

HA118010MP

Preliminary

4-Channel Processor for Video Cameras

T-77-17

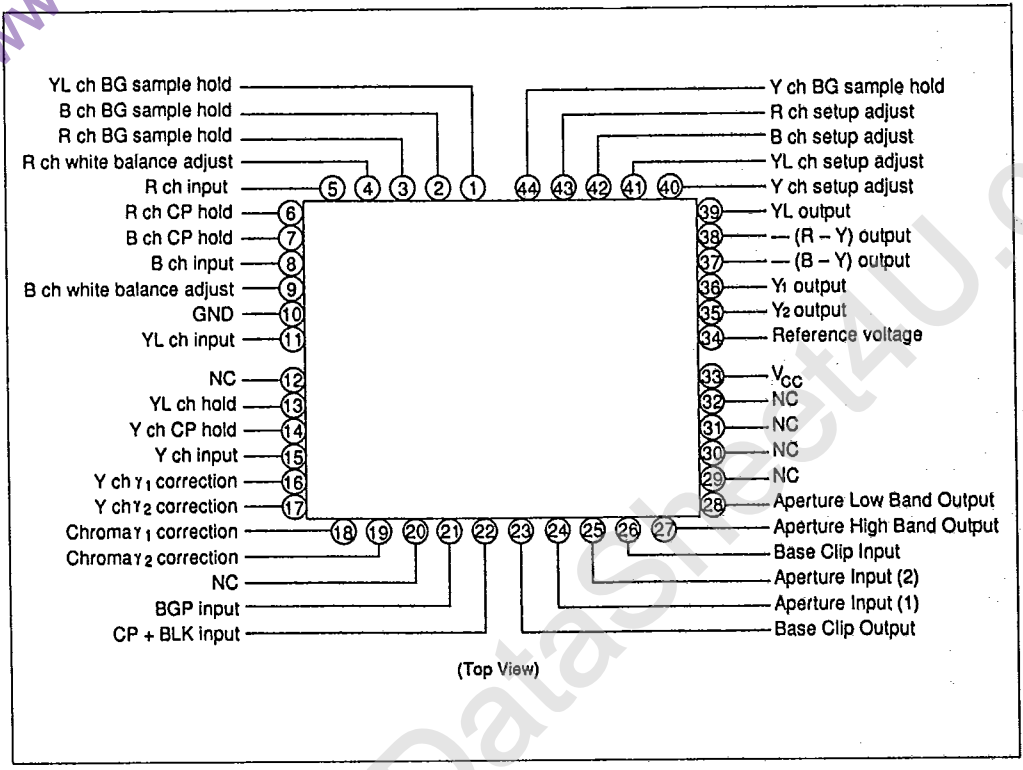
Features

- Low supply voltage
- γ correction circuit plus on-chip white balance, essential features for MOS and CCD color cameras

Ordering Information

| Type No. | Package |
|------------|--------------------------|
| HA118010MP | 44-pin Plastic QFI (MSP) |

