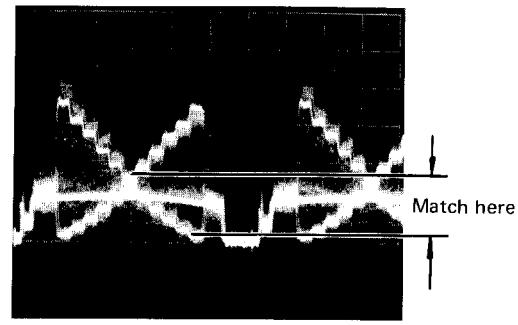
(18) B gain and YL pedestal preset adjustment

Test points :	Pin 3 of CN13 (B-YL)	Process-1 board
	Pin 2 of CN13 (YL)	Process-1 board
Adjusts :	VR2 (R/B GAIN)	Process-1 board
	VR13 (YL PED)	Process-1 board

- Set the YL ON/OFF switch to OFF position.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to pin 2 and pin 3 of CN13.
- Trigger the oscilloscope at H.rate. (Use Hs TP1 on deflection board.)
- Set the colour balance control on right bottom cover to centre (click) position.
- Turn B TRACKING-1 VR91, B TRACKING-2 VR92, B TRACKING-3 VR93, R TRACKING-1 VR101, R TRACKING-2 VR102 and R TRACKING-3 VR103 on process-1 board to their mechanical centre.

  Note : Before adjusting R/B GAIN VR2, if the gray scales black chip of YL signal is suppressed, turn YL PED VR13 until the black chip of YL signal can be observed.
- Overlay the R signal and YL signal on the oscilloscope, and adjust R/B GAIN VR2 so that the signal level between the black chip (zero step) and fifth step (crossing step) of gray scale waveform match. (Fig. 4-2-20)

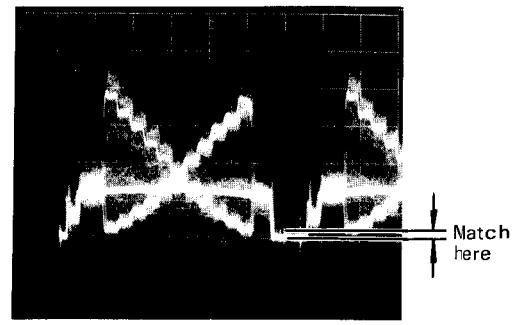
Steps denoted by shaded outlines do not have to be performed if only pick-up tube is replaced.



0.1V/DIV, 10μsec/DIV

Fig. 4-2-20

- Next adjust YL PED VR13 so that the pedestal level of YL signal matches that of B signal. (Fig. 4-2-21)



0.1V/DIV, 10μsec/DIV

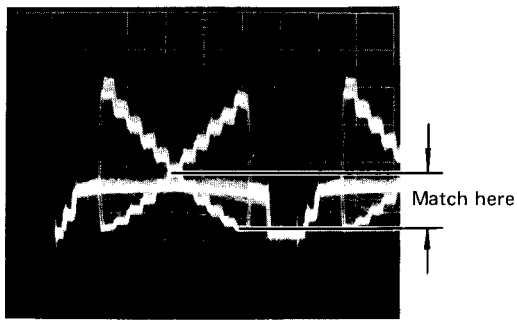
Fig. 4-2-21

(19) R gain and R pedestal preset adjustment

Test points :	Pin 1 of CN13 (R-YL)	Process-1 board
	Pin 2 of CN13 (YL)	Process-1 board
Adjusts :	VR7 (R GAIN)	Process-1 board
	VR8 (R PED)	Process-1 board

- Set the YL ON/OFF switch to OFF position.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to Pin 1 and Pin 2 of CN13.
- Trigger the oscilloscope at H.rate. (Use Hs TP1 on deflection board.)

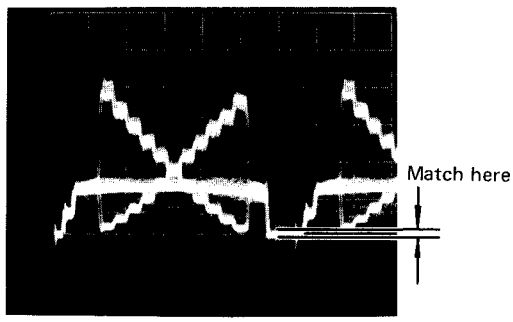
  Note : Before adjusting R GAIN VR7, if the gray scales black chip of R signal is suppressed, turn R PED VR8 until the black chip of R signal can be observed.
- Overlay the B signal and YL signal on the oscilloscope, and adjust R/B GAIN VR2 so that the signal level between the black chip (zero step) and fifth step (crossing step) of gray scale waveform match. (Fig. 4-2-22)



0.1V/DIV, 10μsec/DIV

Fig. 4-2-22

- Next adjust R PED VR8 so that the pedestal level of R signal matches that of YL signal. (Fig. 4-2-23)



0.1V/DIV, 10μsec/DIV

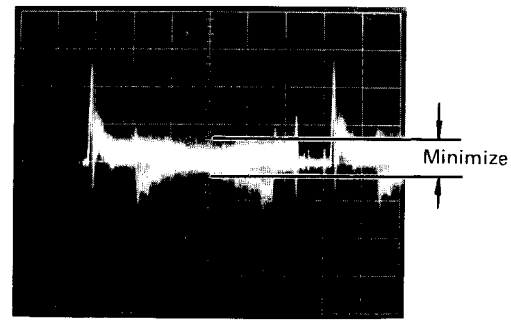
Fig. 4-2-23

- Repeat adjusting R GAIN VR7 and R PED VR8 until the signal level between the black chip (zero step) and fifth step (crossing step), and pedestal level of gray scale waveform match.

(20) YL and B signal tracking adjustment

Test point:	Pin 3 of CN13 (B-YL)	Process-1 board
Adjusts:	VR91 (B TRACKING-1)	Process-1 board
	VR92 (B TRACKING-2)	Process-2 board
	VR93 (B TRACKING-3)	Process-1 board
	VR2 (R/B GAIN)	Process-1 board

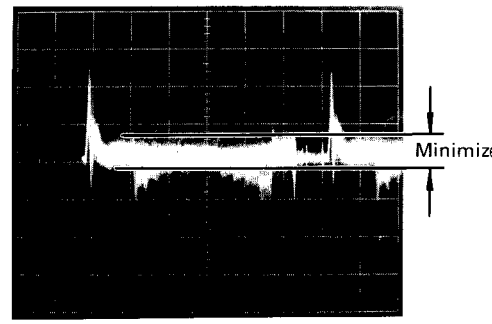
- Set the YL ON/OFF switch to ON position.
- Confirm that the B TRACKING-1 VR91, B TRACKING-2 VR92 and B TRACKING-3 VR93 are set to their mechanical centre.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to Pin 3 of CN13.
- Trigger the oscilloscope at H.rate. (Use Hs TP1 on deflection board.)
- Confirm that the centre portion of B-YL signal is minimum. If not, adjust R/B GAIN VR2 on process-1 board to minimize. (Fig. 4-2-24)



0.1V/DIV, 10μsec/DIV

Fig. 4-2-24

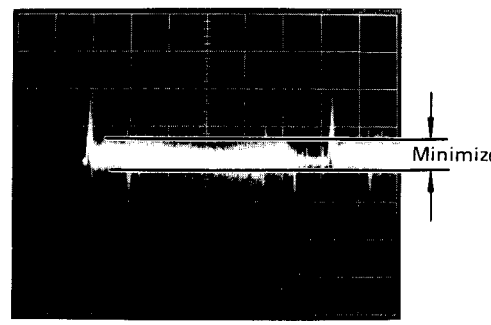
- Adjust B TRACKING-1 VR91 so that the B-YL signal becomes minimum. (Fig. 4-2-25)



0.1V/DIV, 10μsec/DIV

Fig. 4-2-25

- Adjust B TRACKING-2 VR92 and B TRACKING-3 VR93 so that the B-YL signal becomes minimum. (Fig. 4-2-26)



0.1V/DIV, 10μsec/DIV

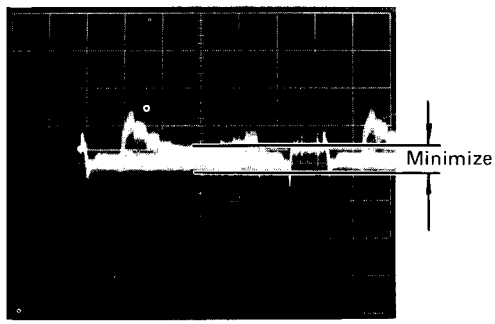
Fig. 4-2-26

- Repeat these steps until the B-YL signal becomes minimum.

(21) YL and R signal tracking adjustment

Test point:	Pin 1 of CN13 (R-YL)	Process-1 board
Adjusts:	VR101 (R TRACKING-1)	Process-1 board
	VR102 (R TRACKING-2)	Process-1 board
	VR103 (R TRACKING-3)	Process-1 board
	VR12 (R GAIN)	Process-1 board

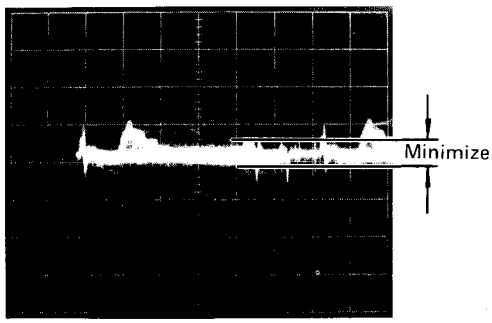
- Set the YL ON/OFF switch to ON position.
- Confirm that the R TRACKING-1 VR101, R TRACKING-2 VR102 and R TRACKING-3 VR103 are set to their mechanical centre.
- Aim the camera at logarithmic gray scale chart.
- Connect the oscilloscope Pin 1 of CN8.
- Trigger the oscilloscope at H.rate. (Use Hs TP1 on deflection board.)
- Confirm that the centre portion of R-YL signal is minimum. If not, adjust R GAIN VR7 on process-1 board to minimize. (Fig. 4-2-27)



0.1V/DIV, 10μsec/DIV

Fig. 4-2-27

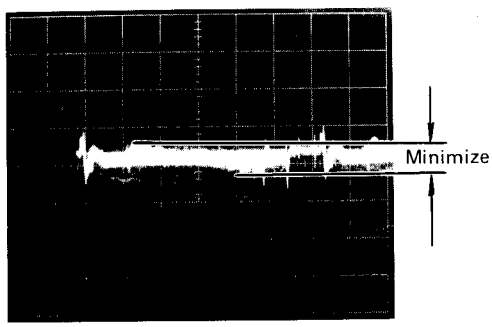
- Adjust R TRACKING-1 VR101 so that R-YL signal becomes minimum. (Fig. 4-2-28)



0.1V/DIV, 10μsec/DIV

Fig. 4-2-28

- Adjust R TRACKING-2 VR11 and R TRACKING-3 VR102 so that the R-YL signal becomes minimum. (Fig. 4-2-29)



0.1V/DIV, 10μsec/DIV

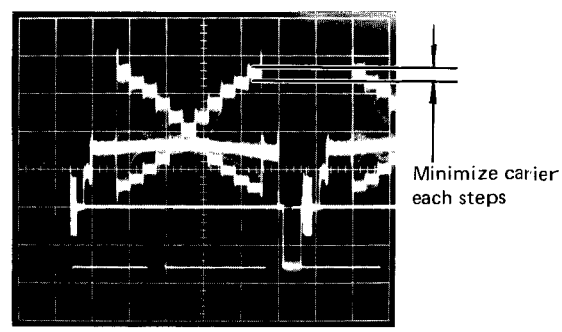
Fig. 4-2-29

- Repeat these steps until the R-YL signal becomes minimum.

(22) YL and R/B signal tracking fine adjustment

Test point:	TP12 (PAL OUT)	Process-1 board
Adjusts:	VR2 (R/B GAIN)	Process-1 board
	VR7 (R GAIN)	Process-1 board
	VR91 (B TRACKING-1)	Process-1 board
	VR92 (B TRACKING-2)	Process-1 board
	VR93 (B TRACKING-3)	Process-1 board
	VR101 (R TRACKING-1)	Process-1 board
	VR102 (R TRACKING-2)	Process-1 board
	VR103 (R TRACKING-3)	Process-1 board

- Set the YL ON/OFF switch to ON position.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to PAL OUT TP12.
- Trigger the oscilloscope at H.rate. (Use Hs TP1 on deflection board.)
- Fine adjust R/B GAIN VR2 so that the carrier on the fifth step (crossing step) at PAL OUT TP12 becomes minimum.
- Fine adjust R GAIN VR7 for the same condition.
- Fine adjust B TRACKING-1 VR91 and R TRACKING-1 VR101 so that the carrier on the second and third steps at PAL OUT TP12 becomes minimum.
- Fine adjust B TRACKING-2 VR92, R TRACKING-2 VR102, B TRACKING-3 VR93 and R TRACKING-3 VR103 so that the carrier on the eighth to tenth steps becomes minimum. (Fig. 4-2-30)



0.2V/DIV, 10μsec/DIV

Fig. 4-2-30

Steps denoted by shaded outlines do not have to be performed if only pick-up tube is replaced.

(23) Y gain adjustment

Test point :	TP12 (PAL OUT)	Process board
Adjust :	VR11 (Y GAIN)	Process board

- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to PAL OUT TP12.
- Trigger the oscilloscope at H.rate. (Use Hs TP1 on deflection board.)
- Adjust Y GAIN VR11 for 0.7V ± 0.05V from the blanking level to the top step of the gray scale waveform. (Fig. 4-2-31)

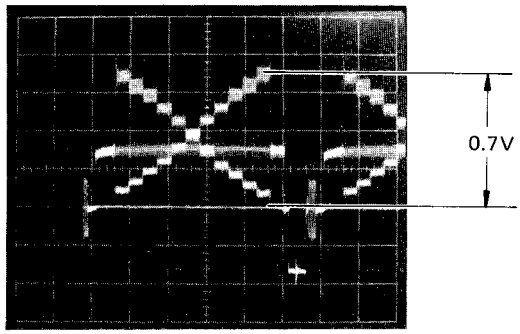


Fig. 4-2-31

(24) Chroma and Burst adjustment

Test point:	TP12 (PAL OUT)	Process-1 board
Adjusts:	VR16 (BURST GAIN)	Process-1 board
	VR5 (BURST PHASE)	Process-1 board
	CT4 (CHROMA PHASE)	Process-1 board
	VR14 (CHROMA GAIN)	Process-1 board
	VR12 (R PHASE)	Process-1 board
Observe:	Vectorscope	

- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to PAL OUT TP12.
- Trigger the oscilloscope at H.rate. (Use Hs TP1 on deflection board.)
- Connect the video output to a terminated vectorscope.
- Set the YL ON/OFF switch to ON position.
- Adjust BURST PHASE VR5 so that the phase between two bursts becomes 90° each other on the vectorscope. (Fig. 4-2-32)

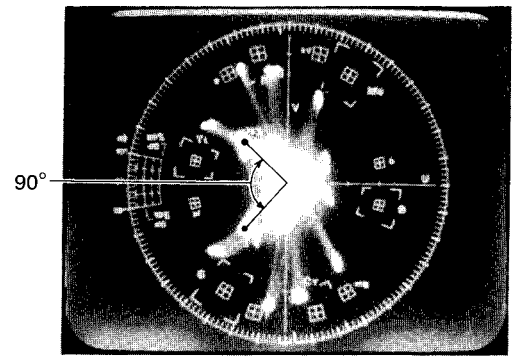


Fig. 4-2-32

Fig. 4-2-32

- Set the vectorscope to NTSC mode.
- Make sure that the burst vector becomes 135° on the vectorscope. (Fig. 2-4-33)

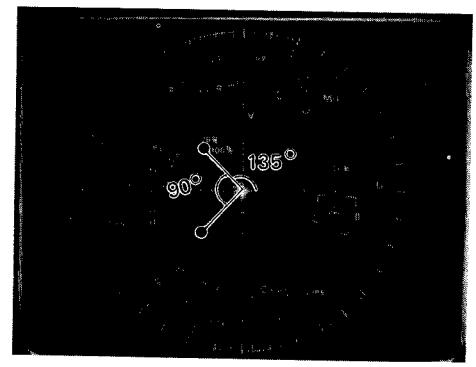


Fig. 4-2-33

- Adjust BURST GAIN VR16 so that the burst level is 0.3V ± 0.01V on the oscilloscope. (Fig. 4-2-34)

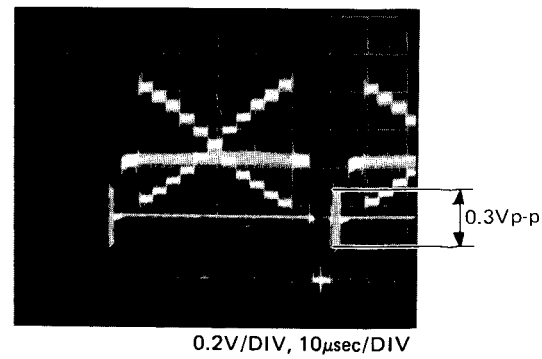


Fig. 4-2-34

- Adjust BURST GAIN VR16 so that the burst level becomes 75% on the vectorscope. (Fig. 4-2-35)
- Adjust CHROMA PHASE CT4 so that the two red vectors become one above another on the vectorscope.
- Adjust CHROMA GAIN VR14 so that the red vector becomes 185% as compares to the burst signal on the vectorscope. (Fig. 4-2-35)

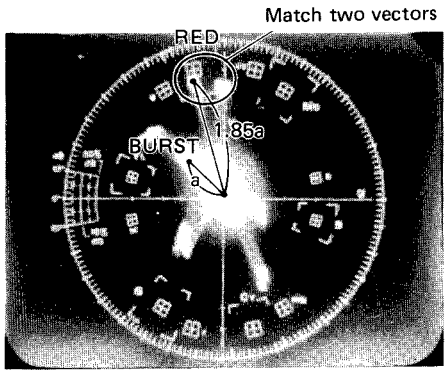


Fig. 4-2-35

- Turn the colour balance control to the R position.
- Adjust R PHASE VR12 so that the red vector becomes 110° on the vectorscope. (Fig. 4-2-36)

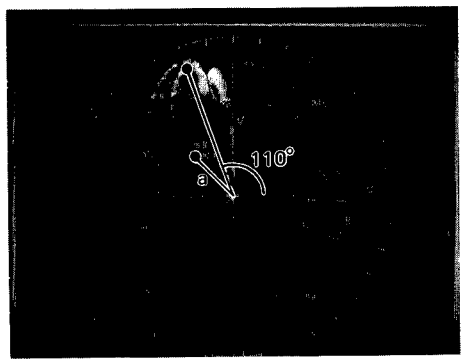


Fig. 4-2-36

- Reset the colour balance control to the centre position.

(25) YL phase adjustment

Adjust :	CT3 (YL PHASE)	Process-1 board
Observe :	Colour monitor	

- Aim the camera at white set chart. (The reverse side of ball chart.)
- Adjust YL PHASE CT3 for minimum colour on the right side edge of white portion. (Fig. 4-2-37)

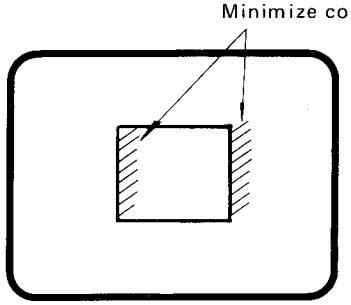


Fig. 4-2-37

Steps denoted by shaded outlines do not have to be performed if only pick-up tube is replaced.

(26) Title colour phase adjustment (for WVP-A2)

Adjust :	CT1 (TITLE COLOUR PHASE)	Process-2 board
Observe :	Colour monitor Vectorscope	

- Connect the video output to a terminated vectorscope.
- Connect the TITLE CARD to the camera.
- Set the vectorscope to NTSC mode.
- Press the TITLE button on the key board to observe the dots on the monitor screen.
- Repeat to press the TITLE CLR button until title colour character becomes Magenta on the EVF screen.
- Press the KEY button on the key board for Magenta key picture on the monitor screen.
- Adjust TITLE COLOUR PHASE CT1 so that the two Magenta vectors become one above another on the vectorscope. (Fig. 4-2-38)

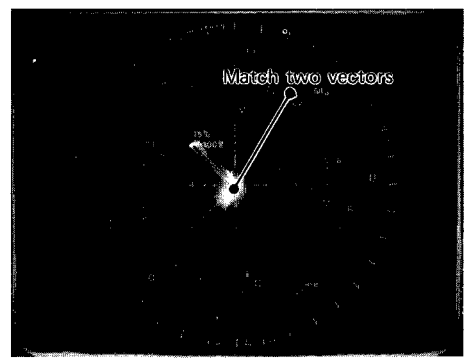


Fig. 4-2-38

(27) Character size adjustment

Test point :	TP5 (PAL OUT)	
Adjust :	VR1 (CHARACTER SIZE)	Microprocessor board

- Cap on the lens.
- Connect the oscilloscope to PAL OUT TP5.
- Trigger the oscilloscope at H.rate. (Use Hs TP1 on deflection board.)
- Press the DATE/TIME/STOP WATCH button on the key board to observe stop watch indication.
- Adjust CHARACTER SIZE VR1 so that the rise time between minutes indication and second indication becomes 7.10μsec ± 0.05μsec.

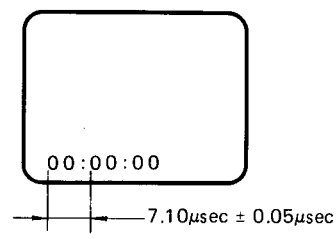


Fig. 4-2-39

Steps denoted by shaded outlines do not have to be performed if only pick-up tube is replaced.

(28) Timer frequency adjustment

Test point : TP1 (TIMER FREQ)		Microprocessor board
Adjust :	CT1 (TIMER FREQ)	Microprocessor board

- Insert the specified battery (SUM-3, AM-3 or AA size) into backup battery compartment.
- Turn OFF the power.
- Connect the frequency counter to TIMER FREQ TP1 on Micro processor board.
- Adjust TIMER FREQ CT1 so that the frequency at TIMER FREQ TP1 is 32,000.00(Hz).

(29) Picture tilt adjustment

Adjust :	Deflection coil	EVF
Observe :	Viewfinder	

- Reduce picture size using EVF V. SIZE VR1 and H. SIZE L3 on EVF board.
- Loosen the deflection coil holding screw. (Fig. 4-2-40)

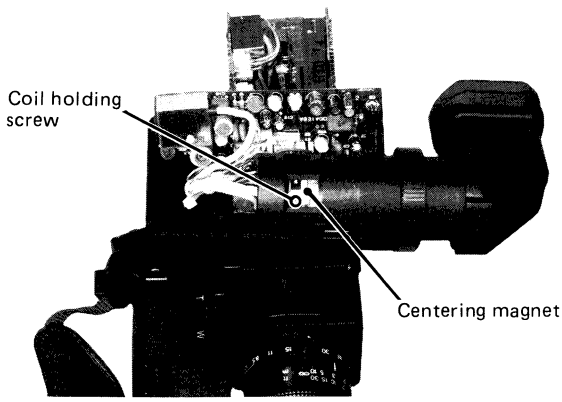


Fig. 4-2-40

- Cap on the lens.
- Observe the viewfinder, and turn the deflection coil until the raster is straight.
- Tighten the deflection coil holding screw.

(30) Centering magnets adjustment

Adjust :	Centring magnet	EVF
Observe :	Viewfinder	

- Aim the camera at the ball chart.
- Adjust the centring magnets (See Fig. 4-2-41) until the centre of picture (raster) becomes to the centre of the viewfinder screen. (Fig. 4-2-41)

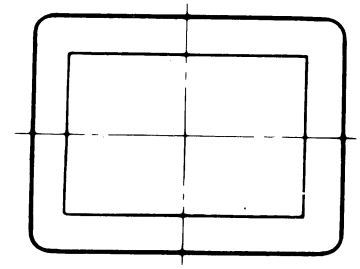


Fig. 4-2-41

(31) EVF V.SIZE and H.SIZE adjustment

Adjusts :	VR1 (EVF V. SIZE)	EVF board
	L3 (H. SIZE)	EVF board
Observe :	Viewfinder	

- Aim the camera at the ball chart, and line up the reference arrow head with edge of the raster (blanking) on the viewfinder. (Fig. 4-2-42)
- Adjust H. SIZE L3 to a point where the ball charts edges just disappear on the viewfinder. (Fig. 4-2-42)
- Then adjust EVF V. SIZE VR1 so that the circle in the chart is nearly a true circle.

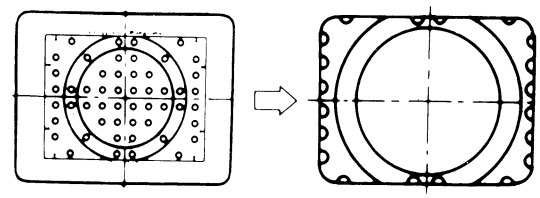


Fig. 4-2-42

(32) Contrast and brightness adjustment

Adjusts :	VR5 (BRIGHT)	EVF board
	VR4 (CONTRAST)	EVF board
Observe :	Viewfinder	

- Aim the camera at the rogarithmic gray scale chart.
- Adjust BRIGHT VR5 and CONTRAST VR4 so that the black and white chip gradations will be the same on the viewfinder screen as that in the monitor.

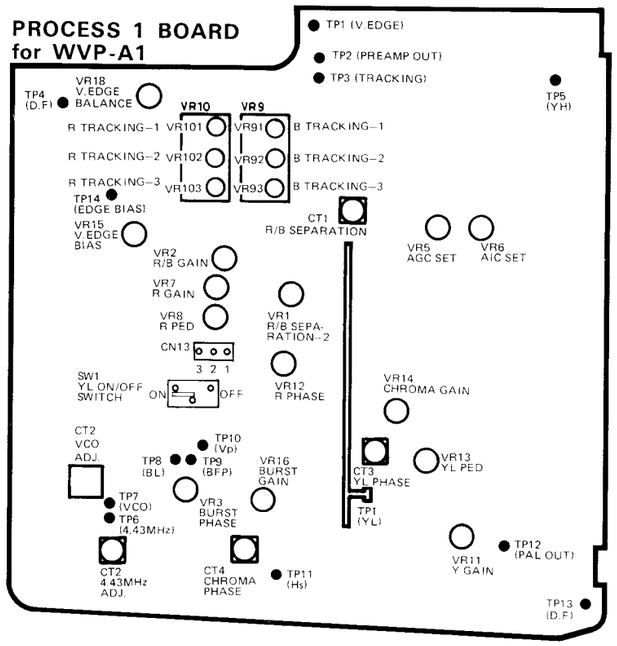
(33) Focus adjustment

Adjust :	VR3 (FOCUS)	EVF board
Observe :	Viewfinder	

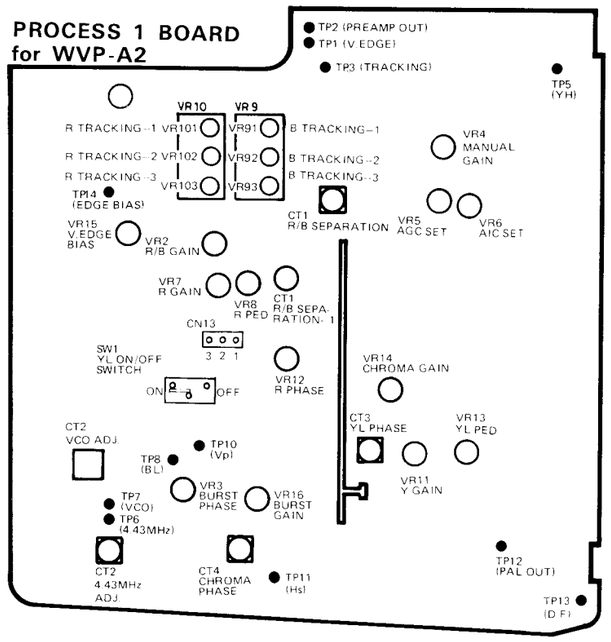
- Aim the camera at ball chart.
- Adjust FOCUS VR1 for best resolution in the viewfinder.

5. LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

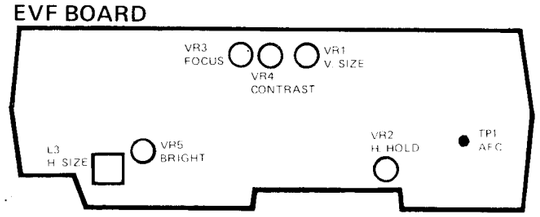
PROCESS 1 BOARD for WVP-A1



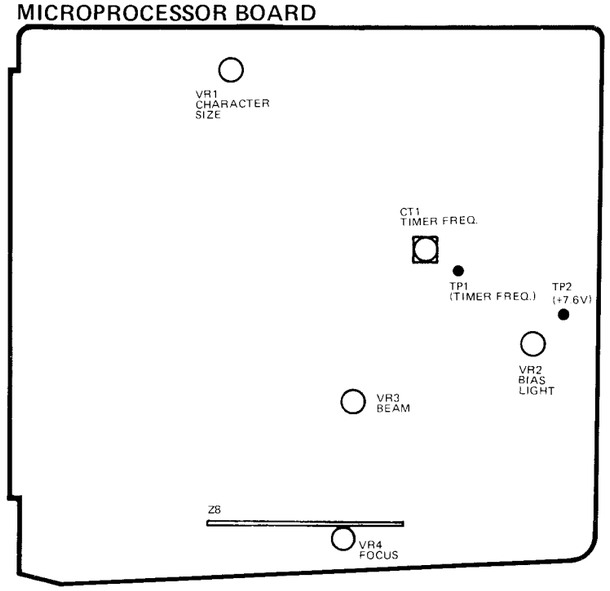
PROCESS 1 BOARD for WVP-A2



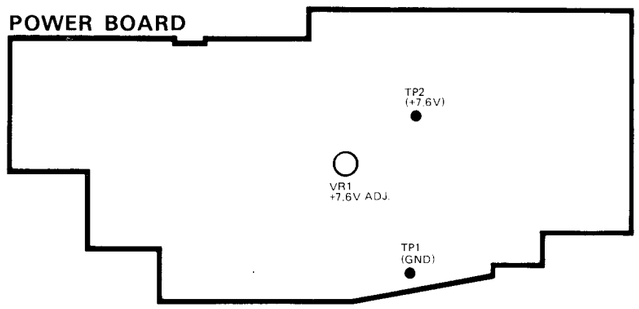
EVF BOARD



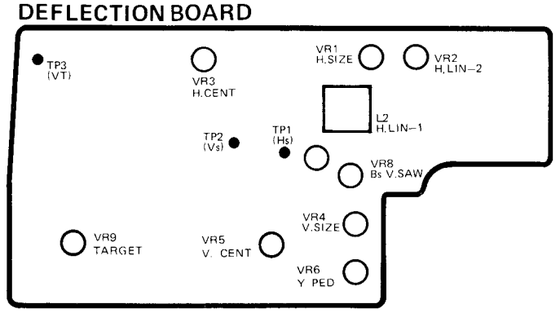
MICROPROCESSOR BOARD



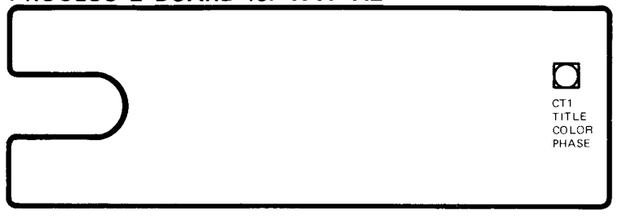
POWER BOARD



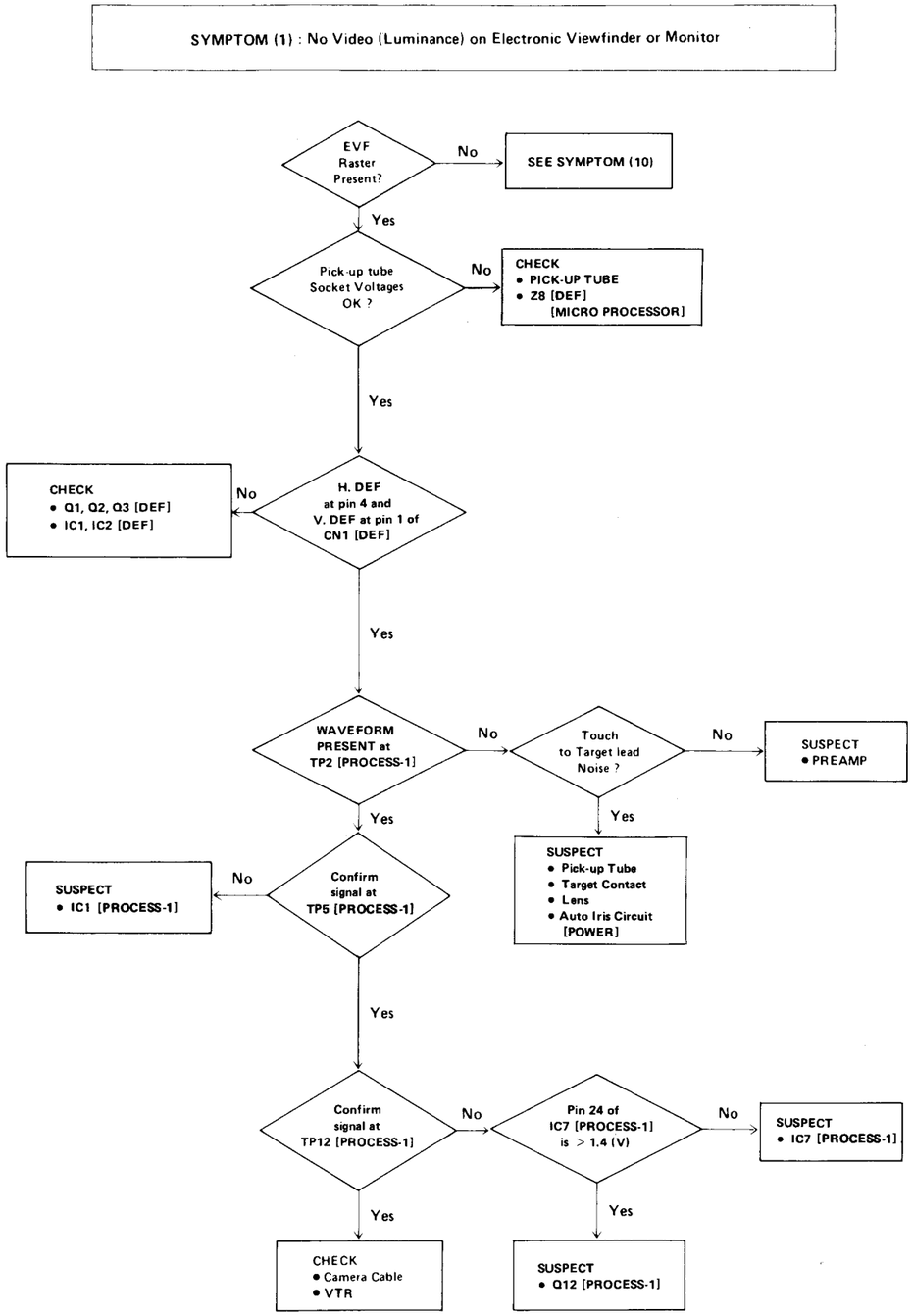
DEFLECTION BOARD

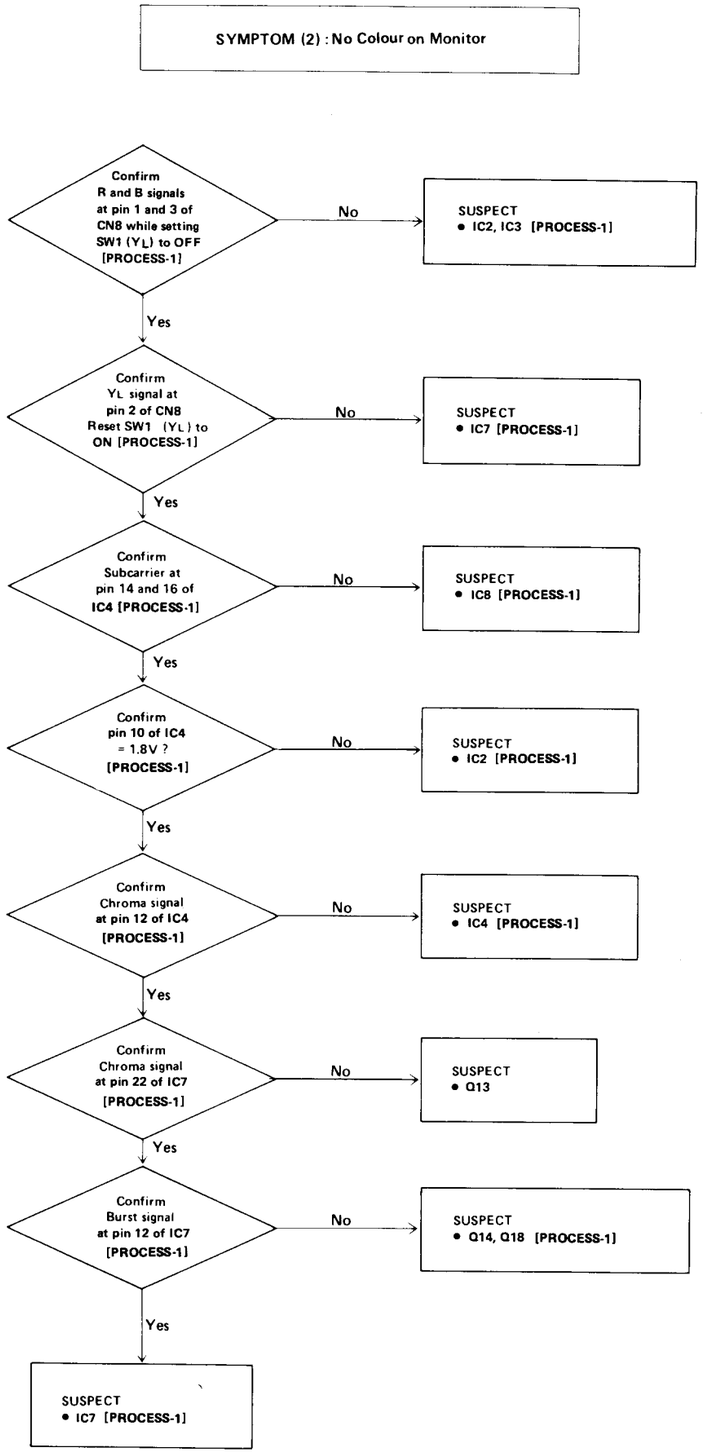


PROCESS 2 BOARD for WVP-A2

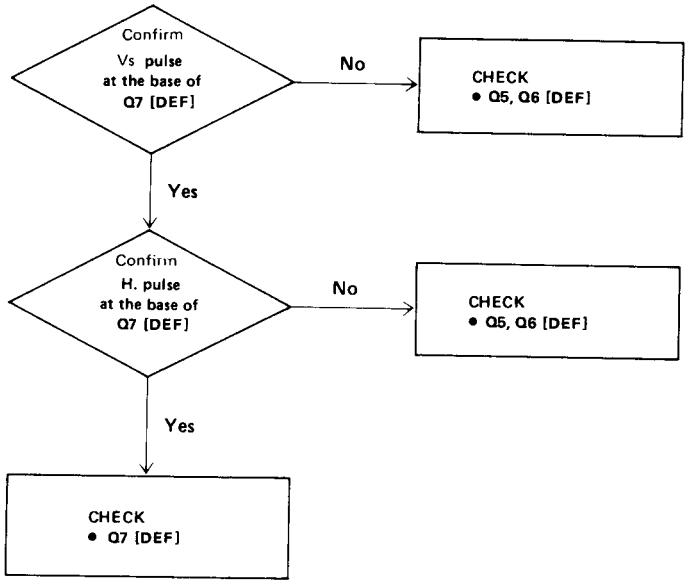


6. TROUBLESHOOTING GUIDE

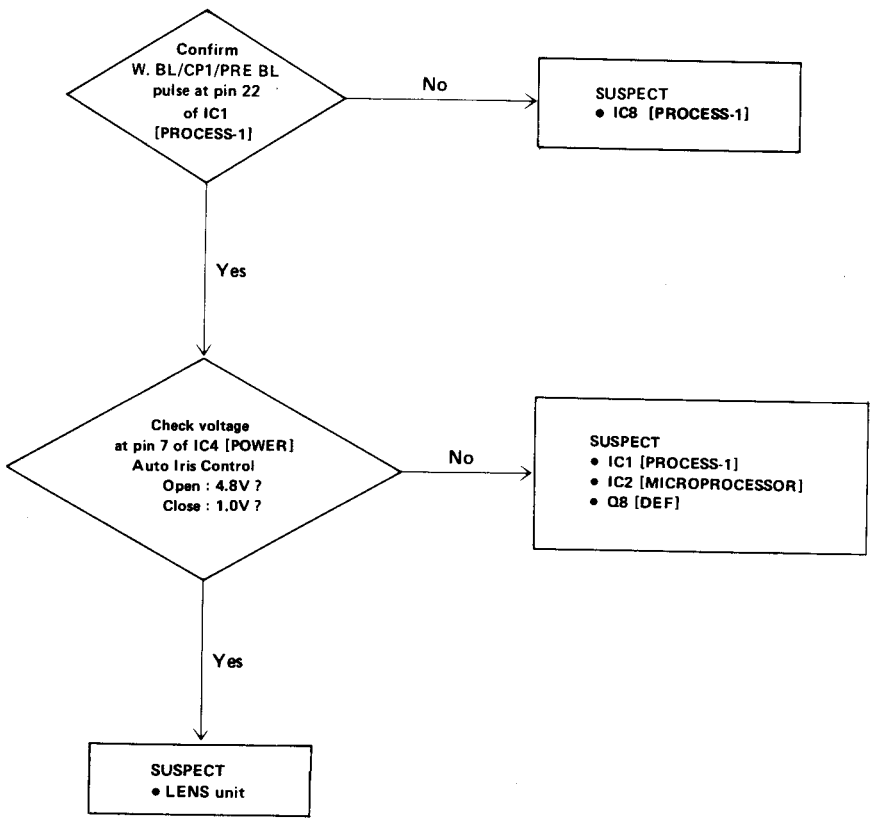




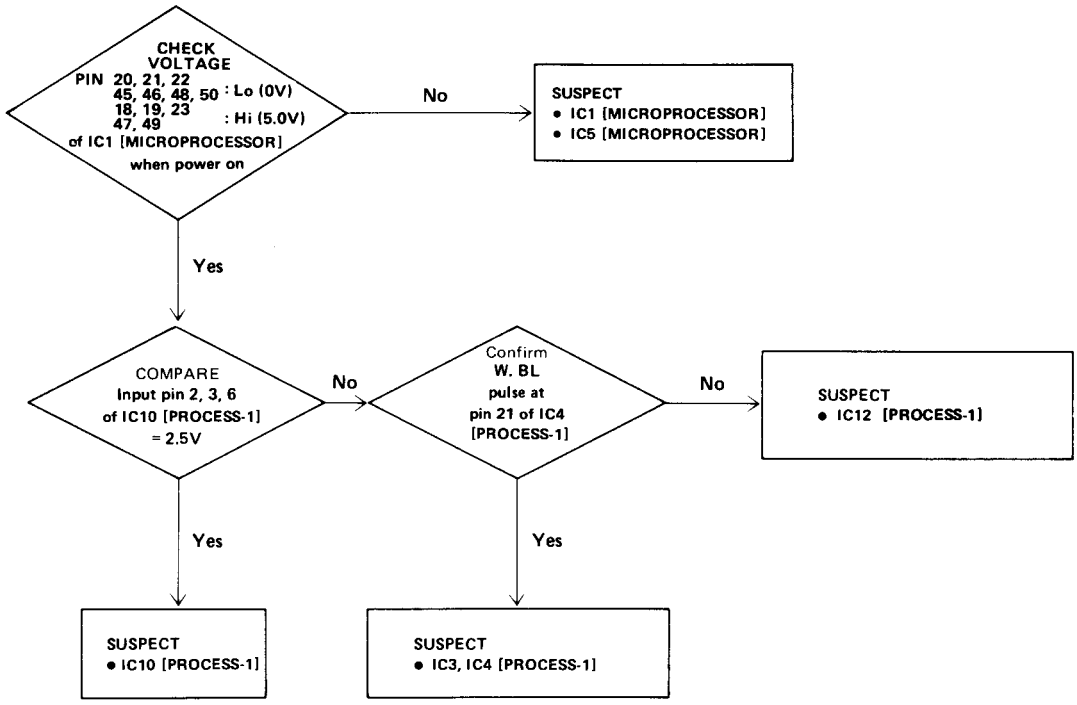
SYMPTOM (3) : Retrace Line in Electronic Viewfinder and Monitor



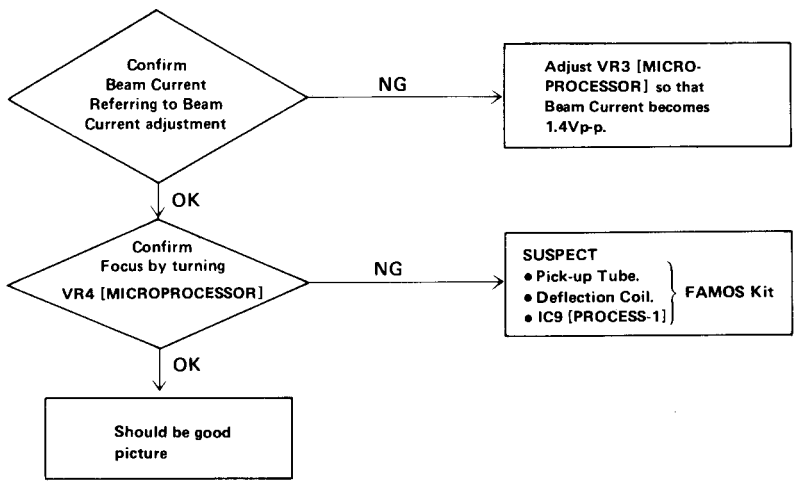
SYMPTOM (4) : Video Level Too High/Low
White Picture Areas Blooming
No/Incorrect Iris Operation



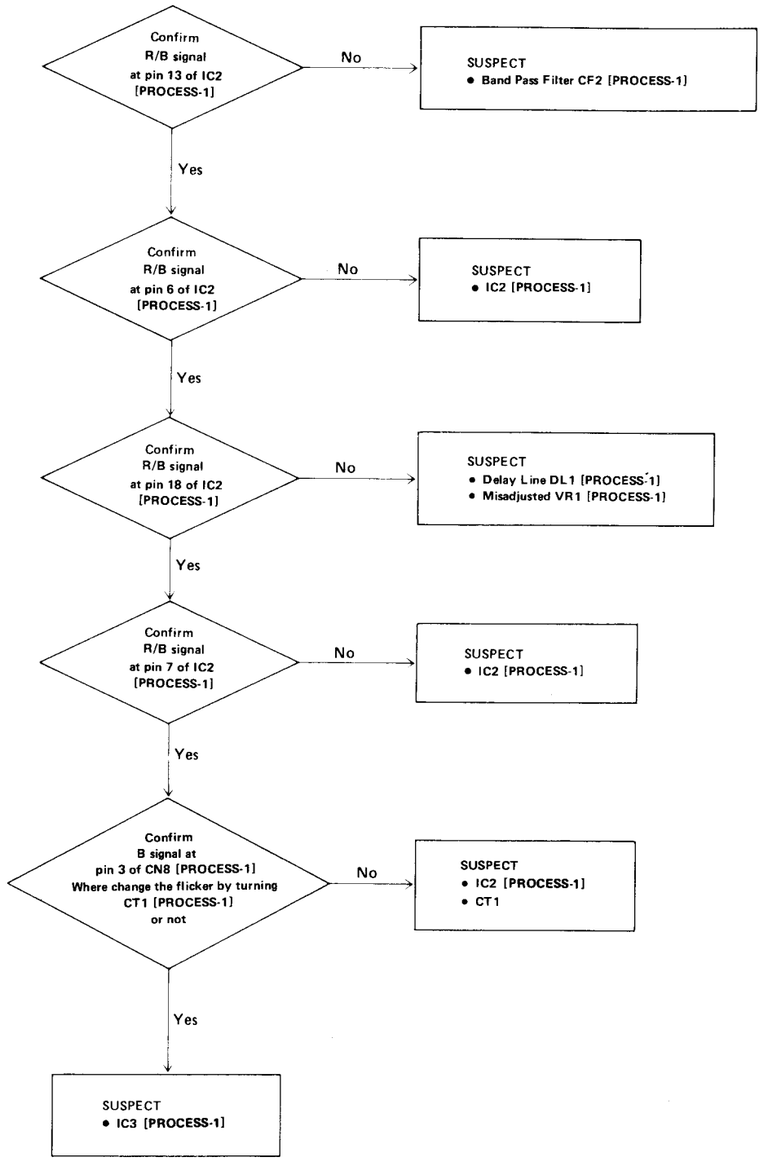
SYMPTOM (5) : Incorrect White Set Operation
Red, Blue, or Green Tinted Picture



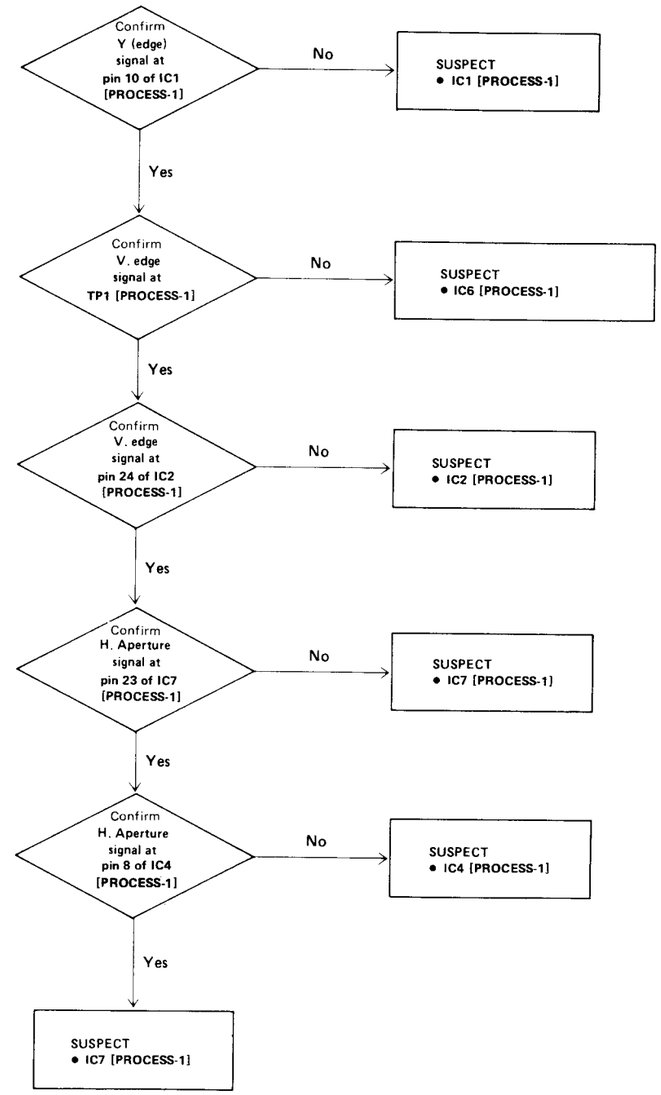
SYMPTOM (6) : Colour Shading



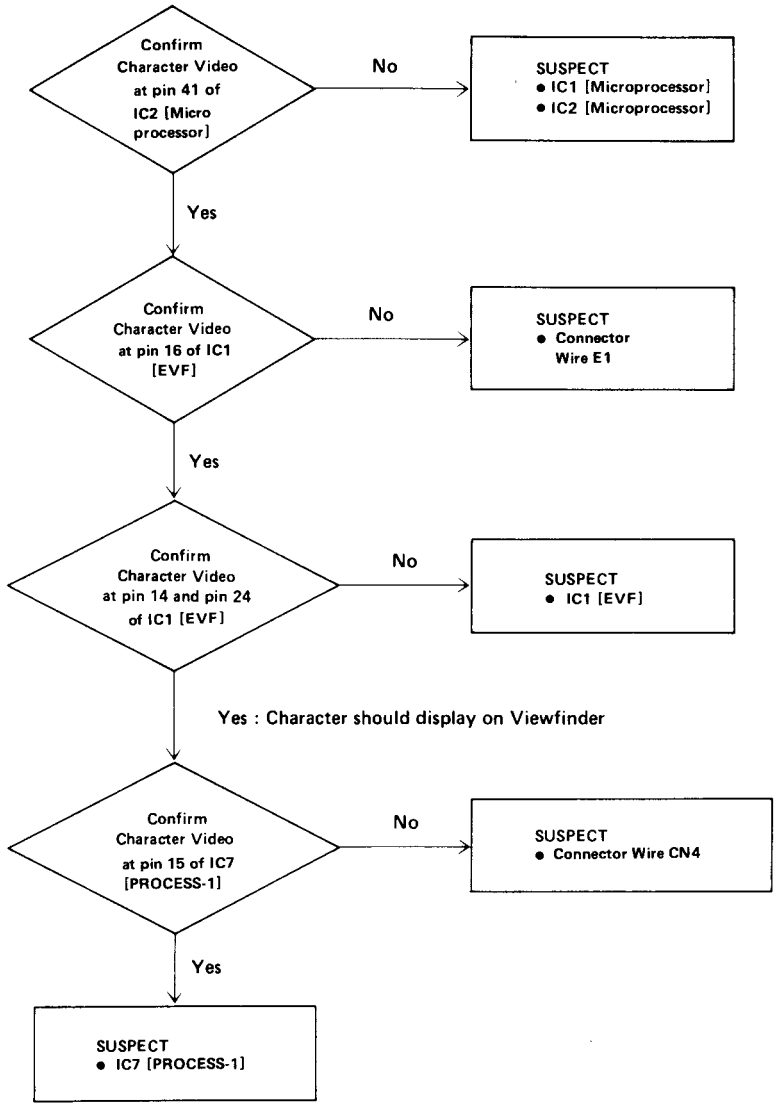
SYMPTOM (7): Incorrect Colour
No Red or Blue Separation



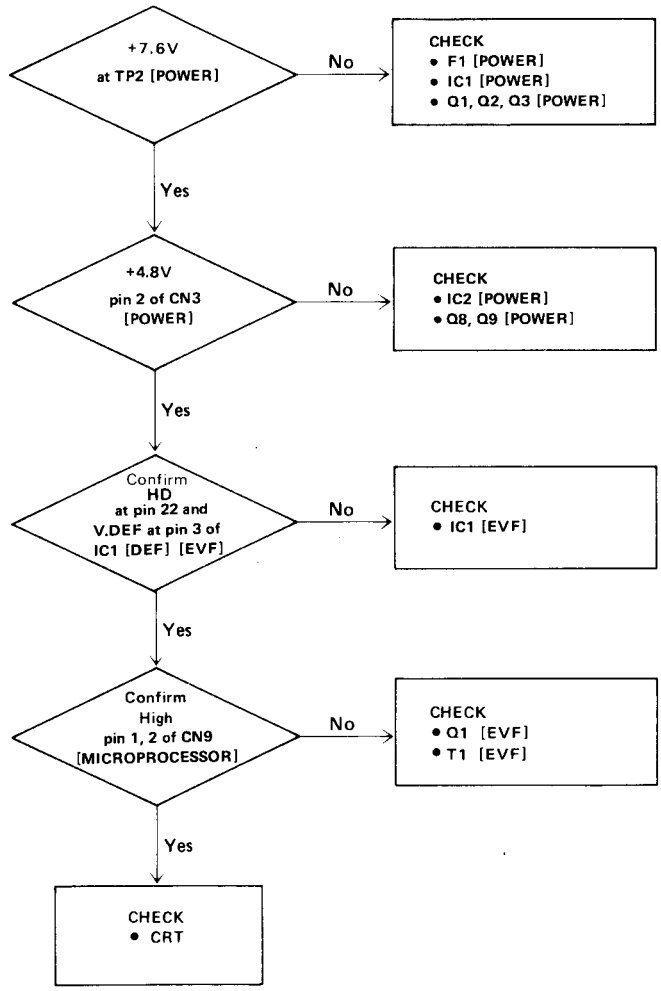
SYMPTOM (8): Soft Picture
No Vertical or Horizontal Detail



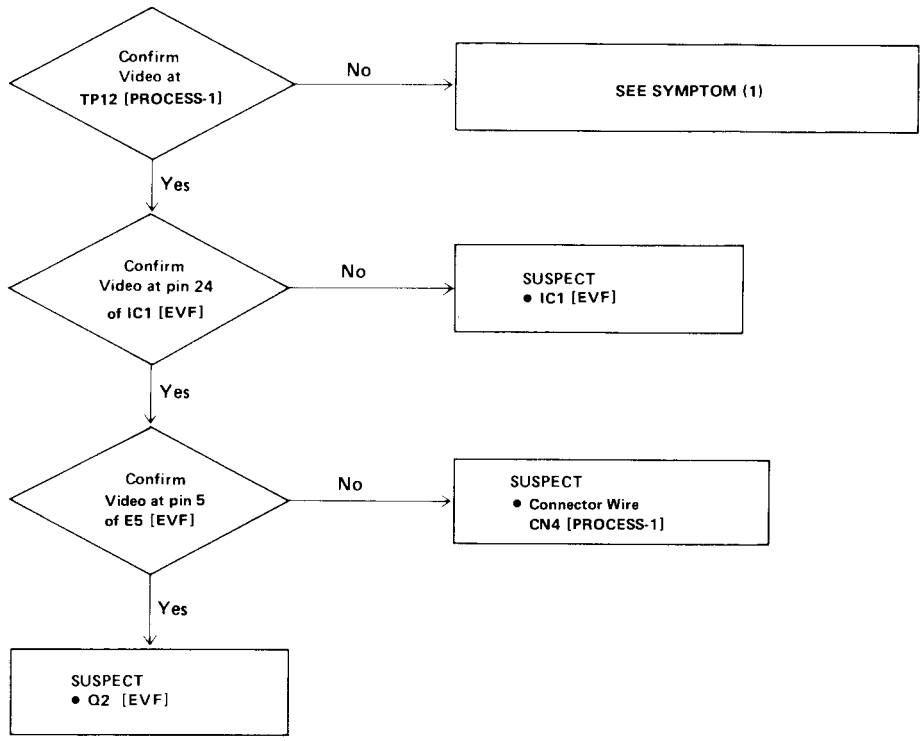
SYMPTOM (9) : No Character Display on Viewfinder or Monitor



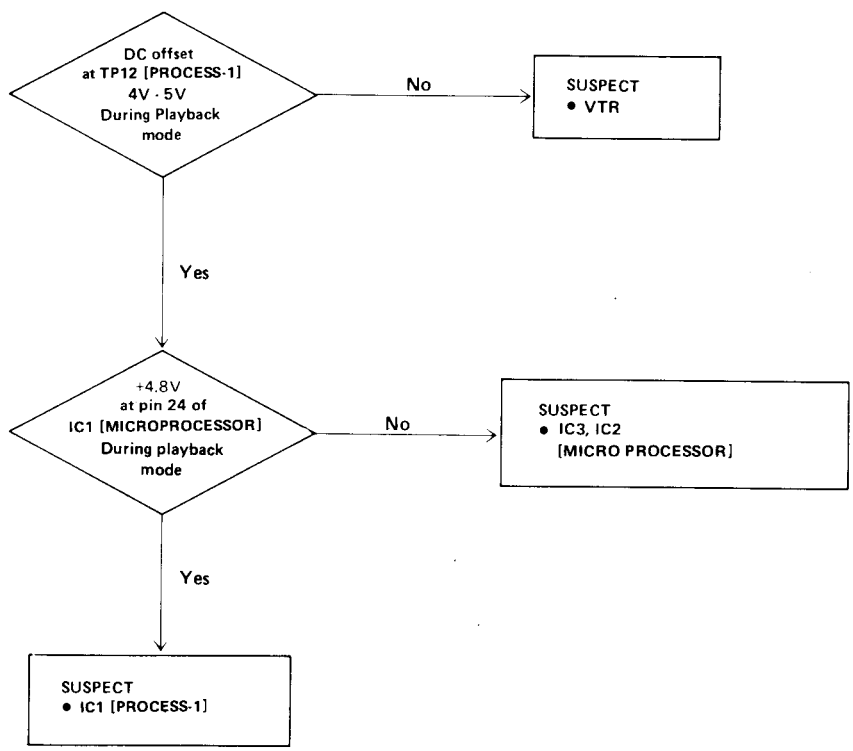
SYMPTOM (10) : No Raster on Electronic Viewfinder



SYMPTOM (11) : No Video on Electronic Viewfinder Only



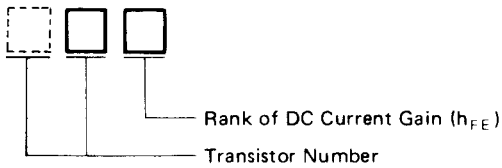
SYMPTOM (12) : Two Separate Images on Electronic Viewfinder Screen During Playback Mode



7. 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

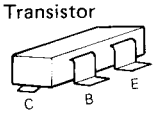
Letter	Transistor No.	Letter	Transistor No.
A	2SB709	X	2SD602A
B	2SB709A	Y	2SD601
C	2SB710	Z	2SD601A
D	2SB710A	1Z	2SD1030
E	2SA1022	1N	2SK199
F	2SA1034	1O	2SK198
H	2SA1035	1A	2SB799
I	2SB792	1B	2SB814
K	2SC2778	1C	2SB902
P	2SD814	1F	2SK321
Q	2SD813	1L	2SK247
R	2SC2480	1K	2SK316
S	2SC2405	1M	2SJ84
T	2SC2406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

Example

WQ ⟶ 2SD602 – Q
YQ ⟶ 2SD601 – Q
1BS ⟶ 2SB814 – S

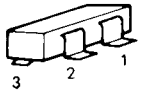
Appearance and Symbols

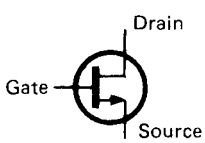
Transistor



C : Collector
B : Base
E : Emitter

FET

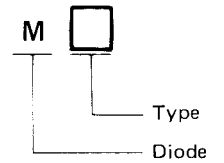




	1	2	3
Except 2SK199	Drain	Source	Gate
2SK199	Gate	Drain	Source

2. Chip Diode

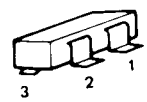
The diode number is indicated on the top surface of the chip diode using Two alphabet letters.



