

## CA3254, CA3255

## Product Preview

## RS-170 Sync Generator (CA3254)

## Features:

- Single LSI IC with multiple genlock capability
- EIA RS-170 Sync with 2:1 Interlace
- PLL for lock to power line zero crossing
- Genlocks to RS-170, RS-330 or random interlace
- Crystal control mode sync option
- Four modes of genlock control
- Maximum of external components
- I<sup>2</sup>L injection configured to work in series with the camera tube filament

The RCA CA3254\* is an integrated circuit sync generator with all functions required to provide EIA RS-170 standard sync for signal processing in cameras and video applications where RS-170 2:1 interlaced sync is needed. The CA3254 is processed in integrated injection logic which provides advantages of combined linear integrated circuit compatibility with functions that enhance the performance of the sync system. These functions include a 60 Hz phase locked loop to synchronize to the power line frequency, horizontal and vertical drive processing circuits which process the drive signals for logic and V<sub>CO</sub> control.

Horizontal and vertical drive may be applied to their respective inputs for genlock operation. When external drive is present, the system automatically switches to external control. Composite sync may be applied in parallel directly to the horizontal and vertical drive inputs as an option. Operation from a dc power source requires the use of the 64 times horizontal frequency crystal reference. The genlock accepts RS-170, RS-330, or random interlace sync.

The CA3255\* is available for 625-line, 50-Hz systems.

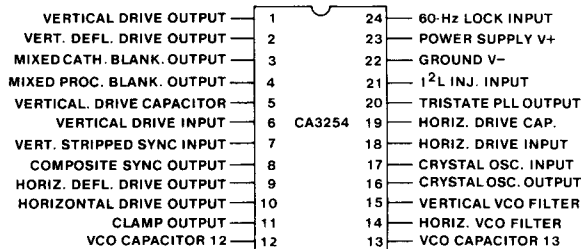
\*Formerly RCA Development Type No. TA10466 (CA3254) and TA10985 (CA3255).

## Applications:

- All RS-170 Sync systems
- Security cameras
- CCTV systems
- Cable systems
- Text encoder sync
- Computer display systems
- Graphics systems

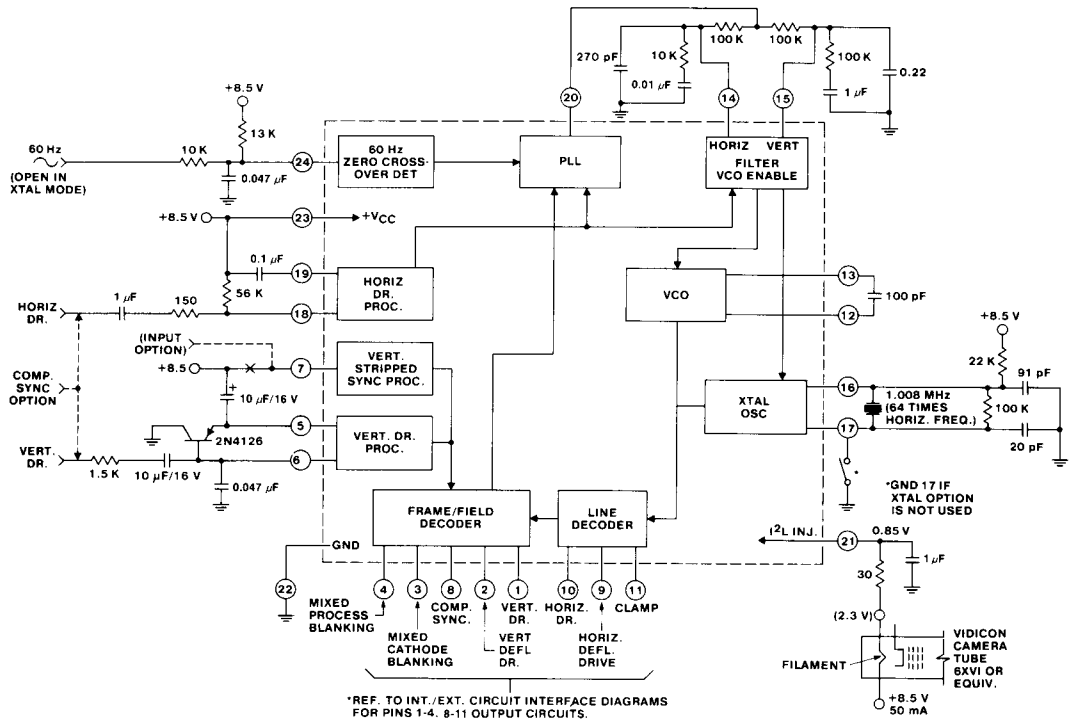
The PLL synchronizes the V<sub>CO</sub> to the power line zero crossing which provides clean switching, splitting and time lapse V<sub>CR</sub> performance. The available output signals are as follows: horizontal drive, horizontal deflection drive, clamp, vertical drive, vertical deflection drive, mixed cathode blanking, mixed process blanking, and composite sync (RS-170, 2:1 interlace).