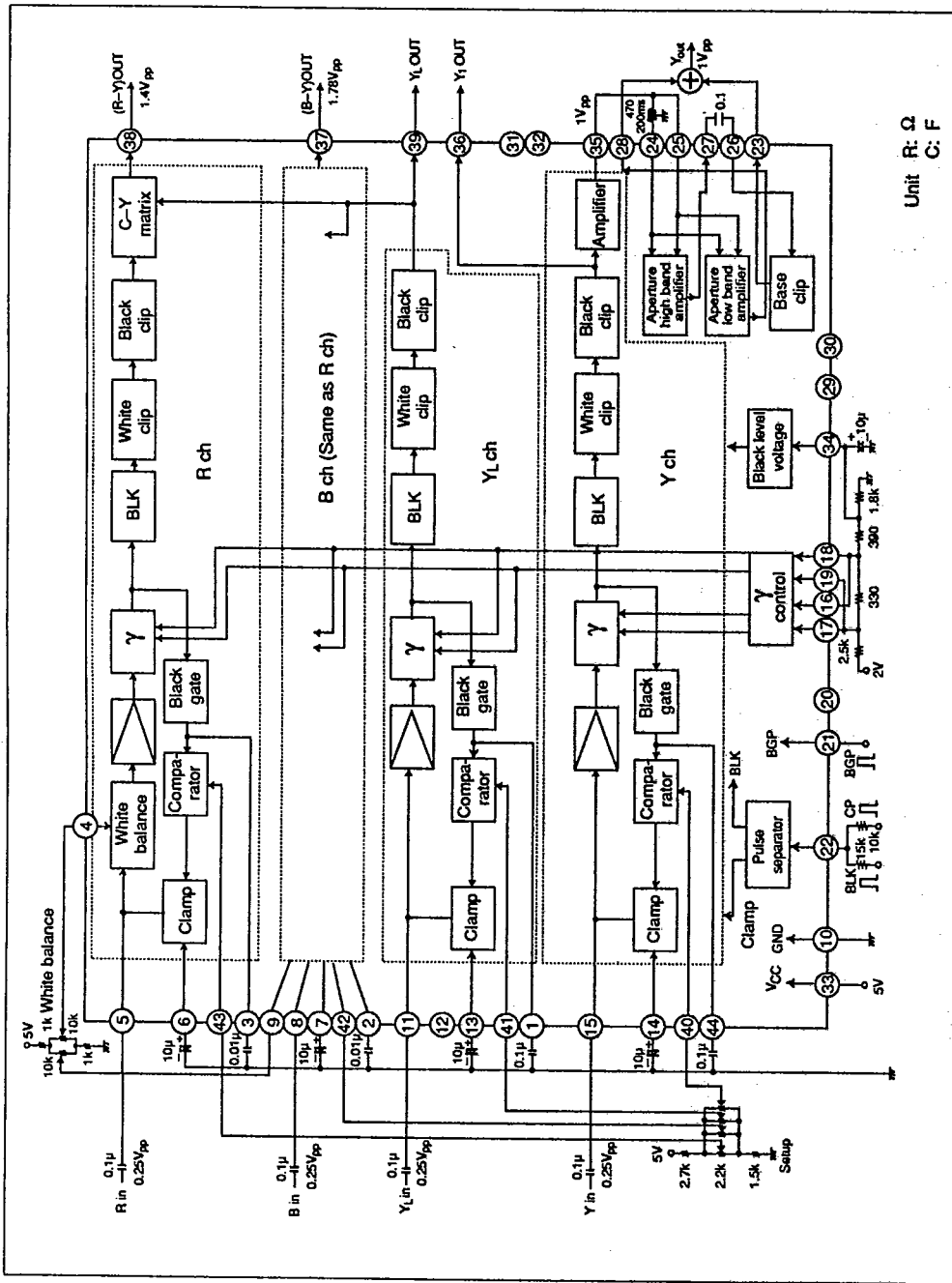
Pin Arrangement



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Block Diagram



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Absolute Maximum Ratings (Ta = 25°C)

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| Item | Symbol | Rating | Unit |
|-------------------------------|------------------|-------------|------|
| Supply Voltage | V _{CC} | 7.0 | V |
| Power Dissipation | P _T * | 350 | mW |
| Operating Temperature | T _{opr} | -10 to +75 | °C |
| Storage Temperature | T _{stg} | -55 to +125 | °C |
| Recommended Operating Voltage | V _{op} | 4.9 to 5.5 | V |

Note: * Value at Ta = 75° C



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Electrical Characteristics ($V_{CC} = 5V, T_a = 25^\circ C$)

