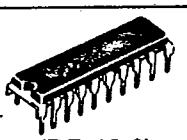
HA11423

T-77-07-11

Color TV Deflection Signal Processor

Functions

- Sync separator
- Horizontal AFC
- Horizontal oscillator
- X-ray radiation protector
- Vertical oscillator
- Vertical blanking pulse generator



(DP-16-2)

(MP-18)

Features

- On-chip blanking circuit: Simplifies output circuit design
- Constant discharge current: No vertical output linearity adjustment
- Horizontal oscillator frequency limiter: No X-ray protector malfunction
- Hold-type operation for X-ray protector
- Less reduction of impedance from frost between pins

Ordering Information

Type No.	Package
HA11423	300 mil 18 pin plastic DIP (DP-16-2)
HA11423MP	18 pin plastic QFI (MP-18)

Table 1 External Components

Part No.	Recommended Value	Larger Than Recommended Value	Smaller Than Recommended Value
R_{114} (pin 1)	100 Ω	A small h_{FE} at the output transistor may delay the leading edge of the blanking pulse	—
C_8 (pin 2)	33,000 pF	May cause ringing during the first half of the vertical output scan	Horizontal component leakage increases; may cause abnormal oscillation; may delay leading edge of blanking pulse
C_{14} (output capacitor)	180 pF	May cause blocking oscillation	May cause high-frequency oscillation
R_{101}, C_{33} (filter at pin 5)	120 Ω, 330 µF		May cause interlacing
Output transistor emitter resistor	0 Ω	A small h_{FE} at the output transistor may delay the leading edge of the blanking pulse	—
R_{109} (oscillation time constant)	24 kΩ	A small h_{FE} at the output transistor may delay the leading edge of the blanking pulse	—

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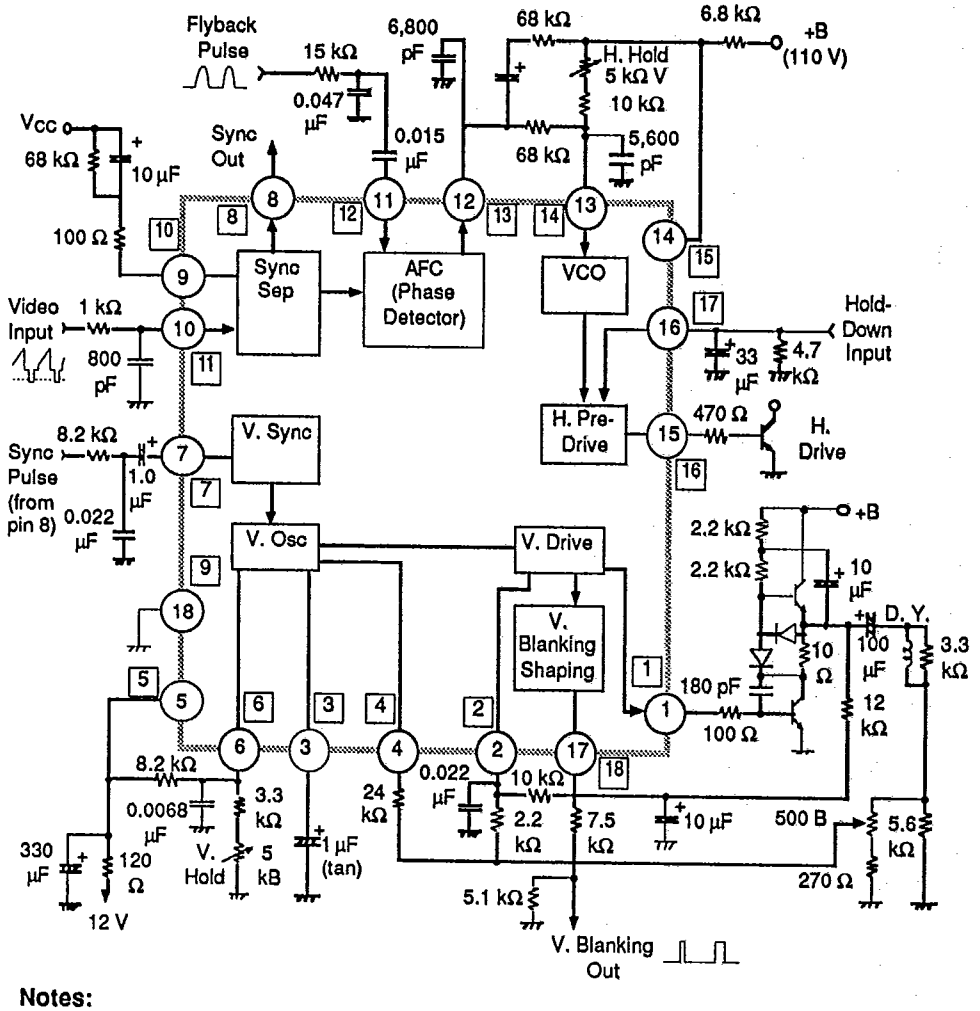
Block Diagram