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

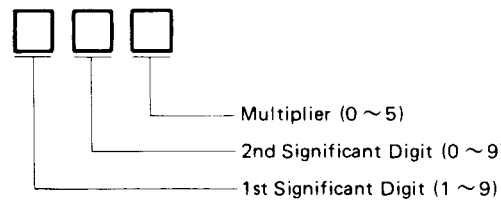




	1	2	3
MA28/28W/28T	–	Anode	Cathode
MA151K/152K	–	Anode	Cathode
MA151A/152A	–	Cathode	Anode
MA151WK/MA152WK	Anode	Anode	Cathode
MA151WA/MA152WA	Cathode	Cathode	Anode
MA153	Cathode	Anode	Common

2. Chip Resistor

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



EXAMPLE:

330 ⟶ 33×10^0 = 33 ohms
561 ⟶ 56×10^1 = 560 ohms
123 ⟶ 12×10^3 = 12 kohms

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

3. Chip Capacitor

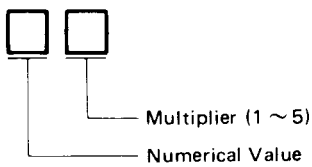
The capacitive value of replacement chip capacitors is indicated on the bottom surface. Original parts do not have value indication.

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	Q	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:

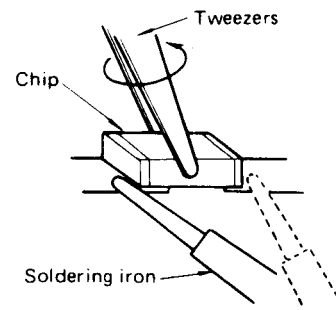
A1 ⟶ $10 \times 10^1 = 100$ pF
N2 ⟶ $33 \times 10^2 = 3300$ pF
S3 ⟶ $47 \times 10^3 = 47000$ pF

4. 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.

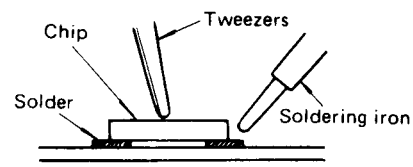
4-1 Removal

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.

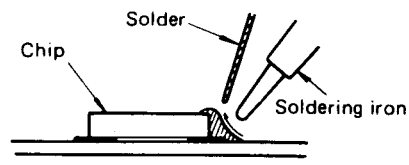


4-2 Mounting

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).



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B–339

ORDER NO. VKD84050836C8

Service Manual

Vol. 3

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Schematic Diagrams
Conductor Views

Colour Video Cameras

WVP-A1E/WVP-A1N



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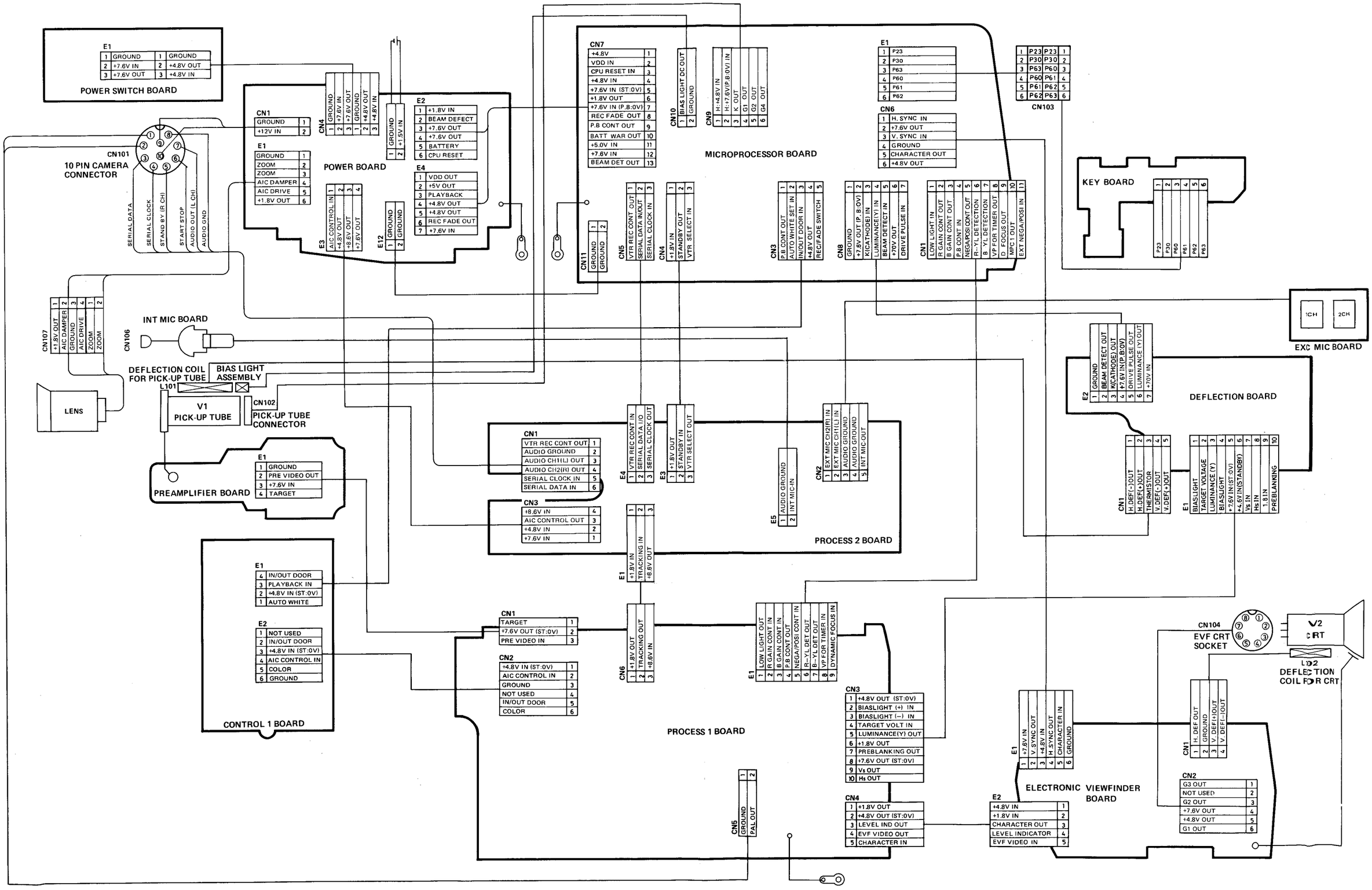
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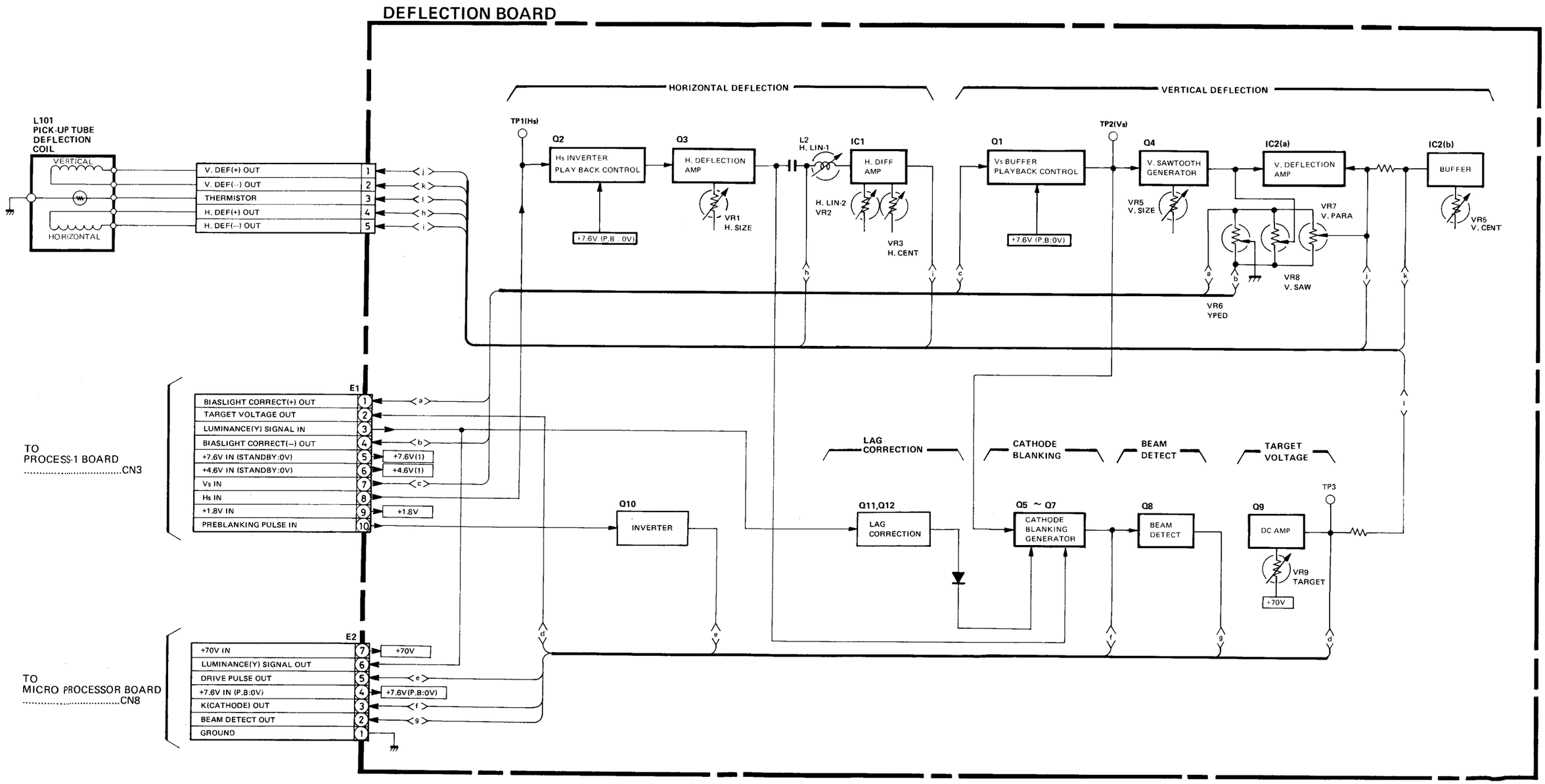
National/Panasonic

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

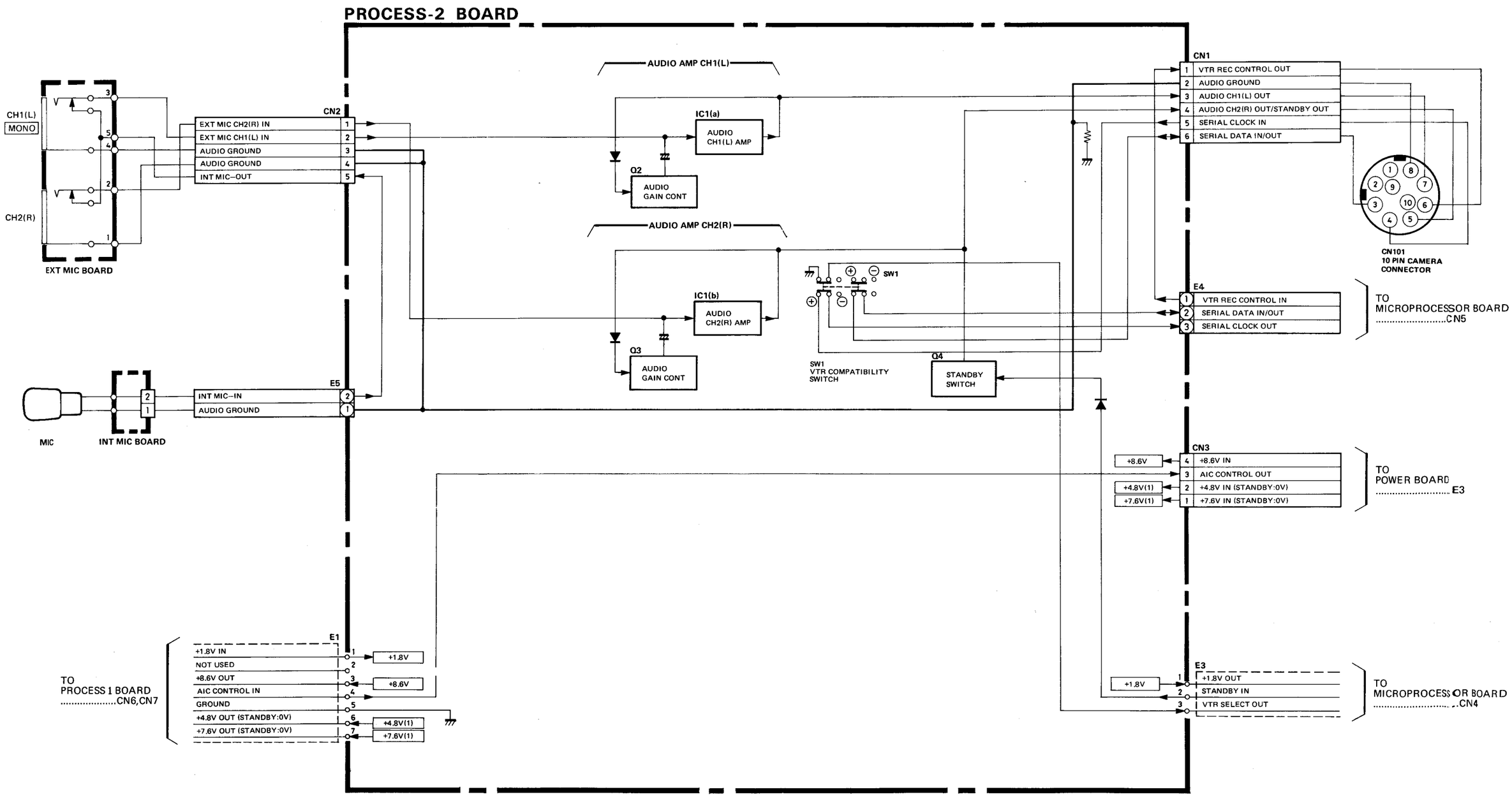
WIRING DIAGRAM



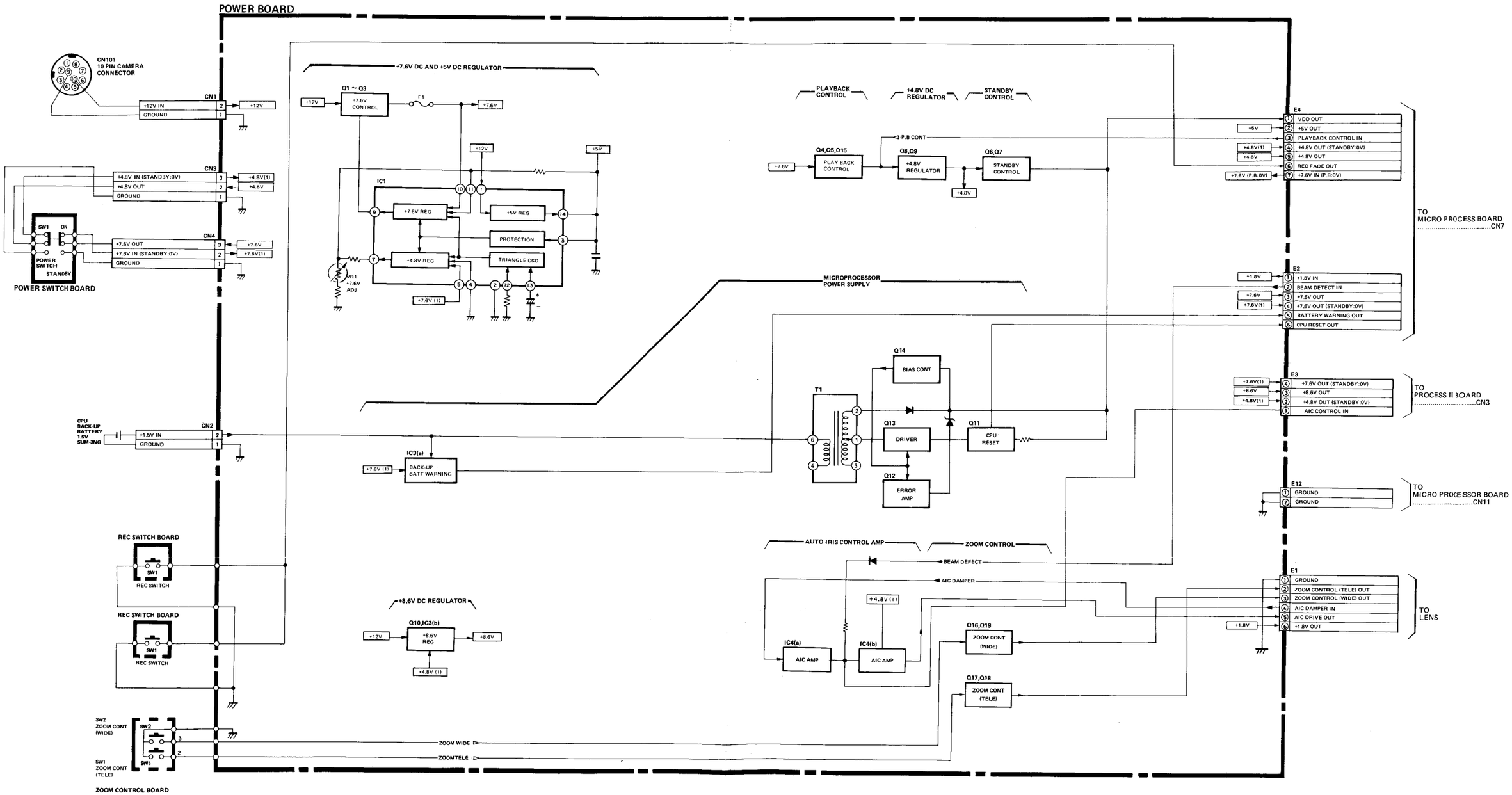
BLOCK DIAGRAM OF DEFLECTION BOARD



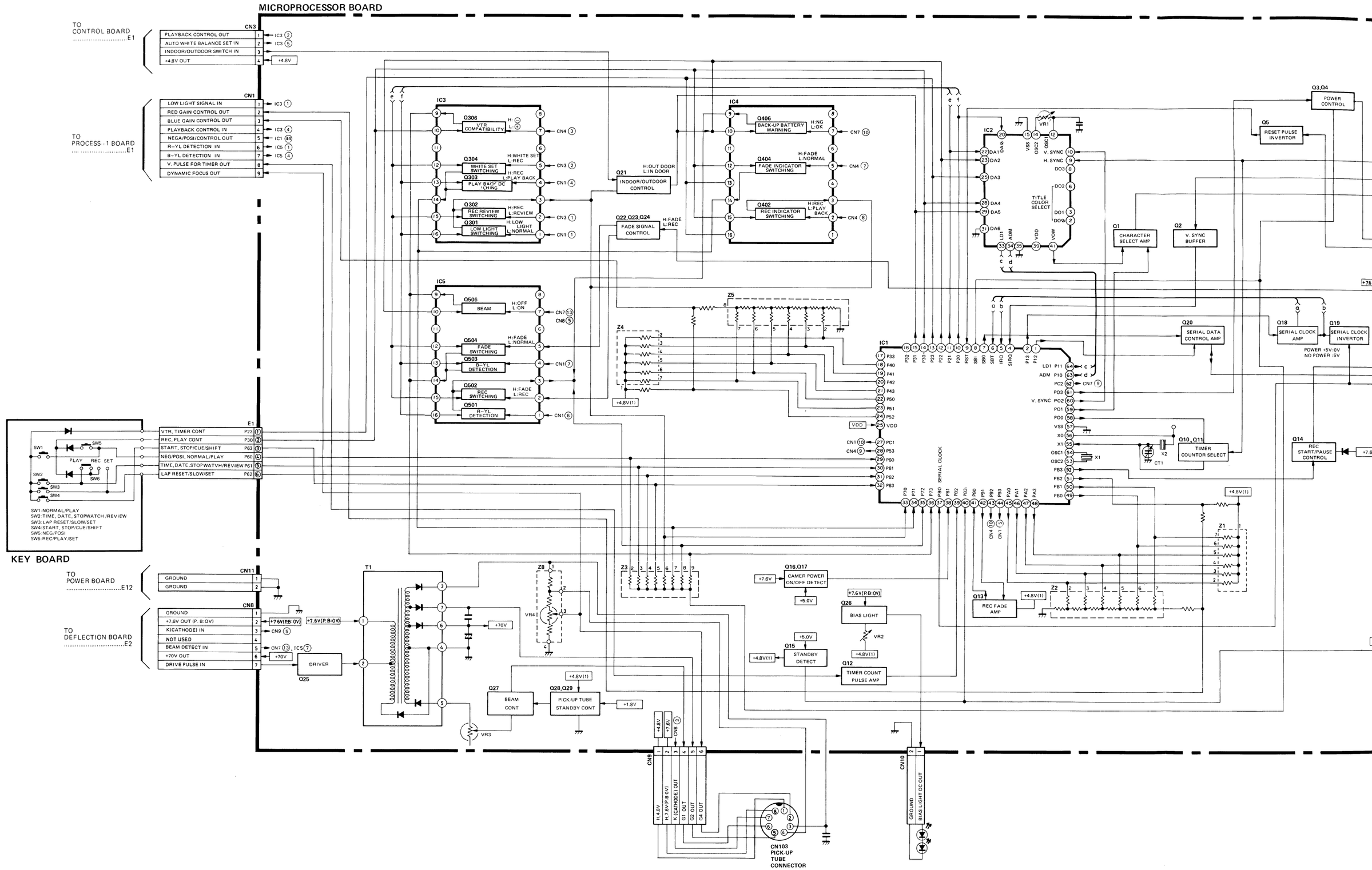
BLOCK DIAGRAM OF PROCESS-2 BOARD



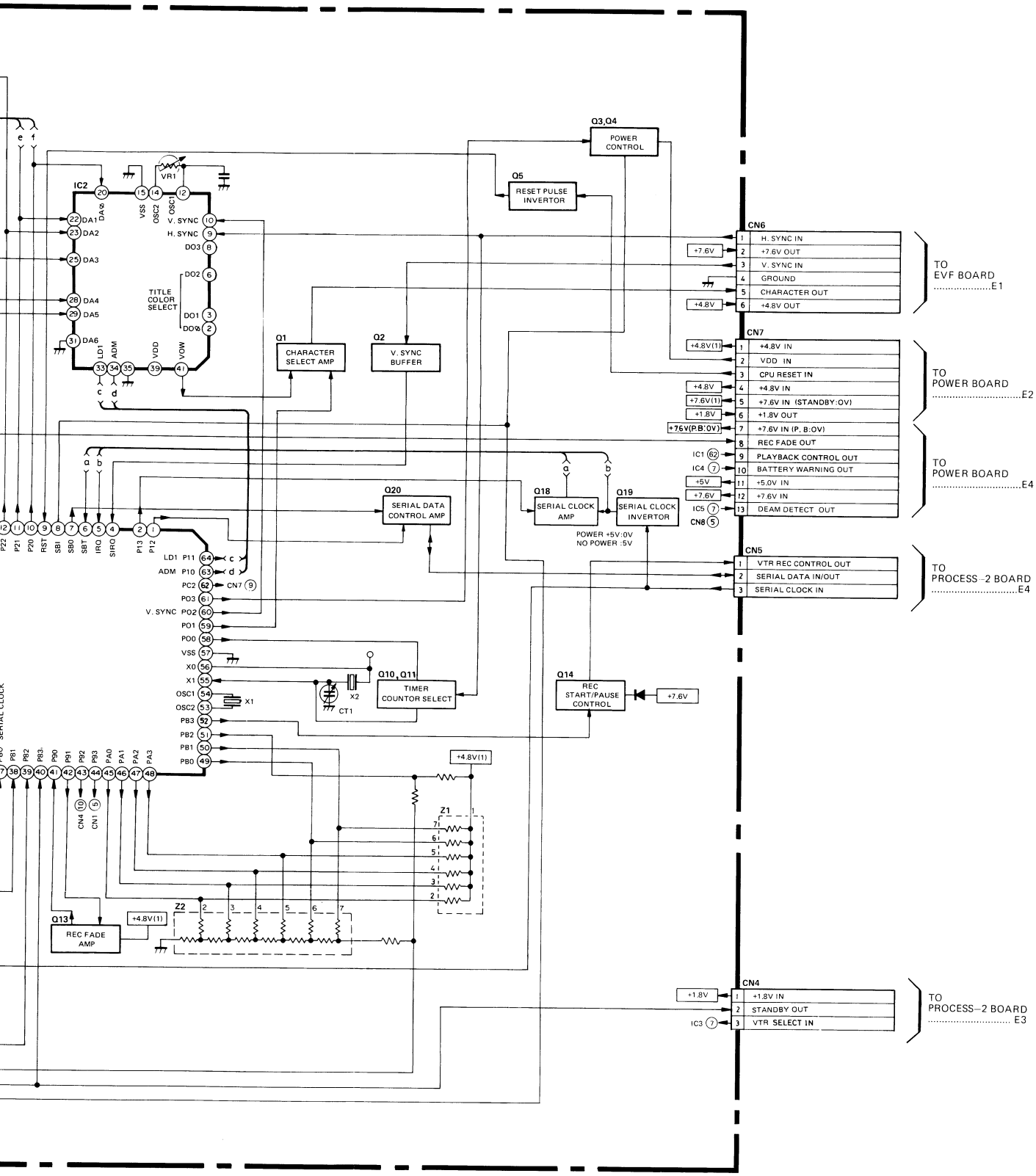
BLOCK DIAGRAM OF POWER BOARD



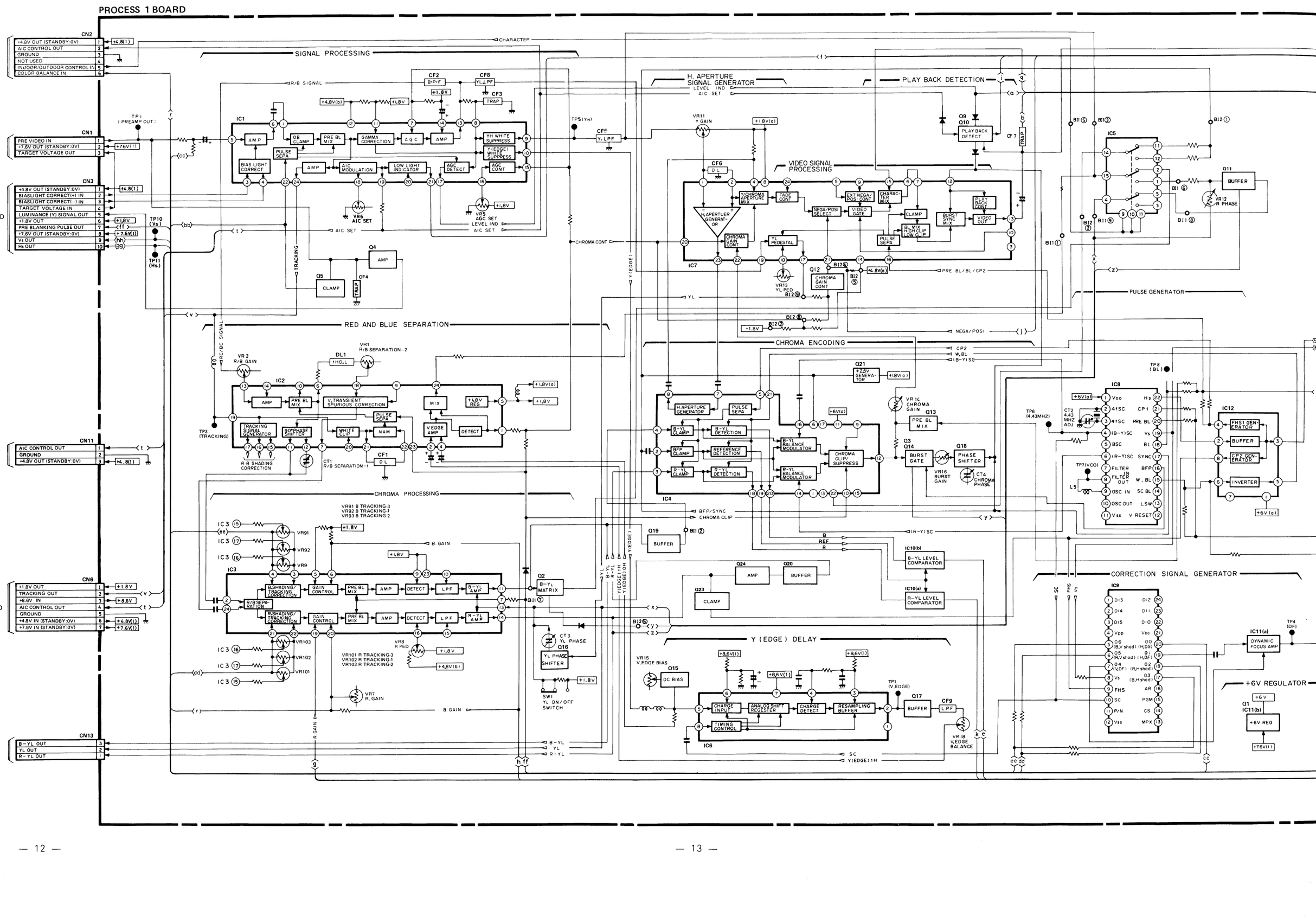
BLOCK DIAGRAM OF MICROPROCESSOR BOARD



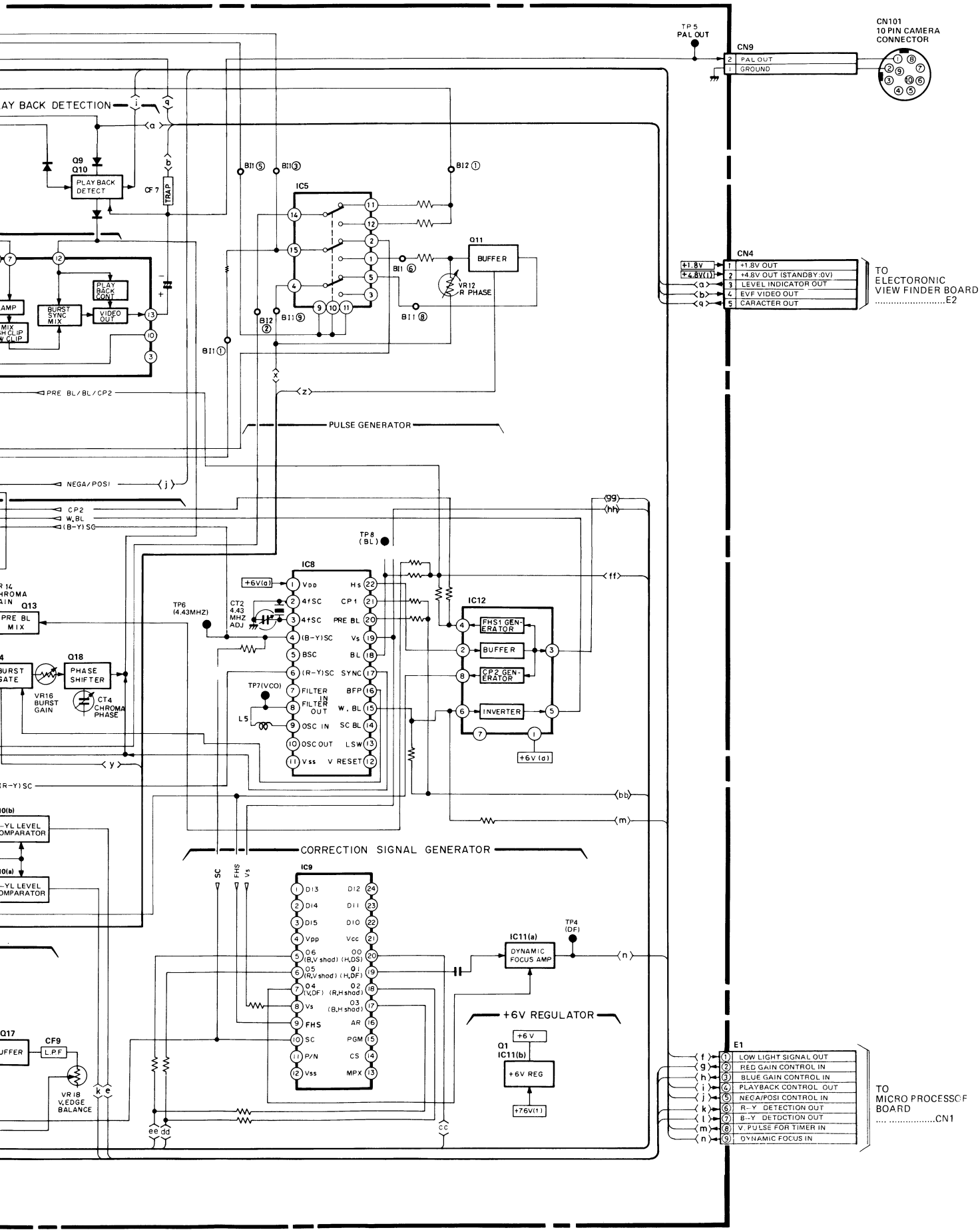
ESSOR BOARD


Q3,Q4
POWER CONTROL
Q5
RESET PULSE INVERTOR
IC2
VR1
V. SYNC
H. SYNC
DO3
DO2
TITLE COLOR SELECT
DO1
DO0
DA1
DA2
DA3
DA4
DA5
DA6
VSS
OSC2
OSC1
LD1
ADM
VDD
VOW
Q1
CHARACTER SELECT AMP
Q2
V. SYNC BUFFER
Q20
SERIAL DATA CONTROL AMP
Q18
SERIAL CLOCK AMP
Q19
SERIAL CLOCK INVERTOR
POWER +5V:0V
NO POWER :5V
CN6
1 H. SYNC IN
+7.6V 2 +7.6V OUT
3 V. SYNC IN
4 GROUND
5 CHARACTER OUT
+4.8V 6 +4.8V OUT
TO EVF BOARD E1
CN7
+4.8V(1) 1 +4.8V IN
2 VDD IN
3 CPU RESET IN
+4.8V 4 +4.8V IN
+7.6V(1) 5 +7.6V IN (STANDBY:0V)
+1.8V 6 +1.8V OUT
+7.6V(P.B:0V) 7 +7.6V IN (P. B:0V)
8 REC FADE OUT
IC1 (62) 9 PLAYBACK CONTROL OUT
IC4 (7) 10 BATTERY WARNING OUT
+5V 11 +5.0V IN
+7.6V 12 +7.6V IN
IC5 (7) 13 DEAM DETECT OUT
CN8 (5)
TO POWER BOARD E2
TO POWER BOARD E4
CN5
1 VTR REC CONTROL OUT
2 SERIAL DATA IN/OUT
3 SERIAL CLOCK IN
TO PROCESS-2 BOARD E4
Q10,Q11
TIMER COUNTOR SELECT
X1
X2
CT1
Q14
REC START/PAUSE CONTROL
+7.6V
+4.8V(1)
Z1
Z2
Q13
REC FADE AMP
CN4 (12)
CN1 (5)
CN4
+1.8V 1 +1.8V IN
2 STANDBY OUT
IC3 (7) 3 VTR SELECT IN
TO PROCESS-2 BOARD E3

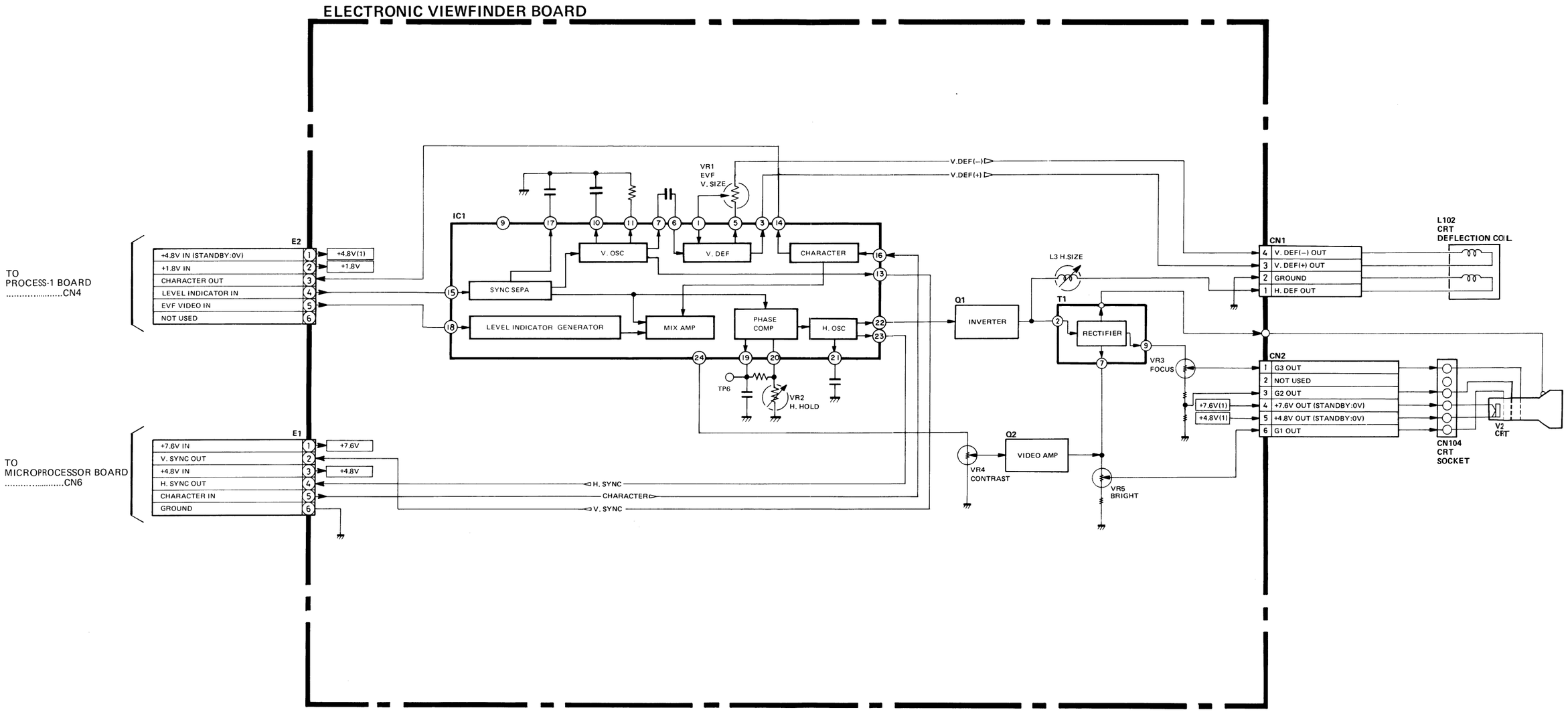
BLOCK DIAGRAM OF PROCESS-1 BOARD



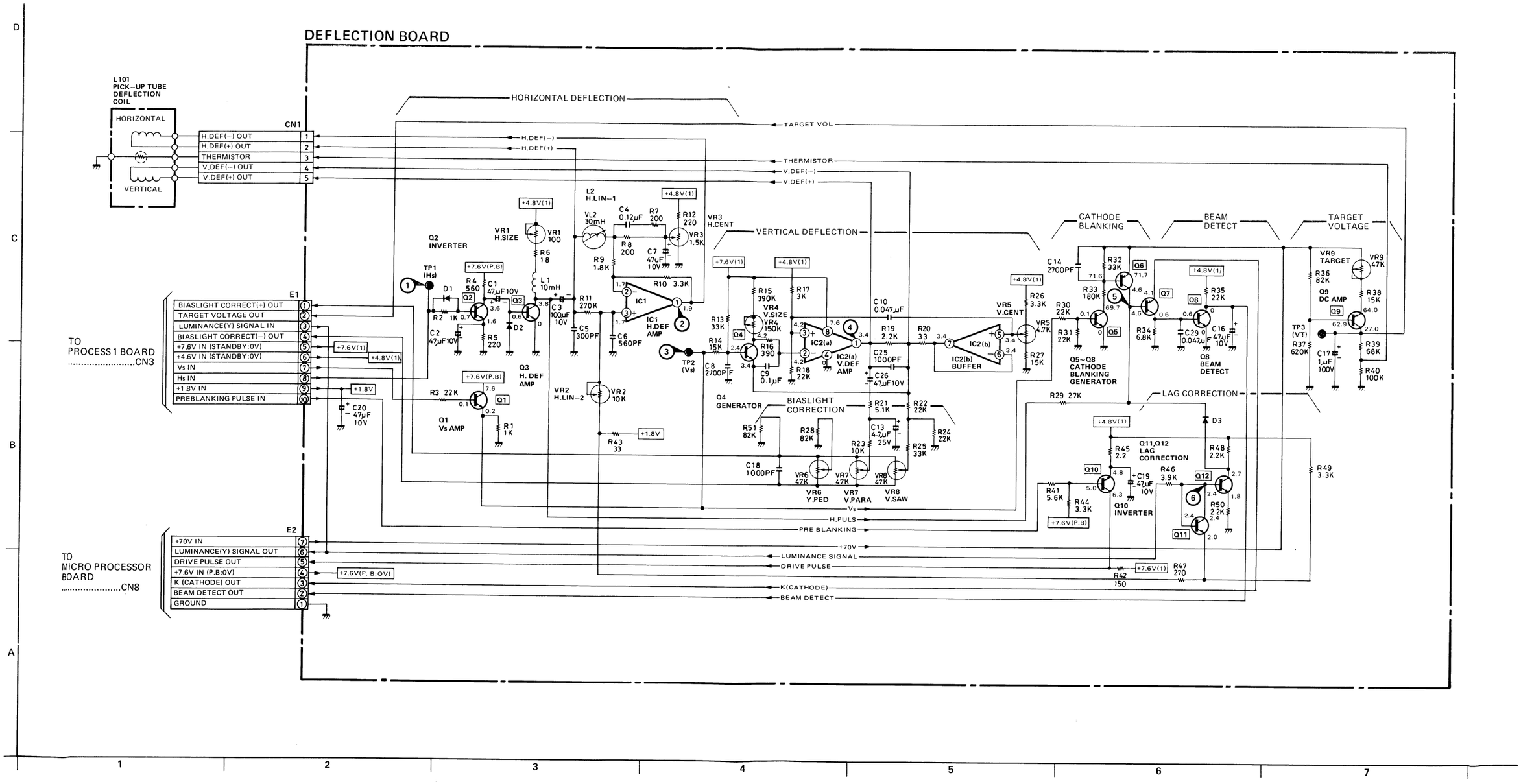
OARD


TP5
PAL OUT
CN9
2 PAL OUT
1 GROUND
CN101
10 PIN CAMERA
CONNECTOR
AY BACK DETECTION
Q9
Q10
PLAY BACK
DETECT
CF7
TRAP
IC5
Q11
BUFFER
VR12
R PHASE
CN4
+1.8V
+4.8V(1)
1 +1.8V OUT
2 +4.8V OUT (STANDBY:0V)
3 LEVEL INDICATOR OUT
4 EVF VIDEO OUT
5 CARACTER OUT
TO
ELECTORONIC
VIEW FINDER BOARD
.....E2
PLAY
BACK
CONT
BURST
SYNC
MIX
VIDEO
OUT
PRE BL/BL/CP2
PULSE GENERATOR
NEGA/POSI
CP2
W.BL
(B-Y) SC
TP8
(BL)
IC8
+6V(a)
Vdd
4fSC
4fSC
(B-Y)SC
BSC
(R-Y)SC
FILTER IN
FILTER OUT
OSC IN
OSC OUT
Vss
Hs
CP1
PRE BL
Vs
BL
SYNC
BFP
W. BL
SC BL
LSW
V RESET
TP6
(4.43MHZ)
CT2
4.43
MHZ
ADJ
IC12
FHS1 GEN-
ERATOR
BUFFER
CP2 GEN-
ERATOR
INVERTER
+6V (a)
TP7(VCO)
L5
Q13
PRE BL
MIX
Q18
PHASE
SHIFTER
VR16
BURST
GAIN
CT4
CHROMA
PHASE
CORRECTION SIGNAL GENERATOR
IC9
SC
FHS
Vs
D13
D14
D15
Vpp
O6
(B,V shad)
O5
(R,V shad)
O4
(V,DF)
Vs
FHS
SC
P/N
Vss
D12
D11
D10
Vcc
O0
(H,DS)
O1
(H,DF)
O2
(R,H shad)
O3
(B,H shad)
AR
PGM
CS
MPX
IC11(a)
DYNAMIC
FOCUS AMP
TP4
(DF)
+6V REGULATOR
+6V
Q1
IC11(b)
+6V REG
+76V(1)
Q17
CF9
L.P.F
VR18
V.EDGE
BALANCE
E1
1 LOW LIGHT SIGNAL OUT
2 RED GAIN CONTROL IN
3 BLUE GAIN CONTROL IN
4 PLAYBACK CONTROL OUT
5 NEGA/POSI CONTROL IN
6 R-Y DETECTION OUT
7 B-Y DETDCTION OUT
8 V PULSE FOR TIMER IN
9 DYNAMIC FOCUS IN
TO
MICRO PROCESSOR
BOARD
.....CN1

BLOCK DIAGRAM OF ELECTRONIC VIEWFINDER BOARD

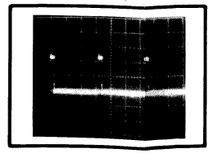


SCHEMATIC DIAGRAM OF DEFLECTION BOARD

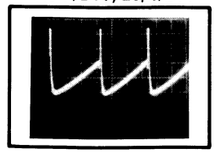


IC1	NJM3415M		C1	Q8	2SD602-QRS	(W)	C6
IC2	NJM3415M		B4, B5	Q9	2SB814-QRS	(1B)	C7
Q1	2SD601-QRS	(Y)	B3	Q10	2SD602-QRS	(W)	B6
Q2	2SD602-QRS	(W)	C3	Q11	2SD601-QRS	(Y)	B6
Q3	2SD1083		C3	Q12	2SD601-QRS	(Y)	B6
Q4	2SC2405STU	(S)	B4	D1	MA151K	(MH)	C3
Q5	2SD814-QRS	(P)	C6	D2	MA151K	(MH)	C3
Q6	2SB814-QRS	(1B)	C6	D3	MA171		B6
Q7	2SB814-QRS	(1B)	C6				

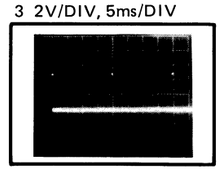
1 2V/DIV, 20μs/DIV



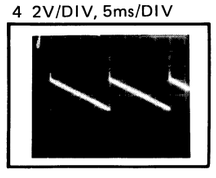
2 0.5V/DIV, 20μs/DIV



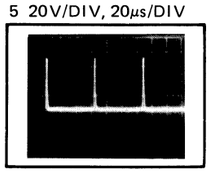
3 2V/DIV, 5ms/DIV



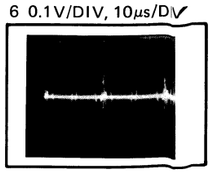
4 2V/DIV, 5ms/DIV



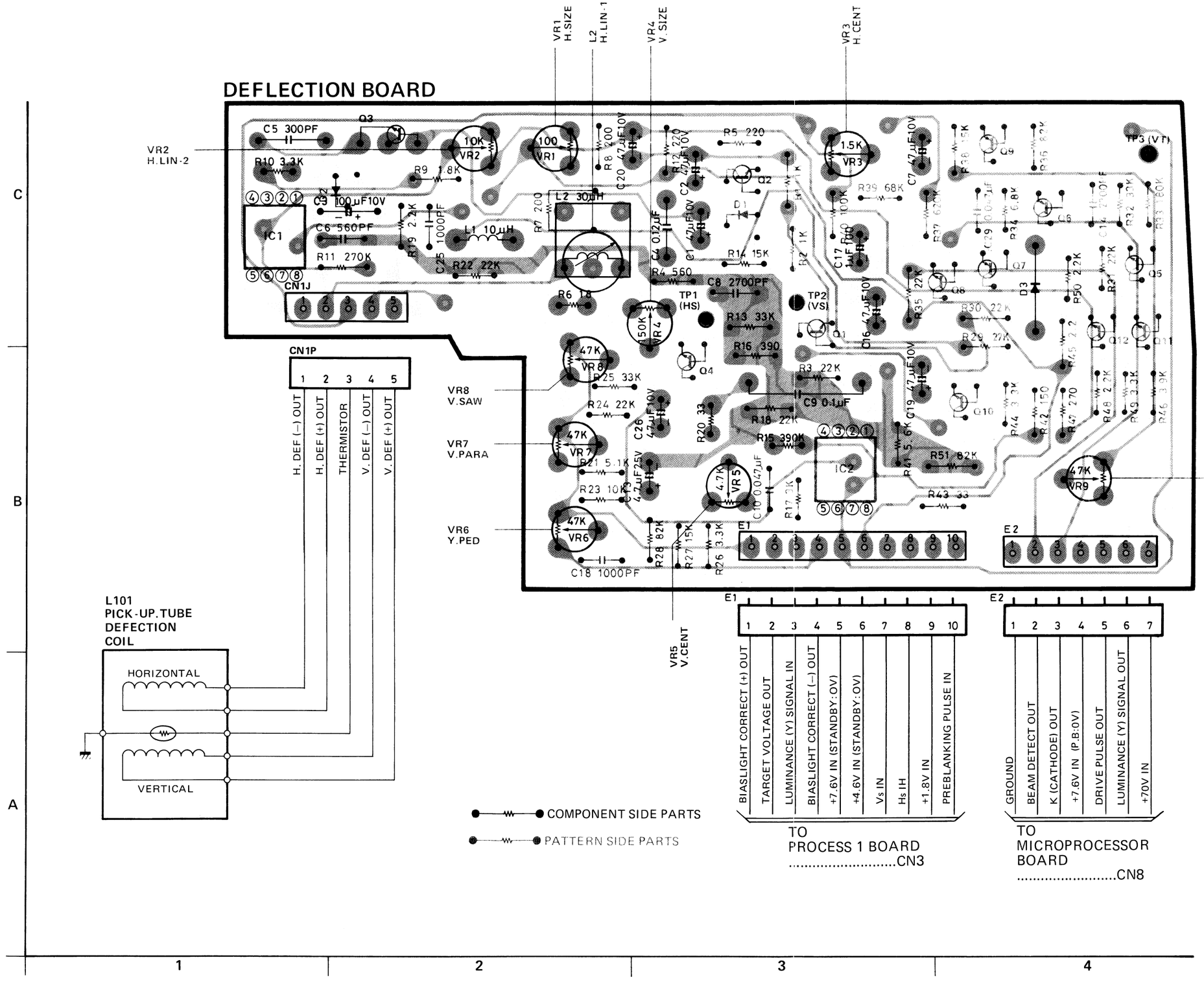
5 20V/DIV, 20μs/DIV



6 0.1V/DIV, 10μs/DIV

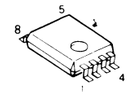


CONDUCTOR VIEW OF DEFLECTION BOARD

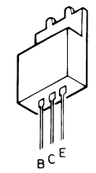


IC1	NJM3415M		C1
IC2	NJM3415M		B4, B5
Q1	2SD601-QRS	(Y)	B3
Q2	2SD602-QRS	(W)	C3
Q3	2SD1083		C3
Q4	2SC2405STU	(S)	B4
Q5	2SD814-QRS	(P)	C6
Q6	2SB814-QRS	(1B)	C6
Q7	2SB814-QRS	(1B)	C6
Q8	2SD602-QRS	(W)	C6
Q9	2SB814-QRS	(1B)	C7
Q10	2SD602-QRS	(W)	B6
Q11	2SD601-QRS	(Y)	B6
Q12	2SD601-QRS	(Y)	B6
D1	MA151K	(MH)	C3
D2	MA151K	(MH)	C3
D3	MA171		B6

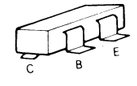
NJM3415M



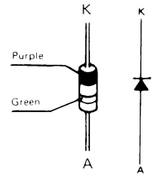
2SD1083



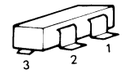
2SB841-QRS
2SC2405-STU
2SD601-QRS
2SD602-QRS
2SD841-QRS