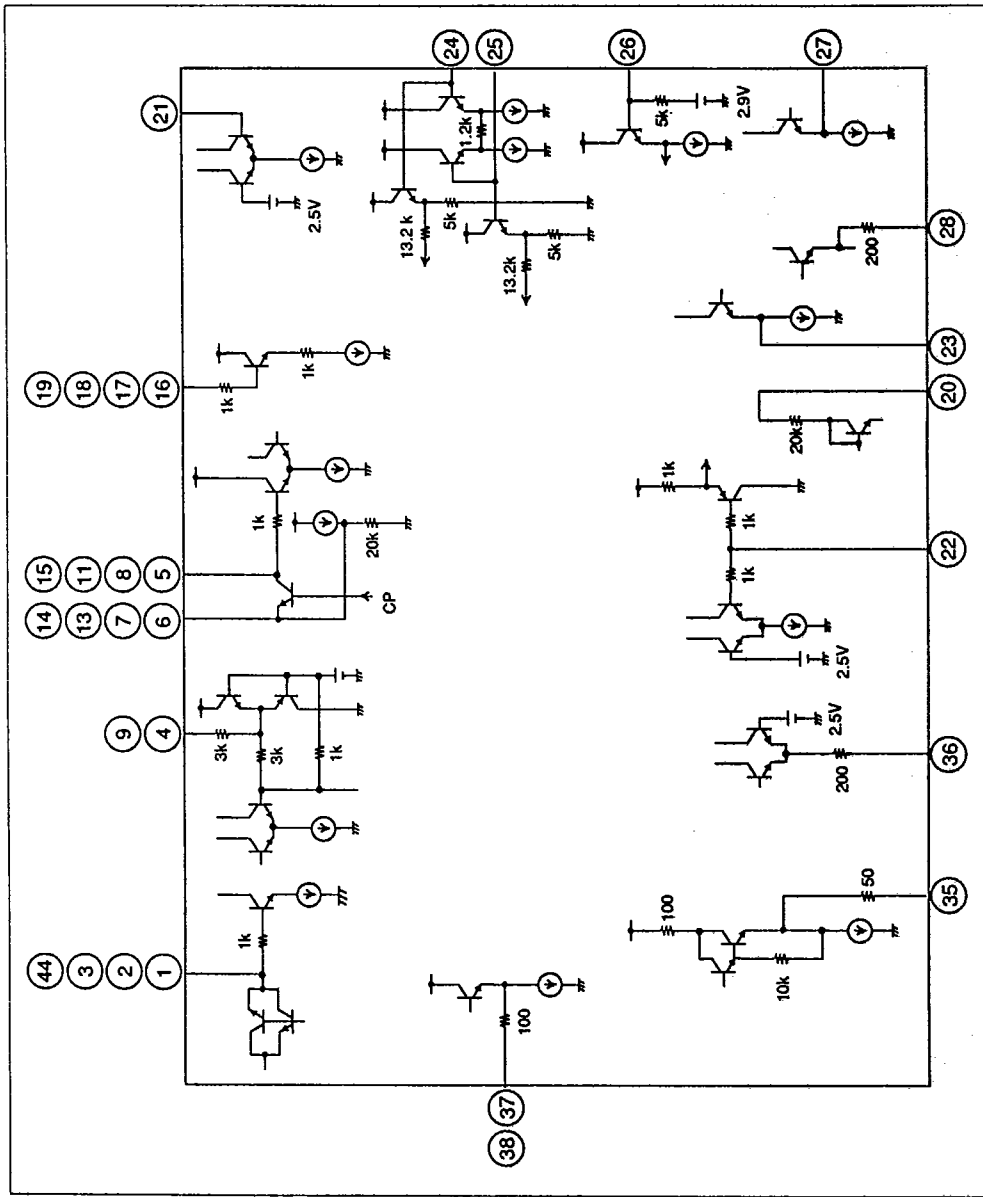
| Item | Symbol | Min | Typ | Max | Unit | Test Condition |
|-----------------------------------|--------------|-------|------|------|------------------|---|
| Supply Current | I_{CC} | 22.0 | 34.3 | 45.3 | mA | Pin 33 |
| Rated Input Voltage | e_{in} | - | 0.25 | - | V_{pp} | Pins 5, 8, 11, 15 |
| Rated Output Voltage (Y) | e_{oY} | - | 1.0 | - | V_{pp} | Pin 35 |
| Rated Output Voltage (R - Y) | e_{oR} | - | 1.40 | - | V_{pp} | Pin 38 |
| Rated Output Voltage (B - Y) | e_{oB} | - | 1.78 | - | V_{pp} | Pin 37 |
| Output DC Voltage (Y_1) | E_{Y1} | 1.15 | 1.65 | 2.15 | V | Pin 36 |
| Output DC Voltage (Y_2) | E_{Y2} | 1.30 | 1.80 | 2.30 | V | Pin 35 |
| Output DC Voltage (R - YL) | E_R | 2.65 | 3.15 | 3.65 | V | Pin 38 |
| Output DC Voltage (B - YL) | E_B | 2.65 | 3.15 | 3.65 | V | Pin 37 |
| Output DC Voltage (YL) | E_{YL} | 1.60 | 1.80 | 2.00 | V | Pin 39 |
| Y ch Gain (1) | G_{Y1} | 9.1 | 10.7 | 12.1 | dB | $\gamma = 1$; pins 15 to 36 |
| Y ch Gain (2) | G_{Y2} | 11.2 | 12.8 | 14.2 | dB | $\gamma = 1$; pins 15 to 35 |
| R ch Gain | G_R | 5.0 | 6.5 | 8.0 | dB | $\gamma = 1$; pins 5 to 38, pin 4 = GND |
| B ch Gain | G_B | 5.0 | 6.5 | 8.0 | dB | $\gamma = 1$; pins 8 to 37, pin 9 = 5V |
| YL ch Gain | G_{YL} | 11.1 | 12.8 | 14.1 | dB | $\gamma = 1$; pins 11 to 39, pin 12 = 5V |
| WB Variance Range (R ch) | WBR | 10.5 | 12.5 | 13.5 | dB | Pins 5 to 38 |
| WB Variance Range (B ch) | WBB | 10.5 | 12.5 | 13.5 | dB | Pins 8 to 37 |
| Gradient Ratio (Y_{Y1}) | Y_{Y1} | 2.4 | 2.7 | 3.0 | | $\gamma = 1$ standard, pins 15 to 35 |
| Gradient Ratio (Y_{Y2}) | Y_{Y2} | 0.4 | 0.5 | 0.6 | | ↓ Pins 15 to 35 |