Notes:
HA11423 pin numbers are enclosed in circles.
HA11423MP pin numbers are enclosed in boxes.

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Operating Principles

The HA11423 consists of a sync separation circuit, a horizontal AFC circuit, a voltage controlled oscillator (VCO), a pulse shaping circuit, a high-voltage protection circuit, a vertical oscillator, a driver, and a vertical blanking circuit.

Sync Separation Circuit

The peak-detection-type sync separator is connected to the PIF section's power supply by C_2 and R_{102} (figure 1) for excellent supply voltage ripple rejection.

R_{102} and R_{103} determine the sync separation slice level and the dynamic range.

The sync separation output is internally connected to the phase detection circuit and is output as a positive pulse at pin 8.

The sync tip DC level can be adjusted between 2.1 V and 8.5 V by changing R_{102} and R_{103}.

Horizontal AFC Circuit/Free-Running Frequency Limiter

The horizontal AFC circuit consists of a fully balanced pulse-width-type phase detector and an external lowpass filter (figure 2).

The free-running frequency limiter includes Q_{25} limit circuit to keep the horizontal osc frequency down to 14.9 kHz typ. The limiter is usually cut off because Q_{25} is reverse biased. It operates when the voltage at pin 12 goes down. During the vertical operation, the blanking signal releases the limiter to prevent the pull-in range from decreasing.

The lowpass filter in the AFC circuit consists of R_{126}, R_{127}, C_{15}, and C_{17}. The loop gain is internally adjusted to $f_c = 750$ Hz/µs typ.

The AC loop gain is determined by R_{126} and R_{127}. It can be optimized by adjusting the characteristics of the screen's upper side curl, skew, and noise under weak field.

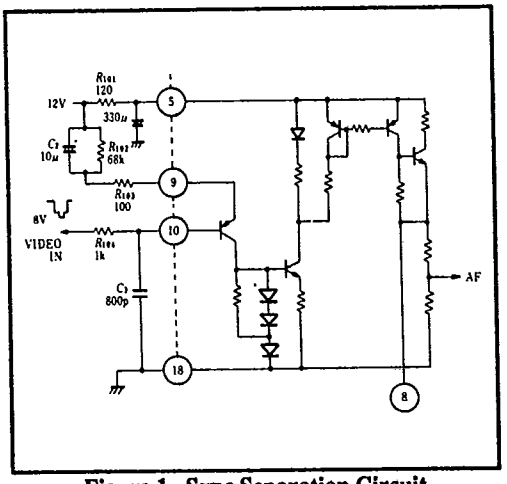

Figure 1 Sync Separation Circuit

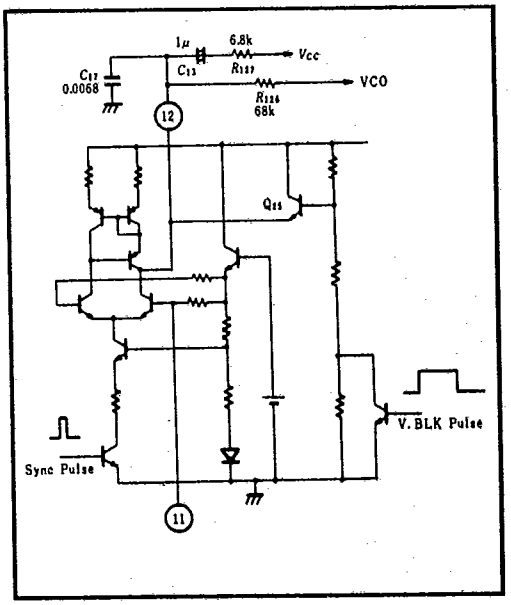

Figure 2 Horizontal AFC Circuit and Free-Running Frequency Limiter

The recommended values are:

- R_{126} = 68 kΩ
- R_{127} = 4.7–6.8 kΩ
- C_{17} = 6800 pF
- C_{13} = 1 µF

Voltage Controlled Oscillator

The VCO is a differential CR oscillator. The external resistor and capacitor at pin 13 determine the charging time constant (figure 3). The external capacitor at pin 13 and internal resistor R_{23} determine the discharging time. R_{27}, R_{28}, and R_{29} determine the threshold voltage.