MA171

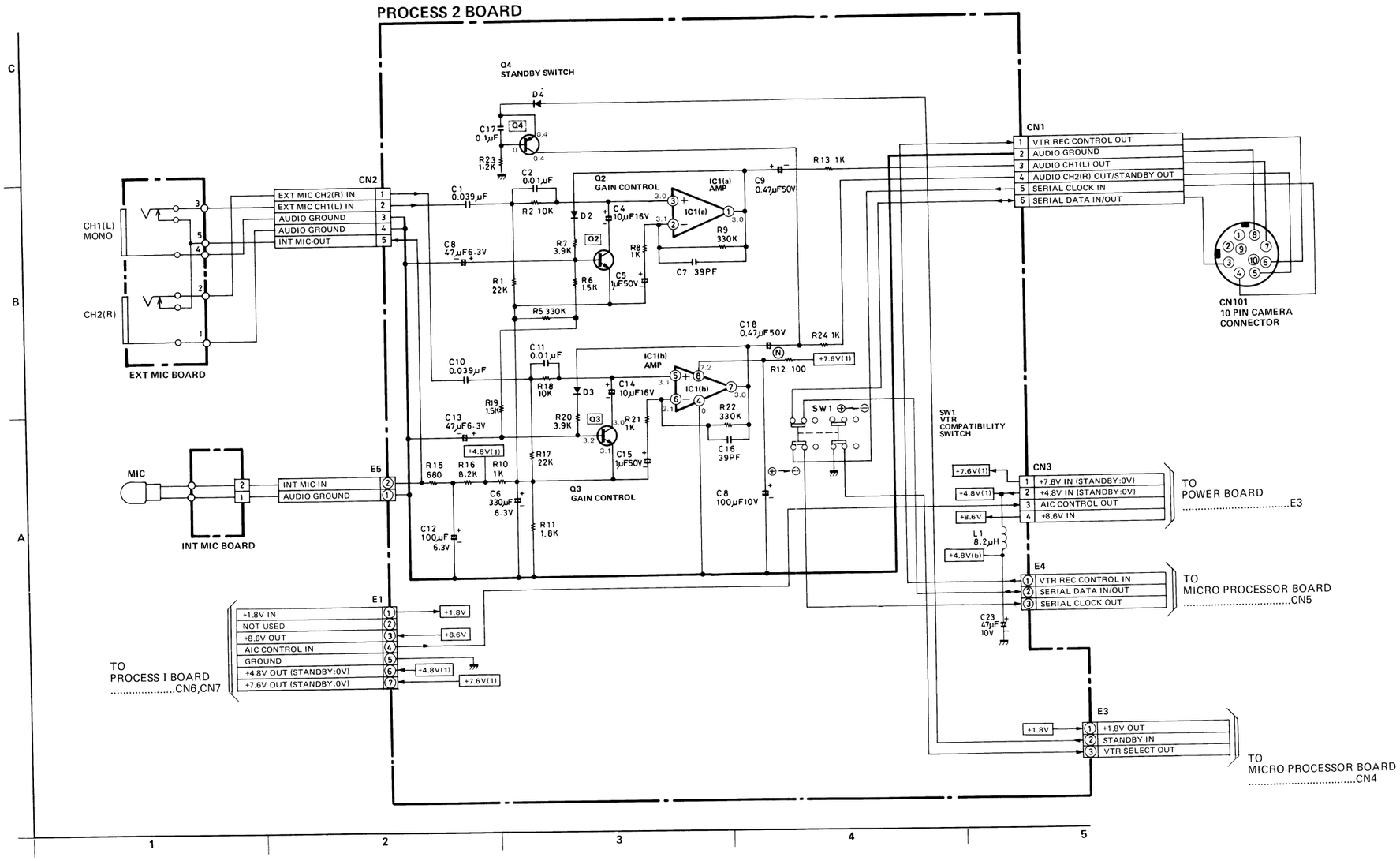


MA151K



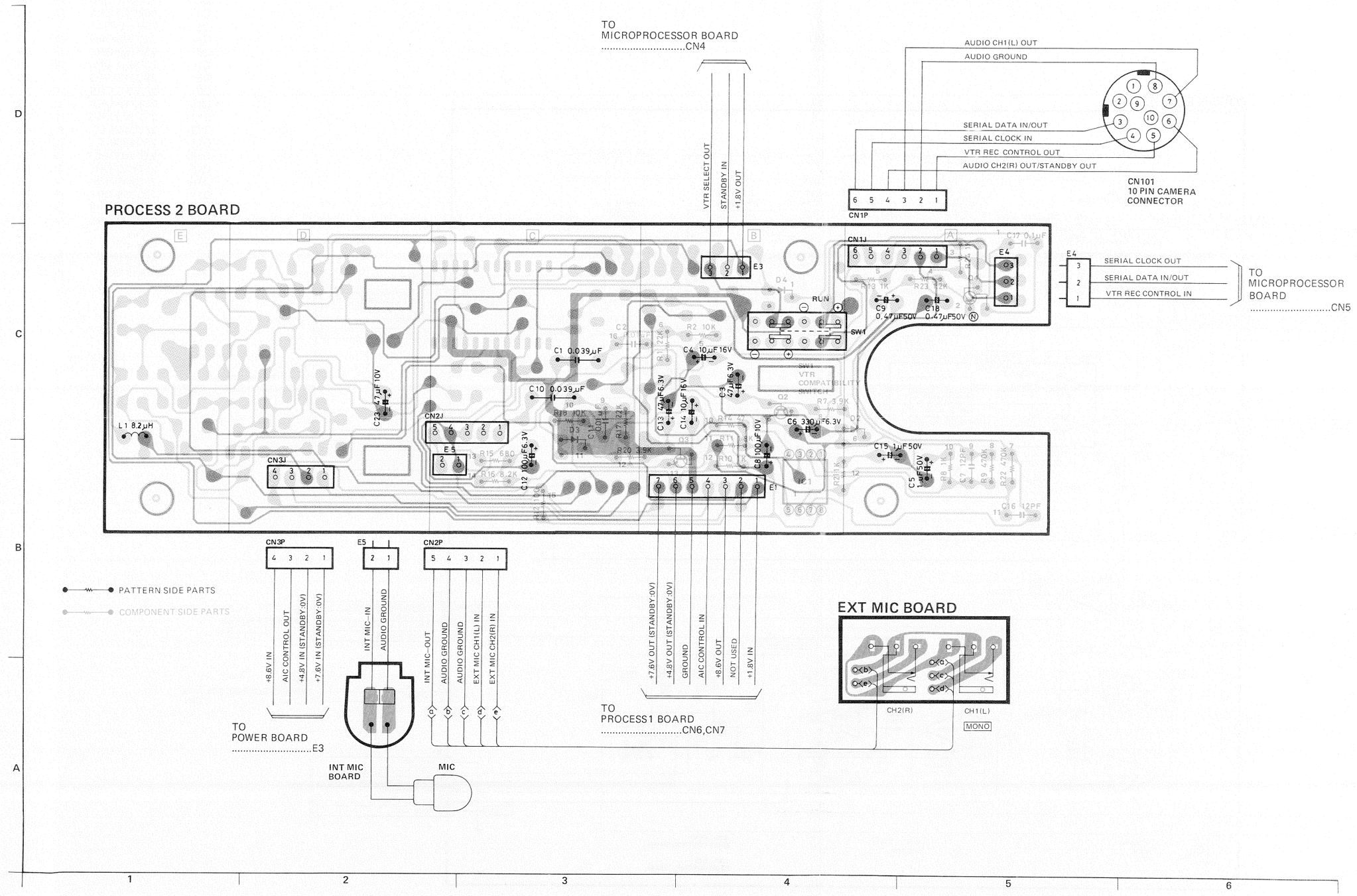
1 : NC
2 : Cathode
3 : Anode

SCHEMATIC DIAGRAM OF PROCESS-2 BOARD



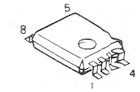
IC1	NJM4558MD		B3
Q2	2SC2405STU	(S)	B3
Q3	2SC2405STU	(S)	A3
Q4	2SB709-QRS	(A)	C3
D2	MA151K	(MH)	B3
D3	MA151K	(MH)	B3
D4	MA151K	(MH)	C3

CONDUCTOR VIEW OF PROCESS-2 BOARD

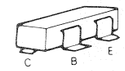


IC1	NJM4558MD		B4
Q2	2SC2405STU	(S)	C4
Q3	2SC2405STU	(S)	B3
Q4	2SB709-QRS	(A)	C5
D2	MA151K	(MH)	C4
D3	MA151K	(MH)	C3
D4	MA151K	(MH)	C4

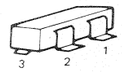
NJM4558MD



2SB709-QR$
2SC2404-CD
2SC2405-ST
2SC2405-STU
2SD601-QR$

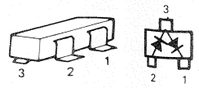


MA151K



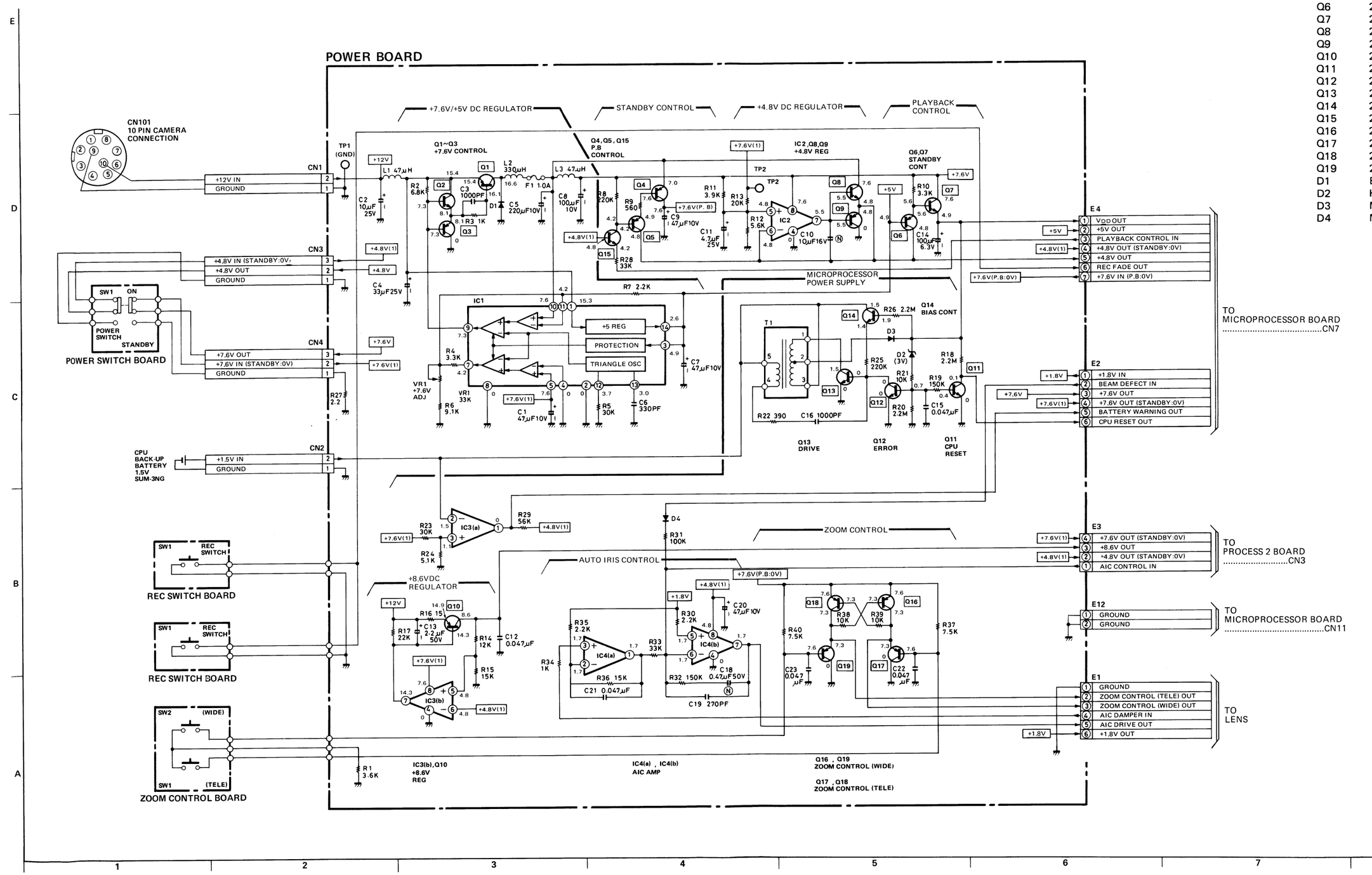
1 : NC
2 : Anode
3 : Cathode

MA153

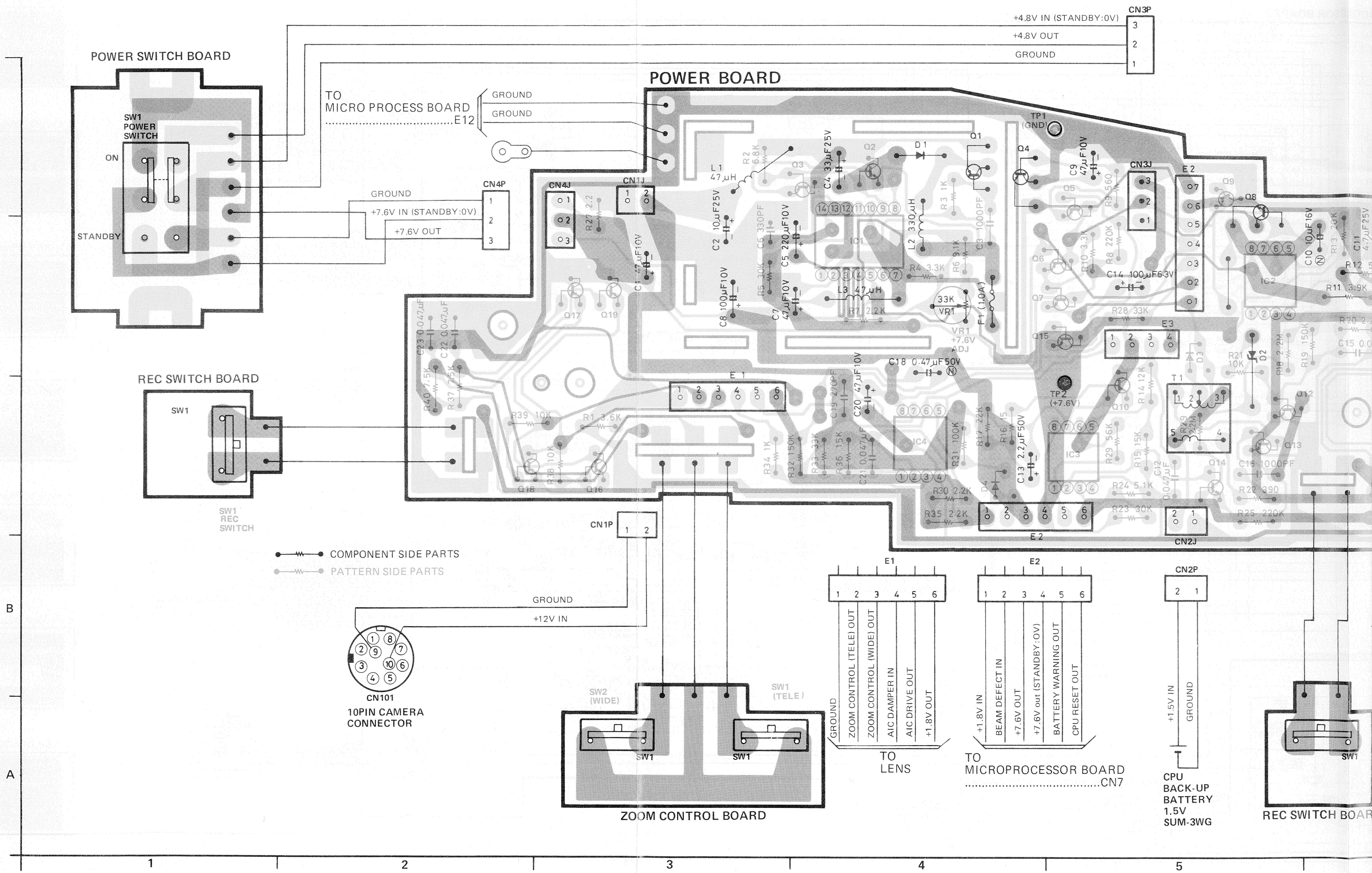


SCHEMATIC DIAGRAM OF POWER BOARD

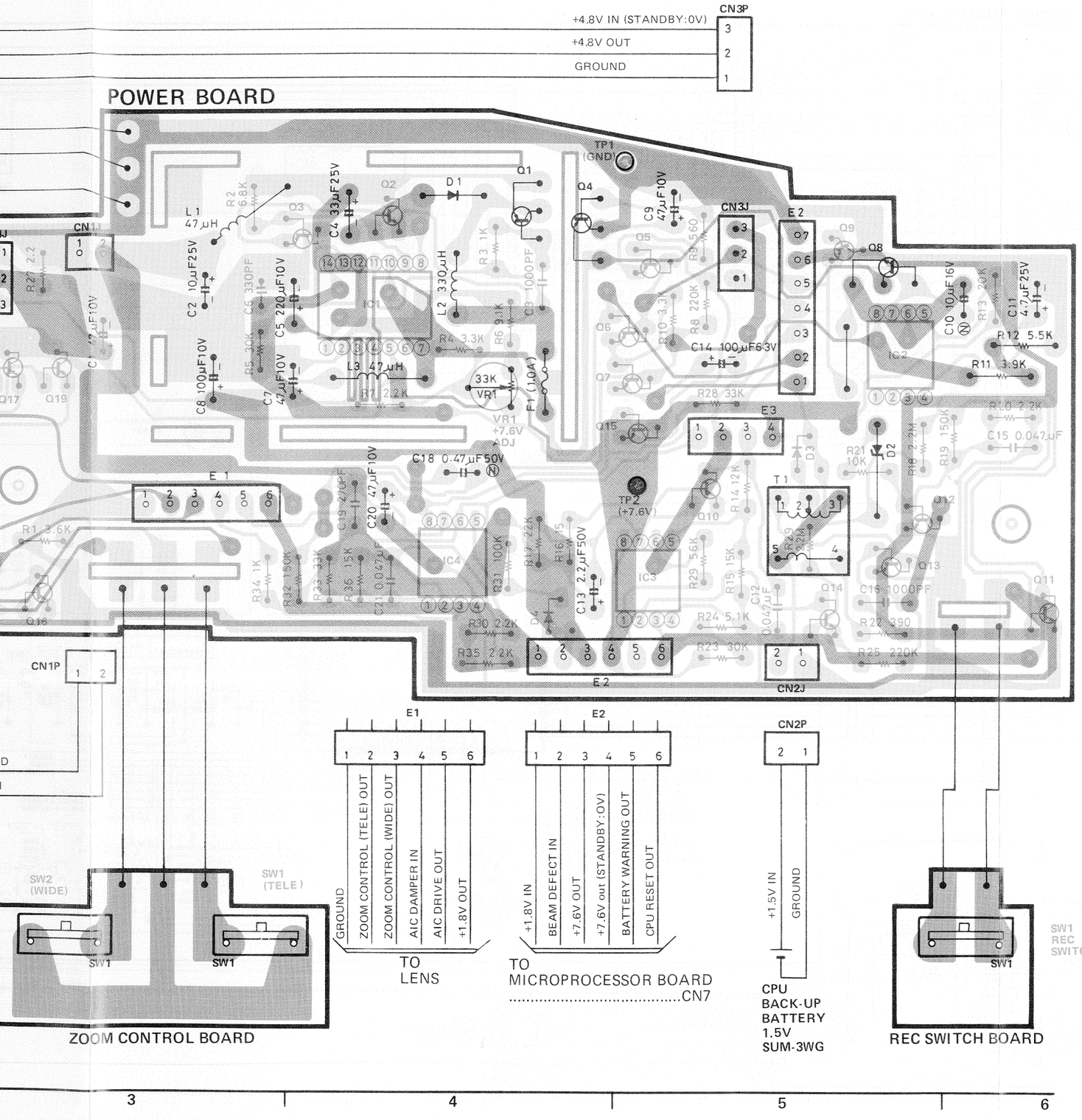
IC1	NJM2048MC		C3, C4
IC2	NJM3415M		D5
IC3	NJM2903M		A3, B3
IC4	NJM3414M		B4
Q1	2SB837-CD		D3
Q2	2SD601-QRS	(Y)	D3
Q3	2SB709-QRS	(A)	D3
Q4	2SB793-RS		D4
Q5	2SB709-QRS	(A)	D4
Q6	2SB709-QRS	(A)	D5
Q7	2SD601-QRS	(Y)	D5
Q8	2SD973-QRS		D5
Q9	2SB710-QRS	(C)	D5
Q10	2SB710-QRS	(C)	B3
Q11	2SD1030RST	(1Z)	C5
Q12	2SC2404-CD	(U)	C5
Q13	2SD1030-T	(1Z)	C5
Q14	2SD1030RST	(1Z)	C5
Q15	2SD602-QRS	(W)	D4
Q16	2SB709-QRS	(A)	B5
Q17	2SB709-QRS	(A)	B5
Q18	2SB709-QRS	(A)	B5
Q19	2SB709-QRS	(A)	B5
D1	EK14		D3
D2	HZ3BLL		C5
D3	MA151K	(MH)	C5
D4	MA151K	(MH)	B4



CONDUCTOR VIEW OF POWER BOARD

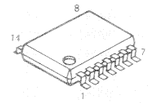


CONDUCTOR VIEW OF POWER BOARD

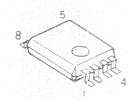


IC1	NJM2048MC		D4, E4
IC2	NJM3415M		D5
IC3	NJM2903M		C5
IC4	NJM3414M		C4
Q1	2SB837-CD		E4
Q2	2SD601-QRS	(Y)	E4
Q3	2SB709-QRS	(A)	E4
Q4	2SB793-RS		E4
Q5	2SB709-QRS	(A)	E5
Q6	2SB709-QRS	(A)	D5
Q7	2SD601-QRS	(Y)	D5
Q8	2SD973-QRS		D5
Q9	2SB710-QRS	(C)	E5
Q10	2SB710-QRS	(C)	C5
Q11	2SD1030RST	(1Z)	C6
Q12	2SC2404-CD	(U)	C5
Q13	2SD1030-T	(1Z)	C5
Q14	2SD1030RST	(1Z)	C5
Q15	2SD602-QRS	(W)	D5
Q16	2SB709-QRS	(A)	C3
Q17	2SB709-QRS	(A)	D3
Q18	2SB709-QRS	(A)	C2
Q19	2SB709-QRS	(A)	D3
D1	EK14		E4
D2	HZ3BLL		D5
D3	MA151K	(MH)	D5
D4	MA151K	(MH)	C4

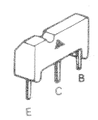
NJM2048MC



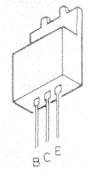
NJM2903M
NJM3414M
NJM3415M



2SB793-QRS
2SD973-QRS

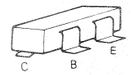


2SB837-CD

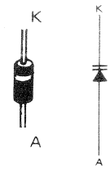


2SB709-QRS
2SB710-QRS
2SC2404-CD
2SC2405-STU

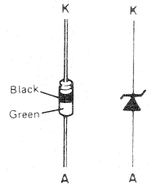
2SD601-QRS
2SD602-QRS
2SD1030-T
2SD1030-RST



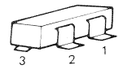
EK14



HZ3BLL



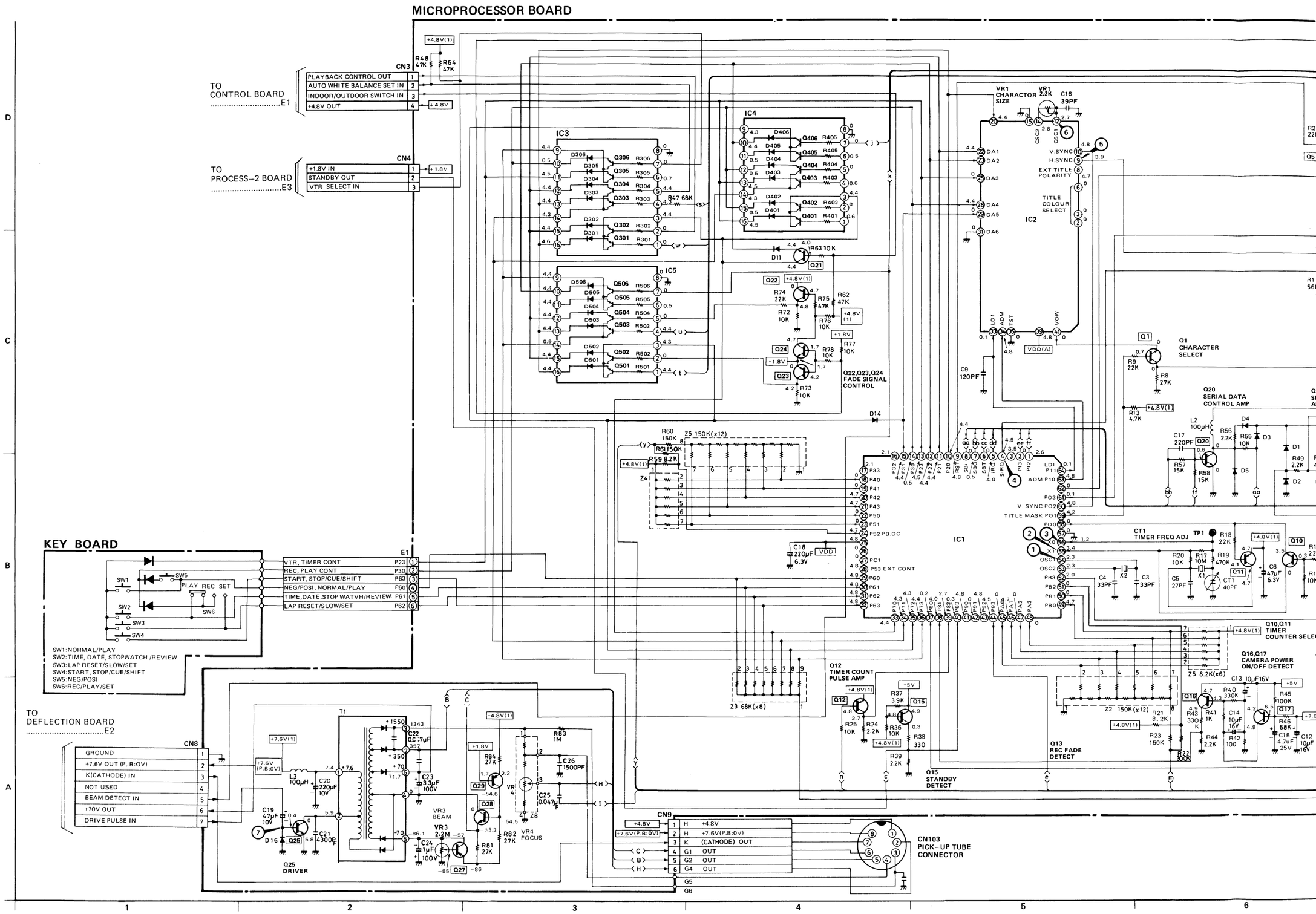
MA151K



1 : NC
2 : Anode
3 : Cathode

SCHEMATIC DIAGRAM OF MICROPROCESSOR BOARD

IC1	MN1554CVH		B5
IC2	MN1237B		C5, D5
IC3	AN90B82S		D3
IC4	AN90B82S		D4
IC5	AN90B82S		C3
Q1	2SC2404-CD	(U)	C6
Q2	2SD601-QRS	(Y)	C7
Q3	2SB709-QRS	(A)	D7
Q4	2SB709-QRS	(A)	D7
Q5	2SD1030RST	(1Z)	D6
Q9	2SB709-QRS	(A)	
Q10	2SC2404-CD	(U)	B7
Q11	2SA1022-CD	(E)	B6
Q12	2SB709-QRS	(A)	B6
Q14	2SD602-QRS	(W)	A5
Q15	2SB709-QRS	(A)	B7
Q16	2SB814-QRS	(1B)	A4
Q17	2SB709-QRS	(A)	A6
Q18	2SD601-QRS	(Y)	A6
Q19	2SD601-QRS	(Y)	B7
Q20	2SD601-QRS	(Y)	B6
Q21	2SD601-QRS	(Y)	B6
Q22	2SB709-QRS	(A)	C4
Q23	2SB709-QRS	(A)	C4
Q24	2SD601-QRS	(Y)	C4
Q25	2SD1083		C4
Q26	2SB709-QRS	(A)	A2
Q27	2SB814-QRS	(1B)	A7
Q28	2SD814-QRS	(P)	A3
Q29	2SB814-QRS	(1B)	A3
D1	MA151K	(MH)	A3
D2	MA151K	(MH)	C6
D3	MA151K	(MH)	B6
D4	MA151K	(MH)	C6
D5	MA151K	(MH)	C6
D9	MA151K	(MH)	A5
D11	MA151K	(MH)	C4
D14	MA151K	(MH)	
D16	MA165		



SCHEMATIC DIAGRAM OF MICROPROCESSOR BOARD

ROCESSOR BOARD

IC3 IC4 IC5 IC1 IC2

VR1 CHARACTOR SIZE

VR1 2.2K

C16 39PF

CSC2 CSC1

V.SYNC H.SYNC

EXT TITLE POLARITY

TITLE COLOUR SELECT

LD1 ADM TST VOW

VDD(A)

C9 120PF

D11 R63 10K Q21

Q22 Q24 Q23 FADE SIGNAL CONTROL

D14

R60 150K Z5 150K(x12) R61 150K R59 8.2K

Z4

C18 220μF 6.3V VDD

P52 PB.DC P53 EXT CONT

V. SYNC PO2

TITLE MASK PO1

CT1 TIMER FREQ ADJ TP1

X1 X2 C4 33PF C3 33PF C5 27PF CT1 40PF C6 4.7μF 6.3V

Q12 TIMER COUNT PULSE AMP

Z3 68K(x8)

Q13 REC FADE DETECT

Q15 STANDBY DETECT

Q10,Q11 TIMER COUNTER SELECT

Z2 150K(x12) Z5 8.2K(x6)

Q16,Q17 CAMERA POWER ON/OFF DETECT

Q1 CHARACTER SELECT

Q20 SERIAL DATA CONTROL AMP

Q19 SERIAL CLOCK AMP

Q18 SERIAL CLOCK INVERTER

Q9 H. SYNC INVERTER

Q14 REC CONTROL

Q3,Q4 POWER CONTROL

Q2 V. SYNC BUFFER

Q26 DC AMP

VR2 10K

BIAS LIGHT ASSEMBLY

CN7

1	+4.8V IN
2	VDD IN
3	CPU RESET IN
4	+4.8V IN
5	+7.6V IN (STANDBY:0V)
6	+1.8V OUT
7	+7.6V IN (P.B:0V)
8	REC FADE OUT
9	PLAYBACK CONTROL OUT
10	BATTERY WARNING OUT
11	+5.0V IN
12	+7.6V IN
13	BEAM DETECT OUT

TO POWER BOARD E2,E4

CN6

1	H. SYNC IN
2	+7.6V OUT
3	V. SYNC IN
4	GROUND
5	CHARACTER OUT
6	+4.8V OUT

TO ELECTRONIC VIEW FINDER BOARD E1

CN5

1	VTR REC CONTROL OUT
2	SERIAL DATA IN/OUT
3	SERIAL CLOCK IN

TO PROCESS–2 BOARD E4

CN1

1	LOW LIGHT SIGNAL IN
2	RED GAIN CONTROL OUT
3	BLUE GAIN CONTROL OUT
4	PLAY BACK CONTROL IN
5	NEGA/POSI CONTROL OUT
6	R-Y DETECTION OUT
7	B-Y DETECTION OUT
8	V. PULSE FOR TIMER OUT
9	DYNAMIC FOCUS OUT

TO PROCESS–1 BOARD E1

CN10

1	BIAS LIGHT DC OUT
2	GROUND

CN9

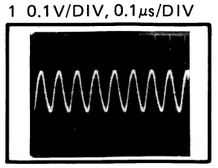
1	H +4.8V
2	H +7.6V(P.B:0V)
3	K (CATHODE) OUT
4	G1 OUT
5	G2 OUT
6	G4 OUT
	G5
	G6

CN103 PICK-UP TUBE CONNECTOR

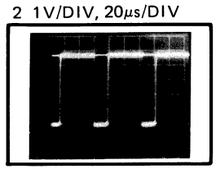
VR4 FOCUS

R83 1M C26 1500PF C25 0.047μF Z8

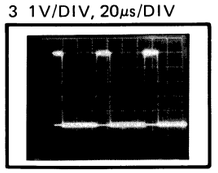
1 0.1V/DIV, 0.1μs/DIV



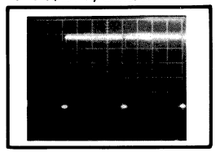
2 1V/DIV, 20μs/DIV



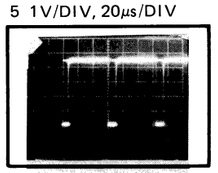
3 1V/DIV, 20μs/DIV



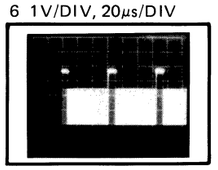
4 1V/DIV, 5ms/DIV



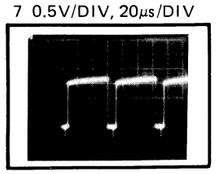
5 1V/DIV, 20μs/DIV

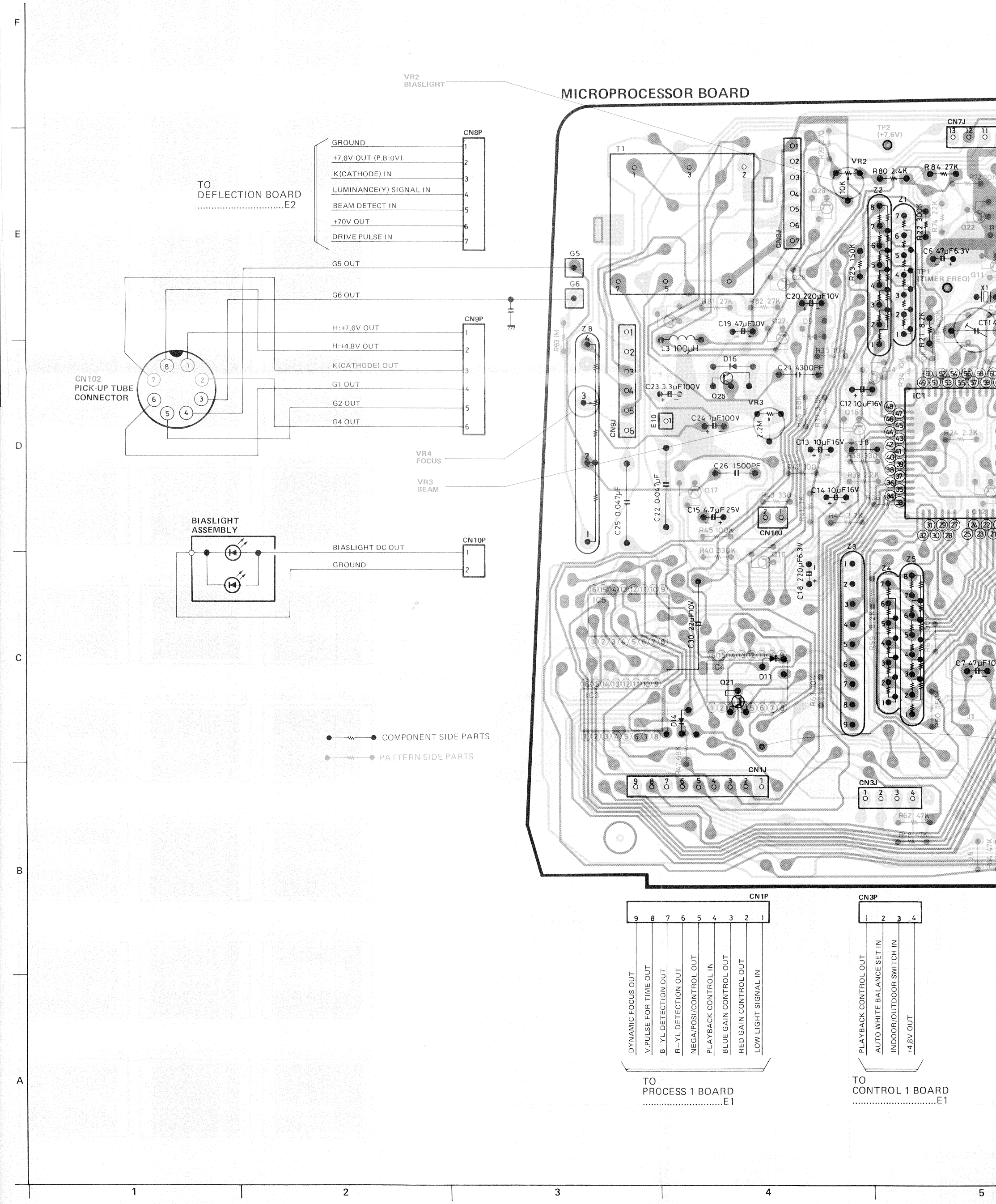


6 1V/DIV, 20μs/DIV

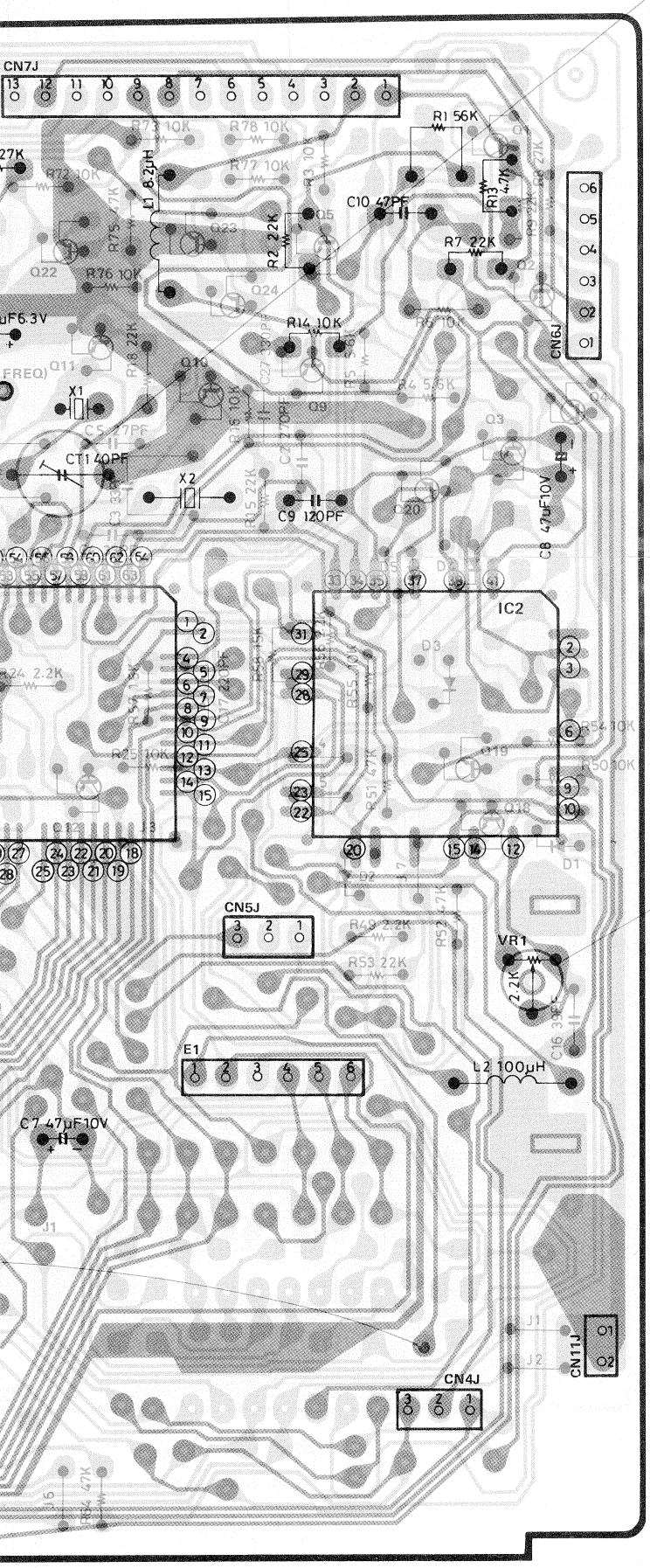


7 0.5V/DIV, 20μs/DIV




MICROPROCESSOR BOARD
VR2
BIASLIGHT
VR4
FOCUS
VR3
BEAM
TO
DEFLECTION BOARD
.....E2
CN8P
GROUND
+7.6V OUT (P.B:0V)
K(CATHODE) IN
LUMINANCE(Y) SIGNAL IN
BEAM DETECT IN
+70V OUT
DRIVE PULSE IN
G5 OUT
G6 OUT
CN9P
H:+7.6V OUT
H:+4.8V OUT
K(CATHODE) OUT
G1 OUT
G2 OUT
G4 OUT
CN102
PICK-UP TUBE
CONNECTOR
BIASLIGHT
ASSEMBLY
BIASLIGHT DC OUT
GROUND
CN10P
COMPONENT SIDE PARTS
PATTERN SIDE PARTS
CN1P
DYNAMIC FOCUS OUT
V.PULSE FOR TIME OUT
B-Y/L DETECTION OUT
R-Y/L DETECTION OUT
NEGA/POSI/CONTROL OUT
PLAYBACK CONTROL IN
BLUE GAIN CONTROL OUT
RED GAIN CONTROL OUT
LOW LIGHT SIGNAL IN
TO
PROCESS 1 BOARD
.....E1
CN3P
PLAYBACK CONTROL OUT
AUTO WHITE BALANCE SET IN
INDOOR/OUTDOOR SWITCH IN
+4.8V OUT
TO
CONTROL 1 BOARD
.....E1

MICROPROCESSOR BOARD



CN7P

1	+4.8V IN (STANDBY:0V)
2	VDD IN
3	CPU RESET IN
4	+4.8V IN
5	+7.6V IN (STANDBY:0V)
6	+1.8V OUT
7	+7.6V IN (P.B:0V)
8	REC FADE OUT
9	PLAYBACK CONTROL OUT
10	BATTERY WARNING IN
11	+5V IN
12	+7.6V IN
13	BEAM DETECT OUT

CT1
TIMER FREQ

TO
POWER BOARD
.....E2,E4

CN6P

6	+4.8V OUT
5	CHARACTER OUT
4	GROUND
3	V. SYNC IN
2	+7.6V OUT
1	H. SYNC IN

TO
ELECTRONIC
VIEWFINDER BOARD
.....E1

CN5P

1	VTR REC CONTROL OUT
2	SERIAL DATA IN/OUT
3	SERIAL CLOCK IN

TO
PROCESS 2 BOARD
.....E4

VR1
CHRACTOR SIZE

E1

1	P23 VTR,TIMER CONT
2	P30 REC,PLAY CONT
3	P63 START,STOP/CUE/SHIFT
4	P60 NEG/POSI,NORMAL/PLAY
5	P61 TIME,DATE,STOP WATCH REVIEW
6	P62 LAP,RESET/SLOW/SET

TO
KEY BOARD

CN11P

1	GROUND
2	GROUND

TO
POWER BOARD
.....E12

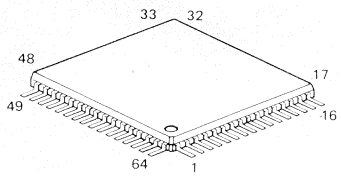
CN4P

3	2	1
VTR SELECT IN	STANDBY OUT	+1.8V IN

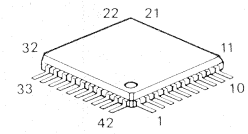
TO
PROCESS 2 BOARD
.....E3

IC1	MN1554CVH		D5
IC2	MN1237B		D6
IC3	AN90B82S		C3
IC4	AN90B82S		C4
IC5	AN90B82S		C3
Q1	2SC2404-CD	(U)	E6
Q2	2SD601-QRS	(Y)	E6
Q3	2SB709-QRS	(A)	E6
Q4	2SB709-QRS	(A)	E6
Q5	2SD1030RST	(1Z)	E6
Q9	2SB709-QRS	(A)	
Q10	2SC2404-CD	(U)	E6
Q11	2SA1022-CD	(E)	E5
Q12	2SB709-QRS	(A)	E5
Q14	2SD602-QRS	(W)	D5
Q15	2SB709-QRS	(A)	D5
Q16	2SB814-QRS	(1B)	D4
Q17	2SB709-QRS	(A)	D4
Q18	2SD601-QRS	(Y)	D4
Q19	2SD601-QRS	(Y)	D6
Q20	2SD601-QRS	(Y)	D6
Q21	2SD601-QRS	(Y)	E6
Q22	2SB709-QRS	(A)	C4
Q23	2SB709-QRS	(A)	E5
Q24	2SD601-QRS	(Y)	E5
Q25	2SD1083		E5
Q26	2SB709-QRS	(A)	D4
Q27	2SB814-QRS	(1B)	E4
Q28	2SD814-QRS	(P)	E4
Q29	2SB814-QRS	(1B)	E4
D1	MA151K	(MH)	E4
D2	MA151K	(MH)	D6
D3	MA151K	(MH)	D6
D4	MA151K	(MH)	D6
D5	MA151K	(MH)	D6
D9	MA151K	(MH)	D5
D11	MA151K	(MH)	C4
D14	MA151K	(MH)	
D16	MA165		

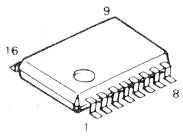
MN1554CVB



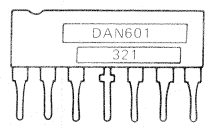
MN1237B



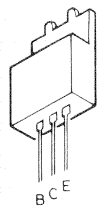
AN90B823



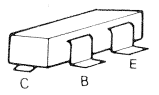
DAN601
DAP601



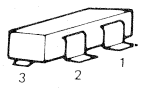
2SD1083



2SA1022-CD
2SB709-QRS
2SB814-RS
2SC2404-CD
2SD601-QRS
2SD602-QRS
2SD1030-RST

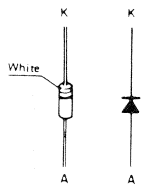


MA151K



1 : NC
2 : Anode
3 : Cathode

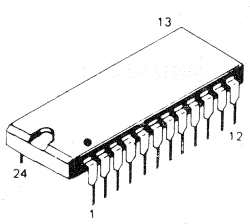
MA165
1SS123



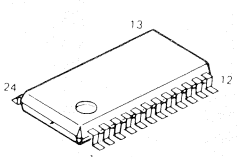
5 6 7 8

CONDUCTOR VIEW O

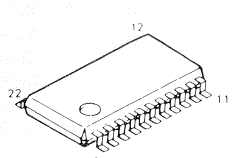
IC9
YFS4161PK1T



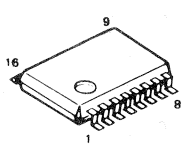
AN2110S
AN2210S
AN2310S
AN2320S



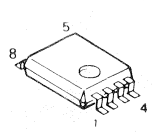
AN2410S
MN6160PBS



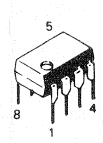
TC4053BF



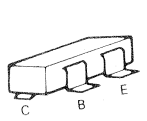
AN6914S
NJM3414M



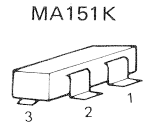
MN8037



2SA1034-ST
2SB709-QRS
2SB710-QRS
2SC2404-CD
2SD601-QRS
2SD602-QRS

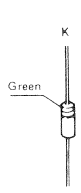


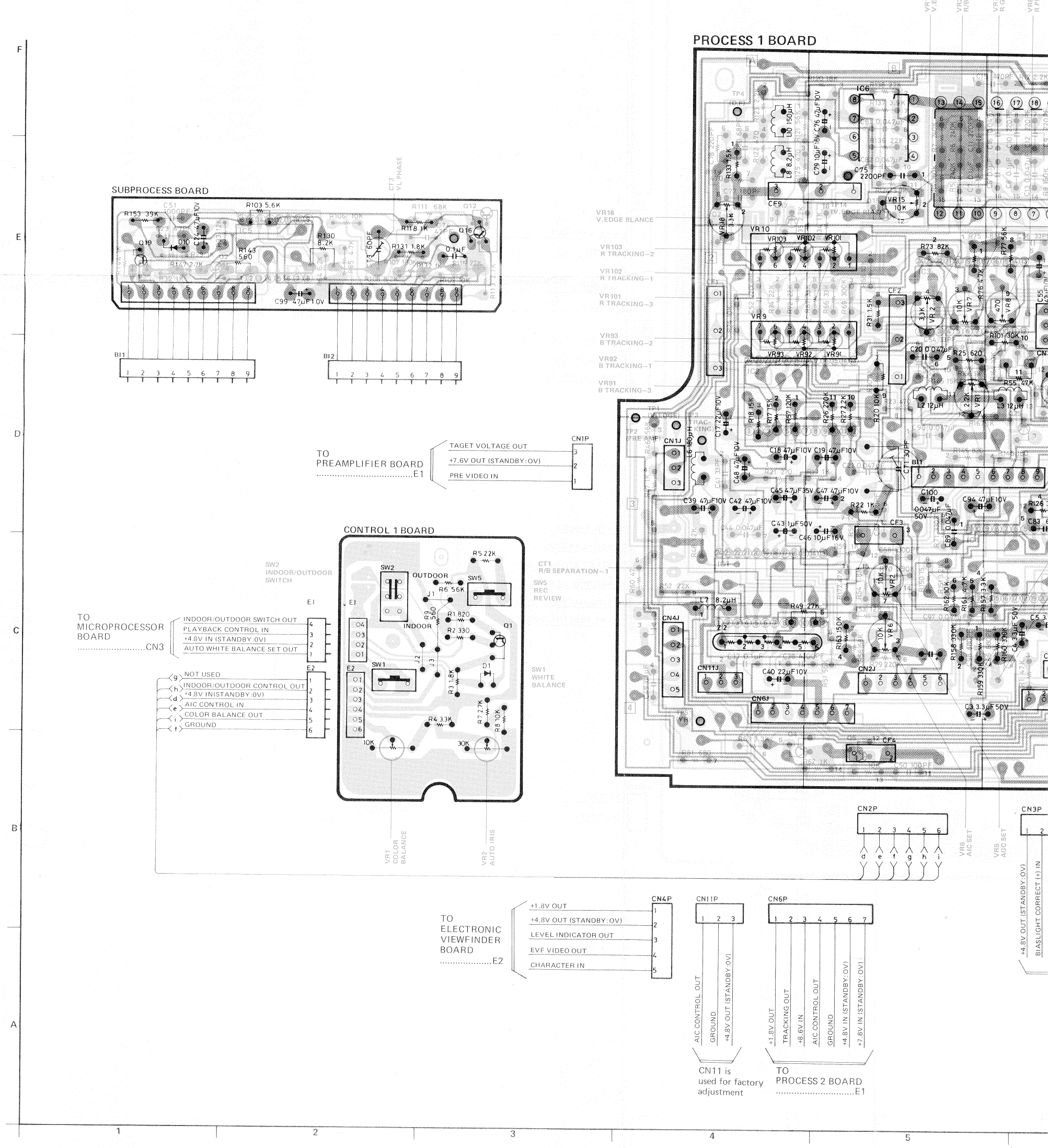
MA151K



1 : NC
2 : Anode
3 : Cathode

1S2688





PROCESS-1 BOARD

IC1	AN2110S	C4	IC11	NJM3414M		E6	Q13	2SD601-QRS	(Y)	D6	Q24	2SB709-QRS	(A)	D6
IC2	AN2310S	D4, D5	IC12	MT0001		D6, E6	Q14	2SC2404-CD	(U)	D6	Q25	2SC2404-CD	(U)	D6
IC3	AN2320S	E5	Q1	2SD602-QRS	(W)	E6	Q15	2SB709-QRS	(A)	E5	D1	MA151K	(MH)	D6
IC4	AN2410S	C5, C6	Q3	2SC2404-CD	(U)	E7	Q17	2SD601-QRS	(Y)	E4	D2	MA151K	(MH)	E4
IC6	MN8037	F5	Q4	2SA1034-ST	(F)	B4	Q18	2SC2404-CD	(U)	D7	D3	YUD1S2688		F7
IC7	AN2210S	C7	Q5	2SD601-QRS	(Y)	B5	Q20	2SC2404-CD	(U)	D6	D4	YUD1S2688		F7
IC8	MN6160PBS	E7	Q9	2SB709-QRS	(A)	C7	Q21	2SD601-QRS	(Y)	C6	D5	MA151K	(MH)	B7
IC9	YFS4161PKIK	E6, F6	Q10	2SD601-QRS	(Y)	C7	Q22	2SC2404-CD	(U)	D6	D6	MA151K	(MH)	C4
IC10	AN6914S	C6	Q11	2SD601-QRS	(Y)	E6	Q23	2SC2404-CD	(U)	D7	D7	MA151WA	(MO)	C7

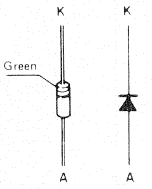
SUB PROCESS BOA

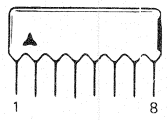
IC5	TC4053BF
Q2	2SD601-QRS
Q12	2SD601-QRS
Q16	2SD601-QRS
Q19	2SC2404-CD
D10	MA151K

EW OF PROCESS-1 BOARD

1S2688

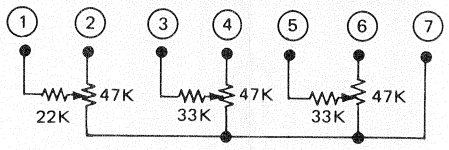
Z1 EXBD85293J
Z2 EXBD86278JM
IC13 MT0001