| Gradient Ratio (C_{Y1}) | C_{Y1} | 1.7 | 2.0 | 2.3 | | ↓ Pins 5 to 38, pins 8 to 37 |
| Gradient Ratio (C_{Y2}) | C_{Y2} | 0.5 | 0.6 | 0.7 | | ↓ Pins 5 to 38, pins 8 to 37 |
| Frequency Characteristics (Y ch) | f_Y | 3.6 | 5.0 | - | MHz | $\gamma = 1$, Pins 15 to 35 |
| Frequency Characteristics (R ch) | f_R | 2.0 | 5.0 | - | MHz | ↓ Pins 5 to 38 |
| Frequency Characteristics (B ch) | f_B | 2.0 | 5.0 | - | MHz | ↓ Pins 8 to 37 |
| Frequency Characteristics (YL ch) | f_{YL} | 1.5 | 2.7 | - | MHz | ↓ Pins 11 to 39 |
| White Clip Level | WC | 0.79 | 0.89 | 0.98 | V | Pins 15 to 36 |
| ΔW (R ch) | ΔWR | -30 | -17 | 20 | mV | Pins 5 to 38 |
| ΔW (B ch) | ΔWB | -30 | -20 | 20 | mV | Pins 8 to 37 |
| Slice Level (BLK) | EBL | 0.3 | 0.8 | 1.0 | V | Pin 22 |
| Slice Level (CP) | ECP | 2.0 | 2.5 | 3.0 | V | Pin 22 |
| Slice Level (BGP) | EGP | 2.0 | 2.5 | 3.0 | V | Pin 21 |
| Aperture Low Band Gain (1) | GaPL24 | -4.7 | -3.7 | -2.7 | dB | 100kHz 200mV _{pp} 24 to 28 |
| Aperture Low Band Gain (2) | GaPL25 | -10.3 | -9.3 | -8.3 | dB | ↓ 25 to 28 |
| Aperture High Band Gain (1) | GaPH24 | 7.8 | 9.3 | 10.8 | dB | 100kHz 100mV _{pp} 24 to 27 |
| Aperture High Band Gain (2) | GaPH25 | 7.8 | 9.3 | 10.8 | dB | ↓ 25 to 27 |
| Aperture Maximum Output Voltage | VapMAX | 1.45 | 1.8 | - | V_{pp} | 100kHz 1V _{pp} 24 to 27 |
| Aperture Band Width | fap | 4.0 | 6.0 | - | MHz | 100mV _{pp} 24 to 27 |
| Base Clip Small-amplitude Gain | GbcS | - | -14 | -8.0 | dB | 100kHz 50mV _{pp} 26 to 23 |
| Base Clip Large-amplitude Gain | GbcL | 2.0 | 3.3 | 4.6 | dB | 100kHz 1V _{pp} 26 to 23 |
| Clip Level | V_g | 155 | 180 | 195 | mV _{pp} | Pins 26 to 23 |
| Base Clip Unbalance | ΔV_g | -30 | 0 | 30 | mV | Pins 26 to 23 |