Pulse Shaping Circuit/High-Voltage Protection Circuit

The pulse shaping circuit shapes the saw-tooth pulse waveform to a rectangular pulse (25 µs typ), which is input to the output drive transistor (figure 4).

The high-voltage protection circuit detects excessive voltage through pin 16. It stops the horizontal output pulse by turning Q_{54} on to inhibit the output transistor. Q_{53} holds the transistor in the non-operating state.

Vertical Oscillator

The vertical oscillator uses the differential amplifier made up of Q_{61} and Q_{62} (figure 5).

The Q_{66} emitter voltage determines the top voltage level (2/3 V_{CC}).

The ratio of R_{106} to (R_{107} + R_{108}), the external resistors at pin 6 determine the bottom voltage level. If the bottom voltage is (1/3 V_{CC} — $V_{BE}(Q_{60})$) or less, oscillation stops. For C_7, the capacitor at pin 3, use 1 µF or less.

Vertical Driver/Blanking Circuit

The vertical driver supplies drive current to pin 1 (figure 6). DC and AC feedback at pin 2 provides equivalence of the differential amplifier.

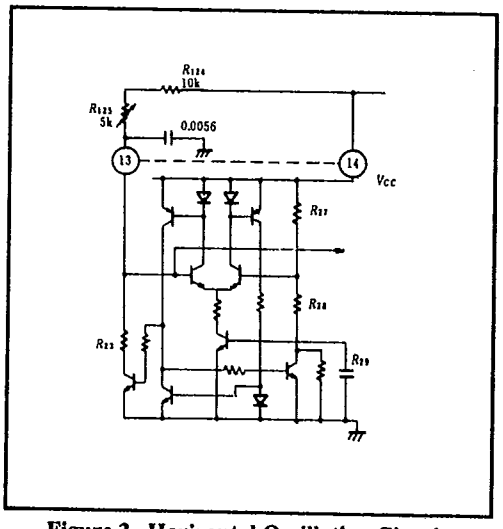

Figure 3 Horizontal Oscillation Circuit

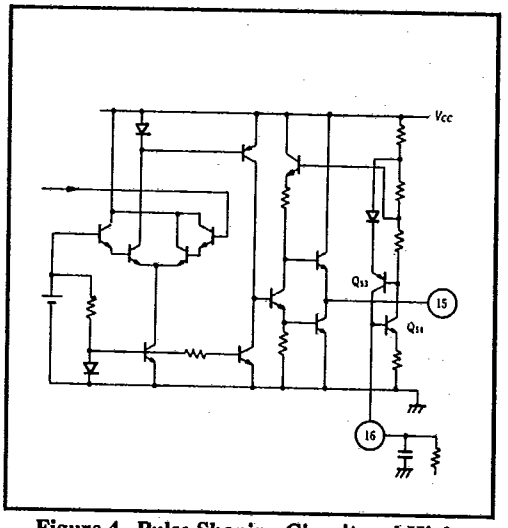

Figure 4 Pulse Shaping Circuit and High-Voltage Protection Circuit

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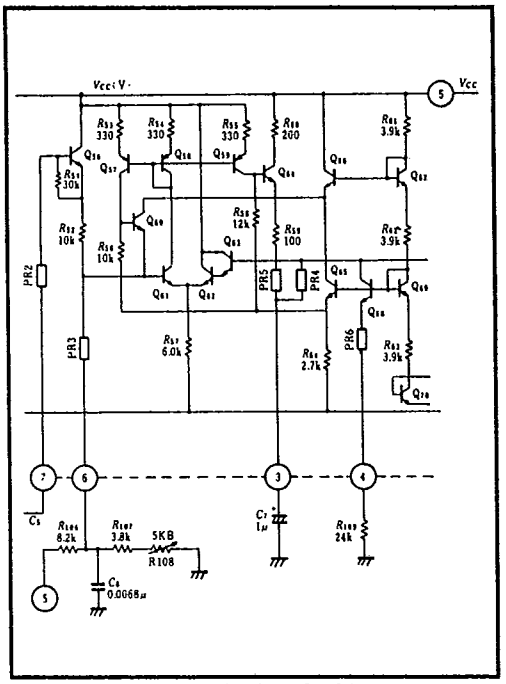