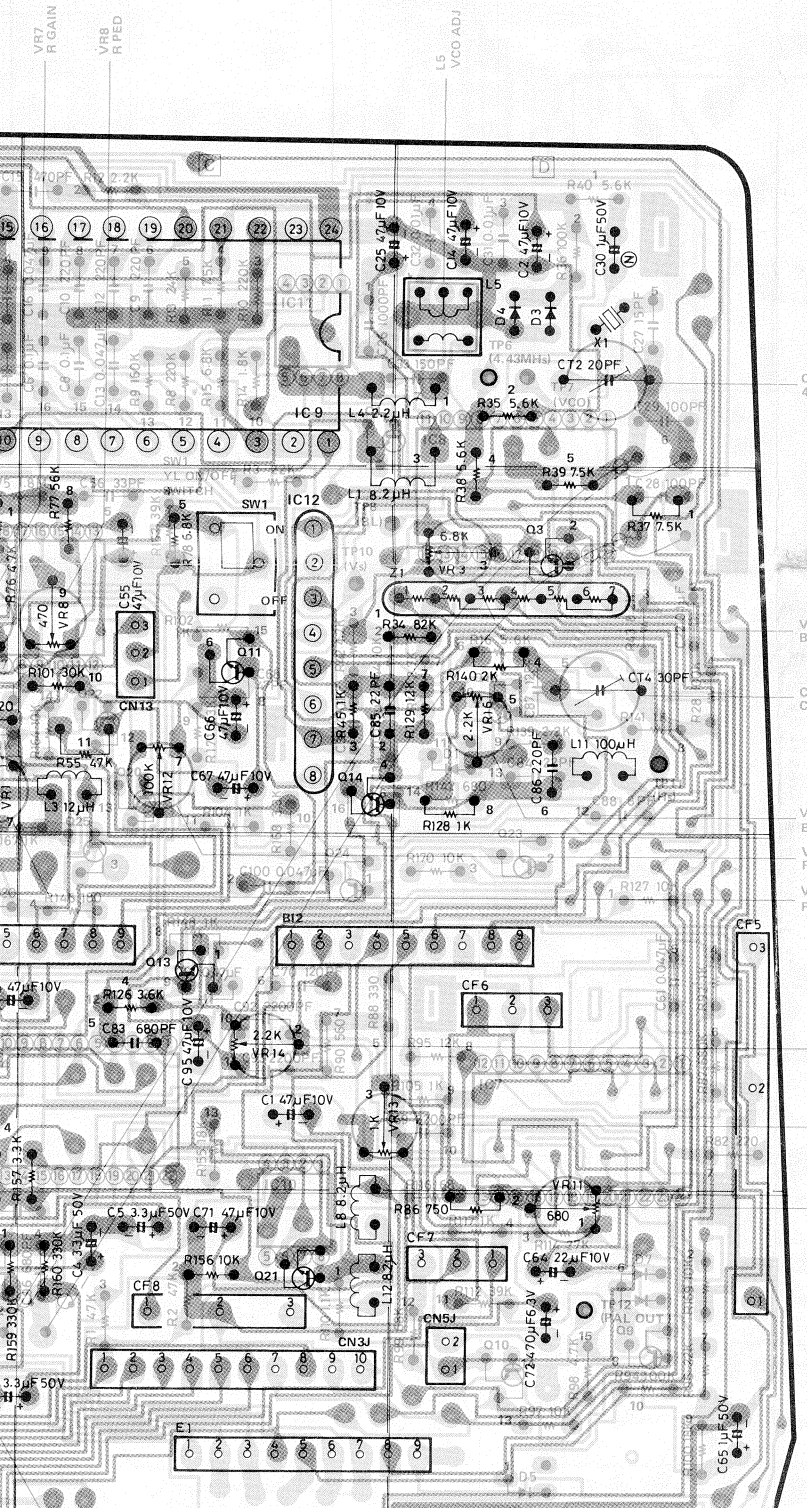


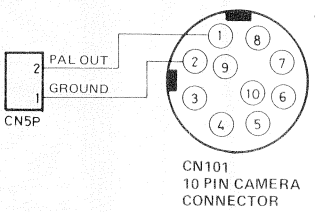


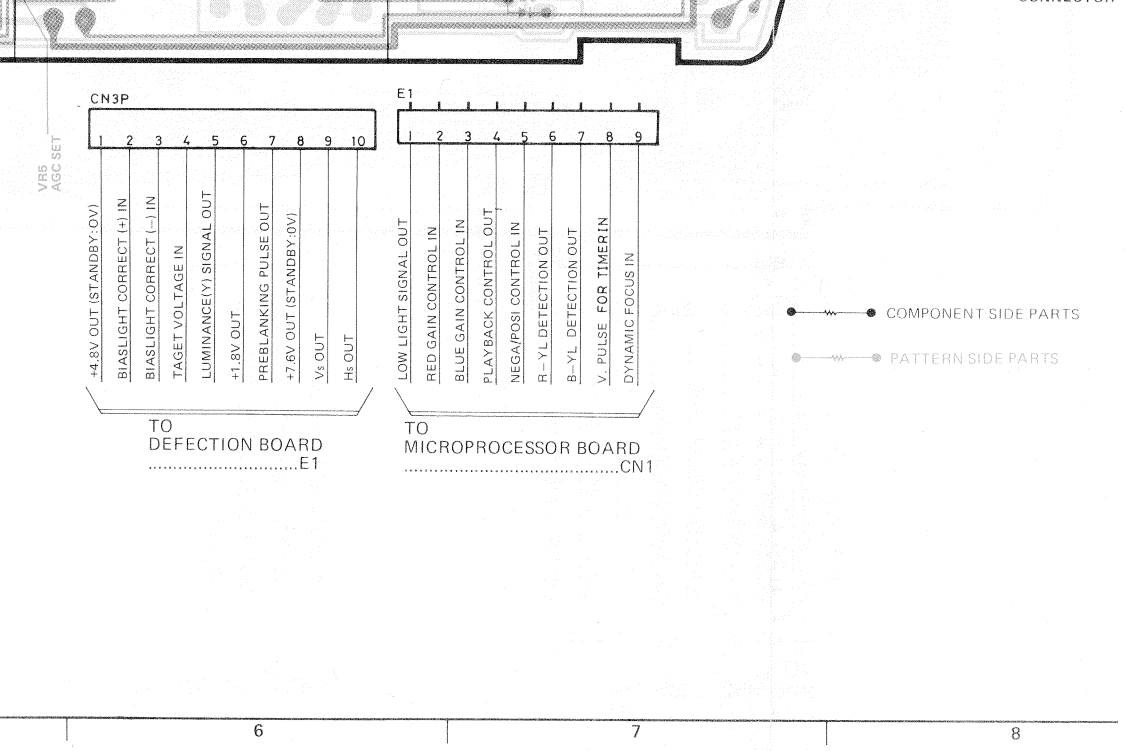
VR9
VR10

BLOCK VARIABLE RESISTOR









COMPONENT SIDE PARTS

PATTERN SIDE PARTS

6 7 8

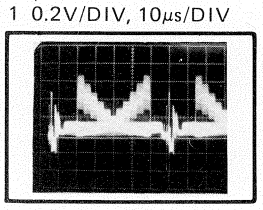
ROCESS BOARD

TC4053BF		E2
2SD601-QRS	(Y)	E1
2SD601-QRS	(Y)	E3
2SD601-QRS	(Y)	E3
2SC2404-CD	(U)	E1
MA151K	(MH)	E1

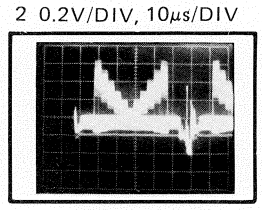
CONTROL-1 BOARD

Q1	2SB641-QRS	C3
D1	LN29WP	C3

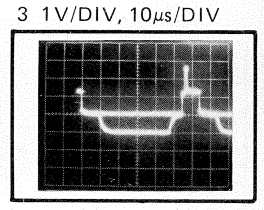
1 0.2V/DIV, 10µs/DIV



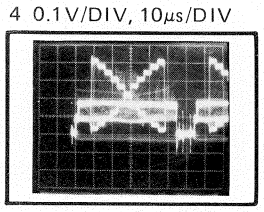
2 0.2V/DIV, 10µs/DIV



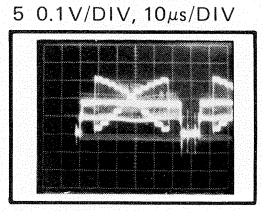
3 1V/DIV, 10µs/DIV



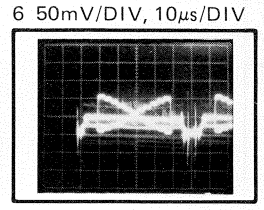
4 0.1V/DIV, 10µs/DIV



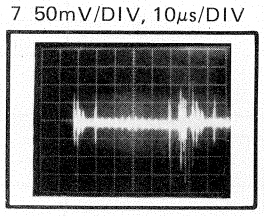
5 0.1V/DIV, 10µs/DIV



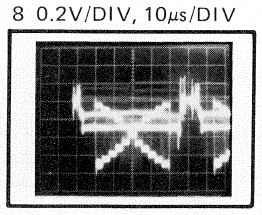
6 50mV/DIV, 10µs/DIV



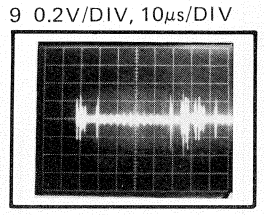
7 50mV/DIV, 10µs/DIV



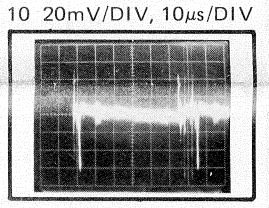
8 0.2V/DIV, 10µs/DIV



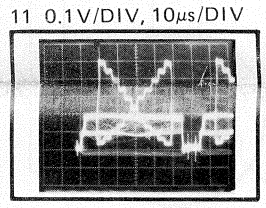
9 0.2V/DIV, 10µs/DIV



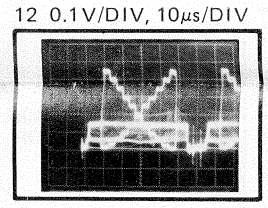
10 20mV/DIV, 10µs/DIV



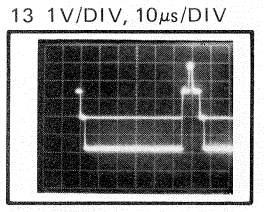
11 0.1V/DIV, 10µs/DIV



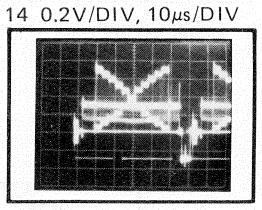
12 0.1V/DIV, 10µs/DIV



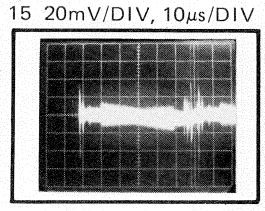
13 1V/DIV, 10µs/DIV



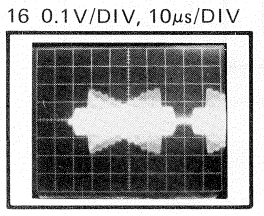
14 0.2V/DIV, 10µs/DIV



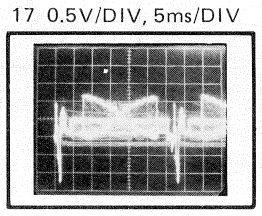
15 20mV/DIV, 10µs/DIV



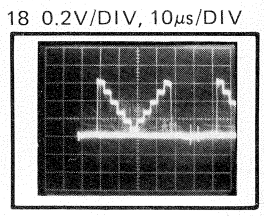
16 0.1V/DIV, 10µs/DIV



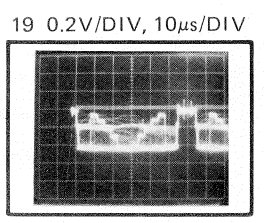
17 0.5V/DIV, 5ms/DIV



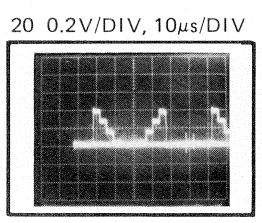
18 0.2V/DIV, 10µs/DIV



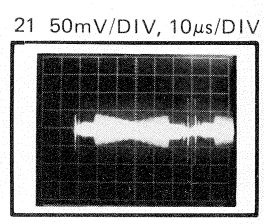
19 0.2V/DIV, 10µs/DIV



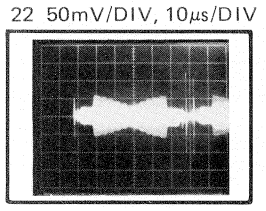
20 0.2V/DIV, 10µs/DIV



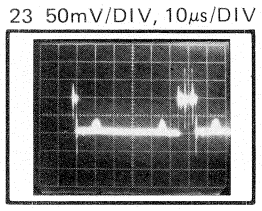
21 50mV/DIV, 10µs/DIV



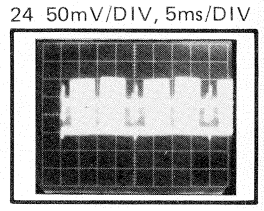
22 50mV/DIV, 10µs/DIV



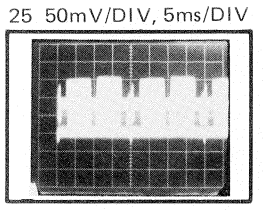
23 50mV/DIV, 10µs/DIV



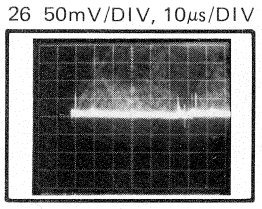
24 50mV/DIV, 5ms/DIV



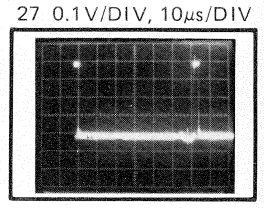
25 50mV/DIV, 5ms/DIV



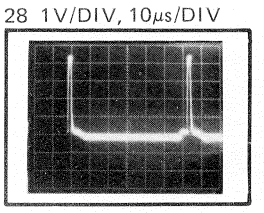
26 50mV/DIV, 10µs/DIV



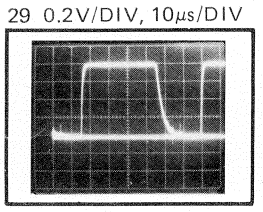
27 0.1V/DIV, 10µs/DIV



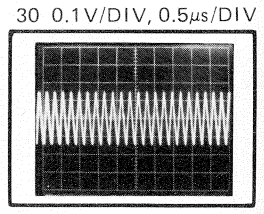
28 1V/DIV, 10µs/DIV



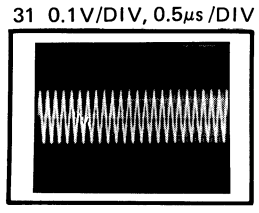
29 0.2V/DIV, 10µs/DIV



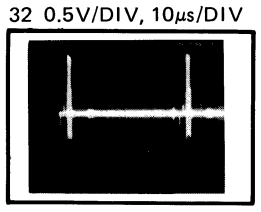
30 0.1V/DIV, 0.5µs/DIV



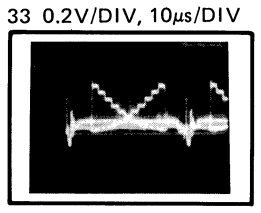
31 0.1V/DIV, 0.5μs /DIV



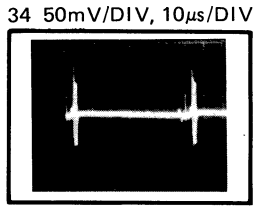
32 0.5V/DIV, 10μs/DIV



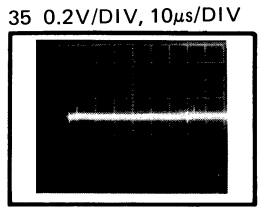
33 0.2V/DIV, 10μs/DIV



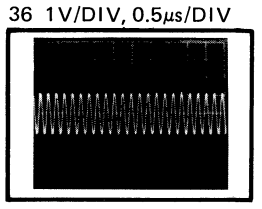
34 50mV/DIV, 10μs/DIV



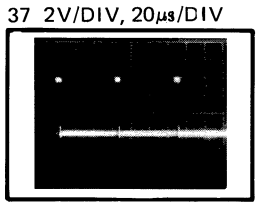
35 0.2V/DIV, 10μs/DIV



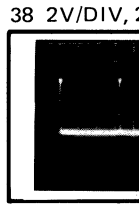
36 1V/DIV, 0.5μs/DIV



37 2V/DIV, 20μs/DIV



38 2V/DIV, 2



PROCESS 1 BOARD

CN2
- +4.8V OUT(STANDBY:OV) 1
- AIC CONTROL OUT 2
- GROUND 3
- NOT USED 4
- INDOOR/OUTDOOR CONTROL IN 5
- COLOR BALANCE IN 6

+4.8V(1) — R79 220K

TO PREAMP. BOARD E1

CN1
- PRE VIDEO IN 1
- +7.6V OUT (STANDBY 1&2:0V) 2
- TARGET VOLTAGE OUT 3

TP1 (PREAMP OUT)

TO DEFLECTION BOARD E1

CN3
- +4.8V OUT (STANDBY:OV) 1
- BIASLIGHT CORRECT(+) IN 2
- BIASLIGHT CORRECT(−) IN 3
- TARGET VOLTAGE IN 4
- LUMINANCE(Y) SIGNAL OUT 5
- +1.8V OUT 6
- PREBLANKING PULSE OUT 7
- +7.6V OUT(STANDBY:OV) 8
- Vs OUT 9
- Hs OUT 10

TP10 (Vs), TP11 (Hs)

E2
- 6 GROUND
- 5 COLOR BALANCE OUT
- 4 AIC CONTROL IN
- 3 +4.8V IN (STANDBY:0V)
- 2 INDOOR/OUTDOOR CONTROL OUT
- 1 NOT USED

VR1 COLOR BALANCE, VR2 AUTO IRIS, SW3 REC REVIEW, SW1 WHITE BALANCE, SW2 INDOOR/OUTDOOR SWITCH

E1
- 1 AUTO WHITE BALANCE SET OUT
- 2 +4.8V IN (STANDBY:0V)
- 3 PLAYBACK CONTROL IN
- 4 INDOOR/OUTDOOR SWITCH OUT

TO MICROPROCESSOR BOARD CN3

CONTROL1 BOARD

CN11 is used for factory adjustment
- AIC CONTROL OUT 1
- GROUND 2
- +4.8V OUT(STANDBY:OV) 3

TO PROCESS 2 BOARD E1

CN6
- +1.8V OUT 1
- TRACKING OUT 2
- +8.6V IN 3
- AIC CONTROL OUT 4
- GROUND 5
- +4.8V IN (STANDBY:OV) 6
- +7.6V IN (STANDBY:OV) 7

CN13 is used for factory adjustment
- B−YL OUT 3
- YL OUT 2
- R−YL OUT 1

SIGNAL PROCESSING

IC1, IC2, IC3, CF1, CF2, CF3, CF4, CF8, CT1, DL1, TP2 (TRACKING), TP5 (Y+H)

RED AND BLUE SEPARATION

CHROMA PROCESSING

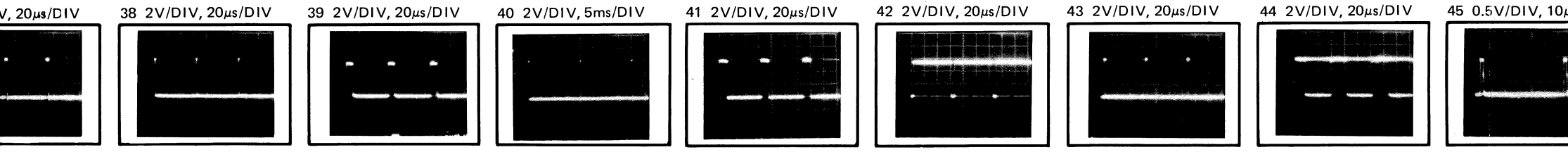
VR1 R/B SEPARATION−2, VR2 R/B GAIN, VR3 B GAIN, VR4 B PED, VR5 AGC SET, VR6 AIC SET, VR7 R GAIN, VR8 R PED, VR9, VR10, VR91, VR92, VR93, VR101, VR102, VR103

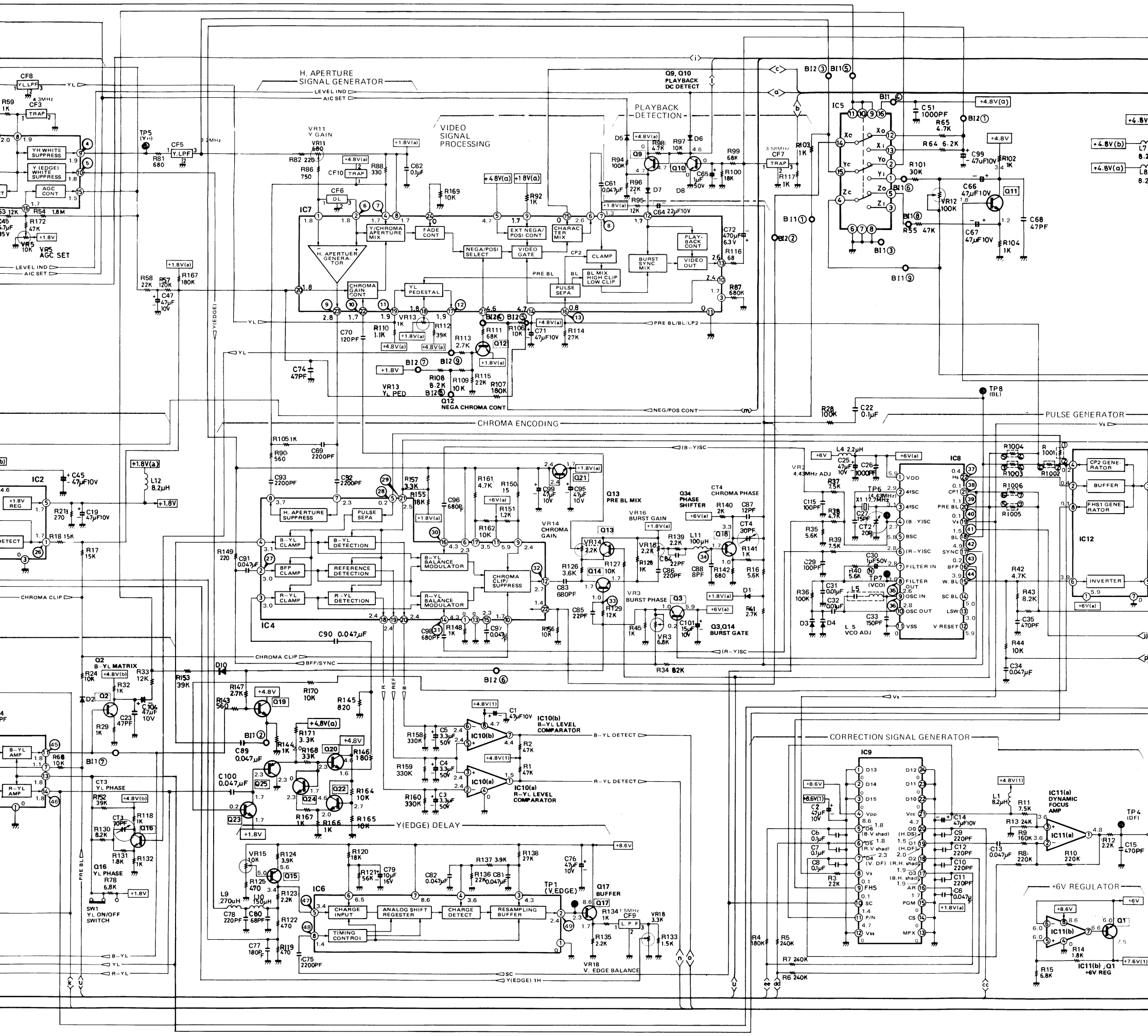
VR91B TRACKING-3, VR92B TRACKING-1, VR93B TRACKING-2

VR101R TRACKING-3, VR102R TRACKING-1, VR103R TRACKING-2

SW1 YL ON/OFF SWITCH

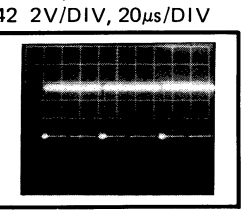
SCHEMATIC DIAGRAM OF PROCESS-1 BOARD



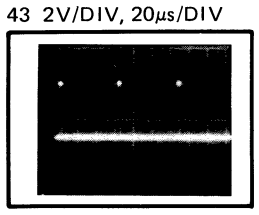


ARD

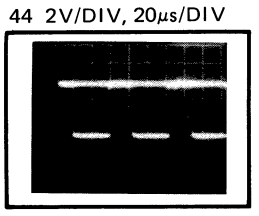
42 2V/DIV, 20μs/DIV



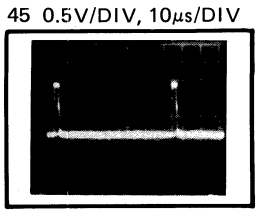
43 2V/DIV, 20μs/DIV



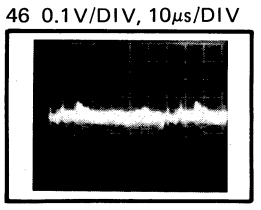
44 2V/DIV, 20μs/DIV



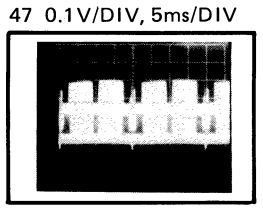
45 0.5V/DIV, 10μs/DIV



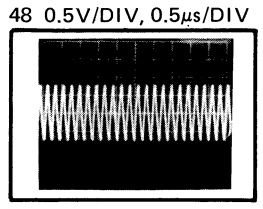
46 0.1V/DIV, 10μs/DIV



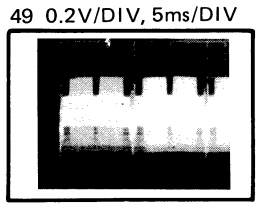
47 0.1V/DIV, 5ms/DIV

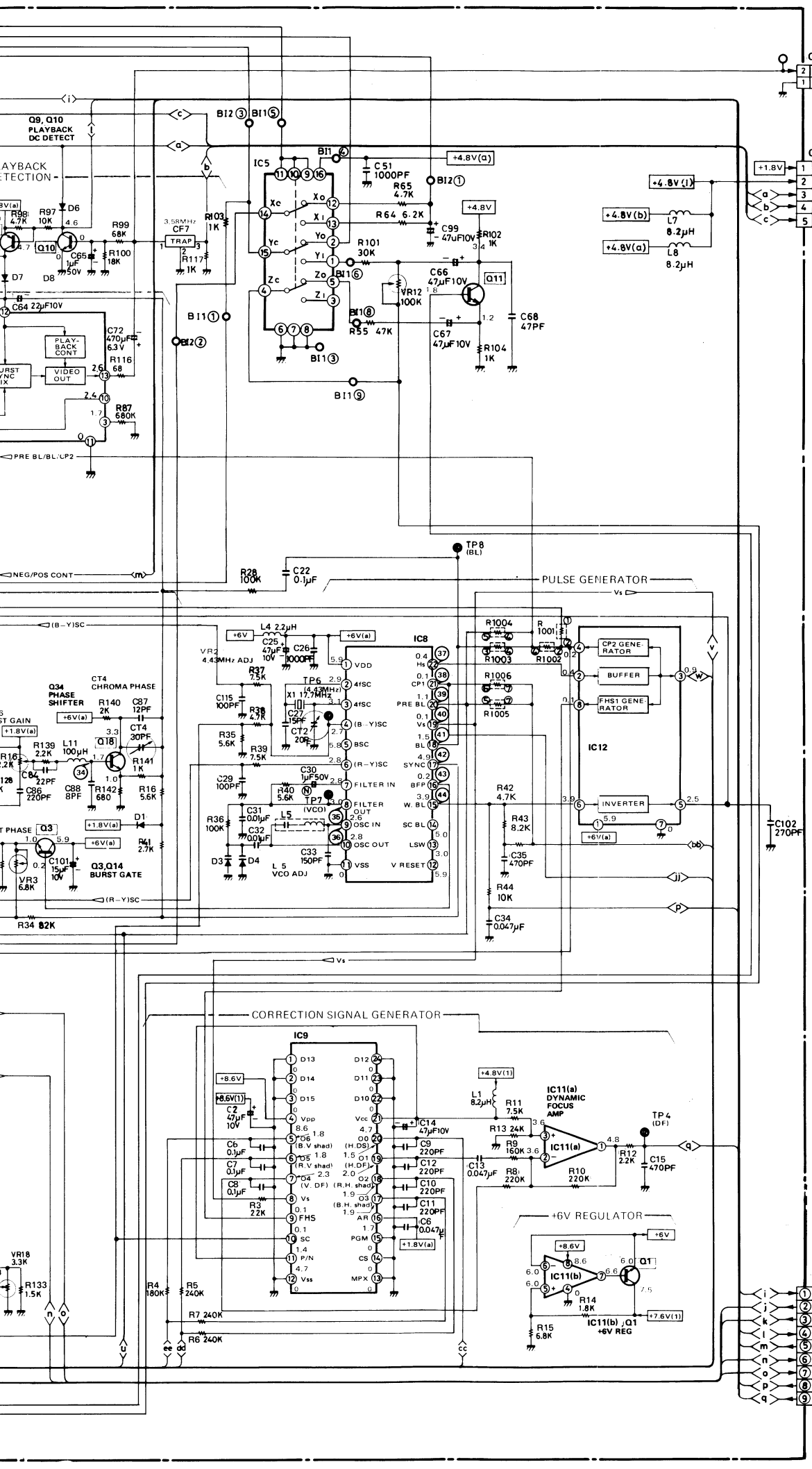


48 0.5V/DIV, 0.5μs/DIV



49 0.2V/DIV, 5ms/DIV





PROCESS-1 BOARD

IC1	AN2110S		E3, E4
IC2	AN2310S		C3, C4
IC3	AN2320S		B3, B4
IC4	AN2410S		C3
IC6	MN8037		F5
IC7	AN2210S		E6, E7
IC8	MN6160PBS		C9
IC9	YFS4161PKIK		B9
IC10	AN6914S		B2
IC11	NJM3414M		A9, B9
IC12	MT0001		D6, E6
Q1	2SD602-QRS	(W)	A10
Q3	2SC2404-CD	(U)	C7
Q4	2SA1034-ST	(F)	D4
Q5	2SD601-QRS	(Y)	D4
Q9	2SB709-QRS	(A)	E7
Q10	2SD601-QRS	(Y)	E8
Q11	2SD601-QRS	(Y)	E9
Q13	2SD601-QRS	(Y)	C7
Q14	2SC2404-CD	(U)	C7
Q15	2SB709-QRS	(A)	B6
Q17	2SD601-QRS	(Y)	A7
Q18	2SC2404-CD	(U)	C8
Q20	2SC2404-CD	(U)	B6
Q21	2SD601-QRS	(Y)	D7
Q22	2SC2404-CD	(U)	B6
Q23	2SC2404-CD	(U)	B5
Q24	2SB709-QRS	(A)	B6
Q25	2SC2404-CD	(U)	B6
D1	MA151K	(MH)	C8
D2	MA151K	(MH)	B5
D3	YUD1S2688		C8
D4	YUD1S2688		C8
D5	MA151K	(MH)	E7
D6	MA151K,	(MH)	E8
D7	MA151WA	(MO)	E7

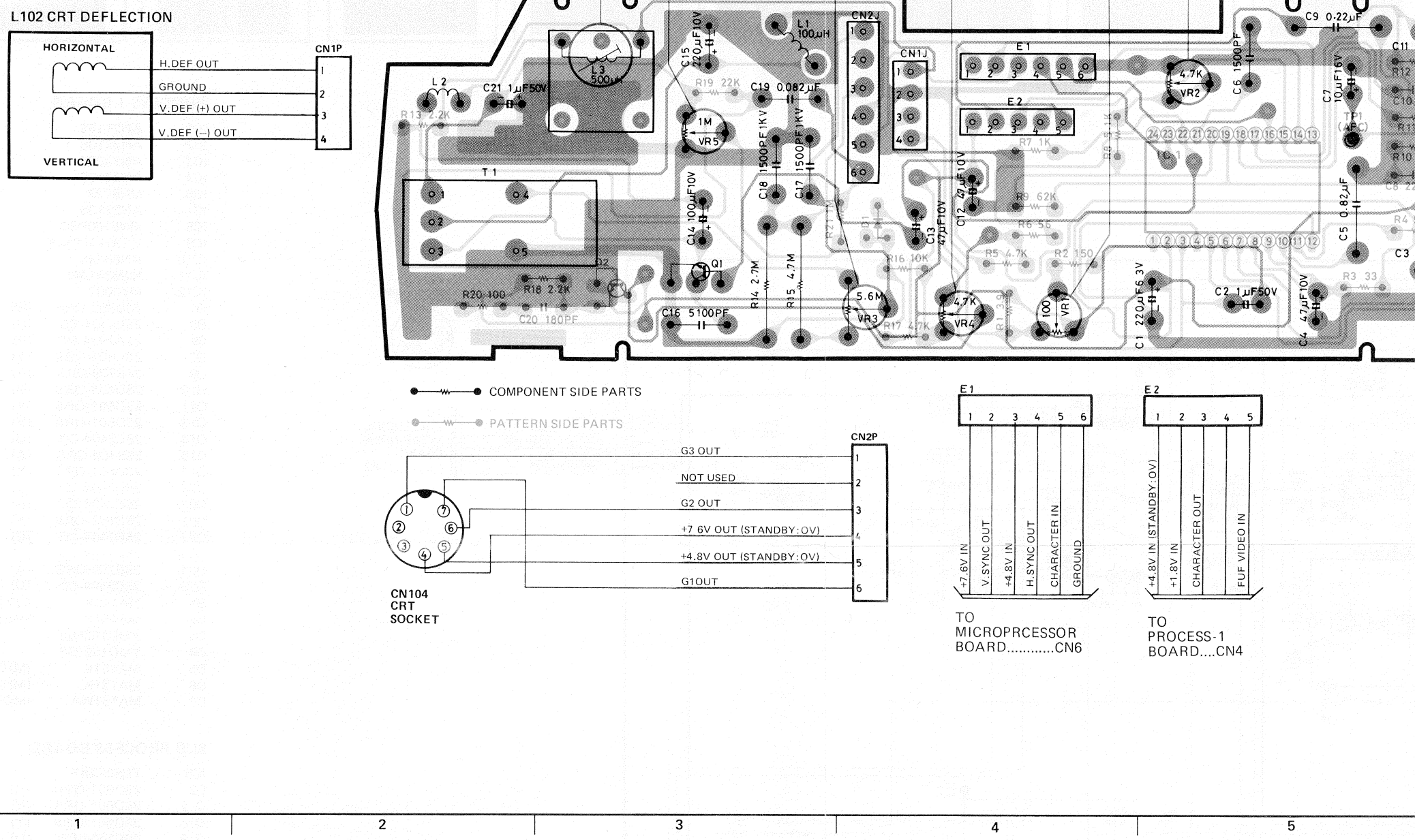
SUB PROCESS BOARD

IC5	TC4053BF		E8
Q2	2SD601-QRS	(Y)	B5
Q12	2SD601-QRS	(Y)	D7
Q16	2SD601-QRS	(Y)	B5
Q19	2SC2404-CD	(U)	B6
D10	MA151K	(MH)	C5

CONTROL-1 BOARD

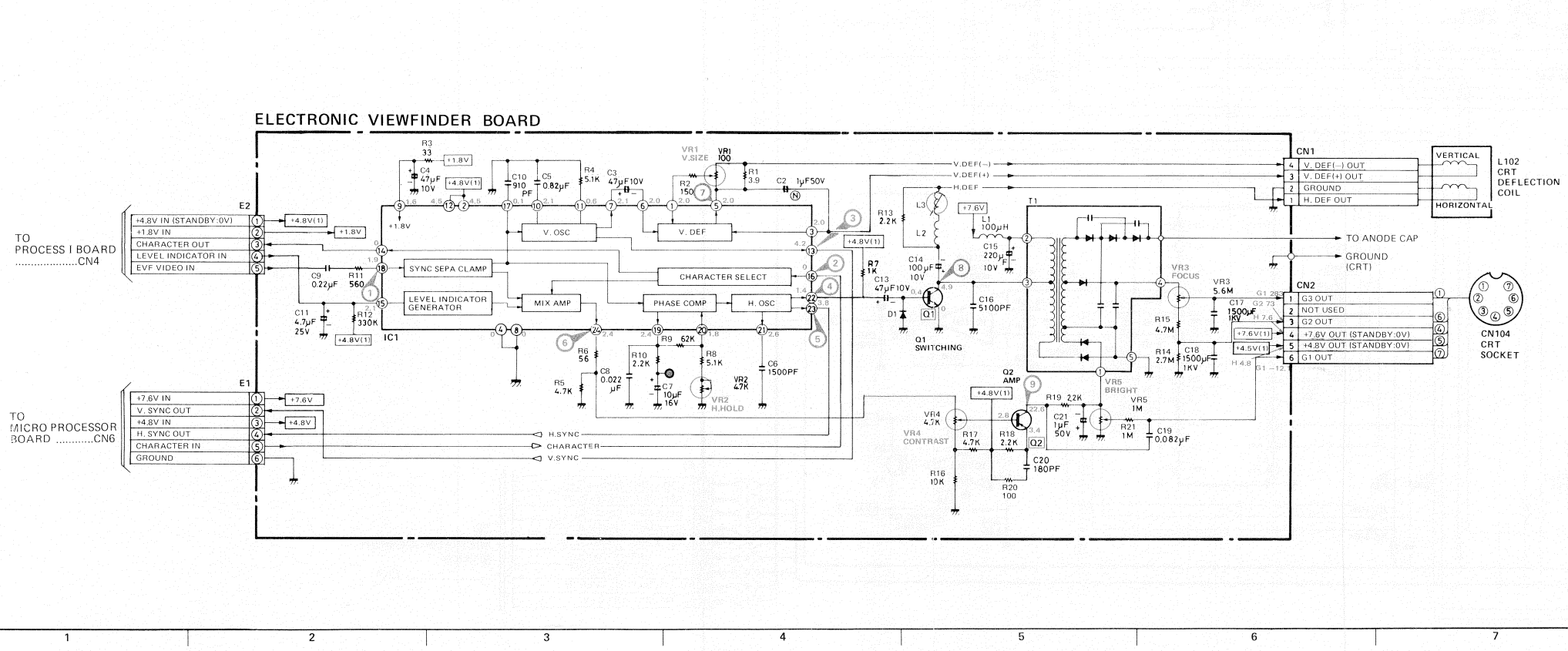
Q1	2SB641-QRS	D3
D1	LN29WP	D3

CONDUCTOR VIEW OF ELECTRONIC VIEWFINDER BOARD

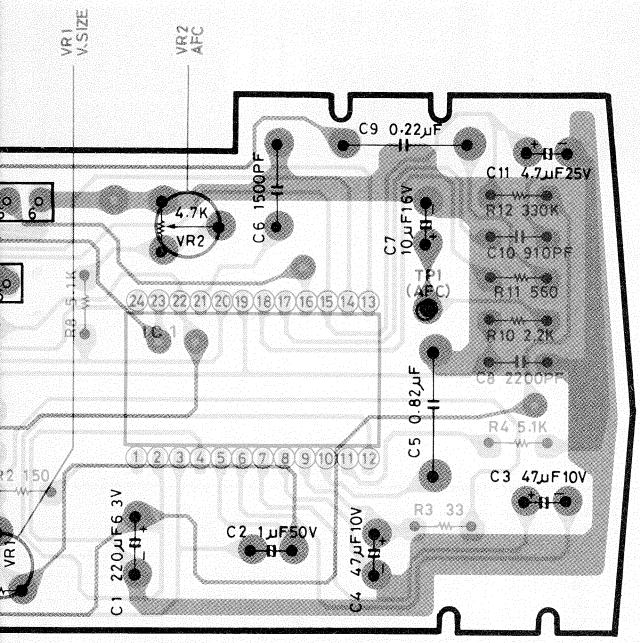


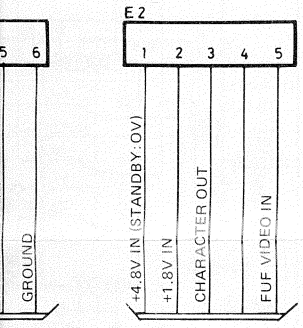
SCHEMATIC DIAGRAM OF ELECTRONIC VIEWFINDER BOARD

IC1	AN2510S	
Q1	2SD1083	
Q2	2SB709AQRS	(B)
D1	MA151K	(MH)



VFINDER BOARD

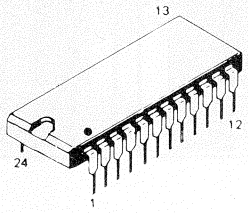




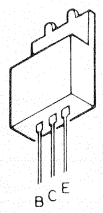
OR
CN6

TO
PROCESS-1
BOARD....CN4

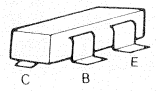
AN2510S



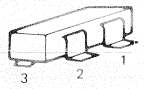
2SD1083



2SB709A-QRS



MA151K

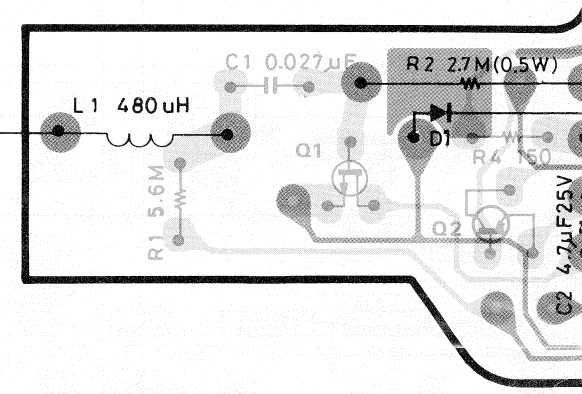


1 : NC
2 : Anode
3 : Cathode

IC1	AN2510S		C5
Q1	2SD1083		B3
Q2	2SB709AQRS	(B)	B3
D1	MA151K	(MH)	B4

CONDUCTOR VIEW

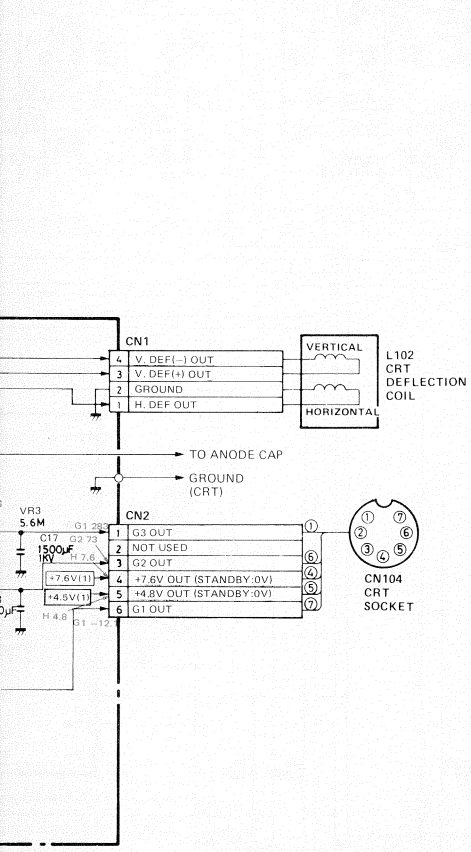
PREAMPLIFIER BOARD



B
A
1
2

EWFINDER BOARD

IC1	AN2510S		B3, B4
Q1	2SD1083		B5
Q2	2SB709AQRS	(B)	A5
D1	MA151K	(MH)	B5

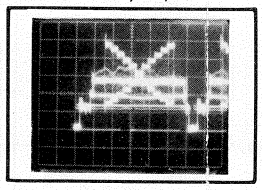


5
6
7

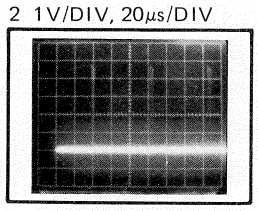
PRODUCT SAFETY NOTE

The shaded area on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

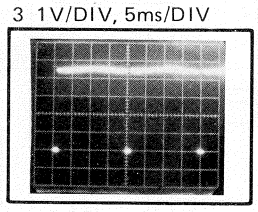
1 0.2V/DIV, 10μs/DIV



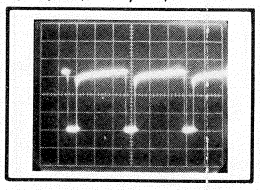
2 1V/DIV, 20μs/DIV



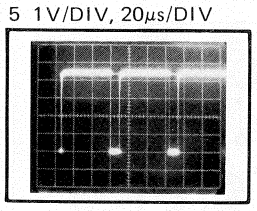
3 1V/DIV, 5ms/DIV



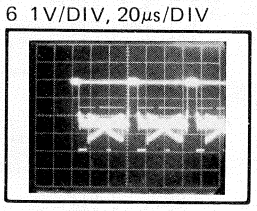
4 0.5V/DIV, 20μs/DIV



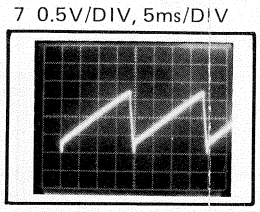
5 1V/DIV, 20μs/DIV



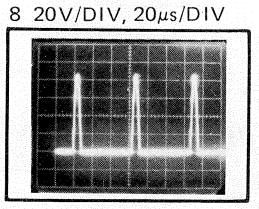
6 1V/DIV, 20μs/DIV



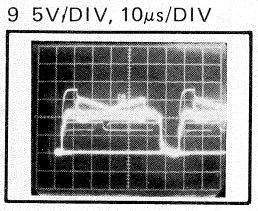
7 0.5V/DIV, 5ms/DIV



8 20V/DIV, 20μs/DIV

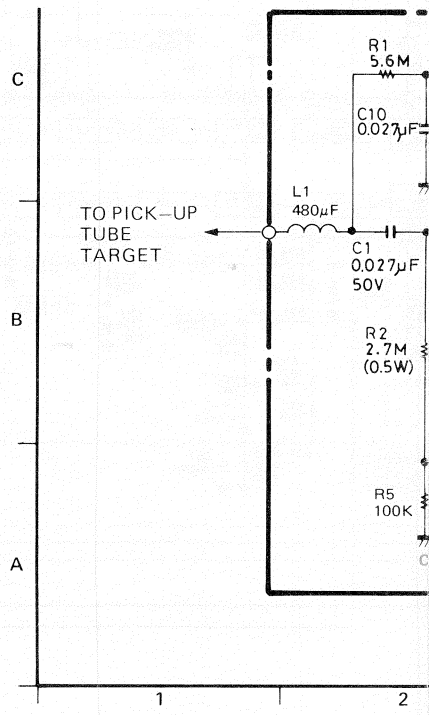


9 5V/DIV, 10μs/DIV



SCHEMATIC DIAGR

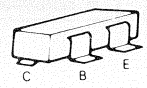
PREAMPL



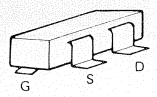
CONDUCTOR VIEW OF PREAMPLIFIER BOARD

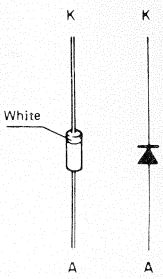
MA165

2SA1022-CD
2SC2404-CD
2SD601-QRS



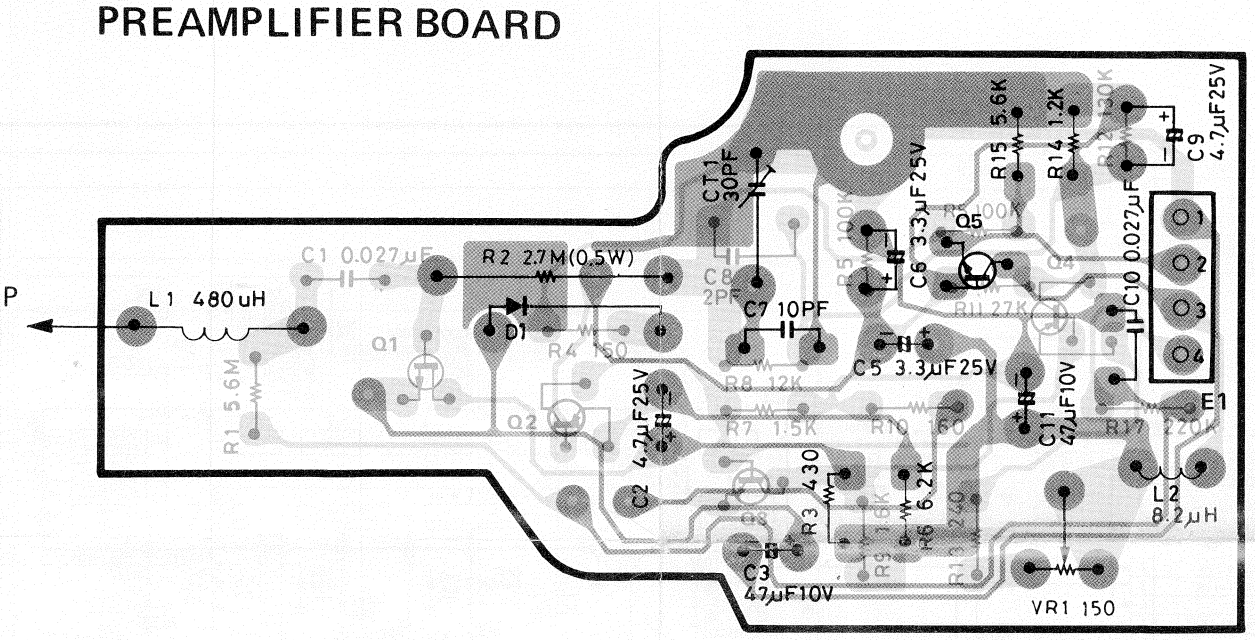
2SK316-P





Q1	2SK316-PQ	(1K)	A2
Q2	2SA1022-CD	(E)	A2
Q3	2SC2404-CD	(U)	A2
Q4	2SA1022-CD	(E)	A3
Q5	2SD601-QRS	(Y)	A3
D1	MA165		A2

PREAMPLIFIER BOARD



E1

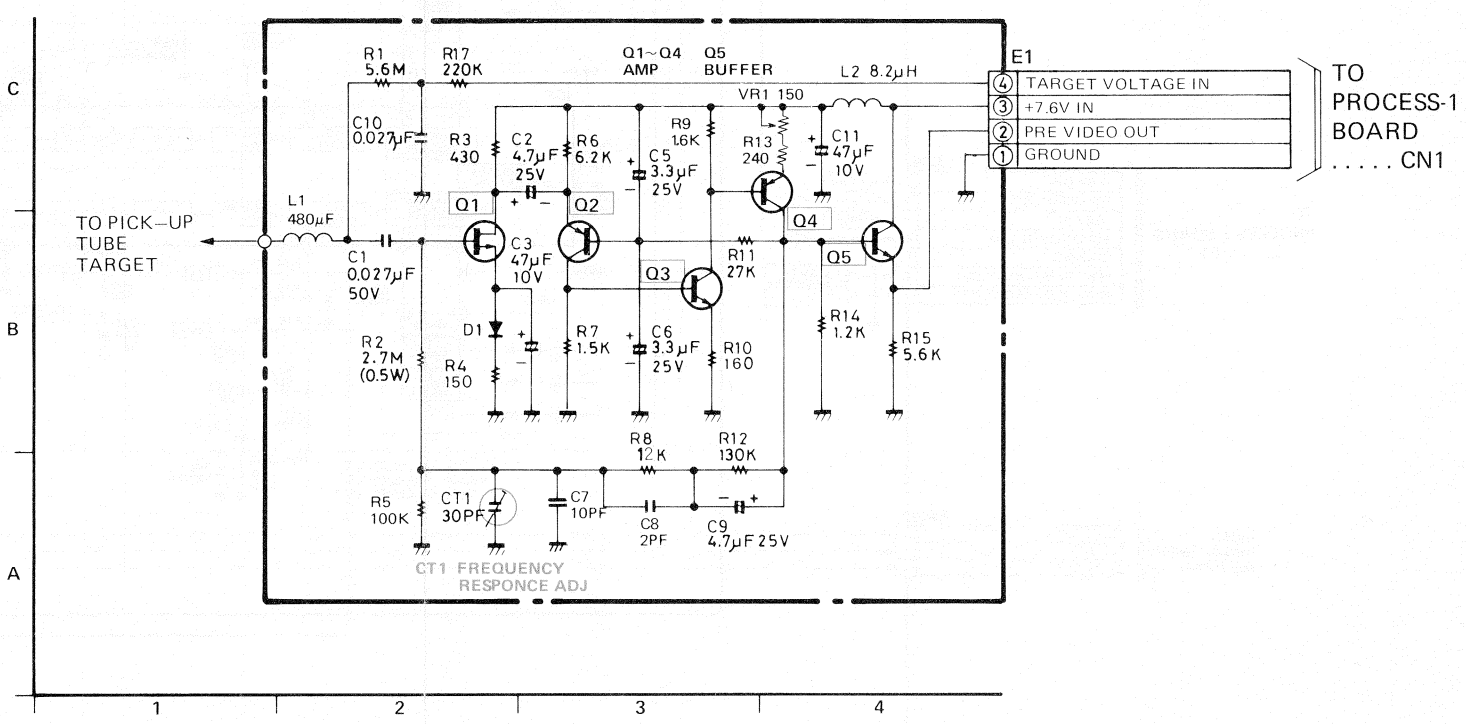
1	GROUND
2	PRE VIDEO OUT
3	+7.6V IN (STANDBY:0V)
4	TARGET VOLTAGE OUT

TO PROCESS–1 BOARD–CN1

SCHEMATIC DIAGRAM OF PREAMPLIFIER BOARD

Q1	2SK316-PQ	(1K)	B2
Q2	2SA1022-CD	(E)	B3
Q3	2SC2404-CD	(U)	B3
Q4	2SA1022-CD	(E)	C4
Q5	2SD601-QRS	(Y)	B4
D1	MA165		B2

PREAMPLIFIER BOARD



ORDER NO. VKD8405083 6C8

Service Manual

Vol. 3

Block Diagrams
Schematic Diagrams
Conductor Views

Colour Video Cameras

WVP-A2E/WVP-A2N



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- Process-2 Board 5, 6
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- Power Board 25, 26
- Microprocessor Board ..... 30 ~ 32
- Process-1 Board ..... 39 ~ 42
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- Preamplifier Board 46

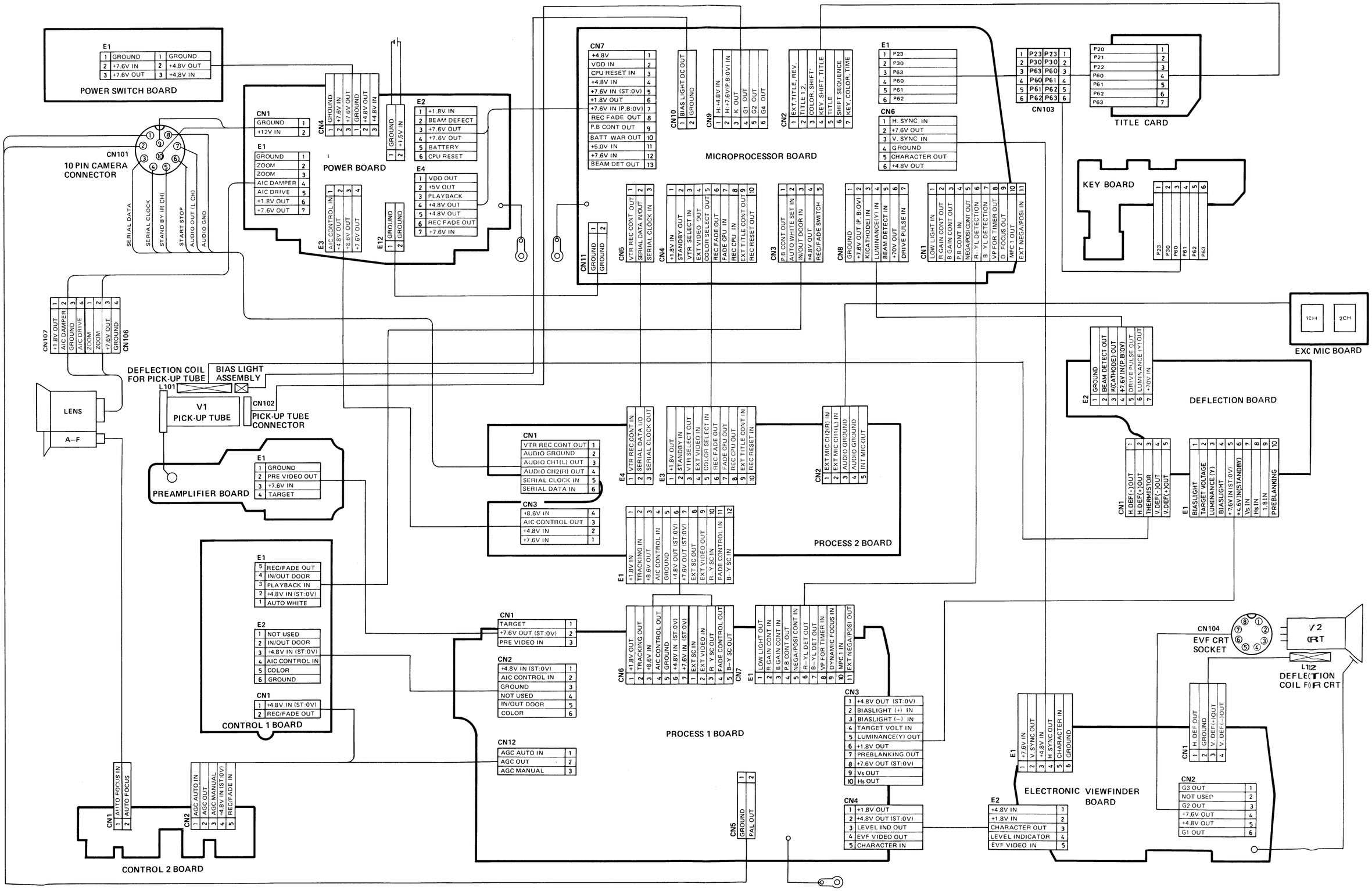
CONDUCTOR VIEW

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- Power Board ..... 27 ~ 29
- Microprocessor Board ..... 33 ~ 35
- Process-1 Board ..... 36 ~ 38
- Electronic Viewfinder Board ..... 43 ~ 45
- Preamplifier Board 46