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Input/Output Equivalent Circuit

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Functional Description

Feedback Amplifier Circuit (Black Gate, Comparator, Clamp)

A feedback system has been adopted in order to stabilize the black level using a *g* compensator circuit and blanking circuit. The *black gate* holds the black level, the *comparator* compares the black level input signal with the set up level, and the *clip* fixes the black level. The gate duration of the black gate pulse (BGP) is 1μs typ, while the clamp pulse (CP) duration is set at 2μs typ.

γ Compensator Circuit

The γ compensator circuit approximates a 3-segment line. The characteristics of Y ch and C ch (R, B, YL or G) can be adjusted separately. Y ch is controlled by the voltage applied to pins 18 and 19, while C ch is controlled by the voltage applied to pins 16 and 17.

White Balance Circuit

The white balance circuit adjusts the R ch and B ch gain ratio. Figure 3 shows the white balance gain control characteristics. Independent control terminals are provided for R ch (pin 4) and B ch (pin 9), and the control characteristic of R ch is the inverse of that for B ch. Because of this, both channels can be controlled simultaneously by a single volume controller.

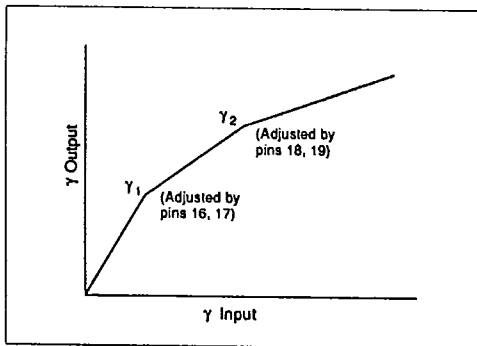


Figure 1. Example of γ Correction

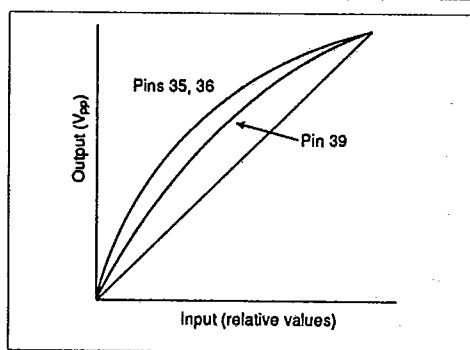


Figure 2. γ Correction Characteristics

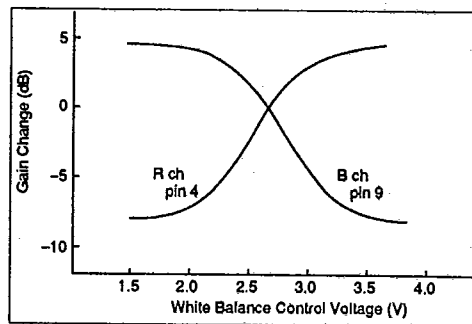


Figure 3. Graph of White Balance Gain Control Characteristics



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Input Pulse Standard Conditions

- BLK, CP Input (pin 22)
In order to keep the number of pins to a minimum, the same pin (pin 22) is used for both BLK and CP inputs. When a sandcastle waveform is input, corresponding pulses are isolated internally.
- BGP Input (pin 21)
The threshold voltage for BGP input is 2.5V typ.

Aperture Correction / Base Clip Circuit

This circuit performs aperture correction and base clip processing. Because of the high input impedance at pin 24 and pin 25, any delay in the input of the signal at pin 24 generates a reflected wave. This reflected wave, in turn is delayed when it is input at pin 25. This circuit allows aperture correction for preshoot and overshoot. Pins 24 and 25 are of reverse polarity.