Figure 5 Vertical Oscillator

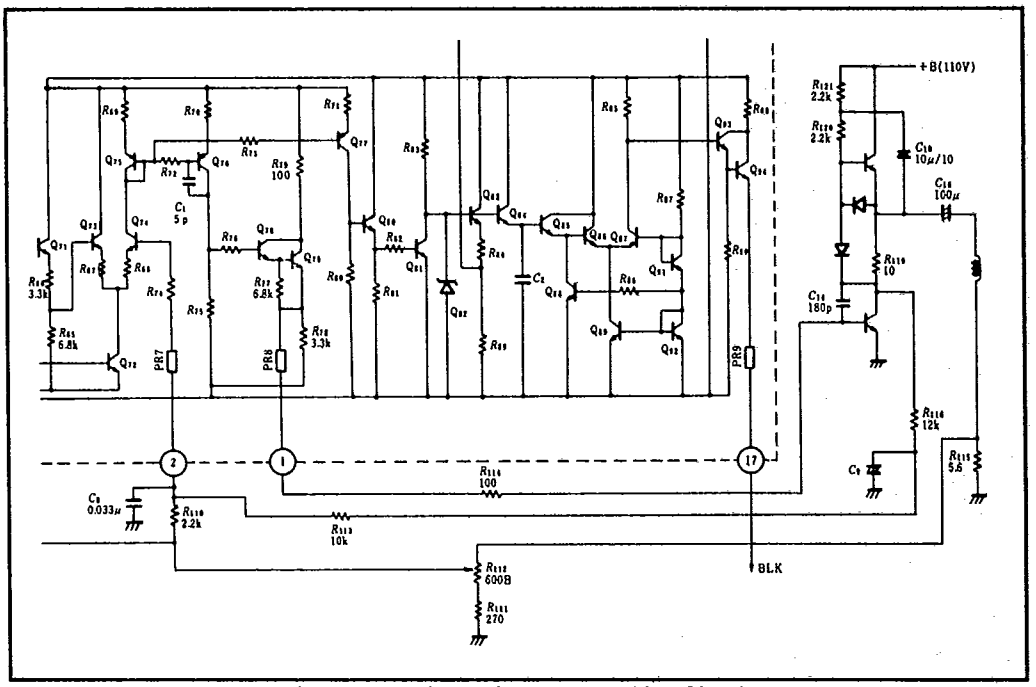

Figure 6 Vertical Driver and Blanking Circuit

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Absolute Maximum Ratings

Item	Symbol	Rating	Unit
Vertical Supply Voltage	V_{CC} (V)	16	V
Horizontal Supply Current	I_{CC} (H)	25	mA
Vertical Output Current	I_{OV}	15	mA
Horizontal Output Current	I_{OH}	15	mA
Power Dissipation (Ta = 75°C)	P_T	500	mW
Operating Temperature	T_{opr}	−20 to +75	°C
Storage Temperature	T_{stg}	−55 to +125	°C

Electrical Characteristics

Item	Symbol	Min	Typ	Max	Unit
Horizontal DC Loop Gain	f_c	—	750	—	Hz/µs
Horizontal Osc Frequency	f_{OH}	14.734	15.734	16.734	kHz
Horizontal Pull-In Range	f_{PH}	450	650	—	Hz
Horizontal Output Pulse Width	t_{NW}	22.5	25.0	27.5	µs
Trigger Gate Voltage	V_{GT}	0.65	0.72	0.79	V
Vertical Osc Frequency	f_{OV}	50	55	60	Hz
Vertical Blanking Pulse Delay Time (Note 1)	t_{BLK}	−10	40	180	µs
Quiescent Sync Input Horizontal Frequency (Note 2)	$f_{OH(L)}$	14.5	14.9	—	kHz

Notes: 1. Delay from vertical output blanking threshold

2. Minimum frequency under quiescent sync signal input