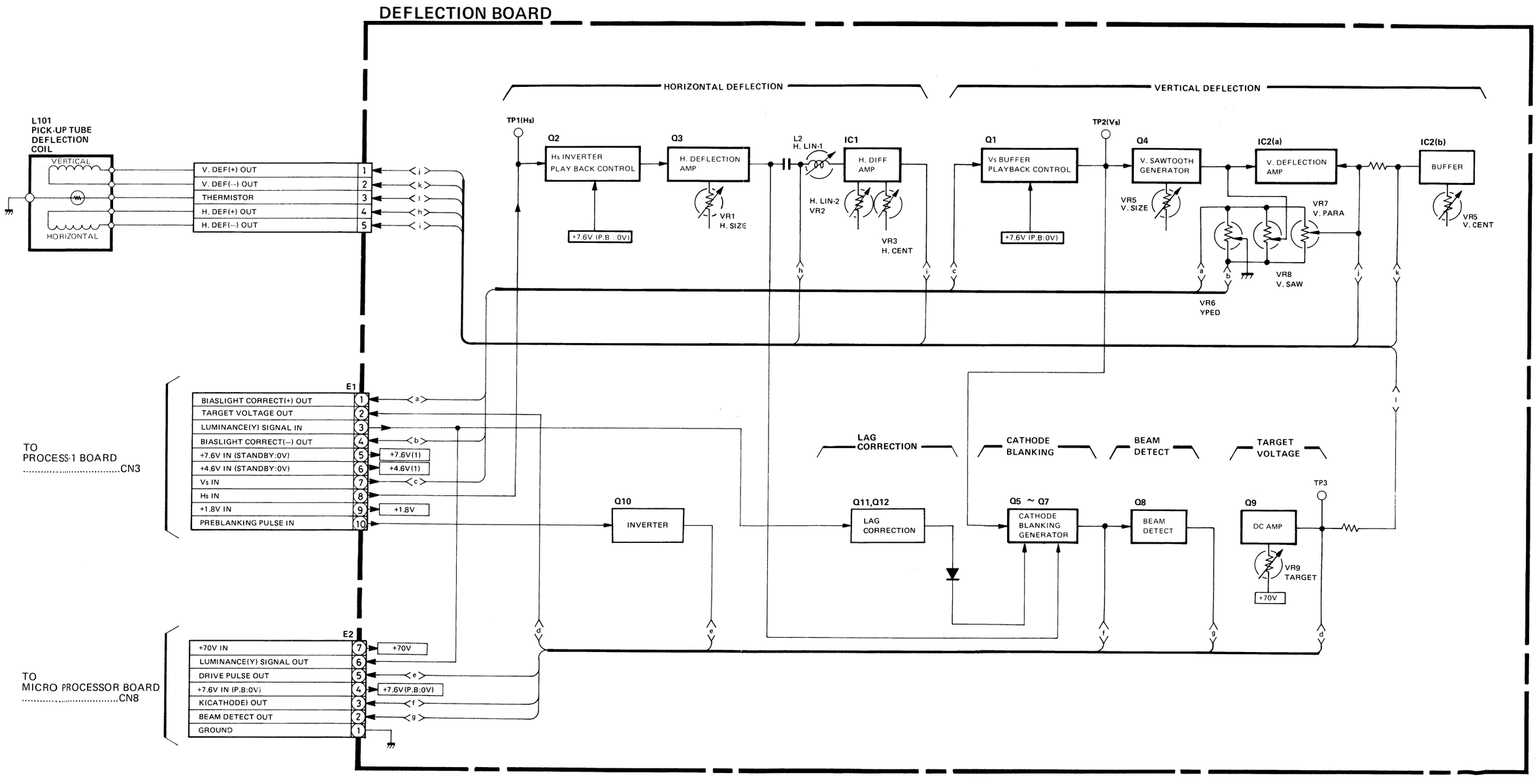
National/Panasonic

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

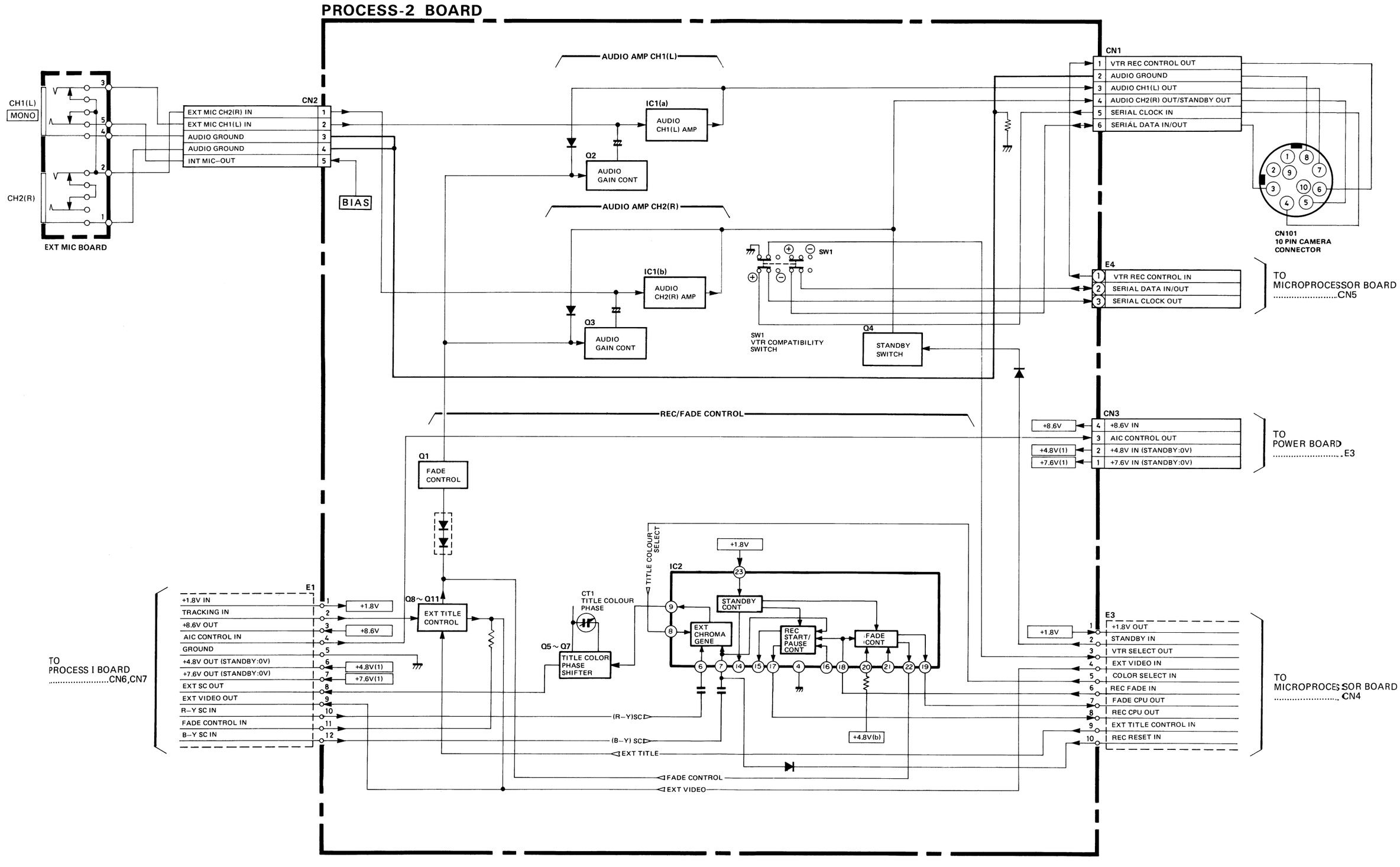
WIRING DIAGRAM



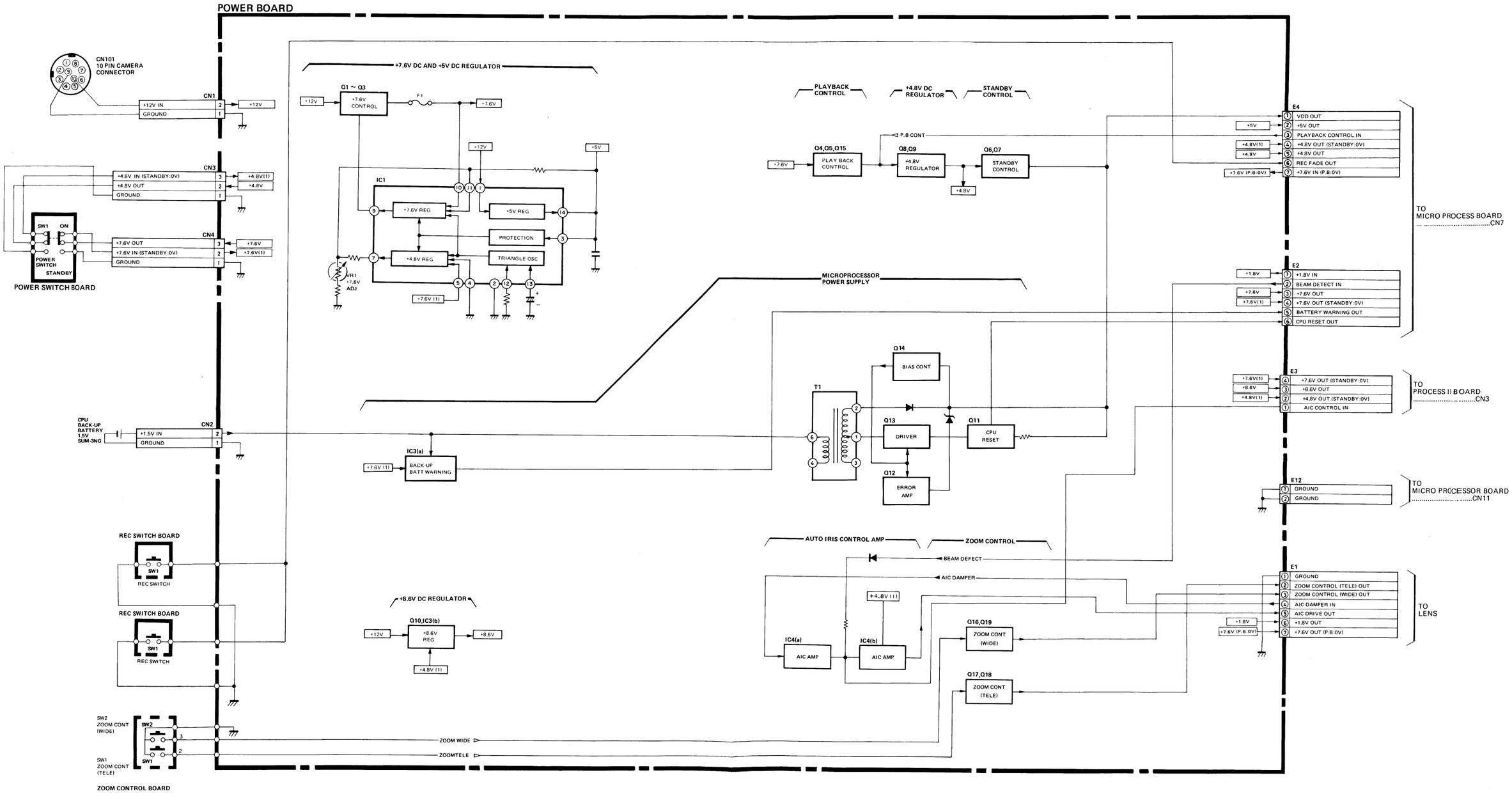
BLOCK DIAGRAM OF DEFLECTION BOARD



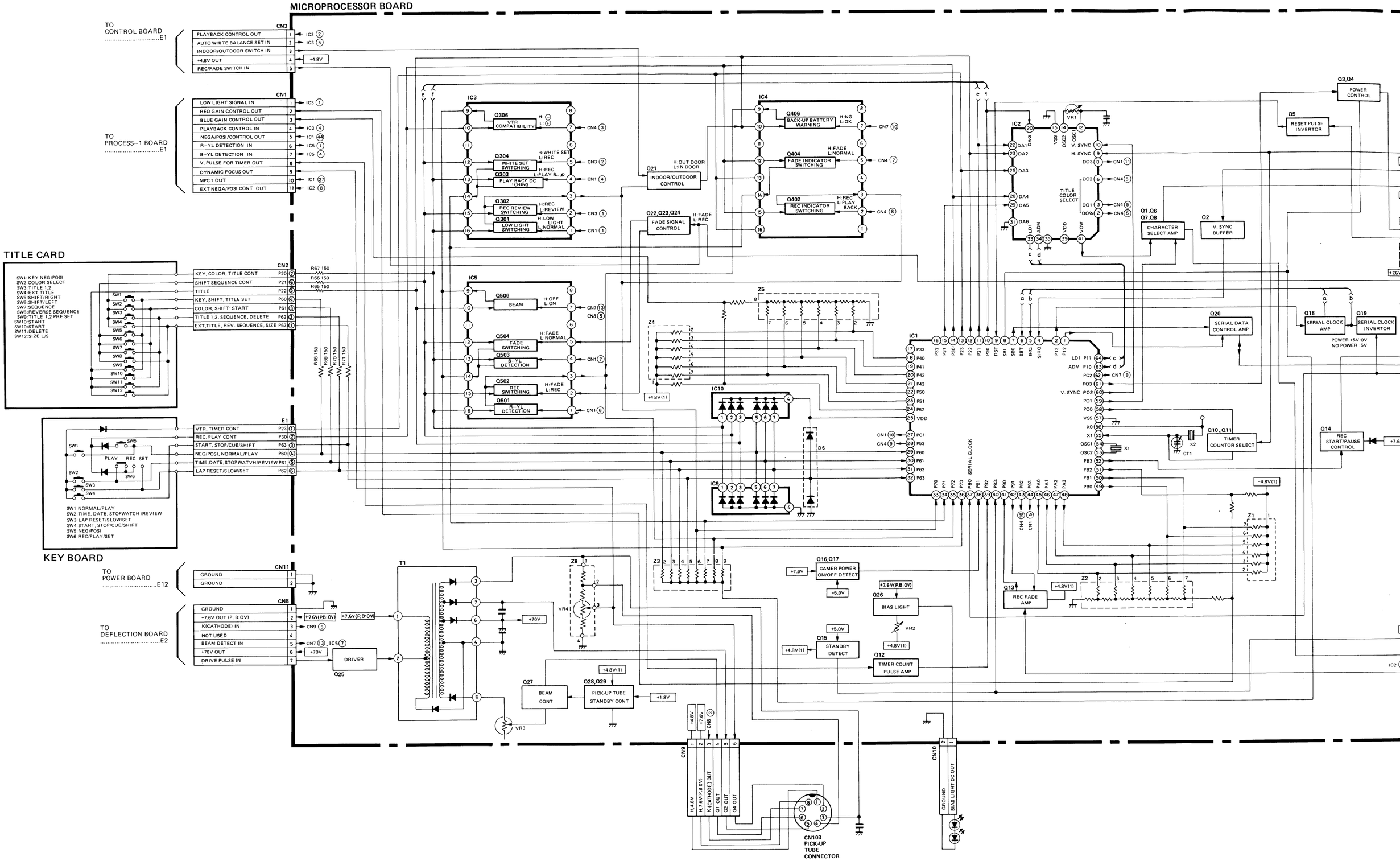
BLOCK DIAGRAM OF PROCESS-2 BOARD



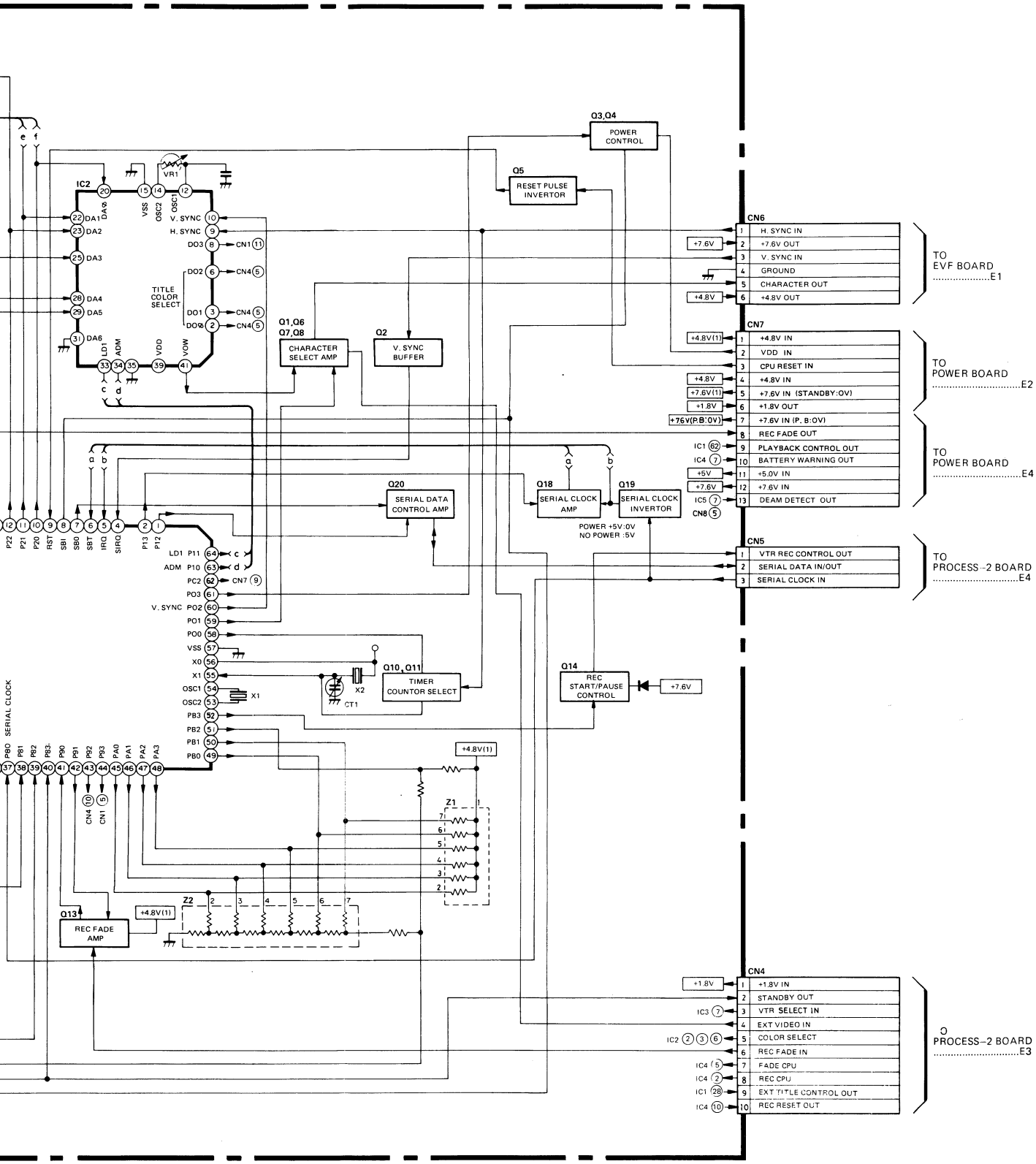
BLOCK DIAGRAM OF POWER BOARD



BLOCK DIAGRAM OF MICROPROCESSOR BOARD



SOR BOARD


Q3,Q4
POWER CONTROL
Q5
RESET PULSE INVERTOR
IC2
VR1
V. SYNC
H. SYNC
DO3
DO2
DO1
DO0
TITLE COLOR SELECT
Q1,Q6 Q7,Q8
CHARACTER SELECT AMP
Q2
V. SYNC BUFFER
Q20
SERIAL DATA CONTROL AMP
Q18
SERIAL CLOCK AMP
Q19
SERIAL CLOCK INVERTOR
POWER +5V:0V
NO POWER :5V
Q10,Q11
TIMER COUNTOR SELECT
X1
X2
CT1
Q14
REC START/PAUSE CONTROL
+7.6V
+4.8V(1)
Z1
Z2
Q13
REC FADE AMP
SERIAL CLOCK
CN6
1 H. SYNC IN
2 +7.6V OUT
3 V. SYNC IN
4 GROUND
5 CHARACTER OUT
6 +4.8V OUT
TO EVF BOARD E1
CN7
1 +4.8V IN
2 VDD IN
3 CPU RESET IN
4 +4.8V IN
5 +7.6V IN (STANDBY:0V)
6 +1.8V OUT
7 +7.6V IN (P. B:0V)
8 REC FADE OUT
9 PLAYBACK CONTROL OUT
10 BATTERY WARNING OUT
11 +5.0V IN
12 +7.6V IN
13 DEAM DETECT OUT
TO POWER BOARD E2
TO POWER BOARD E4
CN5
1 VTR REC CONTROL OUT
2 SERIAL DATA IN/OUT
3 SERIAL CLOCK IN
TO PROCESS-2 BOARD E4
CN4
1 +1.8V IN
2 STANDBY OUT
3 VTR SELECT IN
4 EXT VIDEO IN
5 COLOR SELECT
6 REC FADE IN
7 FADE CPU
8 REC CPU
9 EXT TITLE CONTROL OUT
10 REC RESET OUT
TO PROCESS-2 BOARD E3

BLOCK DIAGRAM OF PROCESS-1 BOARD

PROCESS 1 BOARD

TO CONTROL 1 BOARD E2

CN2
+4.8V OUT (STANDBY:0V)	1	+4.8(1)
AIC CONTROL OUT	2	
GROUND	3	
NOT USED	4	
INDOOR/OUTDOOR CONTROL IN	5	
COLOR BALANCE IN	6	

TO PRE AMP LIFIER BOARD E1

CN1
PRE VIDEO IN	1	
+7.6V OUT (STANDBY:0V)	2	+7.6V(1)
TARGET VOLTAGE OUT	3	

TO DEFLECTION BOARD E1

CN3
+4.8V OUT (STANDBY:0V)	1	+4.8(1)
BIASLIGHT CORRECT(+) IN	2	
BIASLIGHT CORRECT(−) IN	3	
TARGET VOLTAGE IN	4	
LUMINANCE (Y) SIGNAL OUT	5	
+1.8V OUT	6	+1.8V
PRE BLANKING PULSE OUT	7	(f)
+7.6V OUT (STANDBY:0V)	8	+7.6V(1)
Vs OUT	9	(hh)
Hs OUT	10	(gg)

CN11 is used for factory adjustment

CN11
AIC CONTROL OUT	1	(t)
GROUND	2	
+4.8V OUT (STANDBY:0V)	3	+4.8(1)

TO CONTROL 2 BOARD

CN12
AGC MANUAL OUT	1	(u)
AGC IN	2	(s)
AGC AUTO OUT	3	

VR4 AGC MANUAL

TO PROCESS 2 BOARD E1

CN6
+1.8V OUT	1	+1.8V
TRACKING OUT	2	(v)
+8.6V IN	3	+8.6V
AIC CONTROL OUT	4	(t)
GROUND	5	
+4.8V IN (STANDBY:0V)	6	+4.8V(1)
+7.6V IN (STANDBY:0V)	7	+7.6V(1)

CN13 is used for factory adjustment

CN13
B−YL OUT	3	
YL OUT	2	
R−YL OUT	1	

SIGNAL PROCESSING

IC1 — AMP, OB CLAMP, PRE BL MIX, GAMMA CORRECTION, AGC AMP, PULSE SEPA, BIAS LIGHT CORRECT, AMP, AIC MODULATION, LOW LIGHT INDICATOR, AGC DETECT, YH WHITE SUPPRESS, Y(EDGE) WHITE SUPPRESS, AGC CONT

CF2 B·P·F, CF8 YL LPF, CF3 TRAP, CF5 Y LPF, CF4 TRAP, CF6 DL, CF7 TRAP

TP1 (PREAMP OUT), TP10 (Vs), TP11 (Hs), TP5 (YH)

VR6 AIC SET, VR5 AGC SET, LEVEL IND, AIC SET

Q4 AMP, Q5 CLAMP

TRACKING, AIC SET, CHROMA CONT, Y(EDGE), CHARACTER

RED AND BLUE SEPARATION

IC2 — AMP, PRE BL MIX, V.TRANSIENT SPURIOUS CORRECTION, PULSE SEPA, WHITE CLIP, NAM, MIX, V.EDGE AMP, DETECT, +1.8V REG

VR2 R/B GAIN, VR1 R/B SEPARATION-2, DL1 1H DL

TP3 (TRACKING), TRACKING SIGNAL GENERATOR, 90°PHASE SHIFTER, R·B SHADING CORRECTION, CT1 R/B SEPARATION-1, DL

CHROMA PROCESSING

IC3 — B.SHADING/TRACKING CORRECTION, GAIN CONTROL, PRE BL MIX, AMP, DETECT, LPF, B−YL AMP, R/B SEPARATION, R.SHADING/TRACKING CORRECTION, GAIN CONTROL, PRE BL MIX, AMP, DETECT, LPF, R−YL AMP

VR91 B TRACKING-3, VR92 B TRACKING-1, VR93 B TRACKING-2

VR101 R TRACKING-3, VR102 R TRACKING-1, VR103 R TRACKING-2

VR8 R PED, VR7 R. GAIN, B. GAIN, R GAIN

Q2 B−YL MATRIX, CT3 YL PHASE, Q16 YL PHASE SHIFTER, SW1 YL ON/OFF SWITCH

H. APERTURE SIGNAL GENERATOR

VR11 Y GAIN, CF6 DL, IC7 — Y/CHROMA APERTURE MIX, FADE CONT, H.APERTURE GENERATOR, CHROMA GAIN CONT, YL PEDESTAL, EXT NEGA/POSI CONT, CHARACTER MIX, NEGA/POSI SELECT, VIDEO GATE, CLAMP, PULSE SEPA, BL MIX HIGH-CLIP LOW CLIP, BURST SYNC MIX, VIDEO OUT

VR13 YL PED, Q12 CHROMA GAIN CONT, Q6 Q7 TITLE COLOUR CORRECTION

VIDEO SIGNAL PROCESSING

PLAY BACK DETECTION

Q8 BUFFER, Q9 Q10 PLAY BACK DETECT, CF7 TRAP

PULSE GENERATOR

IC5, Q11 BUFFER, VR12 R PHASE

CHROMA ENCODING

Q21 +2.5V GENERATOR, IC4 — H.APERTURE GENERATOR, PULSE SEPA, B−YL CLAMP, B−YL DETECTION, BFP CLAMP, REFERENCE DETECTION, R−YL CLAMP, R−YL DETECTION, B−YL BALANCE MODULATOR, R−YL BALANCE MODULATOR, CHROMA CLIP/SUPPRESS

VR14 CHROMA GAIN, Q13 PRE BL MIX, Q3 Q14 BURST GATE, VR16 BURST GAIN, Q18 PHASE SHIFTER, CT4 CHROMA PHASE

IC8 — Vdd, 4fSC, (B−Y)SC, BSC, (R−Y)SC, FILTER IN, FILTER OUT, OSC IN, OSC OUT, Vss, Hs, CP1, PRE BL, Vs, BL, SYNC, BFP, W. BL, SC BL, LSW, V RESET

TP6 (4.43MHZ), CT2 4.43 MHZ ADJ, L5, TP7(VCO), TP8 (BL)

IC12 — FHS1 GENERATOR, BUFFER, CP2 GENERATOR, INVERTER

CORRECTION SIGNAL GENERATOR

IC9 — D13, D14, D15, Vpp, Q6 (B,V shad), Q5 (R,V shad), Q4 (V,DF), Vs, FHS, SC, P/N, Vss, D12, D11, D10, Vcc, Q0 (H,DS), Q1 (H,DF), Q2 (R,H shad), Q3 (B,H shad), AR, PGM, CS, MPX

IC11(a) DYNAMIC FOCUS AMP, TP4 (DF)

+6V REGULATOR — Q1 IC11(b) +6V REG

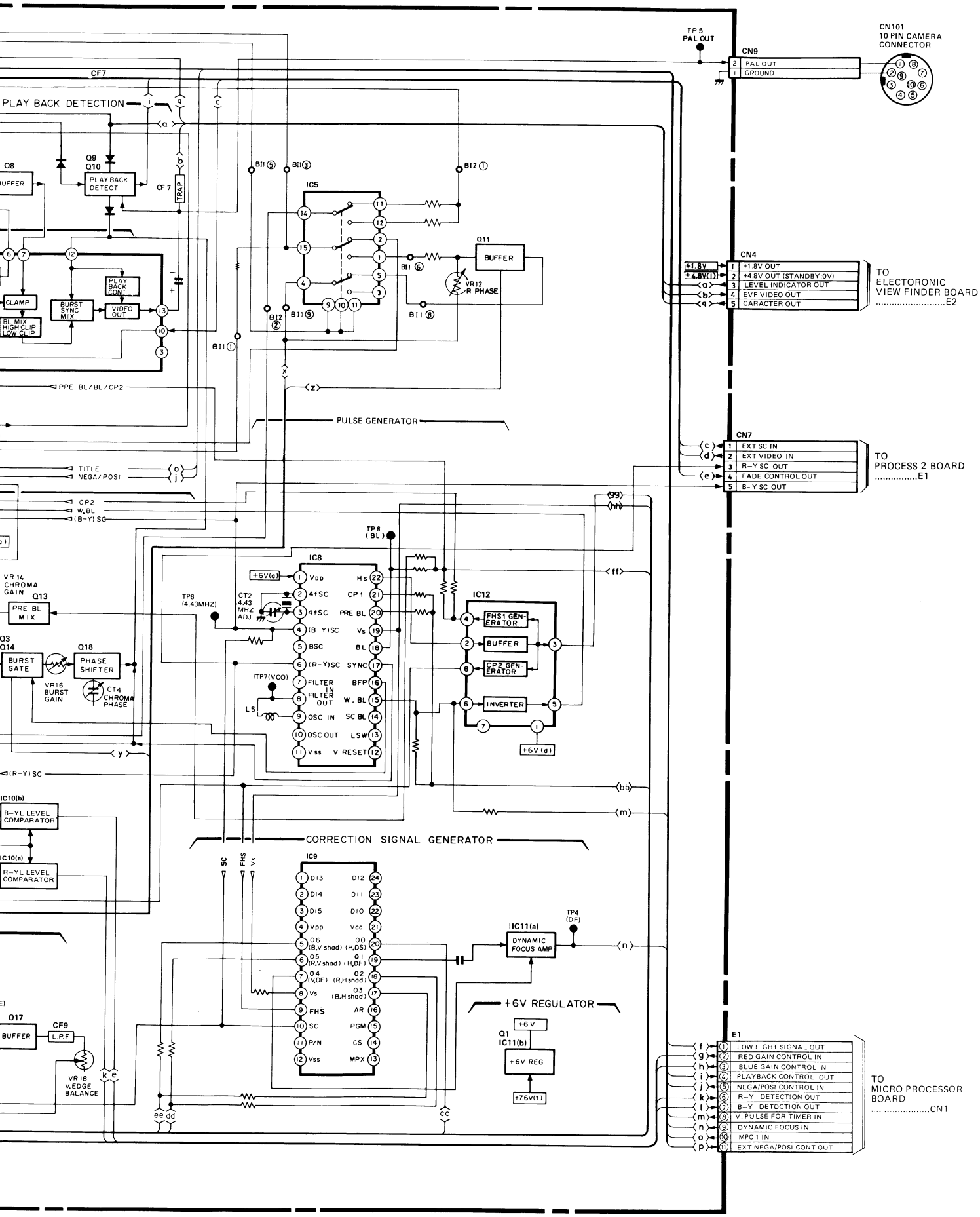
Y(EDGE) DELAY

VR15 V.EDGE BIAS, Q15 DC BIAS, IC6 — CHARGE INPUT, ANALOG SHIFT REGESTER, CHARGE DETECT, RESAMPLING BUFFER, TIMING CONTROL, Q17 BUFFER, CF9 LPF, VR18 V.EDGE BALANCE, TP1 (V.EDGE)

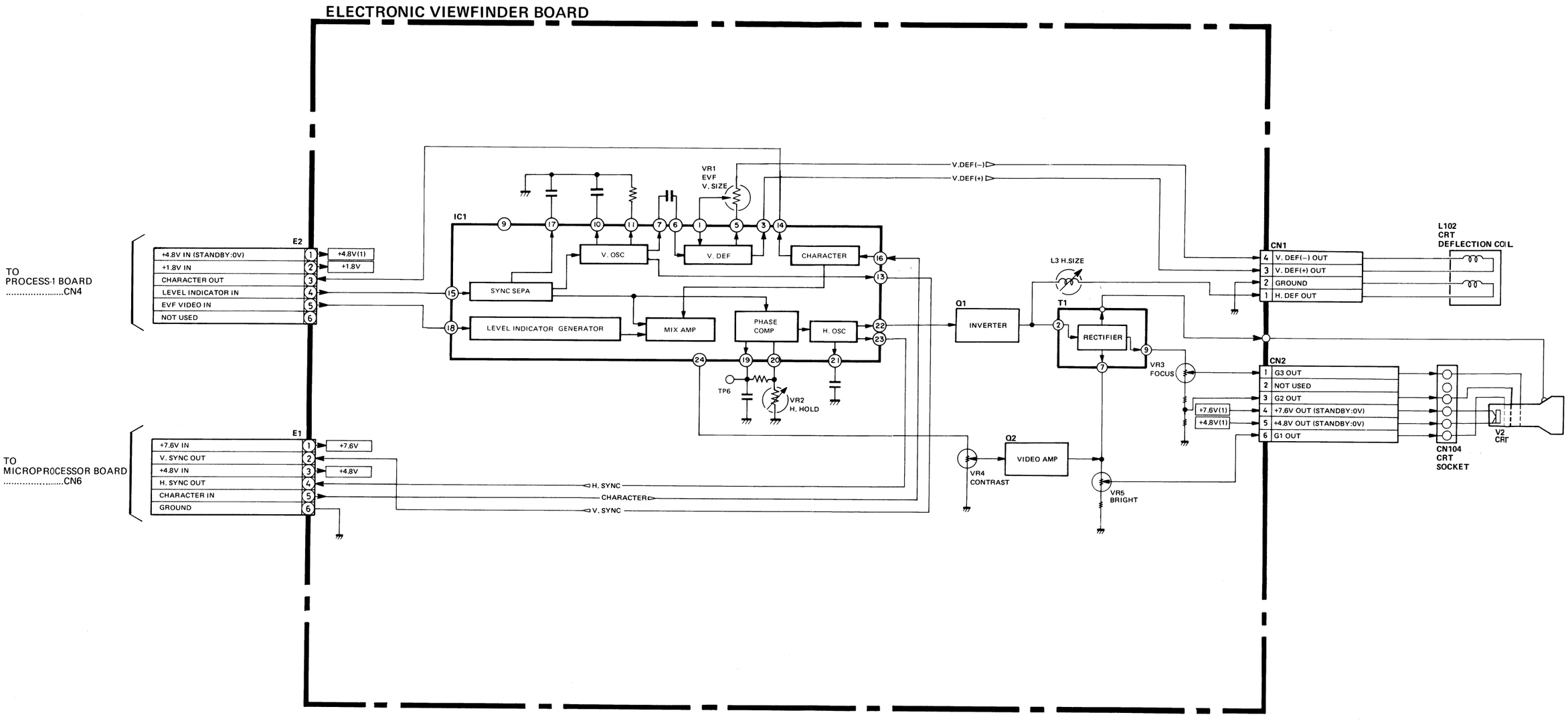
Q19 BUFFER, Q24 AMP, Q20 BUFFER, Q23 CLAMP, IC10(b) B−YL LEVEL COMPARATOR, IC10(a) R−YL LEVEL COMPARATOR

Q11 BUFFER

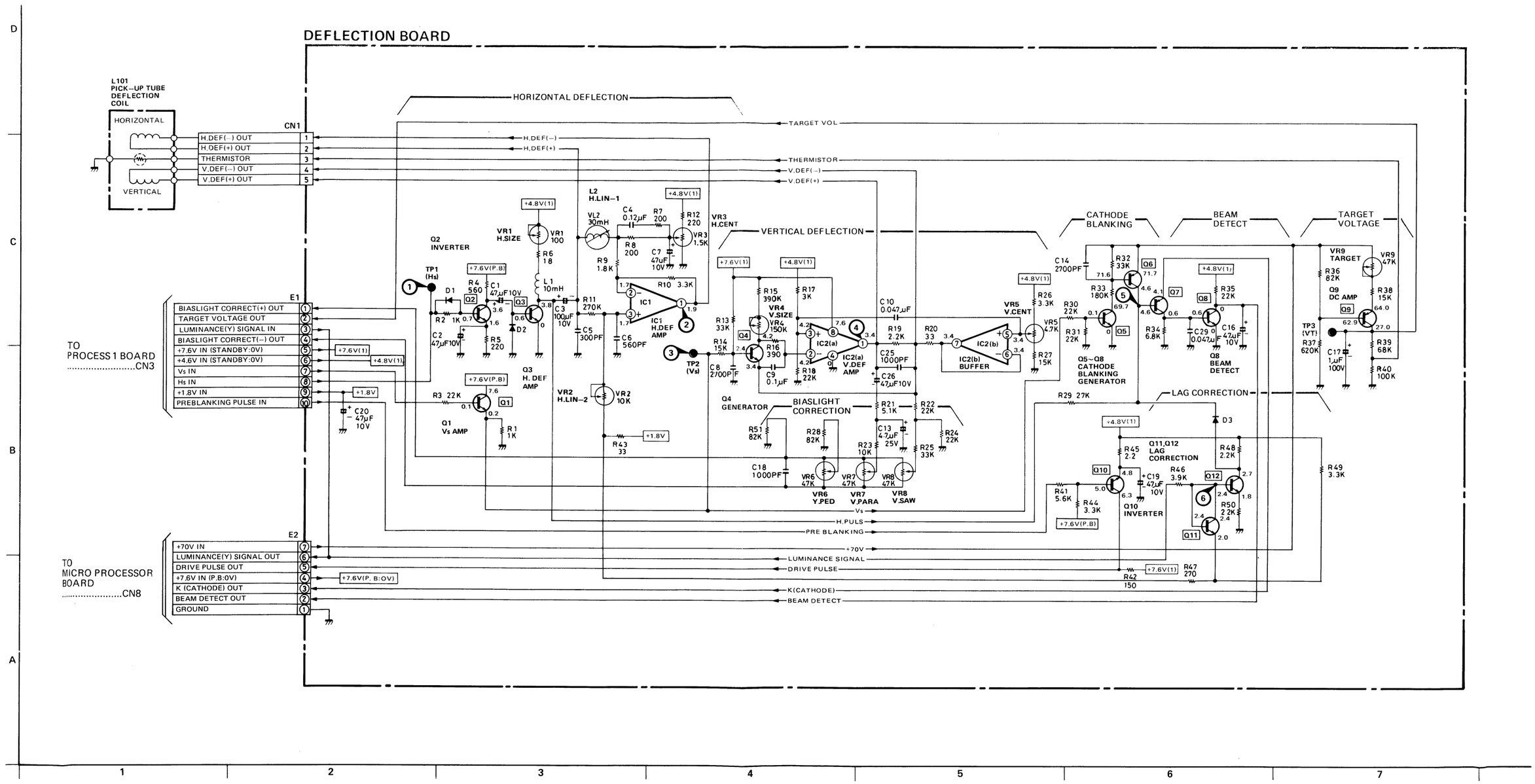
BOARD


TP5
PAL OUT
CN101
10 PIN CAMERA
CONNECTOR
CN9
2 PAL OUT
1 GROUND
CF7
PLAY BACK DETECTION
Q8
Q9
Q10
PLAY BACK DETECT
CF7
TRAP
IC5
Q11
BUFFER
VR12
R PHASE
CLAMP
BURST SYNC MIX
VIDEO OUT
PLAY BACK CONT
BL MIX HIGH CLIP LOW CLIP
PPE BL/BL/CP2
PULSE GENERATOR
CN4
+1.8V
+4.8V(1)
1 +1.8V OUT
2 +4.8V OUT (STANDBY:0V)
3 LEVEL INDICATOR OUT
4 EVF VIDEO OUT
5 CARACTER OUT
TO
ELECTORONIC
VIEW FINDER BOARD
.....E2
CN7
1 EXT SC IN
2 EXT VIDEO IN
3 R-Y SC OUT
4 FADE CONTROL OUT
5 B-Y SC OUT
TO
PROCESS 2 BOARD
.....E1
TITLE
NEGA/POSI
CP2
W.BL
(B-Y) SC
TP8
(BL)
IC8
VR14
CHROMA
GAIN
Q13
PRE BL MIX
TP6
(4.43MHZ)
CT2
4.43
MHZ
ADJ
IC12
FHS1 GENERATOR
BUFFER
CP2 GENERATOR
INVERTER
Q3
Q14
BURST GATE
Q18
PHASE SHIFTER
VR16
BURST
GAIN
CT4
CHROMA
PHASE
TP7(VCO)
L5
(R-Y) SC
IC10(b)
B-YL LEVEL COMPARATOR
IC10(a)
R-YL LEVEL COMPARATOR
CORRECTION SIGNAL GENERATOR
IC9
SC
FHS
Vs
IC11(a)
DYNAMIC FOCUS AMP
TP4
(DF)
+6V REGULATOR
Q1
IC11(b)
+6V REG
+6V
+7.6V(1)
Q17
BUFFER
CF9
L.P.F
VR18
V.EDGE
BALANCE
E1
1 LOW LIGHT SIGNAL OUT
2 RED GAIN CONTROL IN
3 BLUE GAIN CONTROL IN
4 PLAYBACK CONTROL OUT
5 NEGA/POSI CONTROL IN
6 R-Y DETECTION OUT
7 B-Y DETOCTION OUT
8 V.PULSE FOR TIMER IN
9 DYNAMIC FOCUS IN
10 MPC 1 IN
11 EXT NEGA/POSI CONT OUT
TO
MICRO PROCESSOR
BOARD
.....CN1

BLOCK DIAGRAM OF ELECTRONIC VIEWFINDER BOARD

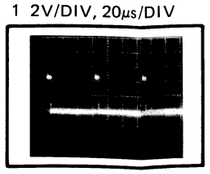


SCHEMATIC DIAGRAM OF DEFLECTION BOARD

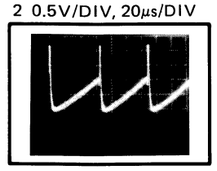


IC1	NJM3415M		C1	Q8	2SD602-QRS	(W)	C6
IC2	NJM3415M		B4, B5	Q9	2SB814-QRS	(1B)	C7
Q1	2SD601-QRS	(Y)	B3	Q10	2SD602-QRS	(W)	B6
Q2	2SD602-QRS	(W)	C3	Q11	2SD601-QRS	(Y)	B6
Q3	2SD1083		C3	Q12	2SD601-QRS	(Y)	B6
Q4	2SC2405STU	(S)	B4	D1	MA151K	(MH)	C3
Q5	2SD814-QRS	(P)	C6	D2	MA151K	(MH)	C3
Q6	2SB814-QRS	(1B)	C6	D3	MA171		B6
Q7	2SB814-QRS	(1B)	C6				

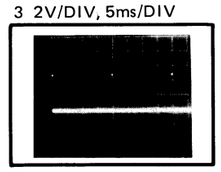
1 2V/DIV, 20μs/DIV



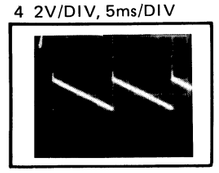
2 0.5V/DIV, 20μs/DIV



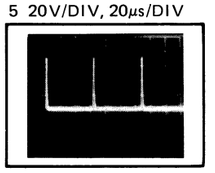
3 2V/DIV, 5ms/DIV



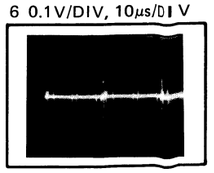
4 2V/DIV, 5ms/DIV



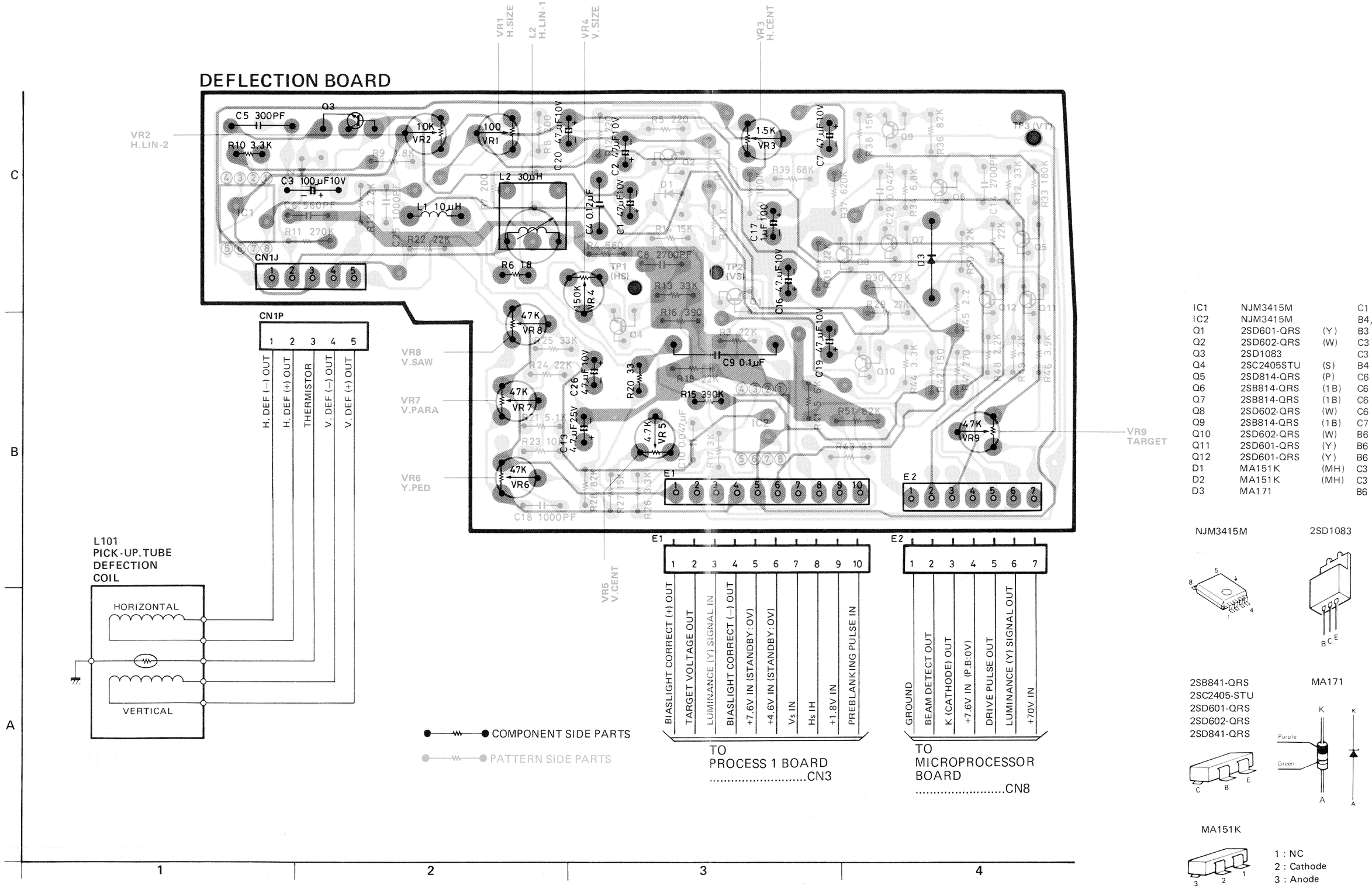
5 20V/DIV, 20μs/DIV



6 0.1V/DIV, 10μs/DIV



CONDUCTOR VIEW OF DEFLECTION BOARD



IC1	NJM3415M		C1
IC2	NJM3415M		B4, B5
Q1	2SD601-QRS	(Y)	B3
Q2	2SD602-QRS	(W)	C3
Q3	2SD1083		C3
Q4	2SC2405STU	(S)	B4
Q5	2SD814-QRS	(P)	C6
Q6	2SB814-QRS	(1B)	C6
Q7	2SB814-QRS	(1B)	C6
Q8	2SD602-QRS	(W)	C6
Q9	2SB814-QRS	(1B)	C7
Q10	2SD602-QRS	(W)	B6
Q11	2SD601-QRS	(Y)	B6
Q12	2SD601-QRS	(Y)	B6
D1	MA151K	(MH)	C3
D2	MA151K	(MH)	C3
D3	MA171		B6

NJM3415M

2SD1083

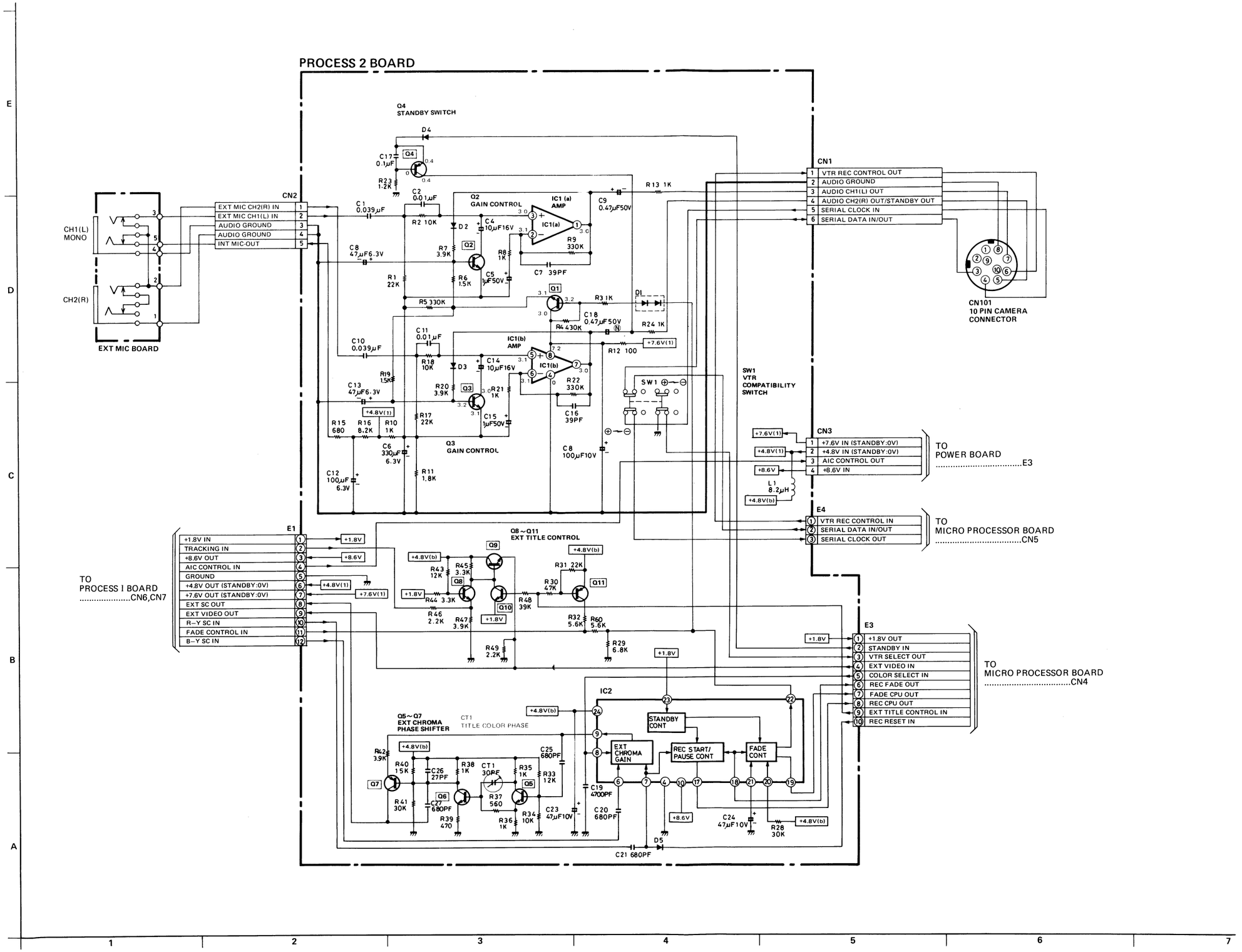
2SB841-QRS
2SC2405-STU
2SD601-QRS
2SD602-QRS
2SD841-QRS

MA171

MA151K

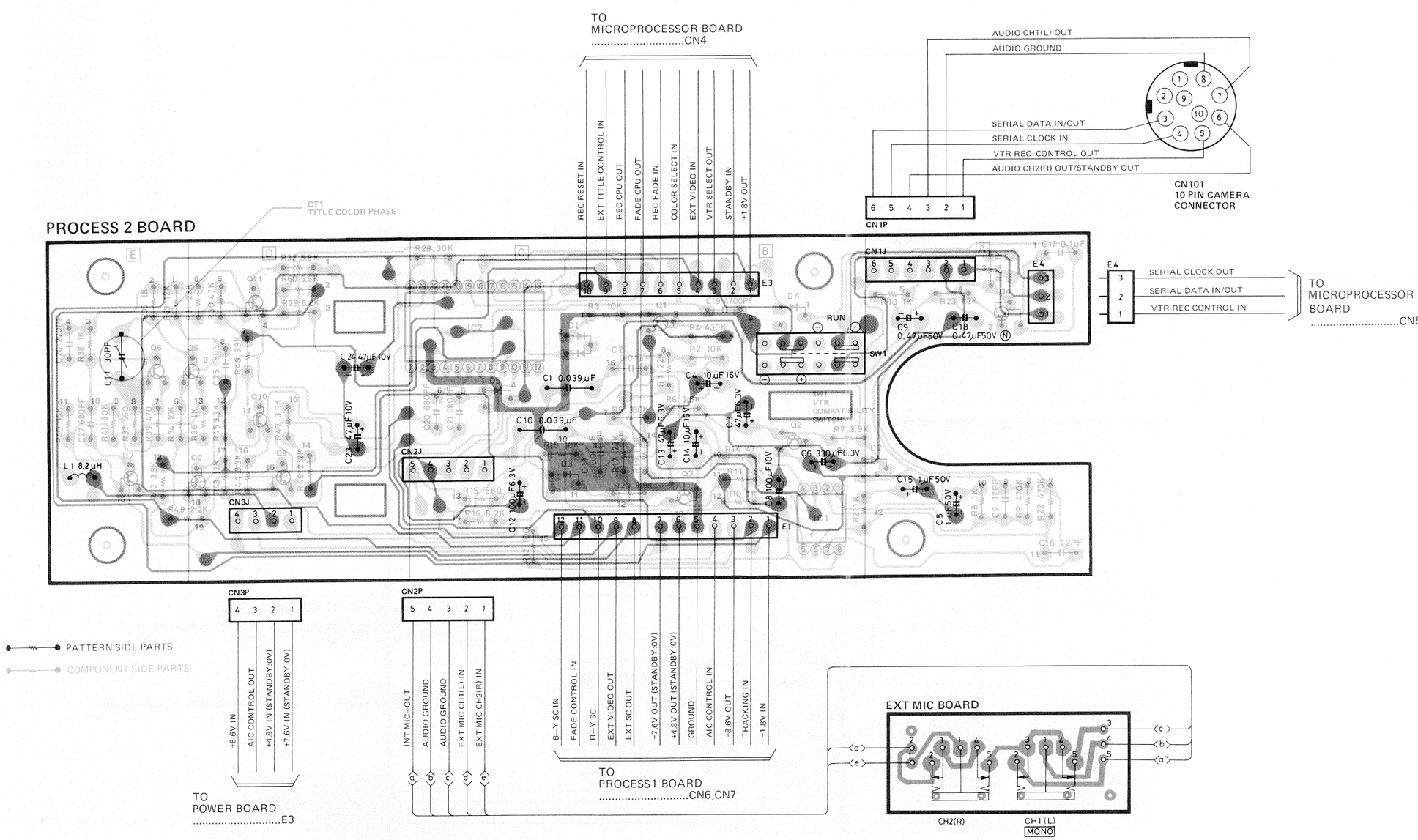
1 : NC
2 : Cathode
3 : Anode

SCHEMATIC DIAGRAM OF PROCESS-2 BOARD



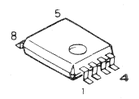
IC1	NJM4558MD		D3
IC2	AN2560S		A4, B4
Q1	2SC2405-ST	(S)	D3
Q2	2SC2405STU	(S)	D3
Q3	2SC2405STU	(S)	C3
Q4	2SB709-QRS	(A)	E3
Q5	2SC2404-CD	(U)	A3
Q6	2SD601-QRS	(Y)	A3
Q7	2SB709-QRS	(A)	A3
Q8	2SD601-QRS	(Y)	B3
Q9	2SD601-QRS	(Y)	C3
Q10	2SD601-QRS	(Y)	B3
Q11	2SB709-QRS	(A)	B4
D1	MA153	(MC)	D4
D2	MA151K	(MH)	D3
D3	MA151K	(MH)	D3
D4	MA151K	(MH)	E4
D5	MA151K	(MH)	A4

CONDUCTOR VIEW OF PROCESS-2 BOARD

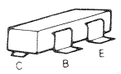


IC1	NJM4558MD		B4
IC2	AN2560S		C2, C3
Q1	2SC2405-ST	(S)	C3
Q2	2SC2405STU	(S)	C4
Q3	2SC2405STU	(S)	B3
Q4	2SB709-QRS	(A)	C5
Q5	2SC2404-CD	(U)	C1
Q6	2SD601-QRS	(Y)	C1
Q7	2SB709-QRS	(A)	C1
Q8	2SD601-QRS	(Y)	C2
Q9	2SD601-QRS	(Y)	C1
Q10	2SD601-QRS	(Y)	C2
Q11	2SB709-QRS	(A)	C2
D1	MA153	(MC)	C3
D2	MA151K	(MH)	C4
D3	MA151K	(MH)	C3
D4	MA151K	(MH)	C4
D5	MA151K	(MH)	C3

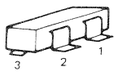
NJM4558MD



2SB709-QRS
2SC2404-CD
2SC2405-ST
2SC2405-STU
2SD601-QRS

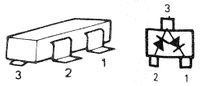


MA151K



1 : NC
2 : Anode
3 : Cathode

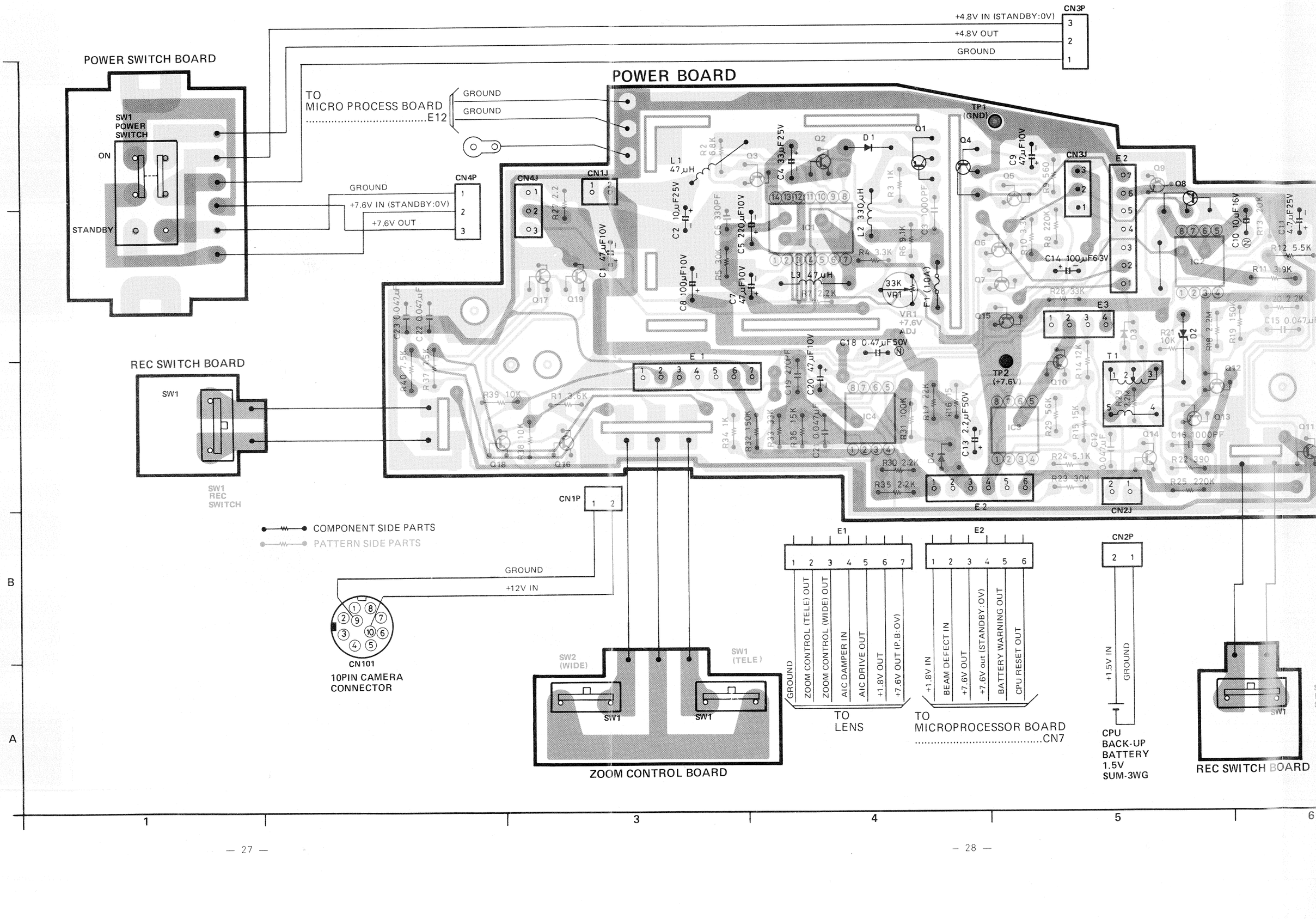
MA153



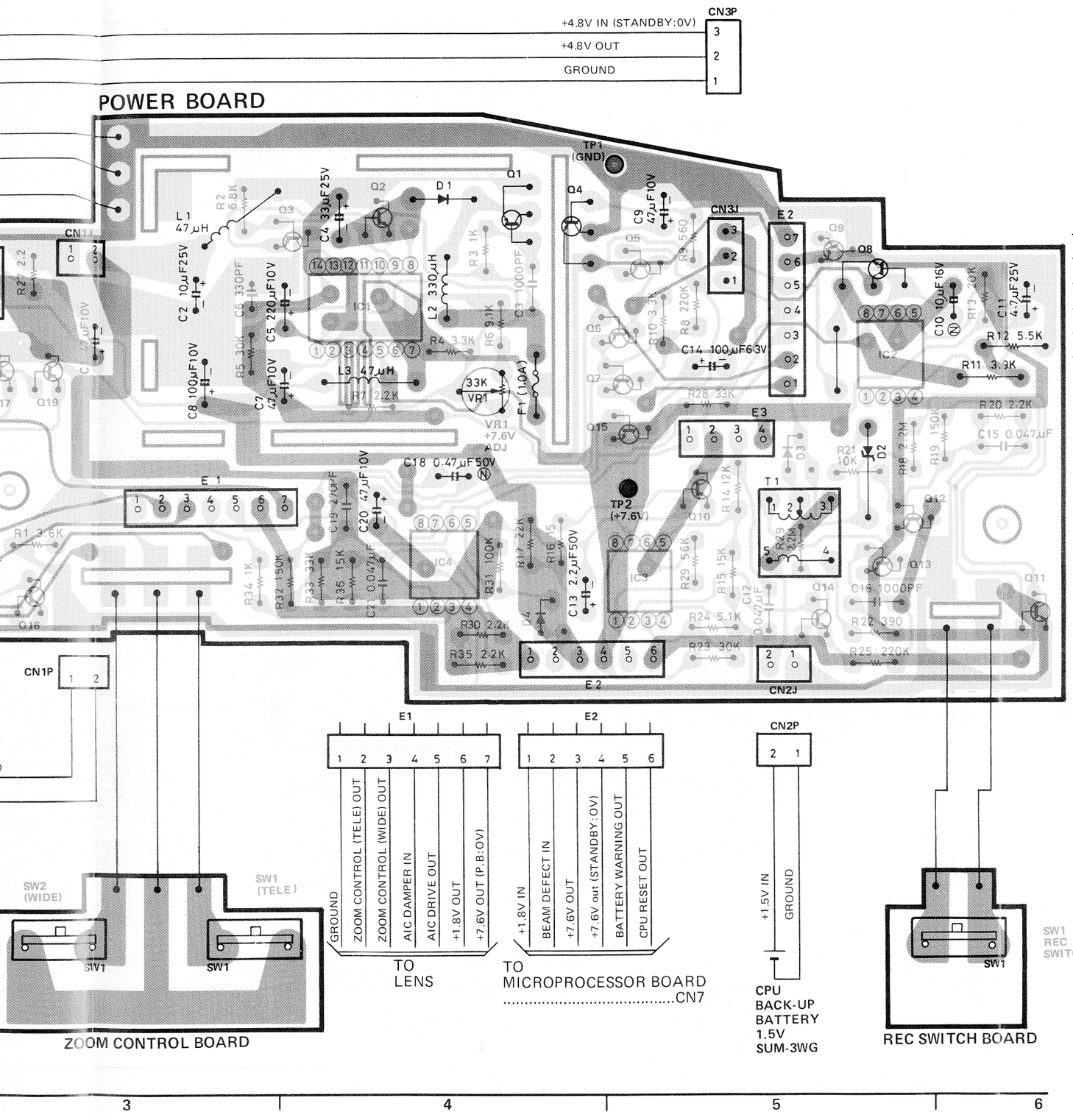
SCHEMATIC DIAGRAM OF POWER BOARD

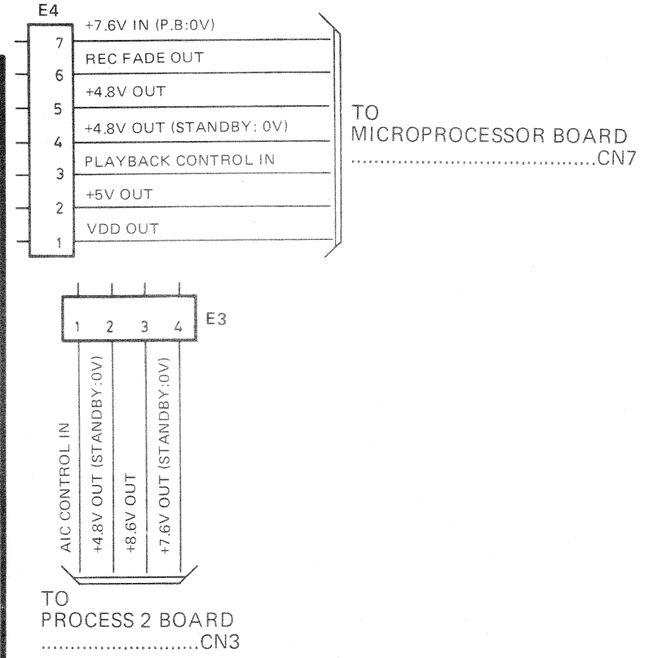
IC1	NJM2048MC		C3, C4
IC2	NJM3415M		D5
IC3	NJM2903M		A3, B3
IC4	NJM3414M		B4
Q1	2SB837-CD		D3
Q2	2SD601-QRS	(Y)	D3
Q3	2SB709-QRS	(A)	D3
Q4	2SB793-RS		D4
Q5	2SB709-QRS	(A)	D4
Q6	2SB709-QRS	(A)	D5
Q7	2SD601-QRS	(Y)	D5
Q8	2SD973-QRS		D5
Q9	2SB710-QRS	(C)	D5
Q10	2SB710-QRS	(C)	B3
Q11	2SD1030RST	(1Z)	C5
Q12	2SC2404-CD	(U)	C5
Q13	2SD1030-T	(1Z)	C5
Q14	2SD1030RST	(1Z)	C5
Q15	2SD602-QRS	(W)	D4
Q16	2SB709-QRS	(A)	B5
Q17	2SB709-QRS	(A)	B5
Q18	2SB709-QRS	(A)	B5
Q19	2SB709-QRS	(A)	B5
D1	EK14		D3
D2	HZ3BLL		C5
D3	MA151K	(MH)	C5
D4	MA151K	(MH)	B4