Figure 6 illustrates base clip characteristics, while figures 7 and 8 illustrate operational principles of the aperture correction/base clip circuit. In figure 7, the characteristic impedance of delay line (L1) should be made equal to that of resistor (R1). The base clip volume is fixed internally at 180mV by conversion of pin 26 input. The base clip ratio can be adjusted by varying the input of pin 26. Addition of the aperture low-band signal and aperture high-band signal is performed by an external resistor matrix.

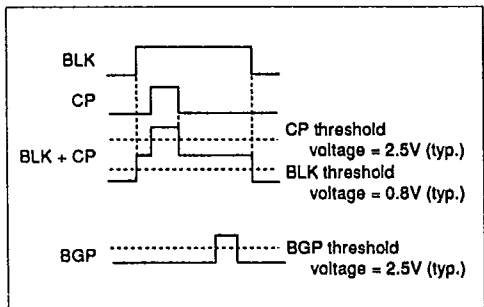


Figure 5. Input Pulse Waveform

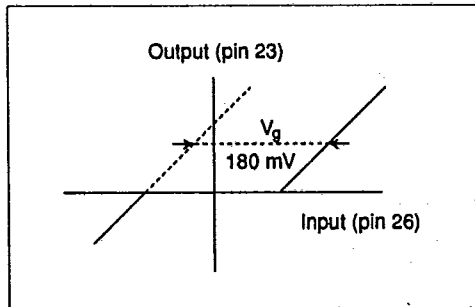


Figure 6. Base Clip Characteristics



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Setup (Pins 40 to 43) Adjustment Procedure

Focus on white light and attain white balance. Then perform the following procedures while no signal input is present.

Y System

While monitoring Y ch output, adjust pin 40 until Y ch output is at the prescribed set up level.

Chroma System

1. While monitoring YL ch output, adjust pin 41 until YL ch output reaches the prescribed set up level.
 2. While monitoring B - YL and R - YL output, adjust pins 42 and 43 until the blanking period and imaging period are at identical levels.
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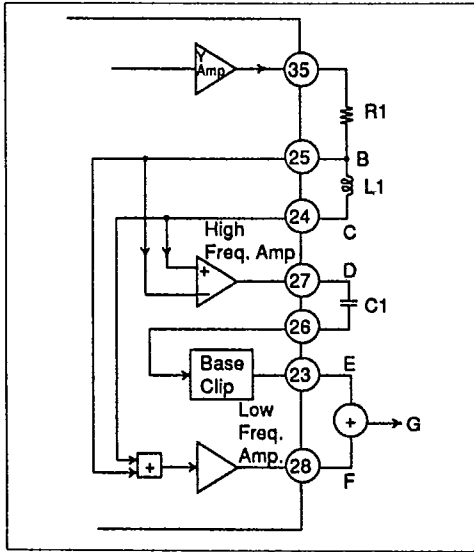


Figure 7. Aperture Correction Section

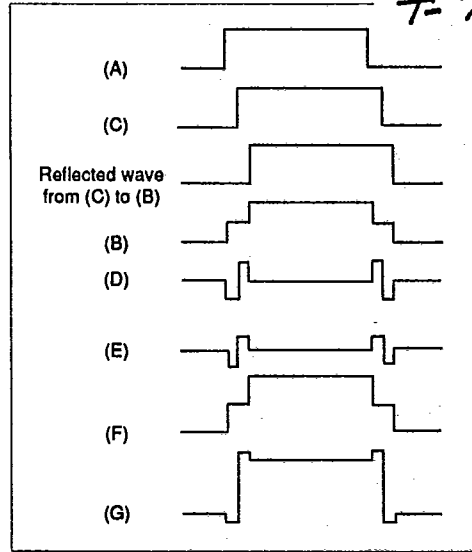


Figure 8. Operational Principle of Aperture Correction

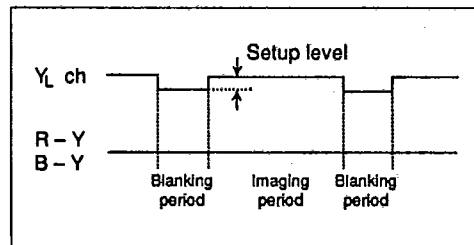


Figure 9. Setup Adjustment Procedure