The CA3254 device is supplied in a 24-lead dual-in-line plastic package (E suffix).



## TERMINAL ASSIGNMENT

# CA3254, CA3255



92CL-39220

Fig. 1 - Functional block diagram of the CA3254 sync generator.

### MAXIMUM RATINGS, Absolute-Maximum Values:

#### DC SUPPLY:

Terminal 23, $V_{CC}$ .....	11 V
Terminals 1, 2, 3, 9, 10 $I_{SINK}$ .....	5 mA
Terminals 4, 8, 11 $I_{SINK}, I_{SOURCE}$ .....	$\pm 5$ mA

#### DEVICE DISSIPATION:

Up to +70°C .....	695 mW
Above +70°C .....	Derate linearly at 8.7 mW/°C

#### AMBIENT TEMPERATURE RANGE:

Operating .....	0 to 70°C
Storage .....	-55 to +150°C

#### LEAD TEMPERATURE (DURING SOLDERING):

At distance 1/16 $\pm$ 1/32 in. (1.59 $\pm$ 0.79 mm) from case for 10 s max. ....	265°C
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## PERFORMANCE CHARACTERISTICS (See Internal Circuit Interface for loads)

Typical Power Supply .....	8.5 V
Supply Voltage Range .....	7.5 to 10.5 V
Power Supply Current @ 8.5 V .....	20 mA
Injection Current Input @ Pin 21 .....	50 mA
60-Hz Power Line Sync Input .....	8 V <sub>p-p</sub>
Typical Horizontal and Vertical Drive Input .....	4 V <sub>p-p</sub>
Horizontal/Vertical Drive Input Range .....	3 to 6 V <sub>p-p</sub>
Vertical Stripped Sync Input Range .....	3 to 6 V <sub>p-p</sub>
Vertical Drive Output .....	8 V <sub>p-p</sub>
Vertical Deflection Drive Output .....	8 V <sub>p-p</sub>
Horizontal Drive Output .....	8 V <sub>p-p</sub>
Horizontal Deflection Drive Output .....	8 V <sub>p-p</sub>
Mixed Cathode Blanking Output .....	8 V <sub>p-p</sub>
Clamp Output .....	8 V <sub>p-p</sub>
Mixed Process Blanking Output .....	8 V <sub>p-p</sub>
Composite Sync Output .....	8 V <sub>p-p</sub>

### TIMING - HORIZONTAL:

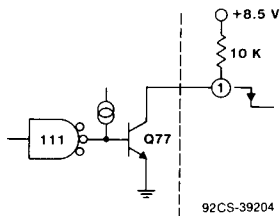
Horizontal Blanking .....	0 to 11 $\mu$ sec.
Horizontal Sync .....	1.5 to 6 $\mu$ sec.
Equalization .....	1.5 to 4 $\mu$ sec.
Serration .....	-3.5 to 1.5 $\mu$ sec.
Clamp .....	3 to 5 $\mu$ sec.
Horizontal Drive .....	0 to 6 $\mu$ sec.
Horizontal Deflection Drive .....	0 to 11 $\mu$ sec.
Cathode Blanking .....	1.5 to 8.5 $\mu$ sec.