CONDUCTOR VIEW OF POWER BOARD



CONDUCTOR VIEW OF POWER BOARD

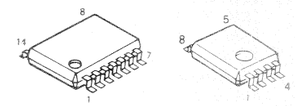




IC1	NJM2048MC		D4, E4
IC2	NJM3415M		D5
IC3	NJM2903M		C5
IC4	NJM3414M		C4
Q1	2SB837-CD		E4
Q2	2SD601-QRS	(Y)	E4
Q3	2SB709-QRS	(A)	E4
Q4	2SB793-RS		E4
Q5	2SB709-QRS	(A)	E5
Q6	2SB709-QRS	(A)	D5
Q7	2SD601-QRS	(Y)	D5
Q8	2SD973-QRS		D5
Q9	2SB710-QRS	(C)	E5
Q10	2SB710-QRS	(C)	C5
Q11	2SD1030RST	(1Z)	C6
Q12	2SC2404-CD	(U)	C5
Q13	2SD1030-T	(1Z)	C5
Q14	2SD1030RST	(1Z)	C5
Q15	2SD602-QRS	(W)	D5
Q16	2SB709-QRS	(A)	C3
Q17	2SB709-QRS	(A)	D3
Q18	2SB709-QRS	(A)	C2
Q19	2SB709-QRS	(A)	D3
D1	EK14		E4
D2	HZ3BLL		D5
D3	MA151K	(MH)	D5
D4	MA151K	(MH)	C4

NJM2048MC

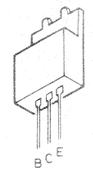
NJM2903M
NJM3414M
NJM3415M



2SB793-QRS
2SD973-QRS

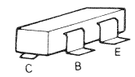


2SB837-CD

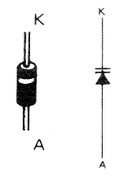


2SB709-QRS
2SB710-QRS
2SC2404-CD
2SC2405-STU

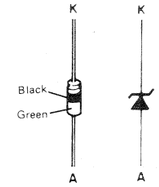
2SD601-QRS
2SD602-QRS
2SD1030-T
2SD1030-RST



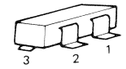
EK14



HZ3BLL



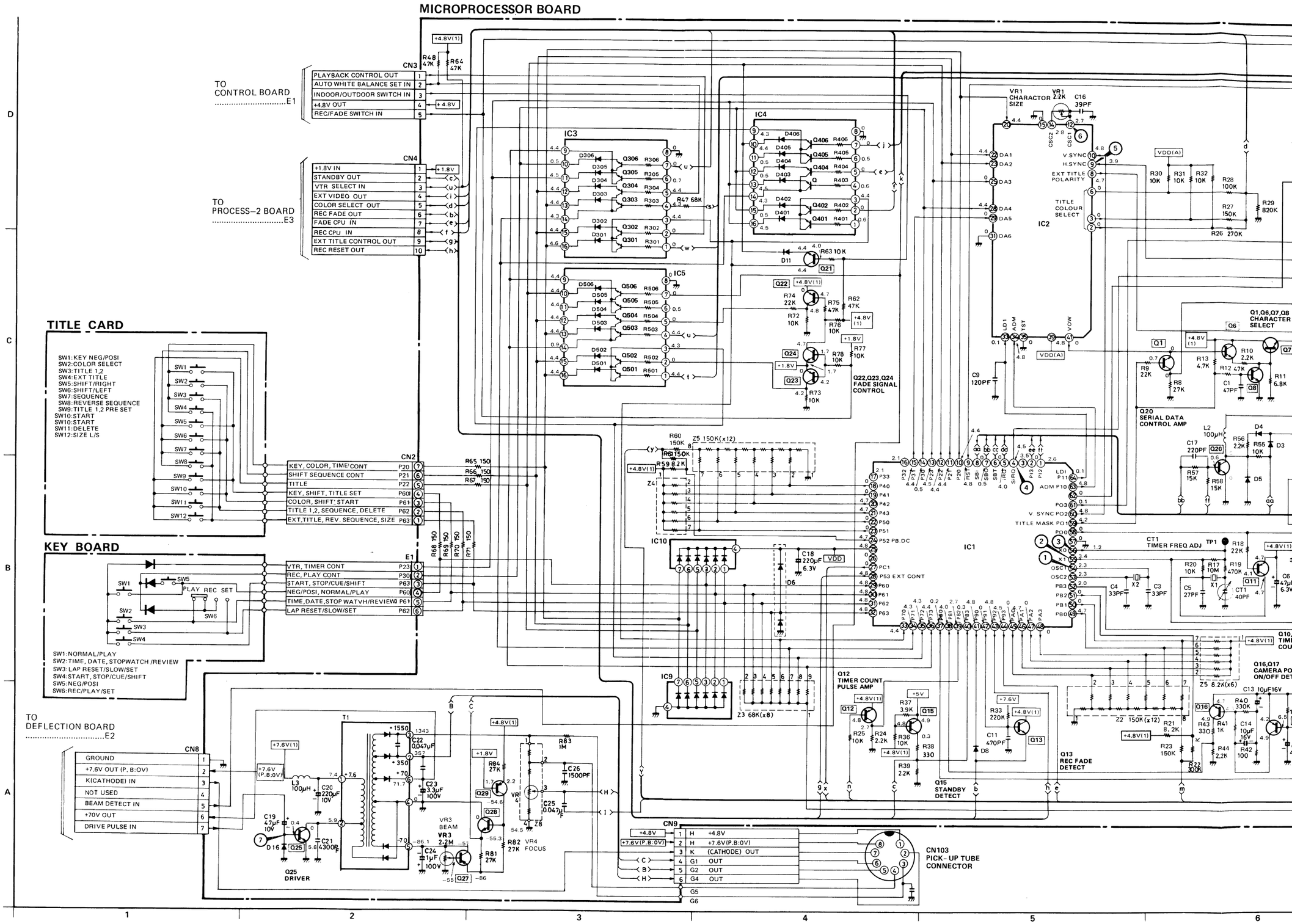
MA151K



1 : NC
2 : Anode
3 : Cathode

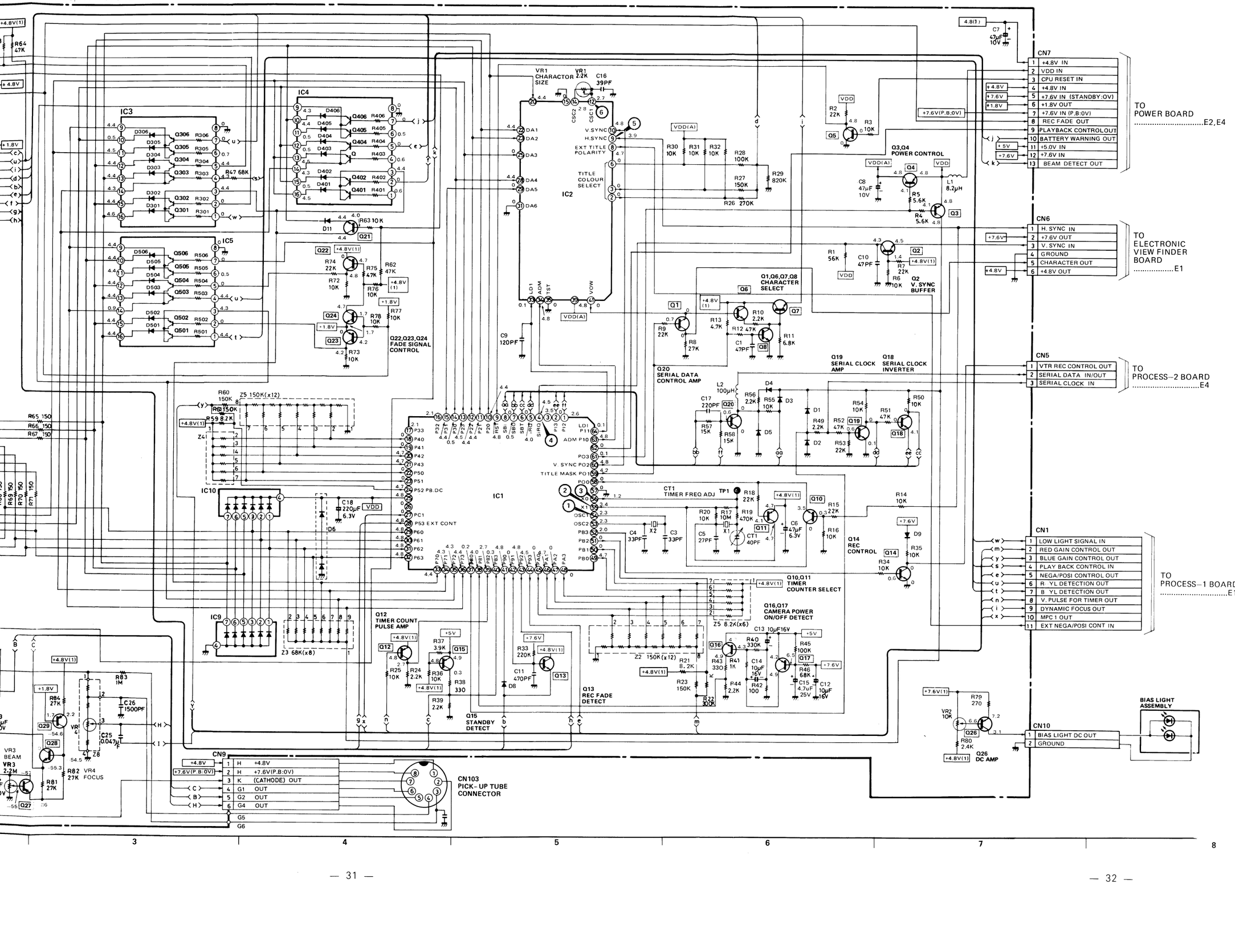
IC1	MN1554CVH		B5
IC2	MN1237B		C5, D5
IC3	AN90B82S		D3
IC4	AN90B82S		D4
IC5	AN90B82S		C3
IC9	DAP601		A4
IC10	DAN601		B4
Q1	2SC2404-CD	(U)	C6
Q2	2SD601-QRS	(Y)	C7
Q3	2SB709-QRS	(A)	D7
Q4	2SB709-QRS	(A)	D7
Q5	2SD1030RST	(1Z)	D6
Q6	2SD601-QRS	(Y)	C6
Q7	2SD601-QRS	(Y)	C6
Q8	2SD601-QRS	(Y)	C6
Q10	2SC2404-CD	(U)	B7
Q11	2SA1022-CD	(E)	B6
Q12	2SB709-QRS	(A)	B6
Q13	2SD601-QRS	(Y)	A4
Q14	2SD602-QRS	(W)	A5
Q15	2SB709-QRS	(A)	B7
Q16	2SB814-QRS	(1B)	A4
Q17	2SB709-QRS	(A)	A6
Q18	2SD601-QRS	(Y)	A6
Q19	2SD601-QRS	(Y)	B7
Q20	2SD601-QRS	(Y)	B6
Q21	2SD601-QRS	(Y)	B6
Q22	2SB709-QRS	(A)	C4
Q23	2SB709-QRS	(A)	C4
Q24	2SD601-QRS	(Y)	C4
Q25	2SD1083		C4
Q26	2SB709-QRS	(A)	A2
Q27	2SB814-QRS	(1B)	A7
Q28	2SD814-QRS	(P)	A3
Q29	2SB814-QRS	(1B)	A3
D1	MA151K	(MH)	A3
D2	MA151K	(MH)	C6
D3	MA151K	(MH)	B6
D4	MA151K	(MH)	C6
D5	MA151K	(MH)	C6
D6	MA151K	(MH)	B6
D8	1SS123	(MH)	B4
D9	MA151K	(MH)	A5
D11	MA151K	(MH)	C4
D16	MA151K	(MH)	A2

SCHEMATIC DIAGRAM OF MICROPROCESSOR BOARD

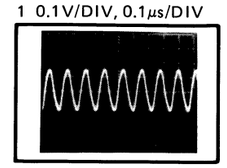


SCHEMATIC DIAGRAM OF MICROPROCESSOR BOARD

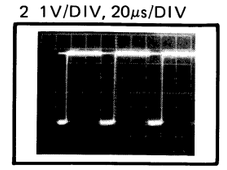
MICROPROCESSOR BOARD



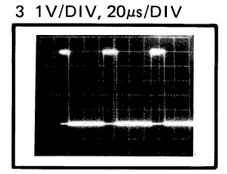
1 0.1V/DIV, 0.1μs/DIV



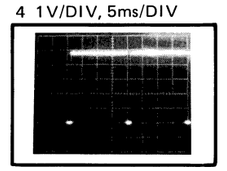
2 1V/DIV, 20μs/DIV



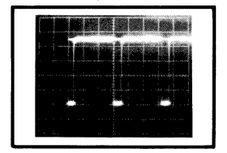
3 1V/DIV, 20μs/DIV



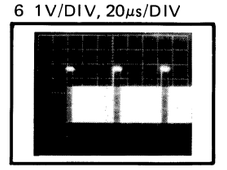
4 1V/DIV, 5ms/DIV



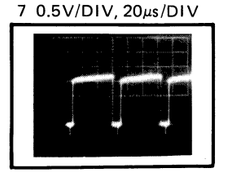
5 1V/DIV, 20μs/DIV

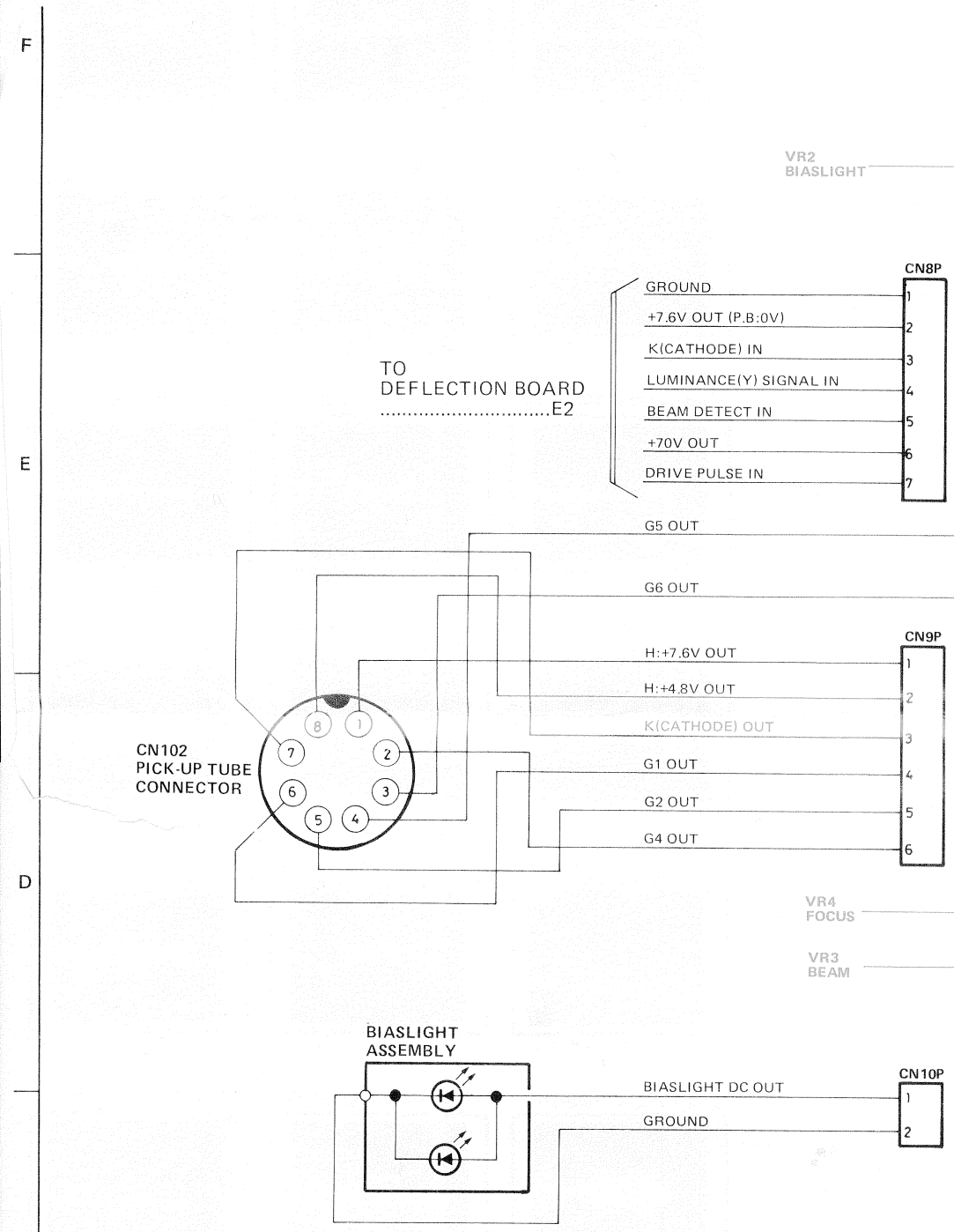


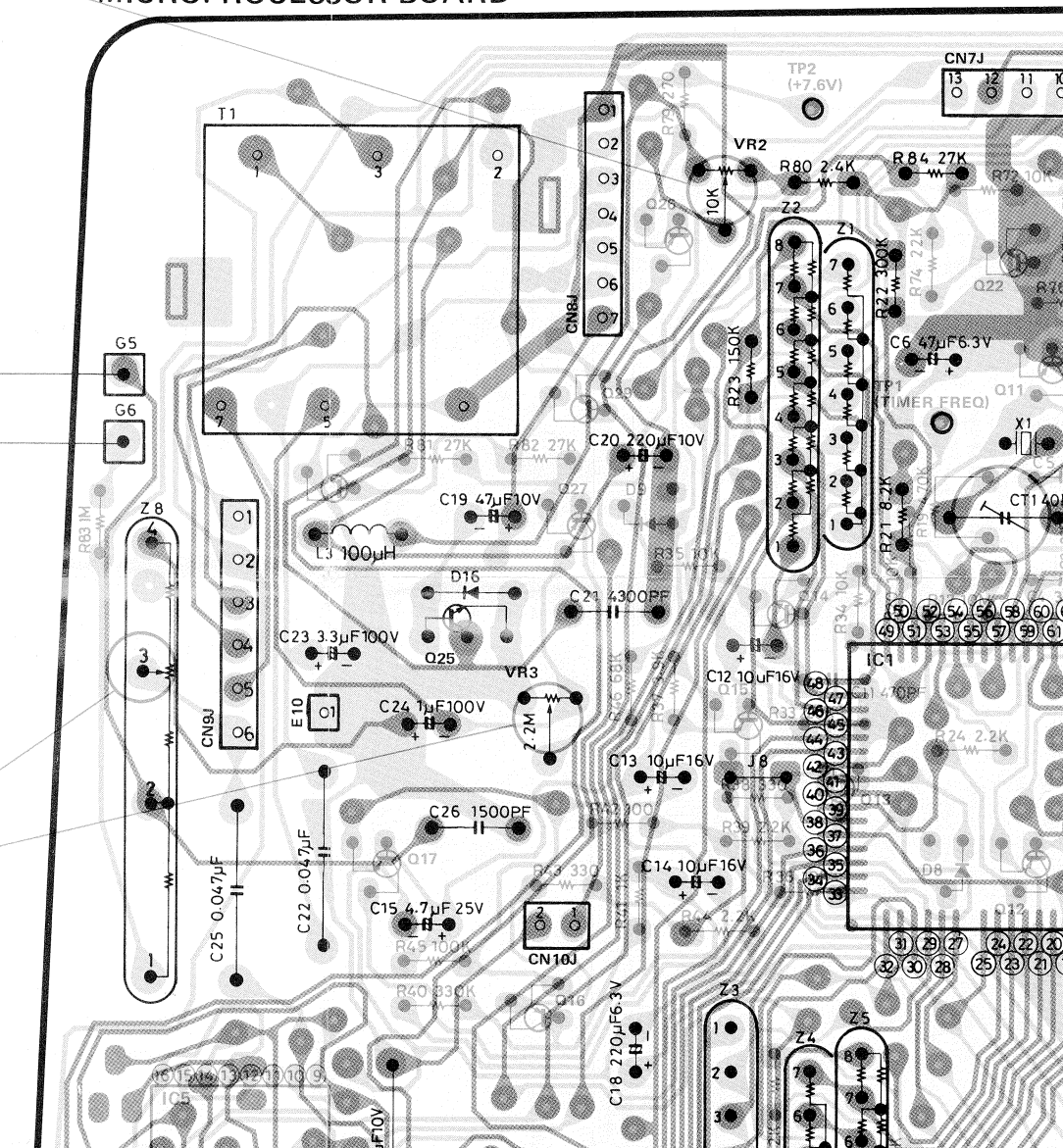
6 1V/DIV, 20μs/DIV



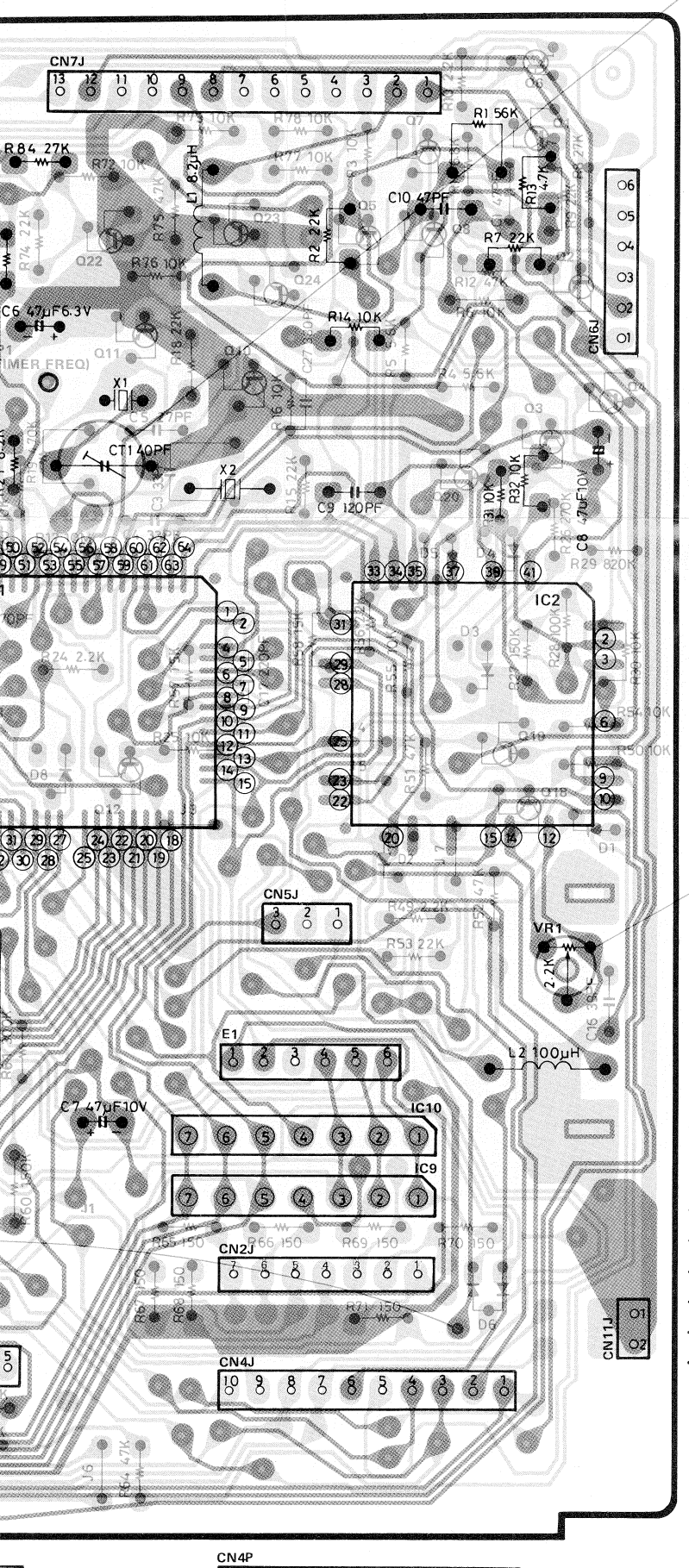
7 0.5V/DIV, 20μs/DIV




TO
DEFLECTION BOARD
.....E2
CN8P
GROUND
+7.6V OUT (P.B:0V)
K(CATHODE) IN
LUMINANCE(Y) SIGNAL IN
BEAM DETECT IN
+70V OUT
DRIVE PULSE IN
G5 OUT
G6 OUT
CN9P
H:+7.6V OUT
H:+4.8V OUT
K(CATHODE) OUT
G1 OUT
G2 OUT
G4 OUT
CN102
PICK-UP TUBE
CONNECTOR
VR2
BIASLIGHT
VR4
FOCUS
VR3
BEAM
BIASLIGHT
ASSEMBLY
CN10P
BIASLIGHT DC OUT
GROUND
COMPONENT SIDE PARTS
PATTERN SIDE PARTS

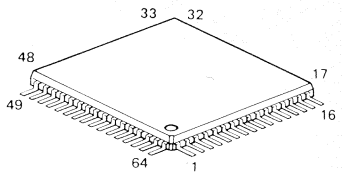

MICROPROCESSOR BOARD
CN7J
TP2
(+7.6V)
T1
VR2
R80 2.4K
R84 27K
R72 10K
Z2
Z1
R22 300K
R74 22K
C6 47μF6.3V
TP1
(TIMER FREQ)
X1
R23 150K
C20 220μF10V
C19 47μF10V
L3 100μH
D16
C21 4300PF
C23 3.3μF100V
Q25
VR3
2.2M
C24 1μF100V
C12 10μF16V
IC1
CN8J
CN9J
E10
C13 10μF16V
J8
C26 1500PF
C25 0.047μF
C22 0.047μF
C15 4.7μF 25V
CN10J
C14 10μF16V
C18 220μF6.3V
Z3
Z4
Z5
IC5
IC4
C30 22μF10V
D11
Q21
C7 47μF10V
CN1J
CN3J
CN1P
EXT NEGA/POSI CONT IN
MPC 1 OUT
DYNAMIC FOCUS OUT
V.PULSE FOR TIME OUT
B–YL DETECTION OUT
R–YL DETECTION OUT
NEGA/POSI/CONTROL OUT
PLAYBACK CONTROL IN
BLUE GAIN CONTROL OUT
RED GAIN CONTROL OUT
LOW LIGHT SIGNAL IN
TO
PROCESS 1 BOARD
.....E1
CN3P
PLAYBACK CONTROL OUT
AUTO WHITE BALANCE SET IN
INDOOR/OUTDOOR SWITCH IN
+4.8V OUT
REC/FADE SWITCH IN
TO
CONTROL 1 BOARD
.....E1

MICROPROCESSOR BOARD

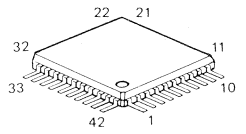


IC1	MN1554CVH		D5
IC2	MN1237B		D6
IC3	AN90B82S		C3
IC4	AN90B82S		C4
IC5	AN90B82S		C3
IC9	DAP601		C5, C6
IC10	DAN601		C5, C6
Q1	2SC2404-CD	(U)	E6
Q2	2SD601-QRS	(Y)	E6
Q3	2SB709-QRS	(A)	E6
Q4	2SB709-QRS	(A)	E6
Q5	2SD1030RST	(1Z)	E6
Q6	2SD601-QRS	(Y)	E6
Q7	2SD601-QRS	(Y)	E6
Q8	2SD601-QRS	(Y)	E6
Q10	2SC2404-CD	(U)	E6
Q11	2SA1022-CD	(E)	E5
Q12	2SB709-QRS	(A)	E5
Q13	2SD601-QRS	(Y)	D5
Q14	2SD602-QRS	(W)	D5
Q15	2SB709-QRS	(A)	D5
Q16	2SB814-QRS	(1B)	D4
Q17	2SB709-QRS	(A)	D4
Q18	2SD601-QRS	(Y)	D4
Q19	2SD601-QRS	(Y)	D6
Q20	2SD601-QRS	(Y)	D6
Q21	2SD601-QRS	(Y)	E6
Q22	2SB709-QRS	(A)	C4
Q23	2SB709-QRS	(A)	E5
Q24	2SD601-QRS	(Y)	E5
Q25	2SD1083		E5
Q26	2SB709-QRS	(A)	D4
Q27	2SB814-QRS	(1B)	E4
Q28	2SD814-QRS	(P)	E4
Q29	2SB814-QRS	(1B)	E4
D1	MA151K	(MH)	E4
D2	MA151K	(MH)	D6
D3	MA151K	(MH)	D6
D4	MA151K	(MH)	D6
D5	MA151K	(MH)	D6
D6	MA151K		D6
D8	1SS123	(MH)	B6
D9	MA151K	(MH)	D5
D11	MA151K	(MH)	C4
D16	MA151K		D4

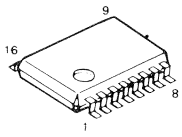
MN1554CVB



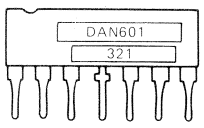
MN1237B



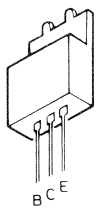
AN90B823



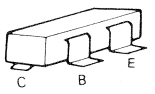
DAN601
DAP601



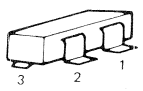
2SD1083



2SA1022-CD
2SB709-QRS
2SB814-RS
2SC2404-CD
2SD601-QRS
2SD602-QRS
2SD1030-RST

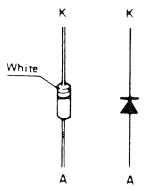


MA151K



1 : NC
2 : Anode
3 : Cathode

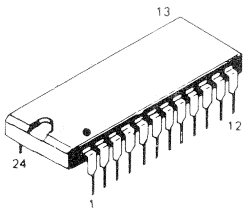
MA165
1SS123



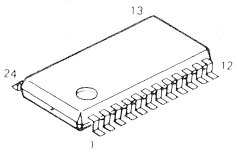
5 6 7 8

CONDUCTOR VIEW O

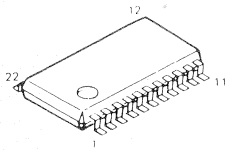
IC9
YFS4161PK1T



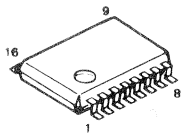
AN2110S
AN2210S
AN2310S
AN2320S



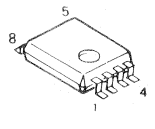
AN2410S
MN6160PBS



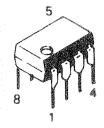
TC4053BF



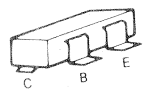
AN6914S
NJM3414M



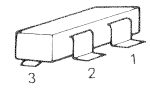
MN8037



2SA1034-ST
2SB709-QRS
2SB710-QRS
2SB2404-CD
2SD601-QRS
2SD602-QRS

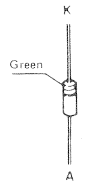


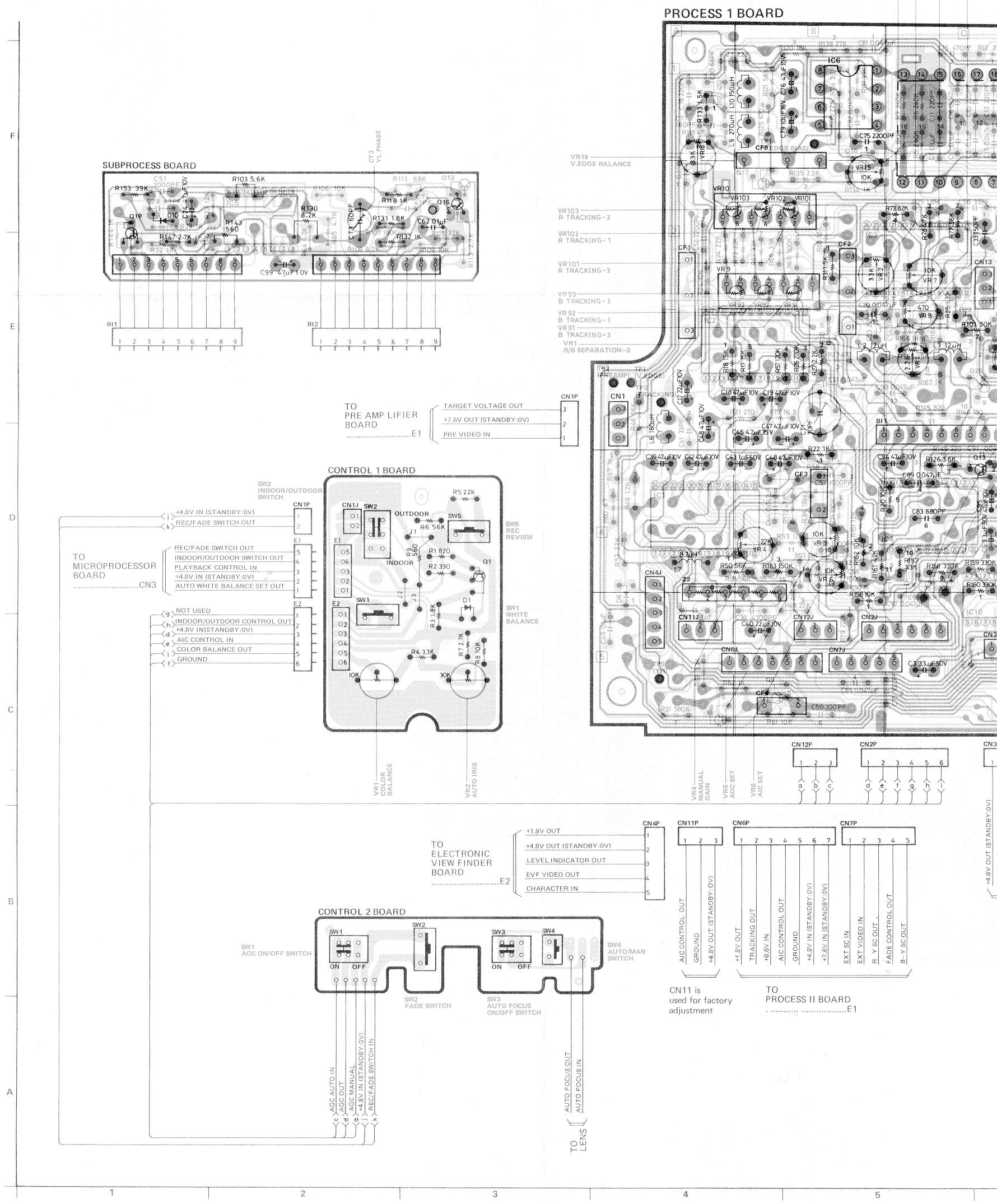
MA151K



1 : NC
2 : Anode
3 : Cathode

1S2688





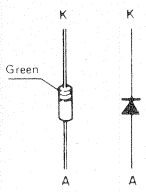
PROCESS-1 BOARD

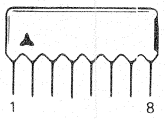
IC1	AN2110S	D4	IC11	NJM3414M		F6	Q9	2SB709-QRS	(A)	C7	Q21	2SD601-QRS	(Y)	D6	D5	MA151K
IC2	AN2310S	E4	IC12	MT0001		E6	Q10	2SD601-QRS	(Y)	C7	Q22	2SC2404-CD	(U)	E5	D6	MA151K
IC3	AN2320S	E5	Q1	2SD602-QRS	(W)	F6	Q11	2SD601-QRS	(Y)	E6	Q23	2SC2404-CD	(U)	E6	D7	MA151K
IC4	AN2410S	D5	Q3	2SC2404-CD	(U)	E7	Q13	2SD601-QRS	(Y)	D6	Q24	2SB709-QRS	(A)	E6		
IC6	MN8037	C4	Q4	2SA1034-ST	(F)	C4	Q14	2SC2404-CD	(U)	E6	Q25	2SC2404-CD	(U)	E6		
IC7	AN2210S	D6	Q5	2SD601-QRS	(Y)	C4	Q15	2SB709-QRS	(A)	E5	D1	MA151K	(MH)	E6		
IC8	MN6160PBS	F6, F7	Q6	2SB709-QRS	(A)	D7	Q17	2SD601-QRS	(Y)	F4	D2	MA151K	(MH)	F4		
IC9	YFS4161PKIK	F5, F6	Q7	2SB709-QRS	(A)	D7	Q18	2SC2404-CD	(U)	E6	D3	YUD1S2688		F7		
IC10	AN6914S	D5	Q8	2SB709-QRS	(A)	E7	Q20	2SC2404-CD	(U)	E6	D4	YUD1S2688		F7		

EW OF PROCESS-1 BOARD

1S2688

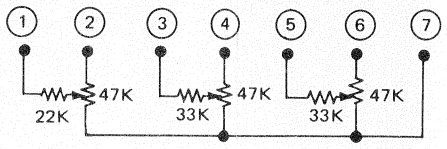
Z1 EXBD85293J
Z2 EXBD86278JM
IC13 MT0001

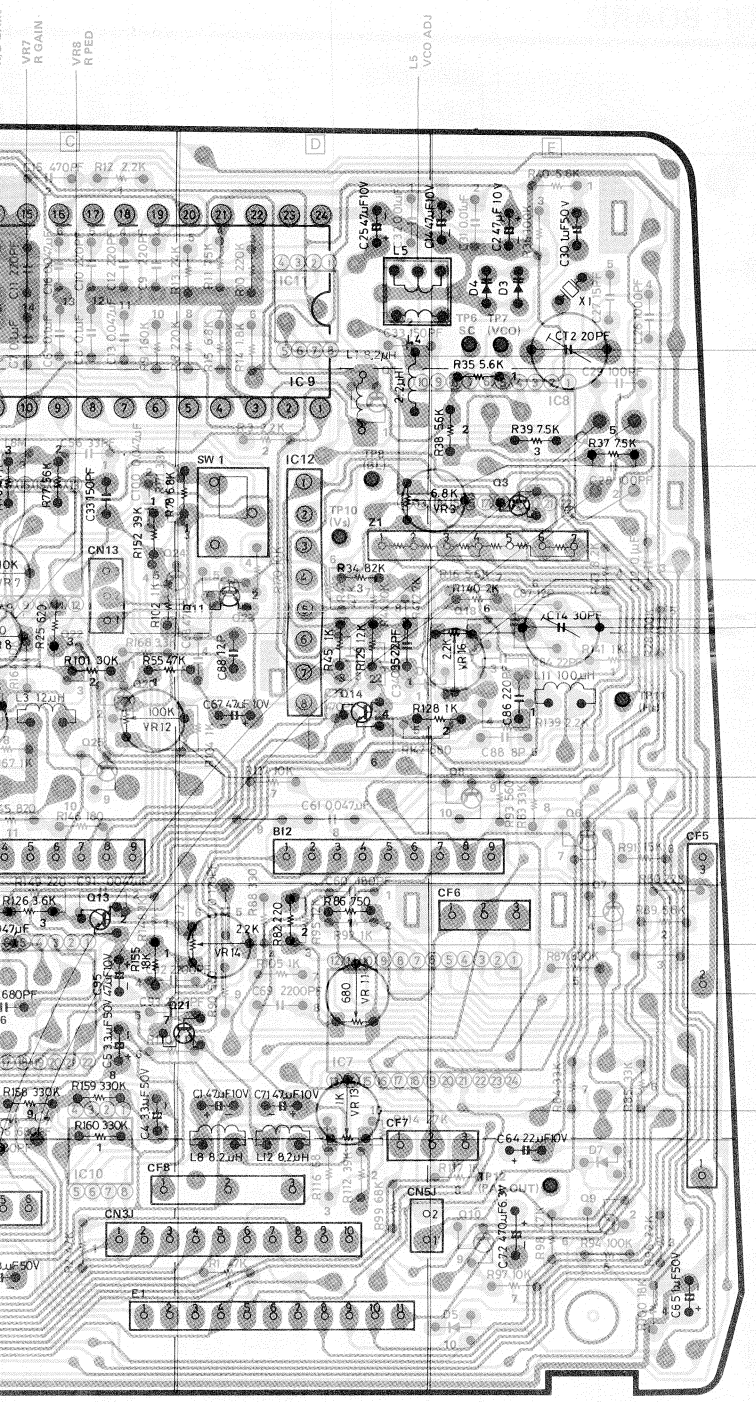




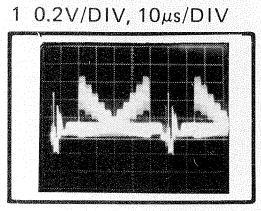
VR9
VR10

BLOCK VARIABLE RESISTOR

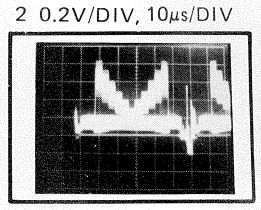




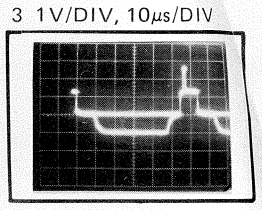
1 0.2V/DIV, 10μs/DIV



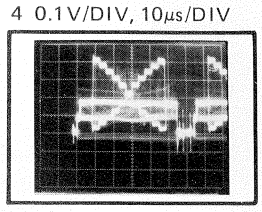
2 0.2V/DIV, 10μs/DIV



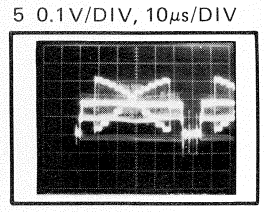
3 1V/DIV, 10μs/DIV



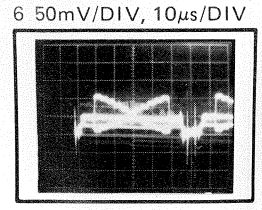
4 0.1V/DIV, 10μs/DIV



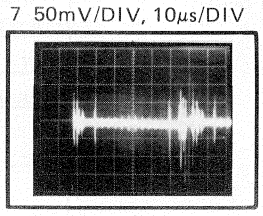
5 0.1V/DIV, 10μs/DIV



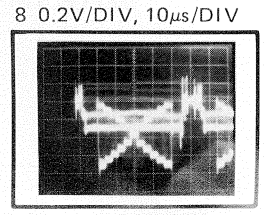
6 50mV/DIV, 10μs/DIV



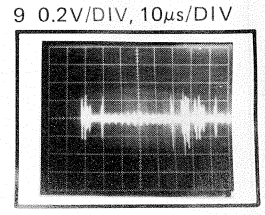
7 50mV/DIV, 10μs/DIV



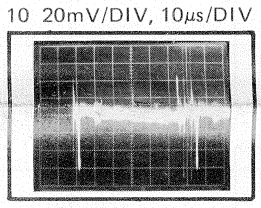
8 0.2V/DIV, 10μs/DIV



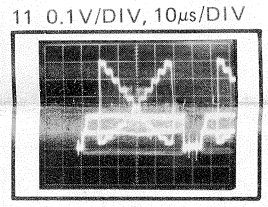
9 0.2V/DIV, 10μs/DIV



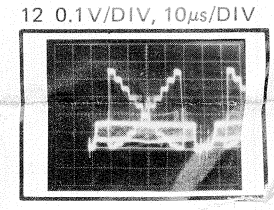
10 20mV/DIV, 10μs/DIV



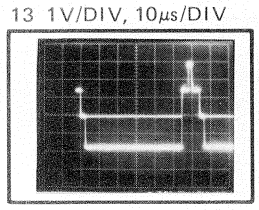
11 0.1V/DIV, 10μs/DIV



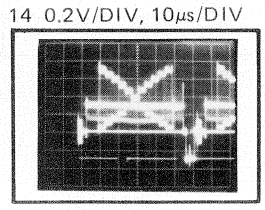
12 0.1V/DIV, 10μs/DIV



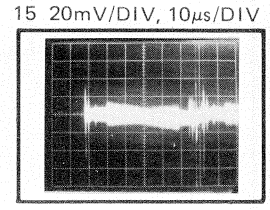
13 1V/DIV, 10μs/DIV



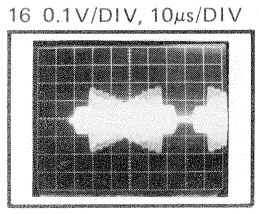
14 0.2V/DIV, 10μs/DIV



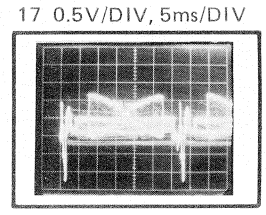
15 20mV/DIV, 10μs/DIV



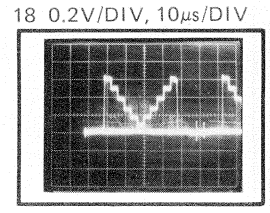
16 0.1V/DIV, 10μs/DIV



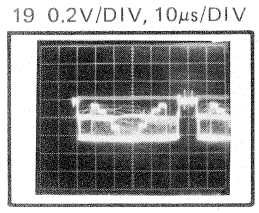
17 0.5V/DIV, 5ms/DIV



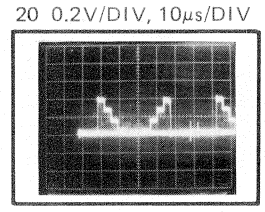
18 0.2V/DIV, 10μs/DIV



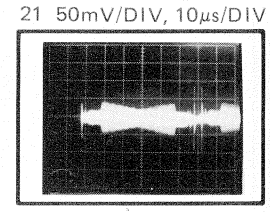
19 0.2V/DIV, 10μs/DIV



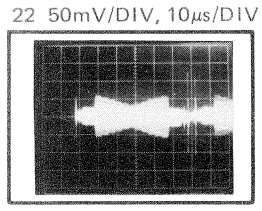
20 0.2V/DIV, 10μs/DIV



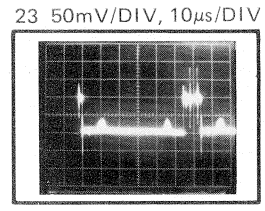
21 50mV/DIV, 10μs/DIV



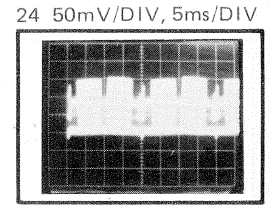
22 50mV/DIV, 10μs/DIV



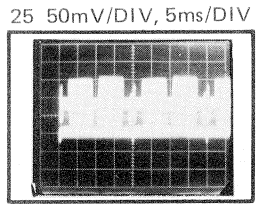
23 50mV/DIV, 10μs/DIV



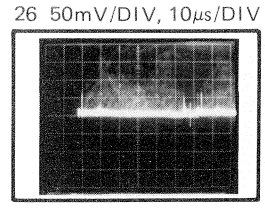
24 50mV/DIV, 5ms/DIV



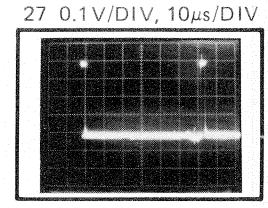
25 50mV/DIV, 5ms/DIV



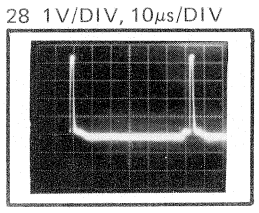
26 50mV/DIV, 10μs/DIV



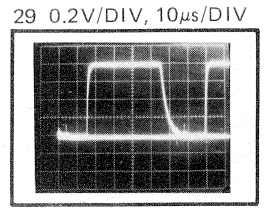
27 0.1V/DIV, 10μs/DIV



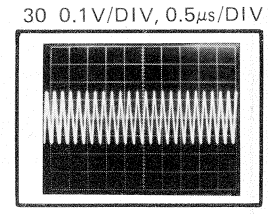
28 1V/DIV, 10μs/DIV



29 0.2V/DIV, 10μs/DIV



30 0.1V/DIV, 0.5μs/DIV



6 7 8

MA151K	(MH)	D7
MA151K	(MH)	D4
MA151K	(MH)	D7

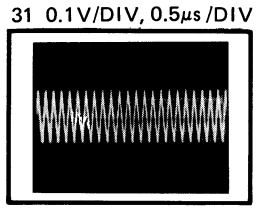
SUB PROCESS BOARD

IC5	TC4053BF		F2
Q2	2SD601-QRS	(Y)	E2
Q12	2SD601-QRS	(Y)	F3
Q16	2SD601-QRS	(Y)	F3
Q19	2SC2404-CD	(U)	E1
D10	MA151K	(MH)	F1

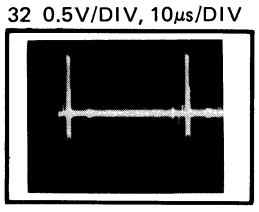
CONTROL-1 BOARD

Q1	2SB641-QRS	D3
D1	LN29WP	D3

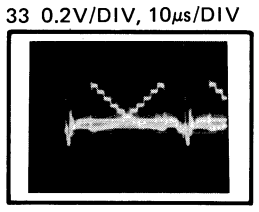
31 0.1V/DIV, 0.5μs /DIV



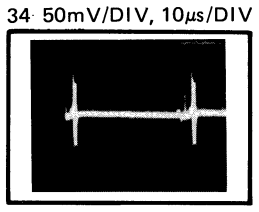
32 0.5V/DIV, 10μs/DIV



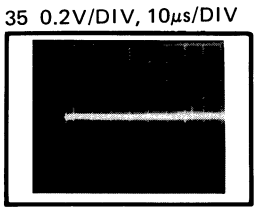
33 0.2V/DIV, 10μs/DIV



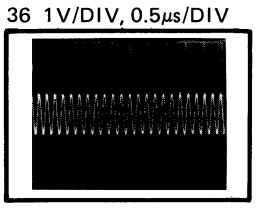
34 50mV/DIV, 10μs/DIV



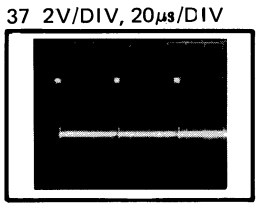
35 0.2V/DIV, 10μs/DIV



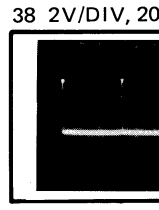
36 1V/DIV, 0.5μs/DIV



37 2V/DIV, 20μs/DIV



38 2V/DIV, 20



PROCESS 1 BOARD

CN2
- +4.8V OUT(STANDBY:OV) 1
- AIC CONTROL OUT 2
- GROUND 3
- NOT USED 4
- INDOOR/OUTDOOR CONTROL IN 5
- COLOR BALANCE IN 6

CN1
- PRE VIDEO IN 1
- +7.6V OUT (STANDBY 1&2:0V) 2
- TARGET VOLTAGE OUT 3

TO PREAMP. BOARD E1

CN3
- +4.8V OUT (STANDBY:OV) 1
- BIASLIGHT CORRECT(+) IN 2
- BIASLIGHT CORRECT(−) IN 3
- TARGET VOLTAGE IN 4
- LUMINANCE(Y) SIGNAL OUT 5
- +1.8V OUT 6
- PREBLANKING PULSE OUT 7
- +7.6V OUT(STANDBY:OV) 8
- Vs OUT 9
- Hs OUT 10

TO DEFLECTION BOARD E1

E2: 5 GROUND, 5 COLOR BALANCE OUT, 4 AIC CONTROL IN, 3 +4.8V IN (STANDBY:0V), 2 INDOOR/OUTDOOR CONTROL OUT, 1 NOT USED

SW1 WHITE BALANCE
SW2 INDOOR/OUTDOOR SWITCH

E1
1. AUTO WHITE BALANCE SET OUT
2. +4.8V IN (STANDBY:0V)
3. PLAYBACK CONTROL IN
4. INDOOR/OUTDOOR SWITCH OUT
5. REC/FADE SWITCH OUT

TO MICROPROCESSOR BOARD CN3

VR1 COLOR BALANCE, VR2 AUTO IRIS, SW3 REC REVIEW

CN1
1. REC/FADE SWITCH OUT
2. +4.8V OUT(STANDBY:ON)

CONTROL1 BOARD

SW1 ACC ON/OFF SWITCH, SW2 FADE SWITCH, SW3 AUTOFOCUS ON/OFF SWITCH, SW4 AUTO/MAIN SWITCH

CN12
6. AUTO FOCUS OUT
7. AUTO FOCUS IN

TO AF LENS

CONTROL 2 BOARD

CN11 is used for factory adjustment
- AIC CONTROL OUT 1
- GROUND 2
- +4.8V OUT(STANDBY:0V) 3

VR4 22K AGC MANUAL, R50 56K

CN12
- AGC MANUAL OUT 1
- AGC IN 2
- AGC AUTO OUT 3

CN6
- +1.8V OUT 1
- TRACKING OUT 2
- +8.6V IN 3
- AIC CONTROL OUT 4
- GROUND 5
- +4.8V IN (STANDBY:OV) 6
- +7.6V IN (STANDBY:OV) 7

TO PROCESS 2 BOARD E1

CN13 is used for factory adjustment
- B−YL OUT 3
- YL OUT 2
- R−YL OUT 1

TP1 (PREAMP OUT), TP10 (Vs), TP11 (Hs), TP2 (TRACKING)

SIGNAL PROCESSING

IC1: AMP, OB CLAMP, PRE BL MIX, GAMMA CORRECTION, AGC, AMP, YH WHITE SUPPRESS, Y (EDGE) WHITE SUPPRESS, PULSE SEPA, BIAS LIGHT CORRECT, AIC MODULATION, LOW LIGHT INDICATOR, AGC DETECT, AGC CONT, VR6 AIC SET, VR5 AGC SET, TRACKING

RED AND BLUE SEPARATION

IC2: R/B GAIN CONT, PRE BL MIX, V. TRANSIENT SPURIOUS CORRECTION, MIX, +1.8V REG, TRACKING SIGNAL GENERATOR, 90° PHASE SHIFTER, WHITE CLIP, NAM, V EDGE AMP, DETECT, PULSE SEPA

VR1 R/B SEPARATION−2, VR2 R/B GAIN, CT1 R/B SEPARATION−1

CHROMA PROCESSING

VR9: VR91 VR91B TRACKING−3, VR92 VR92B TRACKING−1, VR93 VR93B TRACKING−2

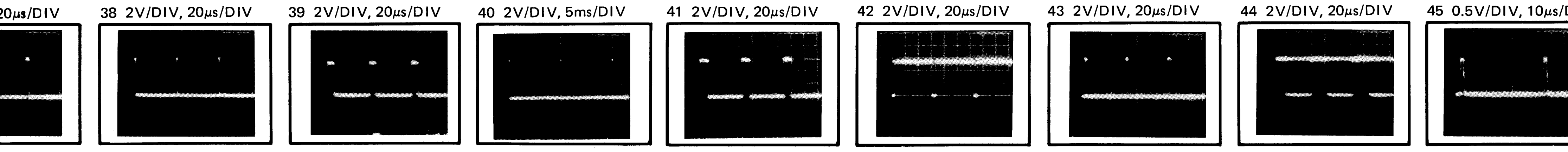
IC3: B SHADING/TRACKING CORRECTION, GAIN CONTROL, PRE BL MIX, AMP, DETECT, LPF, B−YL AMP, R SHADING/TRACKING CORRECTION, R/B SEPARATION

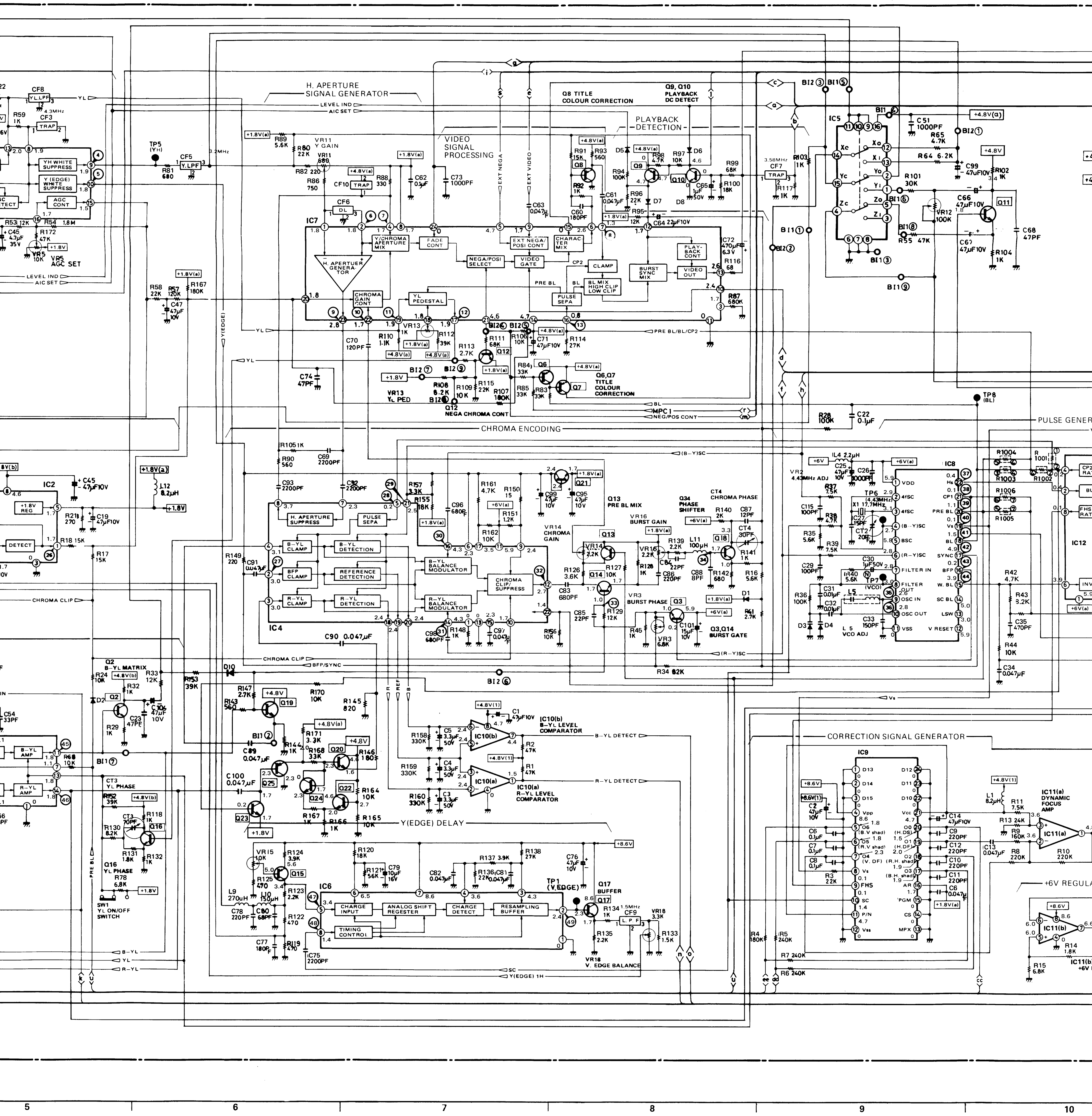
VR10: VR103 VR103R TRACKING−3, VR102 VR102R TRACKING−1, VR101 VR101R TRACKING−2

VR8 R PED, VR7 R GAIN, VR7 10K YL ON/OFF SWITCH

SCHEMATIC DIAGRAM OF PROCESS-1 BOARD

20μs/DIV | 38 2V/DIV, 20μs/DIV | 39 2V/DIV, 20μs/DIV | 40 2V/DIV, 5ms/DIV | 41 2V/DIV, 20μs/DIV | 42 2V/DIV, 20μs/DIV | 43 2V/DIV, 20μs/DIV | 44 2V/DIV, 20μs/DIV | 45 0.5V/DIV, 10μs/DIV

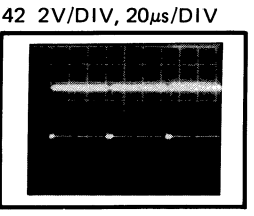




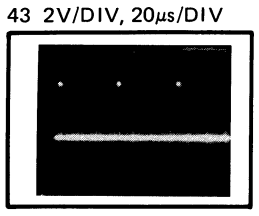
5 | 6 | 7 | 8 | 9 | 10

ARD

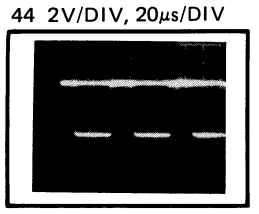
42 2V/DIV, 20μs/DIV



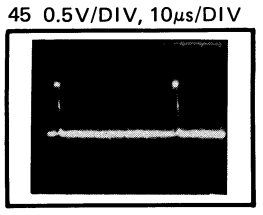
43 2V/DIV, 20μs/DIV



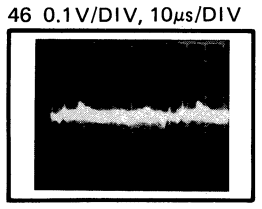
44 2V/DIV, 20μs/DIV



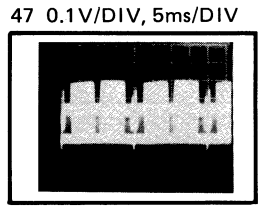
45 0.5V/DIV, 10μs/DIV



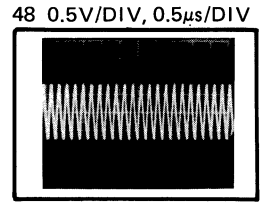
46 0.1V/DIV, 10μs/DIV



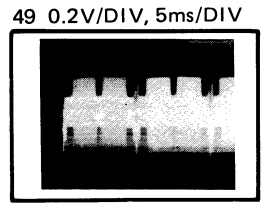
47 0.1V/DIV, 5ms/DIV

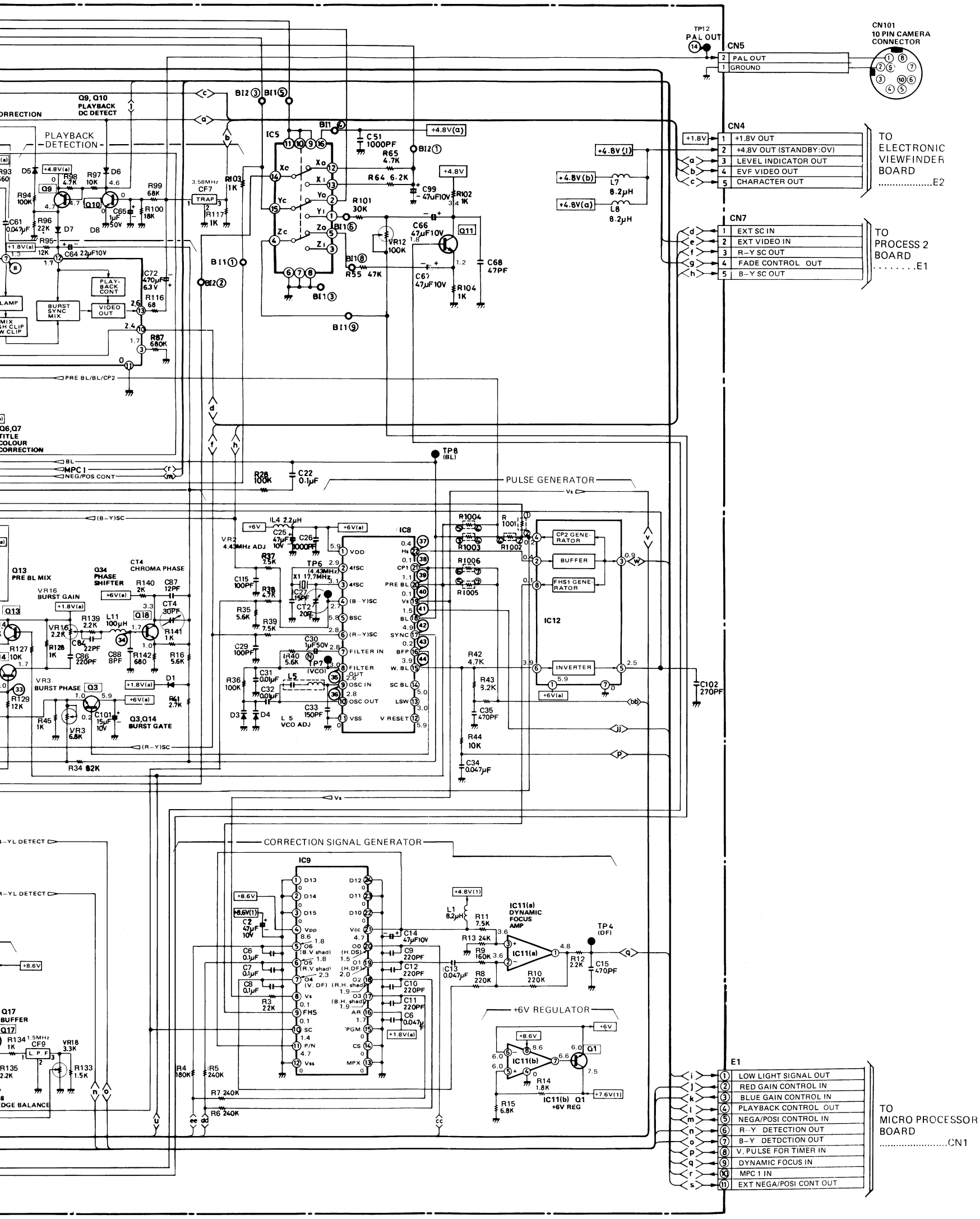


48 0.5V/DIV, 0.5μs/DIV



49 0.2V/DIV, 5ms/DIV





PROCESS-1 BOARD

IC1	AN2110S		E3, E4
IC2	AN2310S		C3, C4
IC3	AN2320S		B3, B4
IC4	AN2410S		C3
IC6	MN8037		A6
IC7	AN2210S		E6, E7
IC8	MN6160PBS		C9
IC9	YFS4161PKIK		B8, B9
IC10	AN6914S		B2
IC11	NJM3414M		A9, B9
IC12	MT0001		C9, C10
Q1	2SD602-QRS	(W)	A10
Q3	2SC2404-CD	(U)	C7
Q4	2SA1034-ST	(F)	D4
Q5	2SD601-QRS	(Y)	D4
Q6	2SB709-QRS	(A)	D7
Q7	2SB709-QRS	(A)	D7
Q8	2SB709-QRS	(A)	E7
Q9	2SB709-QRS	(A)	E7
Q10	2SD601-QRS	(Y)	E8
Q11	2SD601-QRS	(Y)	E9
Q13	2SD601-QRS	(Y)	C7
Q14	2SC2404-CD	(U)	C7
Q15	2SB709-QRS	(A)	B6
Q17	2SD601-QRS	(Y)	A7
Q18	2SC2404-CD	(U)	C8
Q20	2SC2404-CD	(U)	B6
Q21	2SD601-QRS	(Y)	D7
Q22	2SC2404-CD	(U)	B6
Q23	2SC2404-CD	(U)	B5
Q24	2SB709-QRS	(A)	B6
Q25	2SC2404-CD	(U)	B6
D1	MA151K	(MH)	C8
D2	MA151K	(MH)	B5
D3	YUD1S2688		C8
D4	YUD1S2688		C8
D5	MA151K	(MH)	E7
D6	MA151K	(MH)	E8
D7	MA151K	(MH)	E7

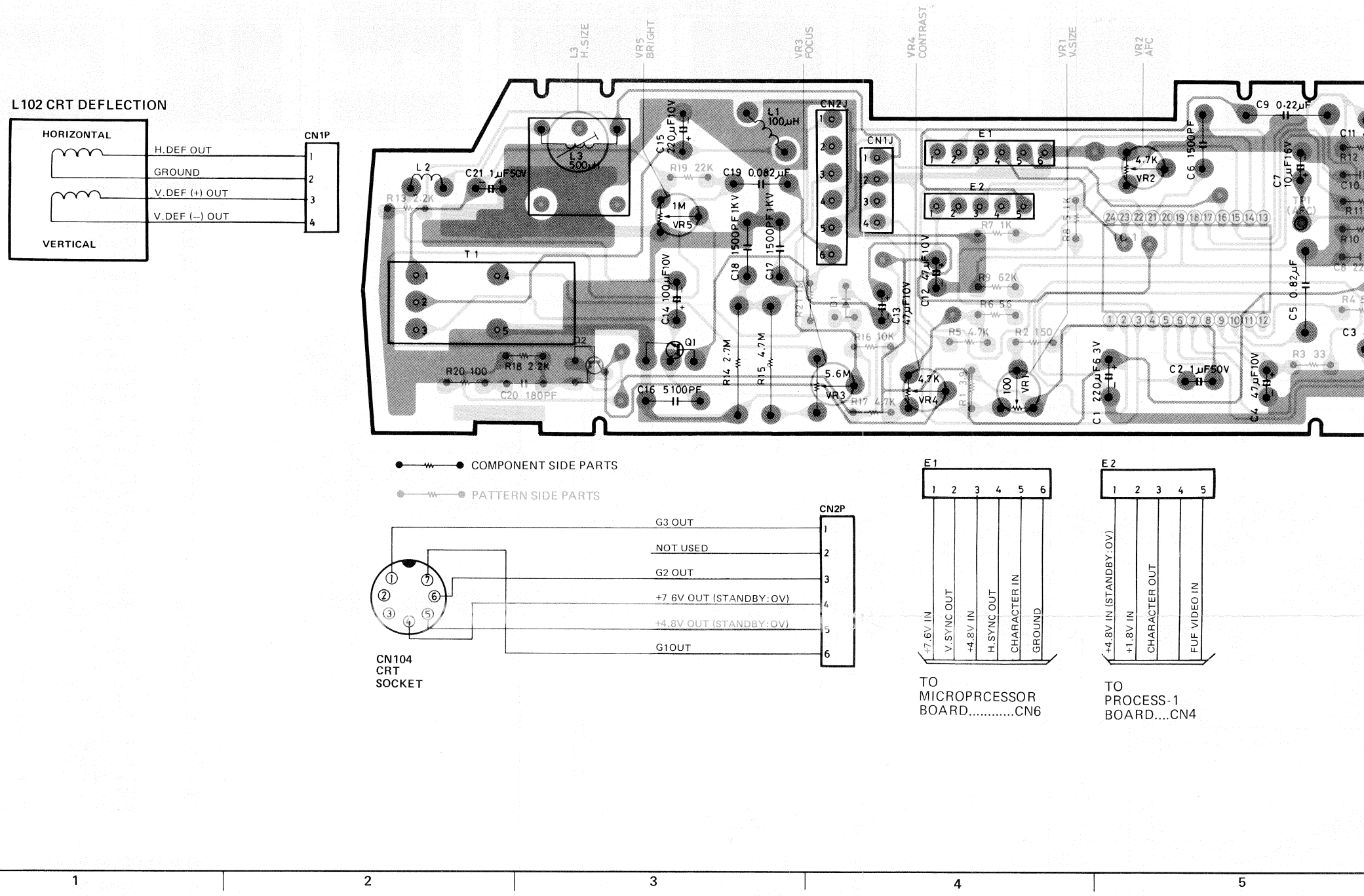
SUB PROCESS BOARD

IC5	TC4053BF		E8
Q2	2SD601-QRS	(Y)	B5
Q12	2SD601-QRS	(Y)	D7
Q16	2SD601-QRS	(Y)	B5
Q19	2SC2404-CD	(U)	B6
D10	MA151K	(MH)	C5

CONTROL-1 BOARD

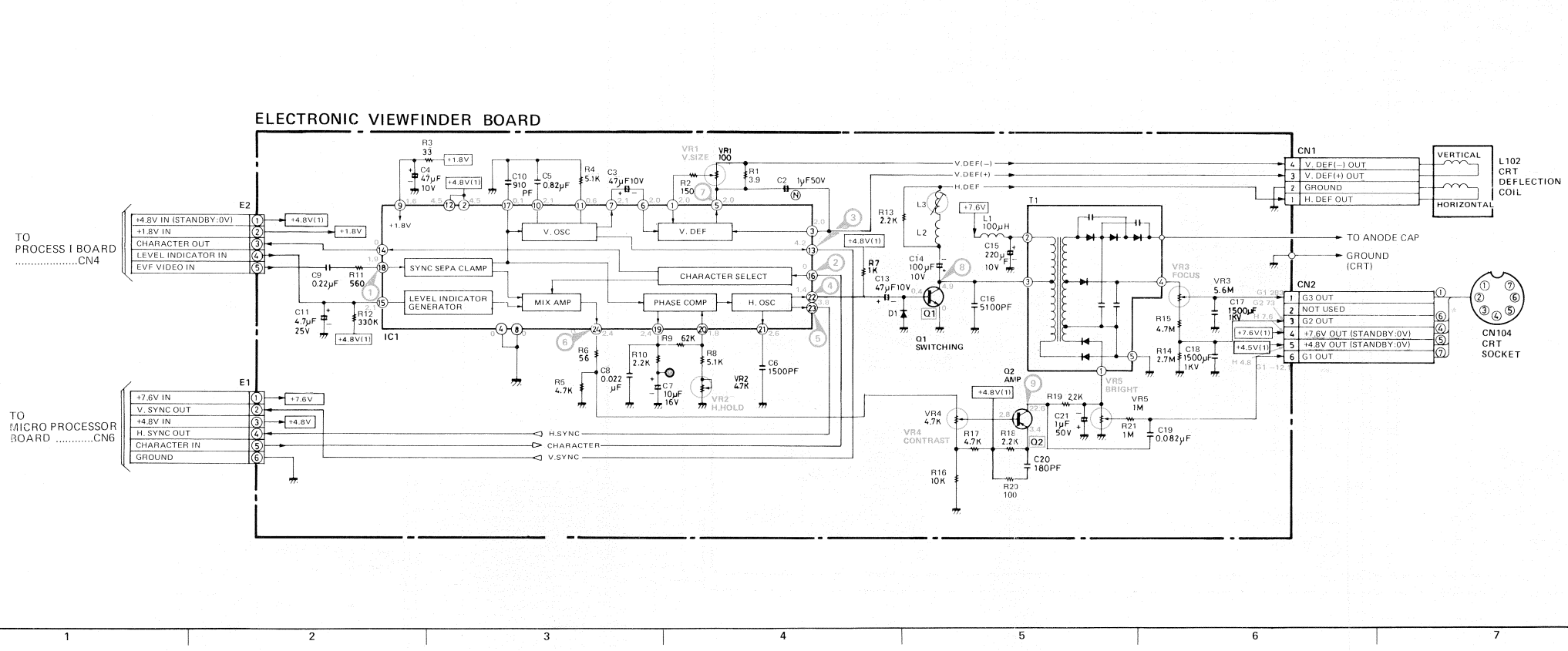
Q1	2SB641-QRS	D3
D1	LN29WP	D3

CONDUCTOR VIEW OF ELECTRONIC VIEWFINDER BOARD

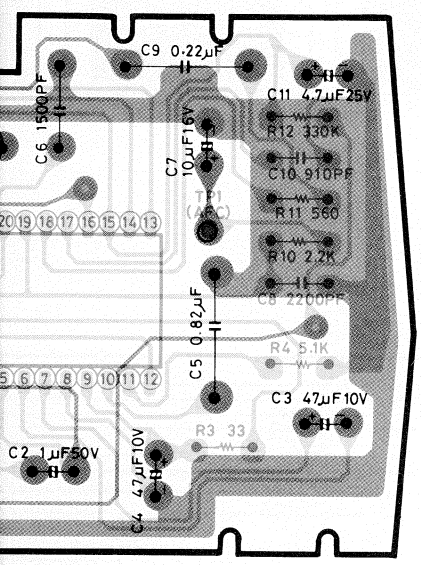


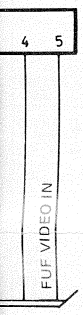
SCHEMATIC DIAGRAM OF ELECTRONIC VIEWFINDER BOARD

IC1	AN2510S	
Q1	2SD1083	
Q2	2SB709AQRS	(B)
D1	MA151K	(MH)



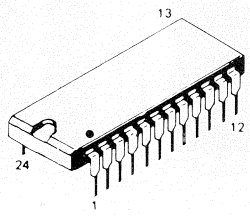
BOARD



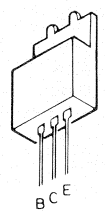


-1
..CN4

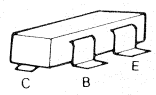
AN2510S



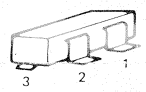
2SD1083



2SB709A-QRS



MA151K



1 : NC
2 : Anode
3 : Cathode

IC1	AN2510S		C5
Q1	2SD1083		B3
Q2	2SB709AQRS	(B)	B3
D1	MA151K	(MH)	B4

B

A

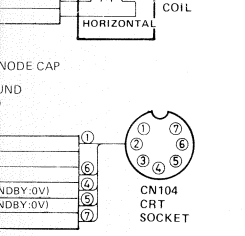
1

2

5

R BOARD

AN2510S		B3, B4
2SD1083		B5
2SB709AQRS	(B)	A5
MA151K	(MH)	B5

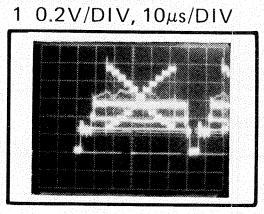


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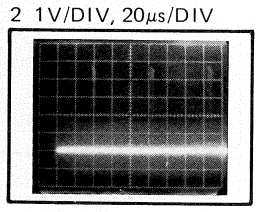
PRODUCT SAFETY NOTE

The shaded area on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

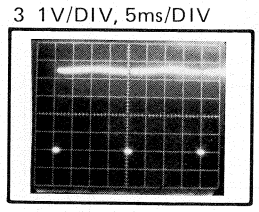
1 0.2V/DIV, 10μs/DIV



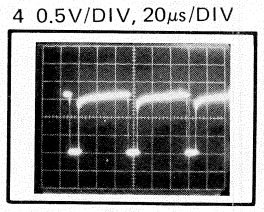
2 1V/DIV, 20μs/DIV



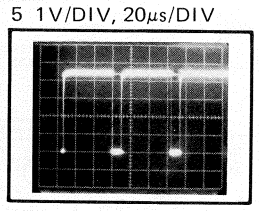
3 1V/DIV, 5ms/DIV



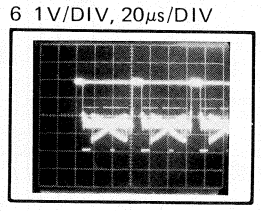
4 0.5V/DIV, 20μs/DIV



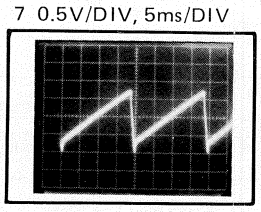
5 1V/DIV, 20μs/DIV



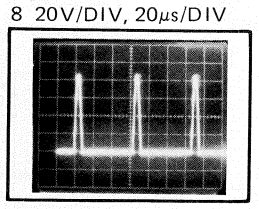
6 1V/DIV, 20μs/DIV



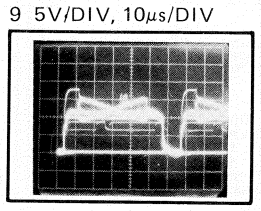
7 0.5V/DIV, 5ms/DIV



8 20V/DIV, 20μs/DIV

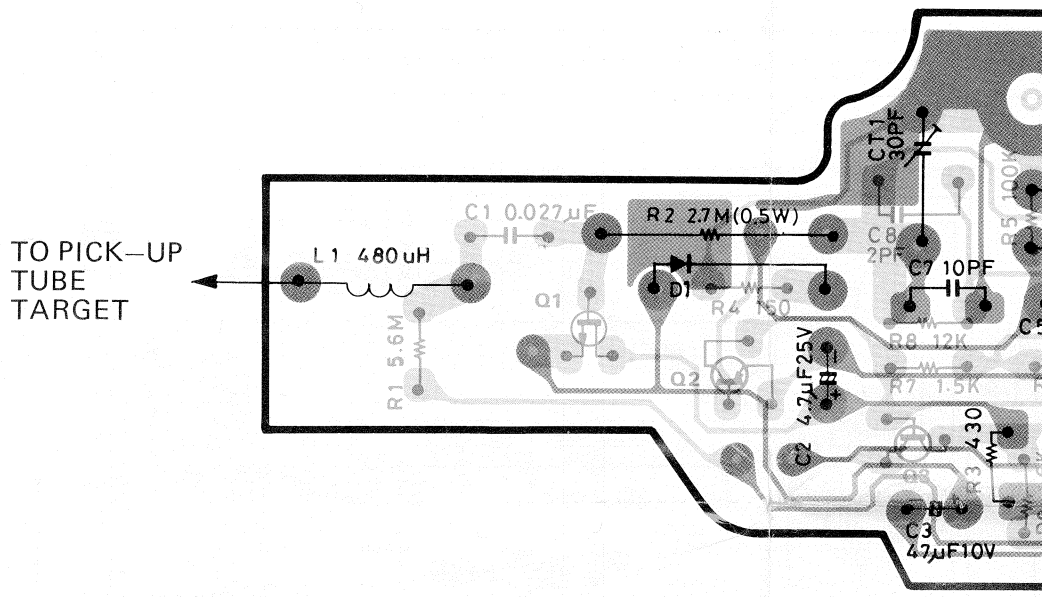


9 5V/DIV, 10μs/DIV



CONDUCTOR VIEW OF PR

PREAMPLIFIER BOARD

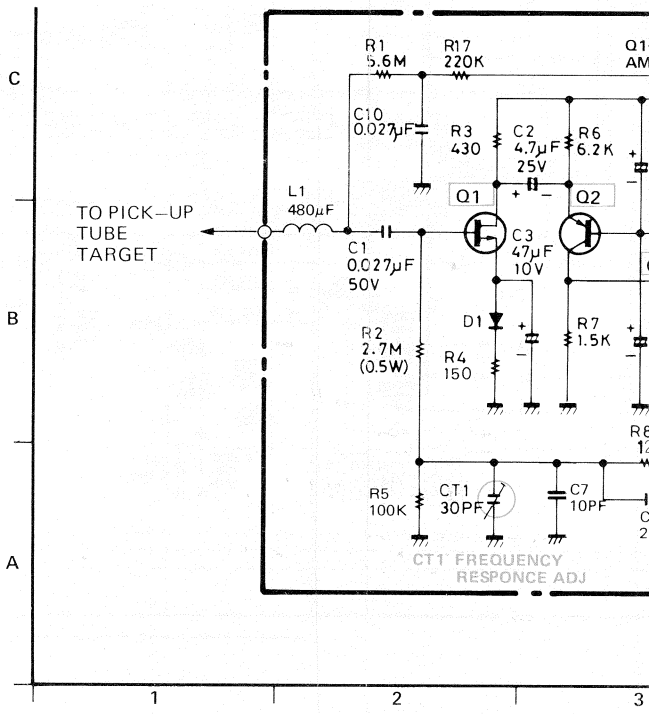


1

2

SCHEMATIC DIAGRAM OF I

PREAMPLIFIER BOARD



C

B

A

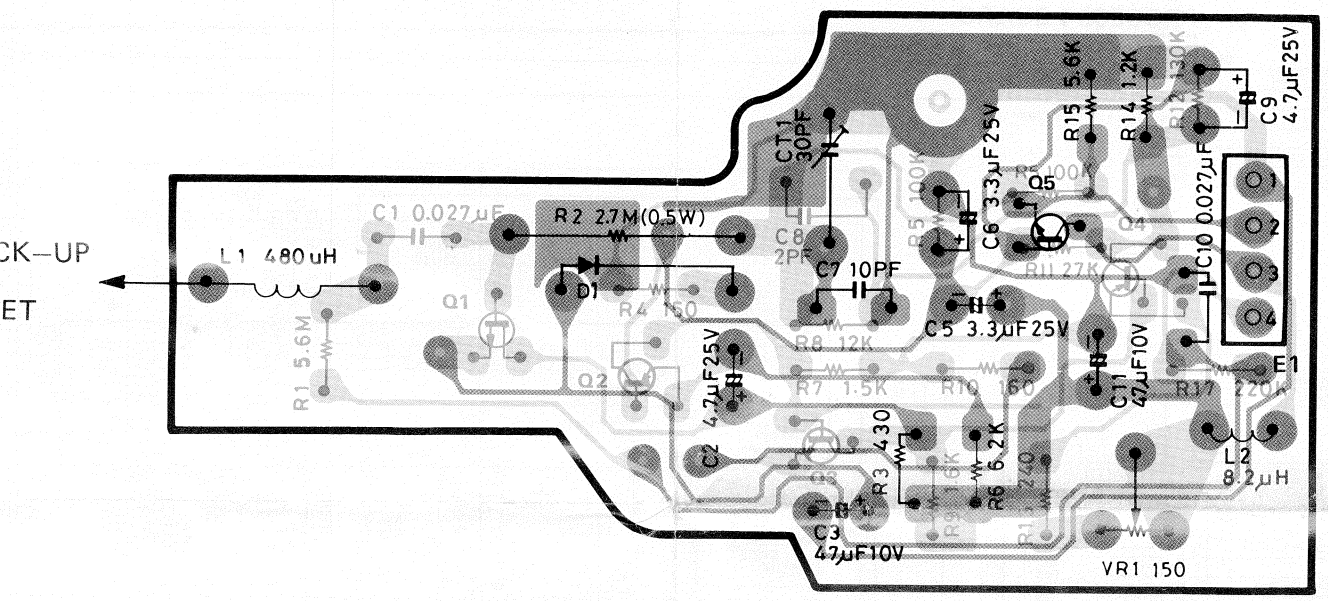
1

2

3

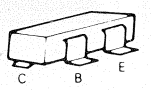
CONDUCTOR VIEW OF PREAMPLIFIER BOARD

PREAMPLIFIER BOARD

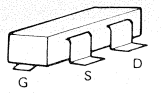


Q1	2SK316-PQ	(1K)	A2
Q2	2SA1022-CD	(E)	A2
Q3	2SC2404-CD	(U)	A2
Q4	2SA1022-CD	(E)	A3
Q5	2SD601-QRS	(Y)	A3
D1	MA165		A2

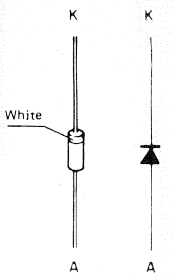
2SA1022-CD
2SC2404-CD
2SD601-QRS

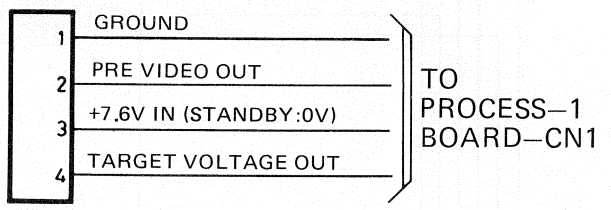


2SK316-P



MA165



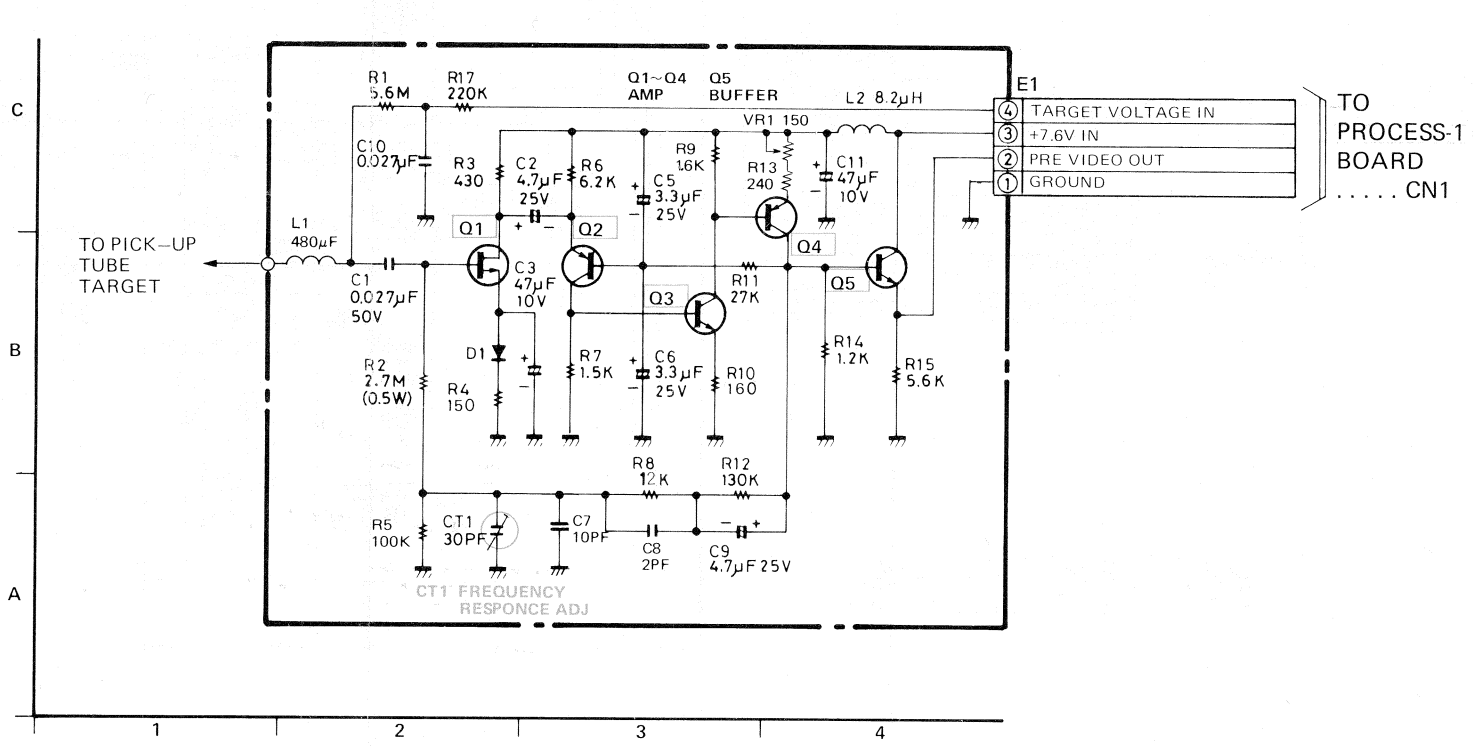


1 | 2 | 3 | 4

SCHEMATIC DIAGRAM OF PREAMPLIFIER BOARD

Q1	2SK316-PQ	(1K)	B2
Q2	2SA1022-CD	(E)	B3
Q3	2SC2404-CD	(U)	B3
Q4	2SA1022-CD	(E)	C4
Q5	2SD601-QRS	(Y)	B4
D1	MA165		B2

PREAMPLIFIER BOARD



ORDER NO. VKD84050836C8

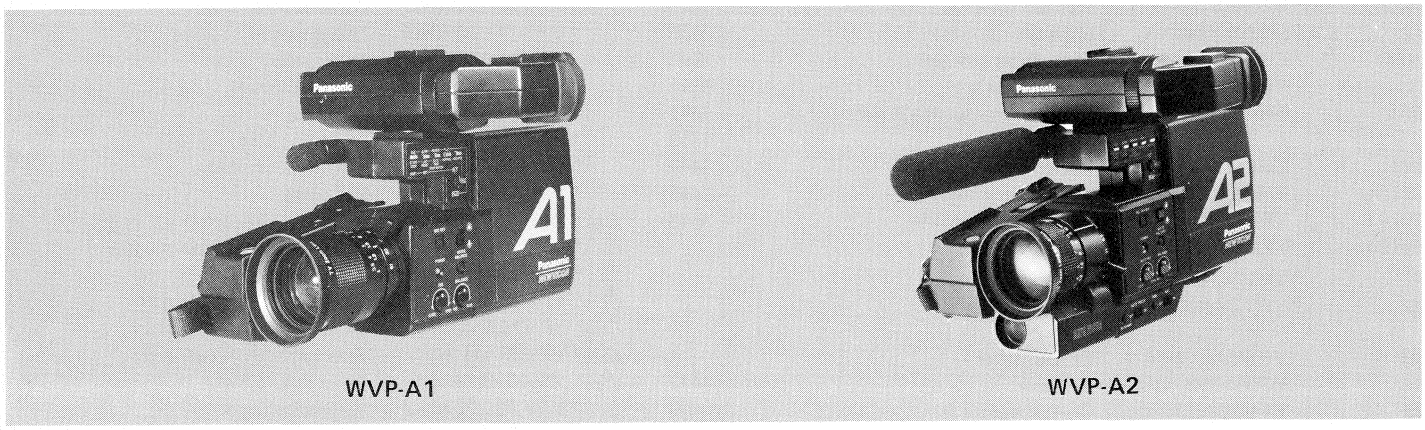
Service Manual

Vol. 4

Replacement Parts List
Exploded View

Colour Video Cameras

WVP-A1E/WVP-A1N
WVP-A2E/WVP-A2N



WVP-A1 WVP-A2

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Preamplifier Board (YFVKY00A1E2A) . . . . . 2 ∿ 3
Process-1 Board (YFVKY00A1E3A,YFVKY00A2E3A) . . . . . 3 ∿ 6
Process-2 Board (YFVKY00A1E5A for WVP-A1) 6
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Electric Viewfinder Board (YFVKY00A1E6A) 9
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REC Switch Board (YFVKD00A1E1A) 11
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EXT Microphone Board (YFVKZ00A1E2A,YFVKZ00A2E2A) 11
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National/Panasonic

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

Vol. 4

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. Components identified by * mark are new parts used from this model.
3. Complete printed circuit board assembly is not available as replacement part.

MODEL WVP-A1E/ WVP-A1N
WVP-A2E/WVP-A2N

SYM-BOL NO.	PART NO.	DESCRIPTION
	CAMERA MISCELLANEOUS	
V1	*YFS4161PKIT	Pick-up tube kit
⚠ V2	*M03JBX8WW	Cathode ray tube
⚠ L102	ELY10V306A	Deflection coil ass'y
E1	YFBIASL1TE50	Bias lite ass'y
MIC1	WM-4031A	Microphone for WVP-A2
CN1	EMCU10B4T34V	Power cable
CN101	EMCTMA21D02	10P camera connector
CN102	YFS8621J606	Pick-up tube socket
CN104	YFS7506P622	CRT socket
M1	*YFV3CA0039B3	Crystal holder A
M2	*YFV3CA0041A4	Crystal holder C
M3	YFXTALLPFA-1	Crystal filter
M4	YFIR1R6X10SQ	IR filter
M5	YFV3CA0040C4	Crystal holder B
M6	*YFV2KB0076A2	Coil chassis
M7	YFV2CA0047A2	Coil holder
M8	*YFV5EA0195A2	Right side cover
M9	*YFVAKA0241AN	Display panel ass'y
M10	*YFV1FA0008A4	Mounting nut plate
M11	*YFV5RA0043A4	Iris and balance knob A
M12	*YFV5RA0044A4	Standby knob B
M13	*YFV6JA0019A4	White balance knob C
M14	*YFV6JA0020A4	REC/REV konb D
M16	*YFV5EA0196B2	Left side cover
M17	*YFV2SA0124A4	EXT microphone mounting angle for WVP-A1
	*YFV2SA0135A4	EXT microphone mounting angle for WVP-A2
M18	*YFV2SA0123A4	EVF mounting angle
M19	*YFV7QA0506A4	EXT microphone label
M21	*YFV3CA0046A4	Microphone holder for WVP-A2
M22	*YFM6CA0023A4	Wind screen for WVP-A2
M24	*YFV9AA0183BN	Bottom cover ass'y A for WVP-A1
	YFV9AA0194AN	Bottom cover ass'y A for WVP-A2
M25	*YFV5EA0187A3	Bottom cover B
M26	*YFV9AA0184AS	Main cover for WVP-A1
	*YFV9AA0195AS	Main cover for WVP-A2
M27	*YFV7QA0504A4	Right side decoration panel for WVP-A1E/WVP-A2E
	*YFV7QB0504A4	Right side decoration panel for WVP-A1N/WVP-A2N
M28	*YFV7QA0505A4	Left side decoration panel for WVP-A1E/WVP-A2E
	*YFV7QB0505A4	Left side decoration panel for WVP-A1N/WVP-A2N
M29	*YFV2HA0100A4	Shield plate A for process 1
M30	*YFV2HA0171A4	Shield plate B for micro process
M31	*YFV2HA0145A4	Shield plate C for pick-up tube kit
M32	*YFV2HA0165A4	Shield plate D for process 2
M34	*YFV2EA0021A3	Hinge for board
M35	*YFV5JA0008A1	Grip
M36	*YFV5EA0201A2	Grip base
M37	*YFV6JA0025A4	REC knob
M38	*YFV6JA0021A3	Zoom switch knob
M39	*YFV2FB0070A4	Zoom switch cushion
M40	YFV1EA0032B4	Zoom shaft
M41	YFV6JB0023A4	Sub REC knob
M42	*YFV5YA0014B3	Grip belt
M43	*YFV2TA0040A4	Mounting plate for belt
M44	*YFV2FA0071A4	REC knob cushion
M45	*YFV1FA0008A4	Nut plate
⚠ M46	*YFV7SA0139A4	Main Label for WVP-A1 E/G,
⚠	*YFV7SA0140A4	Main Label for WVP-A1 E/B
⚠	*YFV7SA0141A4	Main Label for WVP-A1N
⚠	*YFV7SA155A4	Main Label for WVP-A2E
⚠	*YFV7SA156A4	Main Label for WVP-2E/B
⚠	*YFV7SA157A4	Main Label for WVP-A2N
⚠ M47	YVZC700RB50	Serial NO. Label
M48	*YFV2TA0043A4	Connector cover
M49	*YFV5WA0148A4	Switch blank panel
M50	*YFV5EA0200A3	Battery cover
M51	*YFV4JA0052A4	Battery spring A
M52	*YFV5JA0053A4	Battery spring B
M53	YFV4JA0054A4	Coil spring
M54	YFV1EA0022A4	Case stopper screw
M60	YWCC704WM07	Spring for shoe
M61	YFV5MA0002B4	Shoe
M62	*YFV5EA0202A2	EVF upper cover for WVP-A1E/WVP-A2E
	*YFV5EB0202A2	EVF upper cover for WVP-A1N/WVP-A2N
M63	YFV4JA0071A4	CRT spring
M64	YFV1FA0010A4	Nut plate for shoe
M65	YFV4FA0002A4	Slide ring
M66	YFV3FA0016A4	EVF ring
M67	YWCC704FM02	Special screw for shoe
⚠ M68	*YFV7MA0096A4	High voltage caution label for WVP-A1E/WVP-A2E
M70	*YFV5EA0204A2	CRT upper cover
M71	*YFV4JA0067A4	Open and shut spring
M72	*YFVYF0364	Eye cap holder ass'y
M73	*YFV5GA0031A4	Eye cap
M74	*YFV1UA0006A4	EVF mirror
M75	*YFV2FA0072A4	Cushion for CRT (X2)
M77	YFV2FA0014B4	CRT cushion rubber
M79	*YFV5EA0205A2	CRT bottom cover
M80	YFV7MA0097A4	X-ray label for WVP-A1E/WVP-A2E
M81	*YFV5EA0203A2	EVF bottom cover
M82	*YFV1KA0018A4	Wave washer
M83	*YFV2TA0038A3	EVF mounting base
M85	*YFV5EB0215A2	AF bottom cover for WVP-A2
M86	*YFV2SA0129A4	Mounting angle for WVP-A2
⚠ M87	*YFV7QA0531A4	Title label for WVP-A2
M88	*YFV6JA0026A4	AF knob
M89	*YFV5RA0035A4	Slide switch knob (x2)
M90	YF510340	Lens hood cap for WVP-A1
M91	YF510339	Lens hood for WVP-A1

YFVKY00A1E1A DEFLECTION BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION	
PCB1	* YFVKY00A1E1A	Printed Circuit Board Assy	
IC1,2	NJM3415M	IC	
Q1 ⚠	2SD601-QRS	Transistor	
Q2	2SD602-QRS	Transistor	
Q3	2SD1083	Transistor	
Q4	2SC2405STU	Transistor	
Q5	2SD814-QRS	Transistor	
Q6,7	2SB814-QRS	Transistor	
Q8	2SD602-QRS	Transistor	
Q9	2SB814-QRS	Transistor	
Q10	2SD602-QRS	Transistor	
Q11,12	2SD601-QRS	Transistor	
D1,2	MA151K	Diode	
D3	MA171	Diode	
R1,2	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R3	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R4	ERJ8GCSJ561	Carbon	560 ohms 1/8W
R5	ERJ8GCSJ221	Carbon	220 ohms 1/8W
R6	ER025CKF18R0	Metal	18 ohms 1/8W
R7,8	ERJ8GCSJ201	Carbon	200 ohms 1/8W
R9	ERJ8GCSJ182	Carbon	1.8K ohms 1/8W
R10	ERSA39J332	Solid Resistor	3.3K ohms
R11	ERJ8GCSJ274	Carbon	270K ohms 1/8W
R12	ERJ8GCSJ751	Carbon	750 ohms 1/8W
R13	ERJ8GCSJ333	Carbon	33K ohms 1/8W
R14	ERJ8GCSJ153	Carbon	15K ohms 1/8W
R15	ER025CKF3903	Metal	390K ohms 1/4W
R16	ERJ8GCSJ391	Carbon	390 ohms 1/8W
R17	ERJ8GCSJ302	Carbon	3K ohms 1/8W
R18	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R19	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R20	ER025CKF33R0	Metal	33 ohms 1/4W
R21	ERJ8GCSJ512	Carbon	5.1K ohms 1/8W
R22	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R23	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R24	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R25	ERJ8GCSJ333	Carbon	33K ohms 1/8W
R26	ERJ8GCSJ332	Carbon	3.3K ohms 1/8W
R27	ERJ8GCSJ153	Carbon	15K ohms 1/8W
R28	ERJ8GCSJ823	Carbon	82K ohms 1/8W
R29	ERJ8GCSJ273	Carbon	27K ohms 1/8W
R30,31	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R32	ERJ8GCSJ333	Carbon	33K ohms 1/8W
R33	ERJ8GCSJ184	Carbon	180K ohms 1/8W
R34	ERJ8GCSJ682	Carbon	6.8K ohms 1/8W
R35	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R36	ERJ8GCSJ823	Carbon	82K ohms 1/8W
R37	ERJ8GCSJ624	Carbon	620K ohms 1/8W
R38	ERJ8GCSJ153	Carbon	15K ohms 1/8W
R39	ERJ8GCSJ683	Carbon	68K ohms 1/8W
R40	ERJ8GCSJ104	Carbon	100K ohms 1/8W
R41	ERJ8GCSJ562	Carbon	5.6K ohms 1/8W
R42	ERJ8GCSJ151	Carbon	150 ohms 1/8W
R43	ERJ8GCSJ330	Carbon	33 ohms 1/8W
R44	ERJ8GCSJ332	Carbon	3.3K ohms 1/8W
R45	ERJ8GCSJ2R2	Carbon	2.2 ohms 1/8W
R46	ERJ8GCSJ392	Carbon	3.9K ohms 1/8W
R47	ERJ8GCSJ271	Carbon	270 ohms 1/8W
R48	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R49	ERJ8GCSJ332	Carbon	3.3K ohms 1/8W
R50	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R51	ERJ8GCSJ823	Carbon	82K ohms 1/8W
VR1	EVM2DGA00B12	Variable Resistor	100 ohms
VR2	EVN2DCA00B14	Variable Resistor	10K ohms
VR3	YFH0521A1K	Variable Resistor	1K ohms
VR4	EVM2DGA00BC5	Variable Resistor	150K ohms
VR5	EVN2DCA00BQ3	Variable Resistor	4.7K ohms
VR6-8	EVN2DCA00BQ4	Variable Resistor	47K ohms
VR9	YFH0521A47K	Variable Resistor	47K ohms
C1,2	ECEA1ASS470	Electrolytic	47 µF 10V
C3	ECEA1AF101	Electrolytic	100 µF 10V
C4	ECQV1H124JZ	Plastic	0.12 µF 50V
C5	ECQP1301JZ	Plastic	300 pF 100V
C6	YF426561SLJS	Ceramic	560 pF 50V
C7	ECEA1ASS470	Electrolytic	47 µF 10V
C8	YF426272XMS	Ceramic	2700 pF 50V
C9	ECQK1104JG	Plastic	0.1 µF 100V
C10	YF426473XMS	Ceramic	0.047 µF 50V
C13	ECEA1ESS4R7	Electrolytic	4.7 µF 25V
C14	YF426272XMS	Ceramic	2700 pF 50V
C16	ECEA1ASS470	Electrolytic	47 µF 10V
C17	ECEA2AS010	Electrolytic	1 µF 100V
C18	YF426102XMS	Ceramic	1000 pF 50V
C19	ECEA1AF470	Electrolytic	47 µF 10V
C20	ECEA1ASS470	Electrolytic	47 µF 10V
C25	YF426102XMS	Ceramic	1000 pF 50V
C26	ECEA1ASS470	Electrolytic	47 µF 10V
C29	YF426473XMS	Ceramic	0.047 µF 50V
L1	YFLH103JZ	Coil	10 mH
L2	YFVL303	Coil	30 mH
CN1-JM	EMCS0550Z	5 pin Jack Male	

YFVKY00A1E2A PREAMPLIFIER BOARD

PCB2	* YFVKY00A1E2A	Printed Circuit Board Assy
Q1	2SK316-PQ	Transistor
Q2	2SA1022-CD	Transistor
Q3	2SC2404-CD	Transistor
Q4	2SA1022-CD	Transistor

MODEL WVP-A1E/WVP-A1N
WVP-A2E/WVP-A2N

SYM-BOL NO.	PART NO.	DESCRIPTION	
Q5	2SD601-QRS	Transistor	
D1	MA165	Diode	
R1	ERJ8GCSJ565	Carbon	5.6M ohms 1/8W
R2	ER050CKG2704	Metal	2.7M ohms 1/2W
R3	ERJ8GCSJ431	Carbon	430 ohms 1/8W
R4	ERJ8GCSJ151	Carbon	150 ohms 1/8W
R5	ERJ8GCSJ104	Carbon	100K ohms 1/8W
R6	ERJ8GCSJ622	Carbon	6.2K ohms 1/8W
R7	ERJ8GCSG152	Carbon	1.5K ohms 1/8W
R8	ERJ8GCSJ123	Carbon	12K ohms 1/8W
R9	ERJ8GCSG162	Carbon	1.6K ohms 1/8W
R10	ERJ8GCSJ161	Carbon	160 ohms 1/8W
R11	ERJ8GCSJ273	Carbon	27K ohms 1/8W
R12	ERJ8GCSJ134	Carbon	130K ohms 1/8W
R13	ERJ8GCSJ181	Carbon	180 ohms 1/8W
R14	ERJ8GCSG122	Carbon	1.2K ohms 1/8W
R15	ERJ8GCSJ562	Carbon	5.6K ohms 1/8W
R17	ERJ8GCSJ224	Carbon	220K ohms 1/8W
VR1	EVM2DGA00B12	Variable Resistor	100 ohms
C1	YF426H273XKS	Ceramic	0.027 µF 50V
C2	ECEA25Z4R7	Electrolytic	4.7 µF 25V
C3	ECEA1AF470	Electrolytic	47 µF 10V
C5,6	ECEA25Z3R3	Electrolytic	3.3 µF 25V
C7	YF426100CHDS	Ceramic	10 pF 50V
C8	YF426020CHDS	Ceramic	2 pF 50V
C9	ECEA1ESS4R7	Electrolytic	4.7 µF 25V
C10	YF426H273XKS	Ceramic	0.027 µF 50V
C11	ECSF1AE476	Electrolytic	47 µF 10V
CT1	YFTZ03R300FR	Trimmer Capacitor	30 pF
L1	YFPREL481TEA	Coil	
L2	YWL58R2J	Coil	8.2 mH

YFVKY00A1E3A for WVP-A1
YFVKY00A2E3A for WVP-A2
PROCESS-1 BOARD

PCB3	* YFVKY00A1E3A	Printed Circuit Board Assy	
	* YFVKY00A2E3A	Printed Circuit Board Assy	
IC1	AN2110S	IC	
IC2	AN2310S	IC	
IC3	AN2320S	IC	
IC4	AN2410S	IC	
IC6	MN8037	IC	
IC7	AN2210S	IC	
IC8	MN6160PBS	IC	
IC10	AN6914S	IC	
IC11	NJM3414M	IC	
IC12	MT0001	IC	
Q1	2SD602-QRS	Transistor	
Q3	2SC2404-CD	Transistor	
Q4	2SA1034-ST	Transistor	
Q5	2SD601-QRS	Transistor	
Q6-8	2SB709-QRS	Transistor for WVP-A2	

SYM-BOL NO.	PART NO.	DESCRIPTION	
Q9	2SB709-QRS	Transistor	
Q10,11	2SD601-QRS	Transistor	
Q13	2SD601-QRS	Transistor	
Q14	2SC2404-CD	Transistor	
Q15	2SB709-QRS	Transistor	
Q17	2SD601-QRS	Transistor	
Q18,20	2SC2404-CD	Transistor	
Q21	2SD601-QRS	Transistor	
Q22,23	2SC2404-CD	Transistor	
Q24	2SB709-QRS	Transistor	
Q25	2SC2404-CD	Transistor	
D1,2	MA151K	Diode	
D3,4	YUD1S2688	Diode	
D5	MA151K	Diode	
D6	MA151K	Diode	
D7	MA151WA	Diode	
R1,2	ERJ8GCSJ473	Carbon	47K ohms 1/8W
R3	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R4	ERJ8GCSJ184	Carbon	180K ohms 1/8W
R5-7	ERJ8GCSJ244	Carbon	240K ohms 1/8W
R8	ERJ8GCSJ224	Carbon	220K ohms 1/8W
R9	ERJ8GCSJ164	Carbon	160K ohms 1/8W
R10	ERJ8GCSJ224	Carbon	220K ohms 1/8W
R11	ERJ8GCSG752	Carbon	7.5K ohms 1/8W
R12	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R13	ERJ8GCSG243	Carbon	24K ohms 1/8W
R14	ERJ8GCSG182	Carbon	1.8K ohms 1/8W
R15	ERJ8GCSG682	Carbon	6.8K ohms 1/8W
R16	ERJ8GCSJ562	Carbon	5.6K ohms 1/8W
R17,18	ERJ8GCSJ153	Carbon	15K ohms 1/8W
R19	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R20	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R21	ERJ8GCSJ271	Carbon	270 ohms 1/8W
R22	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R23	ERJ8GCSJ471	Carbon	470 ohms 1/8W
R24	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R25	ERJ8GCSJ621	Carbon	620 ohms 1/8W
R26	ERJ8GCSJ274	Carbon	270K ohms 1/8W
R27	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R28	ERJ8GCSJ104	Carbon	100K ohms 1/8W
R30	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R31	ERJ8GCSJ152	Carbon	1.5K ohms 1/8W
R34	ERJ8GCSJ823	Carbon	82K ohms 1/8W
R35	ERJ8GCSJ562	Carbon	5.6K ohms 1/8W
R36	ERJ8GCSJ104	Carbon	100K ohms 1/8W
R37	ERJ8GCSG752	Carbon	7.5K ohms 1/8W
R38	ERJ8GCSJ562	Carbon	5.6K ohms 1/8W
R39	ERJ8GCSG752	Carbon	7.5K ohms 1/8W
R40	ERJ8GCSJ562	Carbon	5.6K ohms 1/8W
R41	ERJ8GCSJ272	Carbon	2.7K ohms 1/8W
R42	ERJ8GCSJ472	Carbon	4.7K ohms 1/8W
R43	ERJ8GCSJ822	Carbon	8.2K ohms 1/8W
R44	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R45	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R46	ERJ8GCSJ563	Carbon	56K ohms 1/8W

SYM-BOL NO.	PART NO.	DESCRIPTION		SYM-BOL NO.	PART NO.	DESCRIPTION	
R47	ERJ8GCSJ102	Carbon	1K ohms 1/8W	R105	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R48	ERJ8GCSJ122	Carbon	1.2K ohms 1/8W	R110	ERJ8GCSG112	Carbon	1.1K ohms 1/8W
R49	ERJ8GCSJ273	Carbon	27K ohms 1/8W	R112	ERJ8GCSJ393	Carbon	39K ohms 1/8W
R50	ERJ8GCSJ563	Carbon	56K ohms 1/8W for WVP	R114	ERJ8GCSJ273	Carbon	27K ohms 1/8W
R51	ERJ8GCSJ563	Carbon	56K ohms 1/8W	R116	ERJ8GCSJ680	Carbon	68 ohms 1/8W
R52	ERJ8GCSJ223	Carbon	22K ohms 1/8W	R117	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R53	ERJ8GCSJ123	Carbon	12K ohms 1/8W	R119	ERJ8GCSJ471	Carbon	470 ohms 1/8W
R54	ERJ8GCSJ185	Carbon	1.8M ohms 1/8W	R120	ERJ8GCSJ183	Carbon	18K ohms 1/8W
R55	ERJ8GCSJ473	Carbon	47K ohms 1/8W	R121	ERJ8GCSJ563	Carbon	56K ohms 1/8W
R56	ERJ8GCSJ683	Carbon	68K ohms 1/8W	R122	ERJ8GCSJ471	Carbon	470 ohms 1/8W
R57	ERJ8GCSJ124	Carbon	120K ohms 1/8W	R123	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R58	ERJ8GCSJ223	Carbon	22K ohms 1/8W	R124	ERJ8GCSJ392	Carbon	3.9K ohms 1/8W
R59	ERJ8GCSJ102	Carbon	1K ohms 1/8W	R125	ERJ8GCSJ471	Carbon	470 ohms 1/8W
R60	ERJ8GCSJ470	Carbon	47 ohms 1/8W	R126	ERJ8GCSJ362	Carbon	3.6K ohms 1/8W
R61	ERJ8GCSJ103	Carbon	10K ohms 1/8W	R127	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R62	ERJ8GCSJ102	Carbon	1K ohms 1/8W	R128	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R63	ERJ8GCSJ332	Carbon	3.3K ohms 1/8W	R129	ERJ8GCSJ123	Carbon	12K ohms 1/8W
R66,67	ERJ8GCSJ333	Carbon	33K ohms 1/8W	R133	ERJ8GCSJ152	Carbon	1.5K ohms 1/8W
R68	ERJ8GCSJ103	Carbon	10K ohms 1/8W	R134	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R69	ERJ8GCSJ304	Carbon	300K ohms 1/8W	R135	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R70	ERJ8GCSJ394	Carbon	390K ohms 1/8W	R136	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R71	ERJ8GCSJ334	Carbon	330K ohms 1/8W	R137	ERJ8GCSJ392	Carbon	3.9K ohms 1/8W
R72	ERJ8GCSJ223	Carbon	22K ohms 1/8W	R138	ERJ8GCSJ273	Carbon	27K ohms 1/8W
R73	ERJ8GCSJ823	Carbon	82K ohms 1/8W	R139	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R74	ERJ8GCSJ223	Carbon	22K ohms 1/8W	R140	ERJ8GCSJ202	Carbon	2K ohms 1/8W
R75	ERJ8GCSJ185	Carbon	1.8M ohms 1/8W	R141	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R76	ERJ8GCSJ472	Carbon	4.7K ohms 1/8W	R142	ERJ8GCSJ681	Carbon	680 ohms 1/8W
R77	ERJ8GCSJ563	Carbon	56K ohms 1/8W	R145	ERJ8GCSJ821	Carbon	820 ohms 1/8W
R78	ERJ8GCSJ682	Carbon	6.8K ohms 1/8W	R146	ERJ8GCSJ181	Carbon	180 ohms 1/8W
R79	ERJ8GCSJ224	Carbon	220K ohms 1/8W	R148	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R80	ERJ8GCSJ223	Carbon for WVP-A2	22K ohms 1/8W	R149	ERJ8GCSJ221	Carbon	220 ohms 1/8W
R81	ERJ8GCSJ681	Carbon	680 ohms 1/8W	R150	ERJ8GCSJ150	Carbon	15 ohms 1/8W
R82	ERJ8GCSJ221	Carbon	220 ohms 1/8W	R151	ERJ8GCSJ122	Carbon	1.2K ohms 1/8W
R83-85	ERJ8GCSJ333	Carbon for WVP-A2	33K ohms 1/8W	R152	ERJ8GCSJ393	Carbon	39K ohms 1/8W
R86	ERJ8GCSJ751	Carbon	750 ohms 1/8W	R155	ERJ8GCSJ183	Carbon	18K ohms 1/8W
R87	ERJ8GCSJ684	Carbon	680K ohms 1/8W	R156	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R88	ERJ8GCSJ331	Carbon	330 ohms 1/8W	R157	ERJ8GCSJ332	Carbon	3.3K ohms 1/8W
R89	ERJ8GCSJ562	Carbon for WVP-A2	5.6K ohms 1/8W	R158-160	ERJ8GCSJ334	Carbon	330K ohms 1/8W
R90	ERJ8GCSJ561	Carbon	560 ohms 1/8W	R161	ERJ8GCSJ472	Carbon	4.7K ohms 1/8W
R91	ERJ8GCSJ153	Carbon for WVP-A2	15K ohms 1/8W	R162	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R92	ERJ8GCSJ102	Carbon	1K ohms 1/8W	R163	ERJ8GCSJ154	Carbon	150K ohms 1/8W
R93	ERJ8GCSJ561	Carbon for WVP-A2	560 ohms 1/8W	R164	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R94	ERJ8GCSJ104	Carbon	100K ohms 1/8W	R165	ERJ8GCSG153	Carbon	15K ohms 1/8W
R95	ERJ8GCSJ123	Carbon	12K ohms 1/8W	R166,167	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R96	ERJ8GCSJ223	Carbon	22K ohms 1/8W	R168	ERJ8GCSJ332	Carbon	3.3K ohms 1/8W
R97	ERJ8GCSJ103	Carbon	10K ohms 1/8W	R169	ERJ8GCSJ103	Carbon for WVP-A1	10K ohms 1/8W
R98	ERJ8GCSJ472	Carbon	4.7K ohms 1/8W	R170	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R99	ERJ8GCSJ683	Carbon	68K ohms 1/8W	R171	ERJ8GCSJ332	Carbon	3.3K ohms 1/8W
R100	ERJ8GCSJ183	Carbon	18K ohms 1/8W	R172	ERJ8GCSJ473	Carbon	47K ohms 1/8W
R101	ERJ8GCSJ303	Carbon	30K ohms 1/8W	VR1	EVM13SW00BE3	Variable Resistor	2.2K ohms
R102,104	ERJ8GCSJ102	Carbon	1K ohms 1/8W	VR2	EVM13SW00BY3	Variable Resistor	3.3K ohms
				VR3	EVM13SW00BS3	Variable Resistor	6.8K ohms
				VR4	EVM13SW00BE4	Variable Resistor for WVP-A2	2K ohms
				VR5-7	EVM13SW00B14	Variable Resistor	10K ohms