### TIMING - VERTICAL:

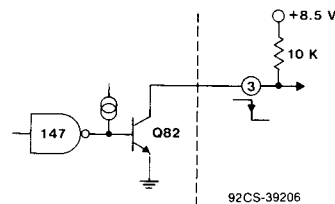
Vertical Blanking .....	0 to 20H
Equalization .....	0 to 3H and 6 to 9H
Serration .....	3 to 6H
Vertical Drive .....	0 to 9H
Vertical Deflection Drive .....	3 to 9H
Reset Disable .....	510 to 18+ serrations

## CA3254 INTERNAL/EXTERNAL CIRCUIT INTERFACE

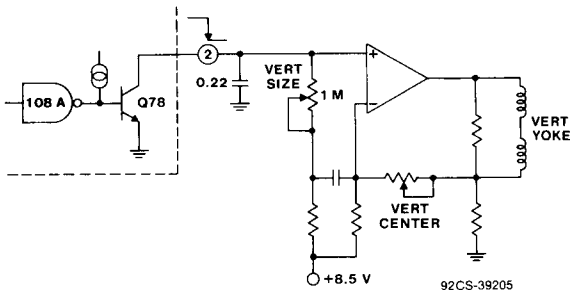
PIN 1: VERTICAL DRIVE OUTPUT



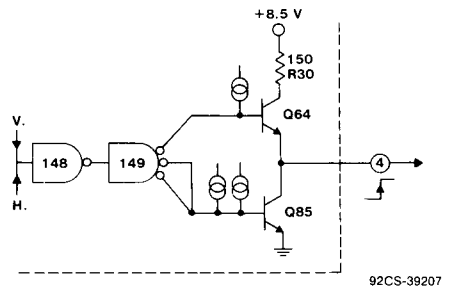
PIN 3: MIXED CATHODE BLANKING OUTPUT



PIN 2: VERTICAL DEFLECTION DRIVE OUTPUT



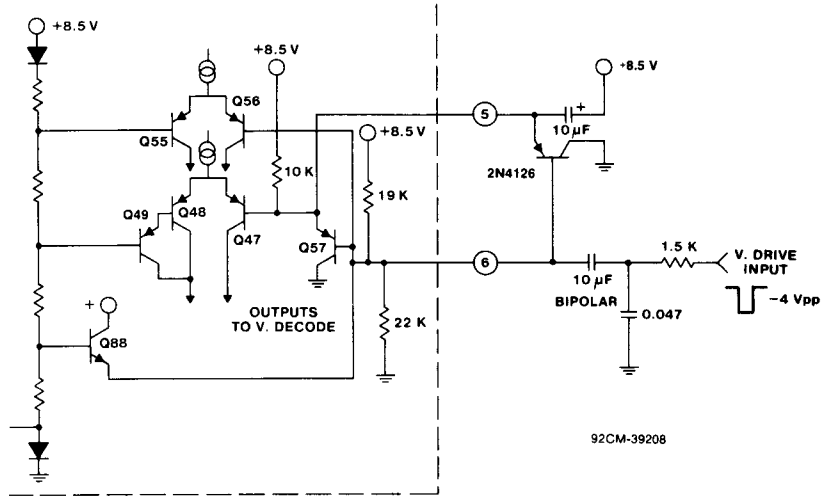
PIN 4: MIXED PROCESS BLANKING OUTPUT



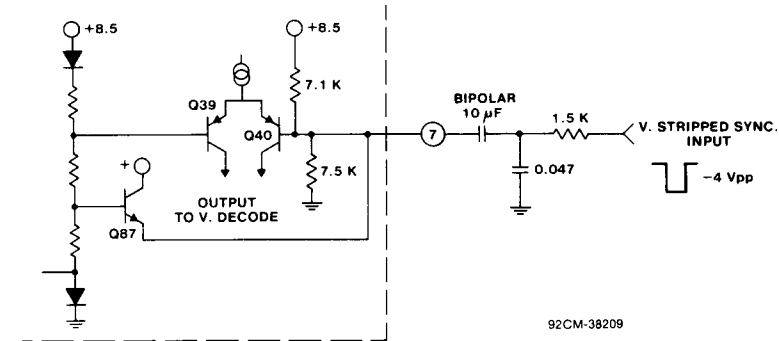