MODEL WVP-A1E/WVP-A1N
WVP-A2E/WVP-A2N

SYM-BOL NO.	PART NO.	DESCRIPTION	
VR8	EVM13SW00BQ2	Variable Resistor	470 ohms
VR9,10	YFH1622A001	Variable Resistor	
VR11	EVM13SW00BS2	Variable Resistor	680 ohms
VR12	EVM13SW00B15	Variable Resistor	100K ohms
VR13	EVM13SW00B13	Variable Resistor	1K ohms
VR14	EVM13SW00BE3	Variable Resistor	2.2K ohms
VR15	EVM13SW00B14	Variable Resistor	10K ohms
VR16	EVM13SW00BE3	Variable Resistor	2.2K ohms
VR18	EVM13SW00BY3	Variable Resistor	3.3K ohms
Z1	EXBD86278JM	Block Resistor	
Z2	EXBD85293J	Block Resistor	
C1	ECEA1ASS470	Electrolytic	47 µF 10V
C2	ECKF1H222KB	Ceramic	2200 pF 50V
C3-5	ECEA1HSS3R3	Electrolytic	3.3 µF 50V
C6-8	YF426104DMS	Ceramic	0.1 µF 50V
C9-12	YF426221SLKS	Ceramic	220 pF 50V
C13	YF426473XMS	Ceramic	0.047 µF 50V
C14	ECEA1ASS470	Electrolytic	47 µF 10V
C15	YF426471SLKS	Ceramic	470 pF 50V
C16	YF426473XMS	Ceramic	0.047 µF 50V
C17	ECEA1ASS220	Electrolytic	22 µF 10V
C18,19	ECEA1ASS470	Electrolytic	47 µF 10V
C20,21	YF426473XMS	Ceramic	0.047 µF 50V
C22	YF426104DMS	Ceramic	0.1 µF 50V
C25	ECSF1AE476	Electrolytic	47 µF 10V
C26	YF426102XMS	Ceramic	1000 pF 50V
C27	YF426150CHJS	Ceramic	15 pF 50V
C28,29	YF426101CHJS	Ceramic	100 pF 50V
C30	ECEA1HN010S	Electrolytic	1 µF 50V
C31,32	YF426103XMS	Ceramic	0.01 µF 50V
C33	YF426151CHJS	Ceramic	150 pF 50V
C34	YF426473XMS	Ceramic	0.047 µF 50V
C35	YF426471SLKS	Ceramic	470 pF 50V
C37	YF426104DMS	Ceramic	0.1 µF 50V
C38	YF426472XMS	Ceramic	4700 pF 50V
C39	ECEA1ASS470	Electrolytic	47 µF 10V
C40	ECEA1ASS220	Electrolytic	22 µF 10V
C41	YF426330CHJS	Ceramic	33 pF 50V
C42	ECEA1ASS470	Electrolytic	47 µF 10V
C43	ECEA1HSS010	Electrolytic	1 µF 50V
C44	YF426473XMS	Ceramic	0.047 µF 50V
C45	ECEA1VSS4R7	Electrolytic	4.7 µF 35V
C46	ECEA1CSS100	Electrolytic	10 µF 16V
C47,48	ECEA1ASS470	Electrolytic	47 µF 10V
C49	YF426104DMS	Ceramic	0.1 µF 50V
C50	YF426101CHJS	Ceramic	100 pF 50V
C52,53	YF426222XMS	Ceramic	2200 pF 50V
C54	YF426330CHJS	Ceramic	33 pF 50V
C55	ECEA1ASS470	Electrolytic	47 µF 10V
C56	YF426330CHJS	Ceramic	33 pF 50V
C57,58	YF426102XMS	Ceramic	1000 pF 50V
C60	YF426181SLKS	Ceramic for WVP-A2	180 pF 50V
C61	YF426473XMS	Ceramic	0.047 µF 50V
C63	YF426473XMS	Ceramic for WVP-A2	0.047 µF 50V

SYM-BOL NO.	PART NO.	DESCRIPTION	
C64	ECSF1AE226	Electrolytic	22 µF 10V
C65	ECEA1HSS010	Electrolytic	1 µF 50V
C66,67	ECEA1ASS470	Electrolytic	47 µF 10V
C68	YF426470SLKS	Ceramic	47 pF 50V
C69	YF426222XMS	Ceramic	2200 pF 50V
C70	YF426121CHJS	Ceramic	120 pF 50V
C71	ECEA1ASS470	Electrolytic for WVP-A2	47 µF 10V
C72	ECEA0JU471	Electrolytic	470 µF 6.3V
C73	YF426102XMS	Ceramic for WVP-A2	1000 pF 50V
C75	YF426222XMS	Ceramic	2200 pF 50V
C76	ECEA1ASS470	Electrolytic	47 µF 10V
C77	YF426181SLJS	Ceramic	180 pF 50V
C78	YF426221SLKS	Ceramic	220 pF 50V
C79	ECEA1CSS100	Electrolytic	10 µF 16V
C80	YF426680CHJS	Ceramic	68 pF 50V
C81,82	YF426473XMS	Ceramic	0.047 µF 50V
C83	YF426681SLKS	Ceramic	680 pF 50V
C84,85	YF426220CHKS	Ceramic	22 pF 50V
C86	YF426221SLKS	Ceramic	220 pF 50V
C87	YF426120CHKS	Ceramic for WVP-A1	12 pF 50V
C88	YF426080CHJS	Ceramic for WVP-A1	8 pF 50V
C88	YF420120CHKS	Ceramic for WVP-A2	12 pF50V
C89-91	YF426473XMS	Ceramic	0.047 µF 50V
C92,93	YF426222XMS	Ceramic	2200 pF 50V
C94,95	ECEA1ASS470	Electrolytic	47 µF 10V
C96	YF426681SLKS	Ceramic	680 pF 50V
C97	YF426473XMS	Ceramic	0.047 µF 50V
C98	YF426681SLKS	Ceramic	680 pF 50V
C100	YF426473XMS	Ceramic	0.047 µF 50V
C101	ECSF1AE156	Electrolytic for WVP-A1	15 µF 10V
C102	ECCF1H271K	Ceramic	270 pF 50V
C103	ECSF0JE226	Electrolytic	22 µF 6.3V
CT1	YFTZ03R300FR	Trimmer Capacitor	30 pF
CT2	YFTZ03R200FR	Trimmer Capacitor	20 pF
CT4	YFTZ03R300FR	Trimmer Capacitor	30 pF
L1	NL4532T8R2K	Coil	8.2 µH
L2,3	YWL5120J	Coil	12 µH
L4	NL4532T2R2K	Coil	2.2 µH
L5	YFF051054	Coil	
L6	EL05SI181J	Coil	180 µH
L7	NL4532T8R2K	Coil	8.2 µH
L8	EL05SI8R2K	Coil	8.2 µH
L9	YWL5271J	Coil	270 µH
L10	YFL5151J	Coil	150 µH
L11	EL05SI101K	Coil	100 µH
L12	EL05SI8R2K	Coil	8.2 µH
L13	EFDMT645L63F	Delay Line	
SW1	YWSSS21200	Slide Switch	
X1	YFMS30917R7M	Crystal Oscillator	
CF1	YFSLC861102A	Filter	
CF2	YFSLC871253	Filter	
CF3,4	MXT4532S3R9	Filter	
CF5	YFSLC841254	Filter	
CF6	YFSLC841255	Filter	
CF7	ELB5A010	Filter	

SYM-BOL NO.	PART NO.	DESCRIPTION
CF8	YFSLC831252	Filter
CF9	ELB5E047	Filter
J1-3	ERJ8GCSJ0R00	Jumper Resistor
CN1-JM	EMCS0350ZL	3 pin Jack Male for WVP-A1
	EMCS0350Z	3 pin Jack Male for WVP-A2
CN2-JM	EMCS0650Z	6 pin Jack Male
CN3-JM	EMCS1050Z	10 pin Jack Male
CN4-JM	EMCS0550ZL	5 pin Jack Male
CN5-JM	EMCS0250Z	2 pin Jack Male
CN6-JM	YF742J27	7 pin Jack Male
CN7-JM	YF742J25	5 pin Jack Male for WVP-A2
CN8-JM	EMCS0350Z	3 pin Jack Male
CN10-JM	YFICS6412663	IC Socket
CN11-JM	EMCS0350Z	3 pin Jack Male
CN12-JM	EMCS0350Z	3 pin Jack Male for WVP-A2
M56	YFV2HA0142A3	Shield Case
M57	YFV2HA0143A3	Shield Cover A
M58	YFV2HA0144A4	Shield Cover B for Block Filter

YFVKY00A1E5A for WVP-A1 PROCESS-2 BOARD

PCB4	* YFVKY00A1E5A	Printed Circuit Board Assy	
IC1	NJM4558MD	IC	
Q2,3	2SC2405STU	Transistor	
Q4	2SB709-QRS	Transistor	
D2-4	MA151K	Diode	
R1	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R2	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R7	ERJ8GCSJ392	Carbon	3.9K ohms 1/8W
R8	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R9	ERJ8GCSJ474	Carbon	470K ohms 1/8W
R10	ERJ8GCSG102	Carbon	1K ohms 1/8W
R11	ERJ8GCSG182	Carbon	1.8K ohms 1/8W
R12	ERJ8GCSJ101	Carbon	100 ohms 1/8W
R13	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R14	ERJ8GCSJ470	Carbon	47 ohms 1/8W
R15	ERJ8GCSJ681	Carbon	680 ohms 1/8W
R16	ERJ8GCSJ822	Carbon	8.2K ohms 1/8W
R17	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R18	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R20	ERJ8GCSJ392	Carbon	3.9K ohms 1/8W
R21	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R22	ERJ8GCSJ474	Carbon	470K ohms 1/8W
R23	ERJ8GCSJ122	Carbon	1.2K ohms 1/8W
R24	ERJ8GCSJ102	Carbon	1K ohms 1/8W
C1	ECQM1H393JZ	Plastic	0.039 µF 50V
C2	YF426103XMS	Ceramic	10000 pF 50V
C3	ECEA0JSS470	Electrolytic	47 µF 6.3V
C4	ECEA1CSS100	Electrolytic	10 µF 16V
C5	ECEA1HSS010	Electrolytic	1 µF 50V
C6	ECEA0JU331	Electrolytic	330 µF 6.3V
C7	YF426120CHKS	Ceramic	12 pF 50V
C8	ECEA1AU101	Electrolytic	100 µF 10V
C9	ECEA1HSSR47	Electrolytic	0.47 µF 50V
C10	ECQM1H393JZ	Plastic	0.039 µF 50V
C11	YF426103XMS	Ceramic	0.01 µF 50V
C12	ECEA0JU101	Electrolytic	100 µF 6.3V
C13	ECEA0JSS470	Electrolytic	47 µF 6.3V
C14	ECEA1CSS100	Electrolytic	10 µF 16V
C15	ECEA1HSS010	Electrolytic	1 µF 50V
C16	YF426120CHKS	Ceramic	12 pF 50V
C17	YF426104DMS	Ceramic	0.1 µF 50V
C18	ECEA1HNR47	Electrolytic	0.47 µF 50V
C23	ECEA1ASS470	Electrolytic	47 µF 10V
SW1	YFSSJ342L4N	Slide Switch	
J1	YFFS2N381A3	Jumper Resistor	
J2	YFFS2N381A7	Jumper Resistor	
CN1-JM	EMCS0650Z	6 pin Jack Male	
CN2-JM	EMCS0550ZL	5 pin Jack Male	
CN3-JM	EMCS0450ZL	4 pin Jack Male	

YFVKY00A2E5A for WVP-A2 PROCESS-2 BOARD

PCB4	* YFVKY00A2E5A	Printed Circuit Board Assy	
IC1	NJM4558MD	IC	
IC2	AN2560S	IC	
Q1	2SC2405-ST	Transistor	
Q2,3	2SC2405STU	Transistor	
Q4	2SB709-QRS	Transistor	
Q5	2SC2404-CD	Transistor	
Q6	2SD601-QRS	Transistor	
Q7	2SB709-QRS	Transistor	
Q8-10	2SD601-QRS	Transistor	
Q11	2SB709-QRS	Transistor	
D1	MA153	Diode	
D2-4	MA151K	Diode	
D5	MA151K	Diode	
R1	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R2	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R3	ERJ8GCSJ104	Carbon	100K ohms 1/8W
R4	ERJ8GCSJ434	Carbon	430K ohms 1/8W
R5	ERJ8GCSJ334	Carbon	330K ohms 1/8W
R6	ERJ8GCSJ152	Carbon	1.5K ohms 1/8W
R7	ERJ8GCSJ392	Carbon	3.9K ohms 1/8W
R8	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R9	ERJ8GCSJ334	Carbon	330K ohms 1/8W
R10	ERJ8GCSG102	Carbon	1K ohms 1/8W
R11	ERJ8GCSG182	Carbon	1.8K ohms 1/8W
R12	ERJ8GCSJ101	Carbon	100 ohms 1/8W
R13	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R14	ERJ8GCSJ470	Carbon	47 ohms 1/8W
R15	ERJ8GCSJ681	Carbon	680 ohms 1/8W
R16	ERJ8GCSJ822	Carbon	8.2K ohms 1/8W
R17	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R18	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R19	ERJ8GCSJ152	Carbon	1.5K ohms 1/8W
R20	ERJ8GCSJ392	Carbon	3.9K ohms 1/8W
R21	ERJ8GCSJ102	Carbon	1K ohms 1/8W

MODEL WVP-A1E/WVP-A1N
WVP-A2E/WVP-A2N

SYM-BOL NO.	PART NO.	DESCRIPTION	
R22	ERJ8GCSJ334	Carbon	330K ohms 1/8W
R23	ERJ8GCSJ122	Carbon	1.2K ohms 1/8W
R24	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R28	ERJ8GCSJ303	Carbon	30K ohms 1/8W
R29	ERJ8GCSJ682	Carbon	6.8K ohms 1/8W
R30	ERJ8GCSJ473	Carbon	47K ohms 1/8W
R31	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R32	ERJ8GCSJ562	Carbon	5.6K ohms 1/8W
R33	ERJ8GCSJ123	Carbon	12K ohms 1/8W
R34	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R35,36	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R37	ERJ8GCSJ561	Carbon	560 ohms 1/8W
R38	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R39	ERJ8GCSJ471	Carbon	470 ohms 1/8W
R40	ERJ8GCSJ153	Carbon	15K ohms 1/8W
R41	ERJ8GCSJ303	Carbon	30K ohms 1/8W
R42	ERJ8GCSJ392	Carbon	3.9K ohms 1/8W
R43	ERJ8GCSJ123	Carbon	12K ohms 1/8W
R44,45	ERJ8GCSJ332	Carbon	3.3K ohms 1/8W
R46	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R47	ERJ8GCSJ392	Carbon	3.9K ohms 1/8W
R48	ERJ8GCSJ393	Carbon	39K ohms 1/8W
R49	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R60	ERJ8GCSJ562	Carbon	5.6K ohms 1/8W
C1	ECQM1H393JZ	Plastic	0.039 µF 50V
C2	YF426103XMS	Ceramic	0.01 µF 50V
C3	ECEA1ASS470	Electrolytic	47 µF 10V
C4	ECEA1CSS100	Electrolytic	10 µF 16V
C5	ECEA1HSS010	Electrolytic	1 µF 50V
C6	ECEA0JU331	Electrolytic	330 µF 6.3V
C7	YF426390CHJS	Ceramic	39 pF 50V
C8	ECEA1AU101	Electrolytic	100 µF 10V
C9	ECEA1HSSR47	Electrolytic	0.47 µF 50V
C10	ECQM1H393JZ	Plastic	0.039 µF 50V
C11	YF426103XMS	Ceramic	0.01 µF 50V
C12	ECEA0JU101	Electrolytic	100 µF 6.3V
C13	ECEA0JSS470	Electrolytic	47 µF 6.3V
C14	ECEA1CSS100	Electrolytic	10 µF 16V
C15	ECEA1HSS010	Electrolytic	1 µF 50V
C16	YF426390CHJS	Ceramic	39 pF 50V
C17	YF426104DMS	Ceramic	0.1 µF 50V
C18	ECEA1HNR47	Electrolytic	0.47 µF 50V
C19	YF426472XMS	Ceramic	4700 pF 50V
C20,21	YF426681SLKS	Ceramic	680 pF 50V
C23	ECSF1AE476B	Electrolytic	47 µF 10V
C24	ECEA10Z47	Electrolytic	47 µF 10V
C25	YF426681SLKS	Ceramic	680 pF 50V
C26	YF426270CHJS	Ceramic	27 pF 50V
C27	YF426681SLKS	Ceramic	680 pF 50V
CT1	YFTZ03R300YR	Trimmer Capacitor	30 pF
L1	YWL58R2J	Coil	8.2 µH
SW1	YFSSJ342L4N	Slide Switch	
J1	YFFS2N381A7	Jumper Resistor	
J2	YFFS2N381A5	Jumper Resistor	
J3	YFFS2N381A10	Jumper Resistor	
CN1-JM	EMCS0650Z	6 pin Jack Male	
CN2-JM	EMCS0550ZL	5 pin Jack Male	
CN3-JM	EMCS0450ZL	4 pin Jack Male	

YFVKY00A1E4A for WVP-A1
YFVKY00A2E4A for WVP-A2
MICROPROCESSOR BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION	
PCB5	* YFVKY00A1E4A	Printed Circuit Board Assy	
	* YFVKY00A2E4B	Printed Circuit Board Assy	
IC1	MN1554CVH	IC	
IC2	MN1237B	IC	
IC3-5	AN90B82S	IC	
IC9	DAP601	IC for WVP-A2	
IC10	DAN601	IC for WVP-A2	
Q1	2SC2404-CD	Transistor	
Q2	2SD601-QRS	Transistor	
Q3,4	2SB709-QRS	Transistor	
Q5	2SD1030RST	Transistor	
Q6-8	2SD601-QRS	Transistor for WVP-A2	
Q9	2SB709-QRS	Transistor for WVP-A1	
Q10	2SC2404-CD	Transistor	
Q11	2SA1022-CD	Transistor	
Q12	2SB709-QRS	Transistor	
Q13	2SD601-QRS	Transistor for WVP-A2	
Q14	2SD602-QRS	Transistor	
Q15	2SB709-QRS	Transistor	
Q16	2SB814-QRS	Transistor	
Q17	2SB709-QRS	Transistor	
Q18-21	2SD601-QRS	Transistor	
Q22,23	2SB709-QRS	Transistor	
Q24	2SD601-QRS	Transistor	
Q25	2SD1083	Transistor	
Q26	2SB709-QRS	Transistor	
Q27	2SB814-QRS	Transistor	
Q28	2SD814-QRS	Transistor	
Q29	2SB814-QRS	Transistor	
D1	MA151K	Diode	
D2	MA151K	Diode	
D3	MA151K	Diode	
D4	MA151K	Diode	
D5	MA151K	Diode	
D6	1SS123	Diode for WVP-A2	
D8	MA151K	Diode for WVP-A2	
D9	MA151K	Diode	
D11	MA151K	Diode	
D14	MA151K	Diode for WVP-A1	
D16	MA165	Diode	
R1	ERJ8GCSJ563	Carbon	56K ohms 1/8W
R2	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R3	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R4,5	ERJ8GCSJ562	Carbon	5.6K ohms 1/8W
R6	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R7	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R8	ERJ8GCSJ273	Carbon	27K ohms 1/8W

SYM-BOL NO.	PART NO.	DESCRIPTION	
R9	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R10	ERJ8GCSJ222	Carbon for WVP-A2	2.2K ohms 1/8W
R11	ERJ8GCSJ682	Carbon for WVP-A2	6.8K ohms 1/8W
R12	ERJ8GCSJ473	Carbon for WVP-A2	47K ohms 1/8W
R13	ERJ8GCSJ472	Carbon	4.7K ohms 1/8W
R14	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R15	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R16	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R17	ERJ8GCSK106	Carbon	10M ohms 1/8W
R18	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R19	ERJ8GCSJ474	Carbon	470K ohms 1/8W
R20	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R21	ERJ8GCSJ822	Carbon	8.2K ohms 1/8W
R22	ERJ8GCSJ304	Carbon	300K ohms 1/8W
R23	ERJ8GCSJ154	Carbon	150K ohms 1/8W
R24	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R25	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R26	ERJ8GCSJ274	Carbon for WVP-A2	270K ohms 1/8W
R27	ERJ8GCSJ154	Carbon for WVP-A2	150K ohms 1/8W
R28	ERJ8GCSJ104	Carbon for WVP-A2	100K ohms 1/8W
R29	ERJ8GCSJ824	Carbon for WVP-A2	820K ohms 1/8W
R30-32	ERJ8GCSJ103	Carbon for WVP-A2	10K ohms 1/8W
R33	ERJ8GCSJ224	Carbon for WVP-A2	220K ohms 1/8W
R34-36	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R37	ERJ8GCSJ392	Carbon	3.9K ohms 1/8W
R38	ERJ8GCSJ331	Carbon	330 ohms 1/8W
R39	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R40	ERJ8GCSJ334	Carbon	330K ohms 1/8W
R41	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R42	ERJ8GCSJ101	Carbon	100 ohms 1/8W
R43	ERJ8GCSJ331	Carbon	330 ohms 1/8W
R44	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R45	ERJ8GCSJ104	Carbon	100K ohms 1/8W
R46,47	ERJ8GCSJ683	Carbon	68K ohms 1/8W
R48	ERJ8GCSJ473	Carbon	47K ohms 1/8W
R49	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R50	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R51,52	ERJ8GCSJ473	Carbon	47K ohms 1/8W
R53	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R54,55	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R56	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R57,58	ERJ8GCSJ153	Carbon	15K ohms 1/8W
R59	ERJ8GCSJ822	Carbon	8.2K ohms 1/8W
R60	ERJ8GCSJ154	Carbon	150K ohms 1/8W
R61	ERJ8GCSJ304	Carbon	300K ohms 1/8W
R62	ERJ8GCSJ473	Carbon	47K ohms 1/8W
R63	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R64	ERJ8GCSJ473	Carbon	47K ohms 1/8W
R65-71	ERJ8GCSJ151	Carbon	150 ohms 1/8W

SYM-BOL NO.	PART NO.	DESCRIPTION	
R65-71	ERJ8GCSJ151	Carbon for WVP-A2	150 ohms 1/8W
R72,73	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R74	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R75	ERJ8GCSJ473	Carbon	47K ohms 1/8W
R76-78	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R79	ERJ8GCSJ271	Carbon	270 ohms 1/8W
R80	ERJ8GCSG242	Carbon	2.4K ohms 1/8W
R81,82	ERJ8GCSJ273	Carbon	27K ohms 1/8W
R83	ERJ8GCSJ105	Carbon	1M ohms 1/8W
R84	ERJ8GCSJ273	Carbon	27K ohms 1/8W
VR1	YFH0521A2R2K	Variable Resistor	2.2K ohms
VR2	EVN2DCA00B14	Variable Resistor	10K ohms
VR3	YFH0651A2R2M	Variable Resistor	2.2M ohms
Z1	EXBEQ6822J	Block Resistor	
Z2	EXBLD6154GU	Block Resistor	
Z3	EXBEQ8683J	Block Resistor	
Z4	EXBEQ6822J	Block Resistor	
Z5	EXBLD6154GU	Block Resistor	
Z8	EVM77GA00112	Block Resistor	
C1	YF426470SLKS	Ceramic	47 pF 50V
C2	YF426271SLJS	Ceramic for WVP-A2	270 pF 50V
C3,4	YF426330CHJS	Ceramic	33 pF 50V
C5	YF426270CHJS	Ceramic	27 pF 50V
C6	ECEA0JSS470	Electrolytic	47 µF 6.3V
C7,8	ECEA1AF470	Electrolytic	47 µF 10V
C9	YF426121CHJS	Ceramic	120 pF 50V
C10	YF426470SLKS	Ceramic	47 pF 50V
C11	YF426471SLKS	Ceramic for WVP-A2	470 pF 50V
C12-14	ECEA1CSS100	Electrolytic	10 µF 16V
C15	ECEA1ESS4R7	Electrolytic	4.7 µF 25V
C16	YF426390CHJS	Ceramic	39 pF 50V
C17	YF426221SLKS	Ceramic	220 pF 50V
C18	ECEA0JS221	Electrolytic	220 µF 6.3V
C19	ECEA1ASS470	Electrolytic	47 µF 10V
C20	ECEA1AU221	Electrolytic	220 µF 10V
C21	ECQP1432JZ	Plastic	4300 pF 100V
C22	ECQE2473KS	Plastic	0.047 µF 250V
C23	ECEA2AS3R3	Electrolytic	3.3 µF 100V
C24	ECEA2AS010	Electrolytic	1 µF 100V
C25	ECQE2473KS	Plastic	0.047 µF 250V
C26	DE979B152K	Ceramic	1500 pF 50V
C27	ECKF1H331KB	Ceramic for WVP-A2	330pF 50V
C30	ECEA1AN220S	Electrolytic	22 µF 10V
CT1	ECRHA040E11	Trimmer Capacitor	40 pF
L1	ELEMH8R2KA	Coil	8.2 µH
L2	ELEMH101KA	Coil	100 µH
L3	YFVC101J	Coil	100 µH
T1	ECXC0077	Flyback Transformer	
X1	KF38J	Crystal Oscillator	
X2	KBR4R0M7	Crystal Oscillator	4 MHZ
J1,2	ERJ8GCSJ0R00	Jumper Resistor for WVP-A1	
J3-8	ERJ8GCSJ0R00	Jumper Resistor	
J9	ERJ8GCSJ0R00	Jumper Resistor for WVP-A2	
CN1-JM	EMCS0950Z	9 pin Jack Male for WVP-A1	
	EMCS1150Z	11 pin Jack Male for WVP-A2	

MODEL WVP-A1E/WVP-A1N
WVP-A2E/WVP-A2N

SYM-BOL NO.	PART NO.	DESCRIPTION
CN2-JM	EMCS0750Z	7 pin Jack Male for WVP-A2
CN3-JM	EMCS0450Z	4 pin Jack Male for WVP-A1
	EMCS0550Z	5 pin Jack Male for WVP-A2
CN4-JM	YF742J23	7 pin Jack Male for WVP-A1
	YF742J210	10 pin Jack Male for WVP-A2
CN5-JM	EMCS0350Z	3 pin Jack Male
CN6-JM	EMCS0650Z	6 pin Jack Male
CN7-JM	EMCS1350Z	13 pin Jack Male
CN8-JM	EMCS0750Z	7 pin Jack Male
CN9	YFS8621J606	IC Socket
CN10,11-JM	EMCS0250Z	2 pin Jack Male
M59	YFV2HA0141A4	Microprocessor Shield Case

YFVKY00A1E6A
ELECTRIC VIEWFINDER BOARD

PCB6	* YFVKY00A1E6A	Printed Circuit Board Assy	
IC1	AN2510S	IC	
Q1	2SD1083	Transistor	
Q2	2SB709AQRS	Transistor	
D1	MA151K	Diode	
R1	ERJ8GCSK3R9	Carbon	3.9 ohms 1/8W
R2	ERJ8GCSJ151	Carbon	150 ohms 1/8W
R3	ERJ8GCSJ330	Carbon	33 ohms 1/8W
R4	ERJ8GCSG512	Carbon	5.1K ohms 1/8W
R5	ERJ8GCSJ472	Carbon	4.7K ohms 1/8W
R6	ERJ8GCSJ560	Carbon	56 ohms 1/8W
R7	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R8	ERJ8GCSJ512	Carbon	5.1K ohms 1/8W
R9	ERJ8GCSJ623	Carbon	62K ohms 1/8W
R10	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R11	ERJ8GCSJ561	Carbon	560 ohms 1/8W
R12	ERJ8GCSJ334	Carbon	330K ohms 1/8W
R13	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R14	ERD25TJ275	Carbon	2.7M ohms 1/4W
R15	ERD25TJ475	Carbon	4.7M ohms 1/4W
R16	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R17	ERJ8GCSJ472	Carbon	4.7K ohms 1/8W
R18	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R19	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R20	ERJ8GCSJ101	Carbon	100 ohms 1/8W
R21	ERJ8GCSJ105	Carbon	1M ohms 1/8W
VR1	EVN2DCA00B12	Variable Resistor	100 ohms
VR2	EVN2DCA00BQ3	Variable Resistor	4.7K ohms
VR3	EVM45GA00BV6	Variable Resistor	5.6M ohms
VR4	EVN2DCA00BQ3	Variable Resistor	4.7K ohms
VR5	EVN2DCA00B16	Variable Resistor	1M ohms
C1	ECEA0JSS221	Electrolytic	220 µF 6.3V
C2	ECEA1HN010S	Electrolytic	1 µF 50V
C3	ECEA1ASS470	Electrolytic	47 µF 10V
C4	ECEA1AF470	Electrolytic	47 µF 10V
C5	ECQV05824JZ	Plastic	0.82 µF 50V
C6	ECQP1152JZ	Plastic	1500 pF 100V
C7	ECEA1CSS100	Electrolytic	10 µF 16V
C8	YF426223XKS	Ceramic	0.022 µF 50V

SYM-BOL NO.	PART NO.	DESCRIPTION	
C9	ECQV1H224JZ	Plastic	0.22 µF 50V
C10	YF426911CHJS	Ceramic	910 pF 50V
C11	ECEA1ESS4R7	Electrolytic	4.7 µF 25V
C12,13	ECEA1ASS470	Electrolytic	47 µF 10V
C14	ECEA10Z100	Electrolytic	100 µF 10V
C15	ECEA1ASS221	Electrolytic	220 µF 10V
C16 ⚠	ECQP1512JZ	Plastic	5100 pF 100V
C17,18	DE979B152K	Ceramic	1500 pF 50V
C19	ECQV05823JZ	Plastic	0.082 µF 50V
C20	YF426181SLJS	Ceramic	180 pF 50V
C21	ECEA1HSS010	Electrolytic	1 µF 50V
L1	YFVC101J	Coil	100 µH
L2	ELH5L62	Coil	
L3	YFUD10A500UH	Coil	
L101	ELEMH101KA	Coil	100µH
T1 ⚠	YFHIPAKEVFA1	Flyback Transformer	
CN1-JM	EMCS0450Z	4 pin Jack Male	
M76	YFV4JA0068B4	Earth Spring	

YFVKY00A1E7A
SUB PROCESS BOARD

PCB7	* YFVKY00A1E7A	Printed Circuit Board Assy	
IC5	TC4053BF	IC	
Q2,12	2SD601-QRS	Transistor	
Q16	2SD601-QRS	Transistor	
Q19	2SC2404-CD	Transistor	
D10	MA151K	Diode	
R29,32	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R33	ERJ8GCSJ123	Carbon	12K ohms 1/8W
R64	ERJ8GCSJ622	Carbon	6.2K ohms 1/8W
R65	ERJ8GCSJ472	Carbon	4.7K ohms 1/8W
R103	ERJ8GCSJ562	Carbon	5.6K ohms 1/8W
R106	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R107	ERJ8GCSJ184	Carbon	180K ohms 1/8W
R108	ERJ8GCSJ822	Carbon	8.2K ohms 1/8W
R109	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R111	ERJ8GCSJ683	Carbon	68K ohms 1/8W
R113	ERJ8GCSJ272	Carbon	2.7K ohms 1/8W
R115	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R118	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R130	ERJ8GCSJ822	Carbon	8.2K ohms 1/8W
R131	ERJ8GCSJ182	Carbon	1.8K ohms 1/8W
R132	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R143	ERJ8GCSJ561	Carbon	560 ohms 1/8W
R144	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R147	ERJ8GCSJ272	Carbon	2.7K ohms 1/8W
R153	ERJ8GCSJ393	Carbon	39K ohms 1/8W
C23	YF426470SLKS	Ceramic	47 pF 50V
C24	ECEA1ASS470	Electrolytic	47 µF 10V
C51	YF426102XMS	Ceramic	1000 pF 50V
C62	YF426104DMS	Ceramic	0.1 µF 50V
C74	YF426470SLKS	Ceramic	47 pF 50V
C99	ECEA1ASS470	Electrolytic	47 µF 10V
CT3	YFTZ03P600YR	Trimmer Capacitor	
CN1,2	YFIH1020-9	CONNECTOR	

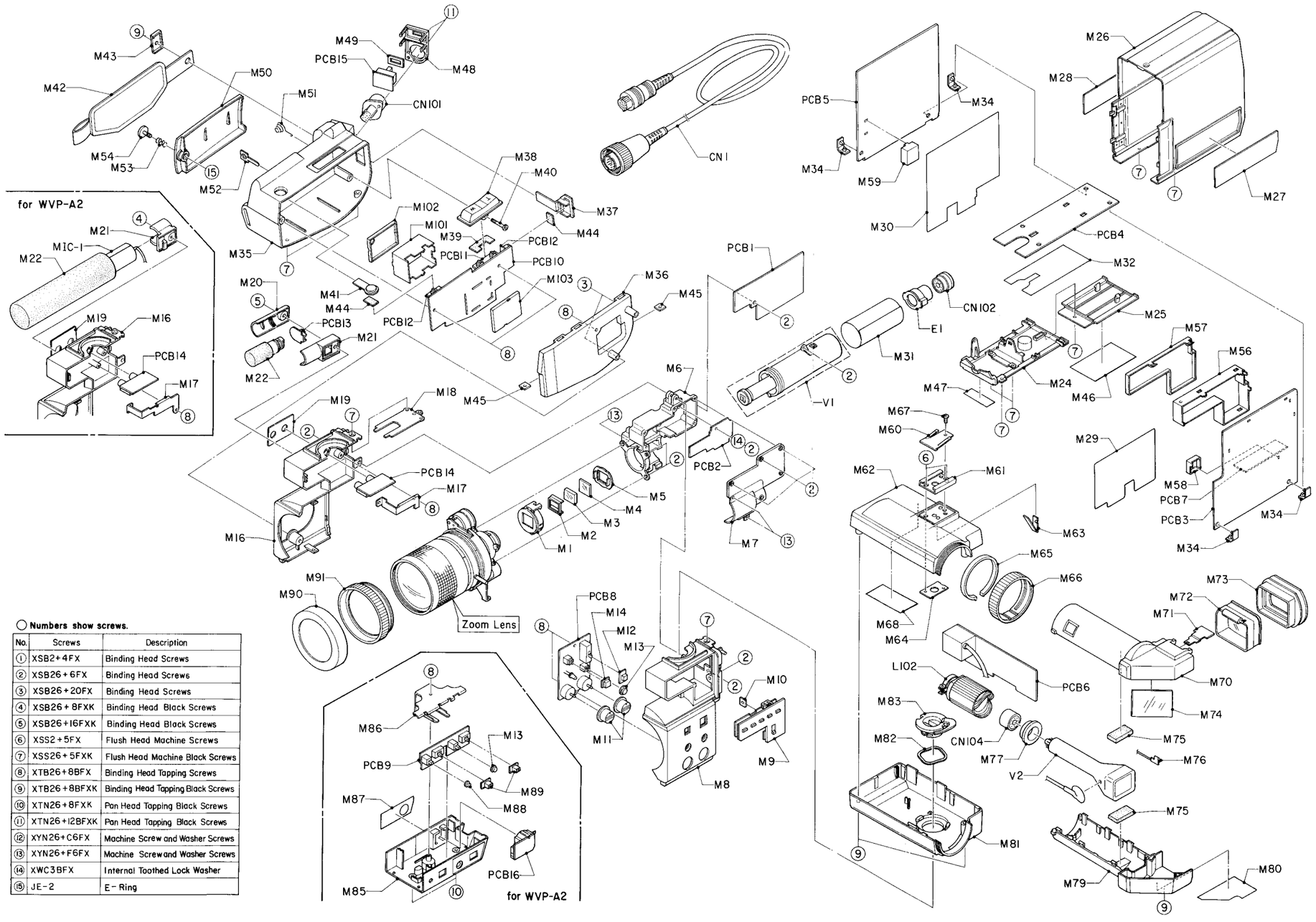
SYM-BOL NO.	PART NO.	DESCRIPTION	
YFVKY00A1E9A for WVP-A1 YFVKY00A2E9A for WVP-A2 CONTROL-1 BOARD			
PCB8	* YFVKY00A1E9A	Printed Circuit Board Assy	
	* YFVKY00A2E9A	Printed Circuit Board Assy	
Q1	2SB641-QRS	Transistor	
D1	LN29WP	LED	
R1	ERD10TJ821	Carbon	820 ohms 1/8W
R2	ERD10TJ331	Carbon	330 ohms 1/8W
R3	ERD10TJ182	Carbon	1.8K ohms 1/8W
R4	ERD10TJ332	Carbon	3.3K ohms 1/8W
R5	ERD10TJ223	Carbon	22K ohms 1/8W
R6	ERD10TJ563	Carbon	56K ohms 1/8W
R7	ERD10TJ272	Carbon	2.7K ohms 1/8W
R8	ERD10TJ103	Carbon	10K ohms 1/8W
R9	ERD10TJ561	Carbon	560 ohms 1/8W
VR4	YFK111A-10KB	Variable Resistor	10K ohms
VR5	YFK111A-30KB	Variable Resistor	30K ohms
SW1	VSP0152	Push Switch	
SW2	VSS0105	Slide Switch	
SW3	VSP0152	Push Switch	
CN1-JM	EMCS0250ZL	2 pin Jack Male for WVP-A2	
YFVKZ00A2E4A for WVP-A2 CONTROL-2 BOARD			
PCB9	* YFVKZ00A2E4A	Printed Circuit Board Assy	
SW1	YWSSS322	Slide Switch	
SW2	VSP0152	Push Switch	
SW3	YWSSS322	Slide Switch	
SW4	YFSPH222A	Slide Switch	
YFVKA00A1E1A for WVP-A1 YFVKA00A2E1A for WVP-A2 POWER BOARD			
PCB10	* YFVKA00A1E1A	Printed Circuit Board Assy	
	* YFVKA00A2E1A	Printed Circuit Board Assy	
IC1	NJM2048MC	IC	
IC2	NJM3415M	IC	
IC3	NJM2903M	IC	
IC4	NJM3414M	IC	
Q1	2SB837-CD	Transistor	
Q2	2SD601-QRS	Transistor	
Q3	2SB709-QRS	Transistor	
Q4	2SB793-RS	Transistor	

SYM-BOL NO.	PART NO.	DESCRIPTION	
Q5,6	2SB709-QRS	Transistor	
Q7	2SD601-QRS	Transistor	
Q8	2SD973-QRS	Transistor	
Q9,10	2SB710-QRS	Transistor	
Q11	2SD1030RST	Transistor	
Q12	2SC2404-CD	Transistor	
Q13	2SD1030-T	Transistor	
Q14	2SD1030RST	Transistor	
Q15	2SD602-QRS	Transistor	
Q16-19	2SB709-QRS	Transistor	
D1	EK14	Diode	
D2	HZ3BLL	Diode	
D3,4	MA151K	Diode	
R1	ERJ8GCSJ362	Carbon	3.6K ohms 1/8W
R2	ERJ8GCSJ682	Carbon	6.8K ohms 1/8W
R3	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R4	ERJ8GCSG332	Carbon	3.3K ohms 1/8W
R5	ERJ8GCSG303	Carbon	30K ohms 1/8W
R6	ERJ8GCSJ912	Carbon	9.1K ohms 1/8W
R7	ERJ8GCSG222	Carbon	2.2K ohms 1/8W
R8	ERJ8GCSJ224	Carbon	220K ohms 1/8W
R9	ERJ8GCSJ561	Carbon	560 ohms 1/8W
R10	ERJ8GCSJ332	Carbon	3.3K ohms 1/8W
R11	ER0S2CKF3901	Metal	3.9K ohms 1/8W
R12	ER0S2CKF5601	Metal	5.6K ohms 1/8W
R13	ERJ8GCSJ203	Carbon	20K ohms 1/8W
R14	ERJ8GCSG123	Carbon	12K ohms 1/8W
R15	ERJ8GCSG153	Carbon	15K ohms 1/8W
R16	ERJ8GCSJ150	Carbon	15 ohms 1/8W
R17	ERJ8GCSJ223	Carbon	22K ohms 1/8W
R18	ERJ8GCSK225	Carbon	2.2M ohms 1/8W
R19	ERJ8GCSJ154	Carbon	150K ohms 1/8W
R20	ERJ8GCSK225	Carbon	2.2M ohms 1/8W
R21	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R22	ERJ8GCSJ391	Carbon	390 ohms 1/8W
R23	ERJ8GCSG303	Carbon	30K ohms 1/8W
R24	ERJ8GCSG512	Carbon	5.1K ohms 1/8W
R25	ERJ8GCSJ224	Carbon	220K ohms 1/8W
R26	ERJ8GCSK225	Carbon	2.2M ohms 1/8W
R27	ERJ8GCSK2R7	Carbon	2.7 ohms 1/8W
R28	ERJ8GCSJ333	Carbon	33K ohms 1/8W
R29	ERJ8GCSJ563	Carbon	56K ohms 1/8W
R30	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R31	ERJ8GCSJ104	Carbon	100K ohms 1/8W
R32	ERJ8GCSJ154	Carbon	150K ohms 1/8W
R33	ERJ8GCSJ333	Carbon	33K ohms 1/8W
R34	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R35	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R36	ERJ8GCSJ153	Carbon	15K ohms 1/8W
R37	ERJ8GCSG752	Carbon	7.5K ohms 1/8W
R38,39	ERJ8GCSJ103	Carbon	10K ohms 1/8W
R40	ERJ8GCSG752	Carbon	7.5K ohms 1/8W
VR1	EVN2DCA00BY4	Variable Resistor	
C1	ECEA1AF470	Electrolytic	47 µF 10V
C2	ECEA1EF100	Electrolytic	10 µF 25V
C3	YF426102XMS	Ceramic	1000 pF 50V

SYM-BOL NO.	PART NO.	DESCRIPTION	
C4	ECEA1EF330	Electrolytic	33 µF 25V
C5	ECEA1AS221	Electrolytic	220 µF 10V
C6	YF426331CHJS	Ceramic	330 pF 50V
C7	ECEA1ASS470	Electrolytic	47 µF 10V
C8	ECEA1AF101	Electrolytic	100 µF 10V
C9	ECEA1ASS470	Electrolytic	47 µF 10V
C10	ECEA1CN100S	Electrolytic	10 µF 16V
C11	ECEA1ESS4R7	Electrolytic	4.7 µF 25V
C12	YF426473XMS	Ceramic	0.047 uF 50V
C13	ECEA1HSS2R2	Electrolytic	2.2 µF 50V
C14	ECEA0JSS101	Electrolytic	100 µF 6.3V
C15	YF426473XMS	Ceramic	0.047 µF 50V
C16	YF426102XMS	Ceramic	1000 pF 50V
C18	ECEA1HNR47	Electrolytic	0.47 µF 50V
C19	YF426271SLJS	Ceramic	270 pF 50V
C20	ECEA1ASS470	Electrolytic	47 µF 10V
C21-23	YF426473XMS	Ceramic	0.047 µF 50V
L1	YFPC470K	Coil	47 µH
L2	YFPF331K	Coil	330 µH
L3	YFPC470K	Coil	47 µH
T1	YFVL801	Flyback Transformer	
F1 ⚠	ICPF25	Current Fuse	1A
CN1,2-JM	EMCS0250Z	2 pin Jack Male	
CN3,4-JM	EMCS0350Z	3 pin Jack Male	
M101	YFV2HA0086A4	Shield Case	
M102	YFV2HA0087A4	Shield Cover C	
M103	YFV2HA0088A4	Shield Cover D	
YFVKC00A1E1A ZOOM SWITCH BOARD			
PCB11	*YFVKC00A1E/A	Printed Circuit Board Assy	
SW1,2	VSP0152	Push Switch	
YFVKD00A1E1A REC SWITCH BOARD			
PCB12	*YFVK001A1E/A	Printed Circuit Board Assy	
SW1	VSP0152	Push Switch	
YFVKZ00A1E1A FOR WVP-A1 INT MICROPHONE BOARD			
PCB13	*YFVKZ00A1E1A	Printed circuit board ass'y	
MIC1	WM4044	Microphone unit	
CN1-JM	EMCS0250ZL	2-pin jack male	
M20	YFV5KA0039A3	Microphone case	
M21	YFV5KA0040A3	Microphone base	

SYM-BOL NO.	PART NO.	DESCRIPTION
YFVKZ00A1E2A YFVLZ00A2E2A EXT MIC BOARD		
PCB14	* YFVKZ00A1E2A	Printed Circuit Board Assy
	YFVKZ00A2E2A	Printed Circuit Board Assy
JK1	YFM0JB21M	Jack for WVP-A1
	YFM0JB20M	Jack for WVP-A2
JK2	YFM0JB21M	Jack for WVP-A1
	YFM0JB20M	Jack for WVP-A2
YFVKZ00A1E3A STANDBY SWITCH BOARD		
PCB15	*YFVKZ00A1E3A	Printed Circuit Board Assy
SW1	YFSSY022L8	Standby Swich
YFVKZ00A2E5A for WVP-A2 CONNECTOR BOARD		
PCB16	* YFVKZ00A2E5A	Printed Circuit Board Assy
CN1	YFRP610RDGS	8 pin Connector
ACCESSORY PARTS/PACKAGING PARTS		
BAT1	UM3NEP	Battery for WVP-A1E/WVP-A2E
	UM3NE	Battery for WVP-A1N/WVP-A2N
M110	* YFV8QA0485AN	Operating instruction for WVP-A1E
	* YFV8QA0486AN	Operating instruction for WVP-A1E/S
	* YFV8QA0487AN	Operating instruction for WVP-A1N
	* YFV8QA0583AN	Operating instruction for WVP-A1N/A
	* YFV8QA0572AN	Operating instruction for WVP-A2E
	* YFV8QA0573AN	Operating instruction for WVP-A2E/S
	* YFV8QA0574AN	Operating instruction for WVP-A2N
	* YFV8QA0584AN	Operating instruction for WVP-A2N/A
M111	MET-77025902	Service guide for WVP-A1E/WVP-A2E
M112	19998700331	Warranty card for WVP-A1E/B, WVP-A2E/B
	19998700308	Warranty card for WVP-A1E/G, WVP-A2E/G
	YFV8UA0004A4	Warranty card for WVP-A1N/A, WVP-A2N/A
M113	YFV8RA0045AN	Pocket book for WVP-A2E
	YFV8RA0046AN	Pocket book for WVP-A2E/S
	YFV8RA0047AN	Pocket book for WVP-A2N
M114	YFVAKA0255AN	Title Card Assy for WVP-A2E
	YFVAKA0257AN	Title Card Assy for WVP-A2N
M115	XZB20X35A02	Polyethylene bag for printed matter
M116	XZB38X50A03	Polyethylene bag for camera
M117	YWT10X35C03	Polyethylene bag for microphone title card
M120	* YFV9CA0407AN	Packaging for WVP-A1E
	* YFV9CA0408AN	Packaging for WVP-A1N
	YFV9CA0436AN	Packaging for WVP-A2

EXPLODED VIEW OF COLOUR VIDEO CAMERA

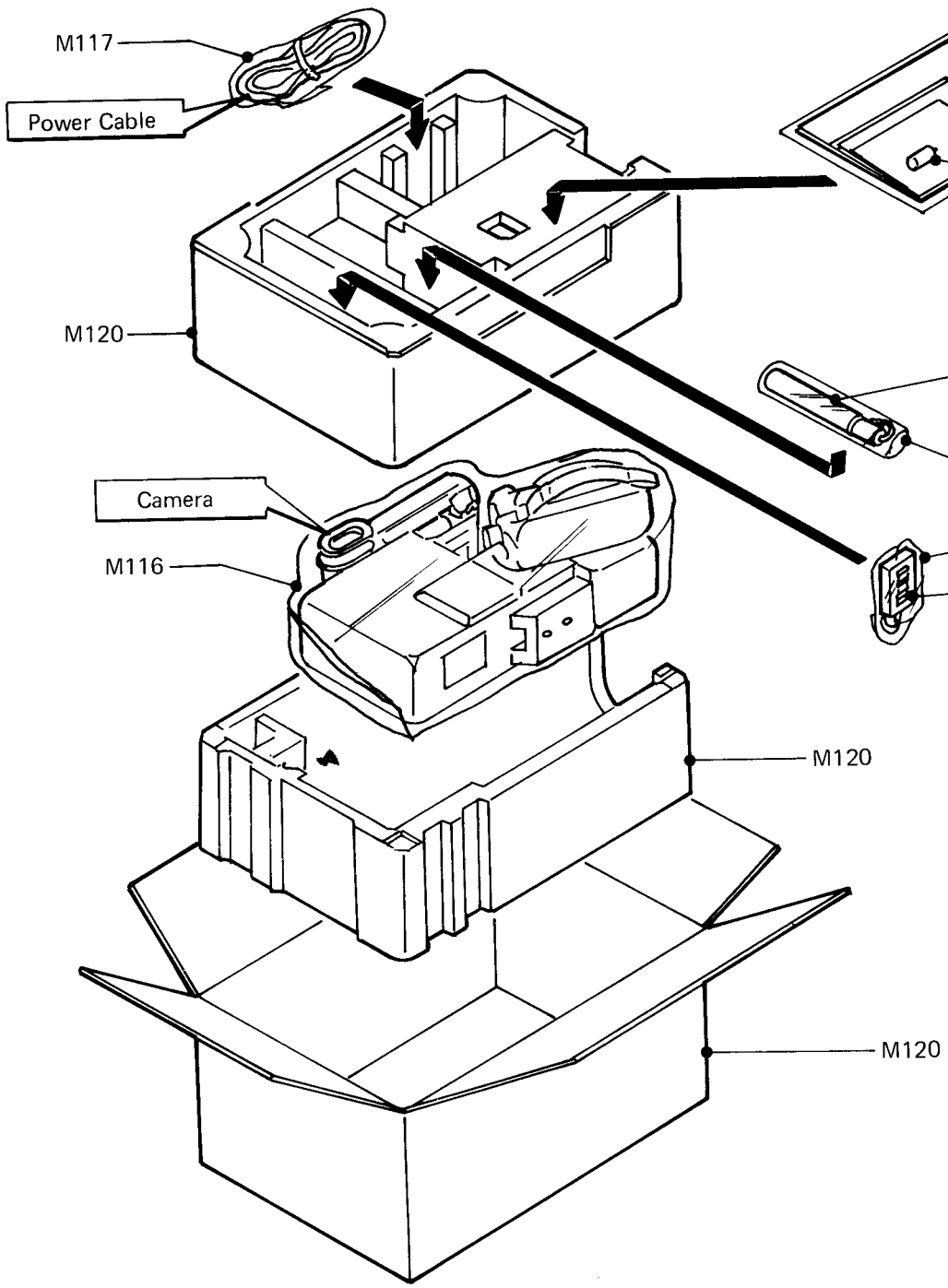


○ **Numbers show screws.**

No.	Screws	Description
①	XSB2+4FX	Binding Head Screws
②	XSB26+6FX	Binding Head Screws
③	XSB26+20FX	Binding Head Screws
④	XSB26+8FXK	Binding Head Black Screws
⑤	XSB26+16FXK	Binding Head Black Screws
⑥	XSS2+5FX	Flush Head Machine Screws
⑦	XSS26+5FXK	Flush Head Machine Black Screws
⑧	XTB26+8BFX	Binding Head Tapping Screws
⑨	XTB26+8BFXK	Binding Head Tapping Black Screws
⑩	XTN26+8FXK	Pan Head Tapping Black Screws
⑪	XTN26+12BFXK	Pan Head Tapping Black Screws
⑫	XYN26+C6FX	Machine Screw and Washer Screws
⑬	XYN26+F6FX	Machine Screw and Washer Screws
⑭	XWC3BFX	Internal Toothed Lock Washer
⑮	JE-2	E-Ring

PCB1	Deflection Board
PCB2	Preamplifier Board
PCB3	Process-1 Board
PCB4	Process-2 Board
PCB5	Microprocessor Board
PCB6	Electric Viewfinder Board
PCB7	Sub Process Board
PCB8	Control-1 Board
PCB9	Control-2 Board
PCB10	Power Board
PCB11	Zoom Switch Board
PCB12	REC Switch Board
PCB13	INT Microphone Board
PCB14	EXT Microphone Board
PCB15	Standby Switch Board
PCB16	Connector Board
V1	YFS4161PK1T
V2	M03JBX8WW
L102	ELY10V306A
E1	YFBIASL1TE50
MIC1	WM-4031A
CN1	EMCU10B4T34V
CN101	EMCTMA21D02
CN102	YFS8621J606
M1	YFV3CA0039B3
M2	YFV3CA0041A4
M3	YFXTALLPFA-1
M4	YFIR1R6X10SQ
M5	YFV3CA0040C4
M6	YFV2KB0076A2
M7	YFV2CA0047A2
M8	YFV5EA0195A2
M9	YFVAKA0241AN
M10	YFV1FA0008A4
M11	YFV5RA0043A4
M12	YFV5RA0044A4
M13	YFV6JA0019A4
M14	YFV6JA0020A4
M16	YFV5EA0196B2
M17	YFV2SA0124A4
	YFV2SA0135A4
M18	YFV2SA0123A4
M19	YFV7QA0506A4
M20	YFV5KA0039A4
M21	YFV3CA0046A4
	YFV5KA0040A3
M22	YFM6CA0023A4
M24	YFV9AA0183BN
	YFV9AA0194AN
M25	YFV5EA0187A3
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	YFV9AA0195AS
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	YFV7QB0504A4
M28	YFV7QA0505A4
	YFV7QB0505A4
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M52	YFV5JA0053A4
M53	YFV4JA0054A4
M54	YFV1EA0022A4
M56	YFV2HA0142A3
M57	YFV2HA0143A3
M58	YFV2HA0144A4
M59	YFV2HA0141A4
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M61	YFV5MA0002B4
M62	YFV5EA0202A2
	YFV5EB0202A2
M63	YFV4JA0071A4
M64	YFV1FA0010A4
M65	YFV4FA0002A4
M66	YFV3FA0016A4
M67	YWCC704FM02
M68	YFV7MA0096A4
M70	YFV5EA0204A2
M71	YFV4JA0067A4
M72	YFVYF0364
M73	YFV5GA0031A4
M74	YFV1UA0006A4
M75	YFV2FA0072A4
M76	YFV4JA0068B4
M77	YFV2FA0014B4
M79	YFV5EA0205A2
M80	YFV7MA0097A4
M81	YFV5EA0203A2
M82	YFV1KA0018A4
M83	YFV2TA0038A3
M85	YFV5EB0215A2
M86	YFV2SA0129A4
M87	YFV7QA0531A4
M88	YFV6JA0026A4
M89	YFV5RA0035A4
M90	YF510340
M91	YF510339
M92	YF510355
M101	YFV2HA0086A4
M102	YFV2HA0087A4
M103	YFV2HA0088A4

PACKAGING



BAT1	UM3NEP
	UM3NE
M110	YFV8QA0485AN
	YFV8QA0486AN
	YFV8QA0487AN
	YFV8QA0583AN
	YFV8QA0572AN
	YFV8QA0573AN
	YFV8QA0574AN
	YFV8QA0584AN
M111	MET-77025902
M112	19998700331
	19998700308
	YFV8UA0004A4
M113	YFV8RA0045AN
	YFV8RA0046AN
	YFV8RA0047AN
M114	YFVAKA0255AN
	YFVAKA0257AN
M115	XZB20X35A02
M116	XZB38X50A03
M117	YWT10X35C03
M120	YFV9CA0407AN
	YFV9CA0408AN
	YFV9CA0436AN