# CA3254, CA3255

## CA3254 INTERNAL/EXTERNAL CIRCUIT INTERFACE (Continued)

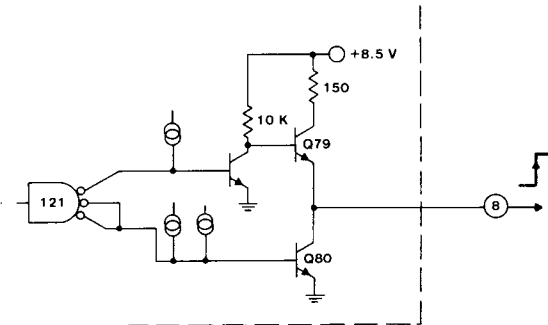
### PIN 5 & 6: VERTICAL CAP. AND VERTICAL DRIVE INPUT



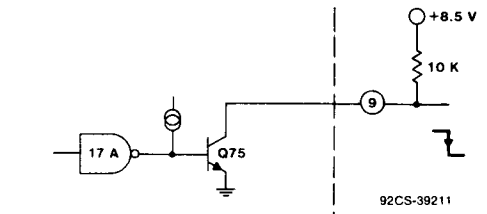
### PIN 7: VERTICAL STRIPPED SYNC INPUT



### PIN 8: COMPOSITE SYNC OUTPUT



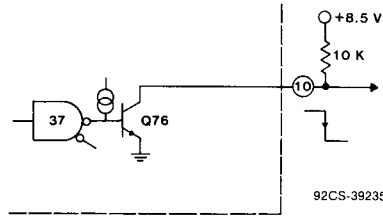
### PIN 9: HORIZONTAL DEFLECTION DRIVE OUTPUT



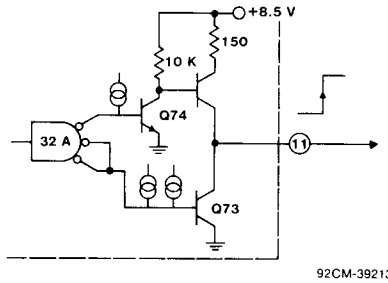
# CA3254, CA3255

## CA3254 INTERNAL/EXTERNAL CIRCUIT INTERFACE (Continued)

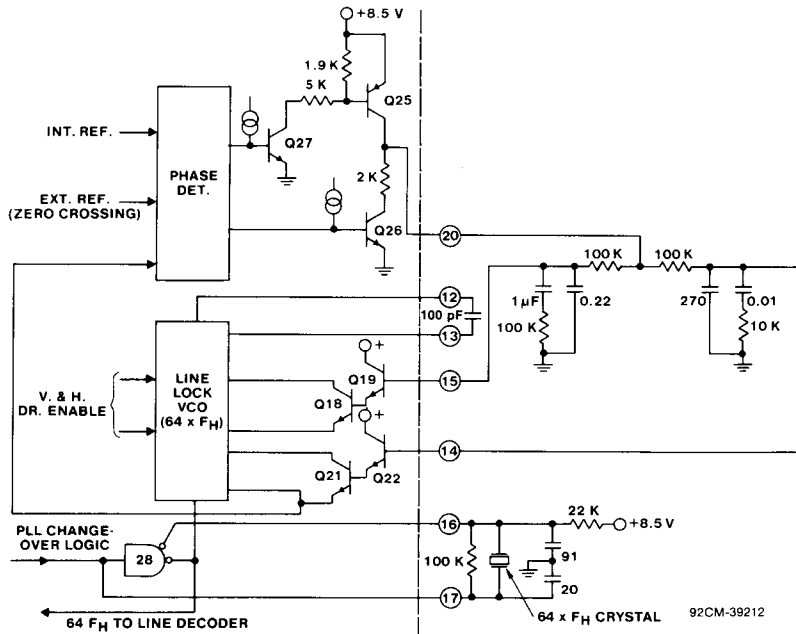
### PIN 10: HORIZONTAL DRIVE OUTPUT



### PIN 11: CLAMP OUTPUT



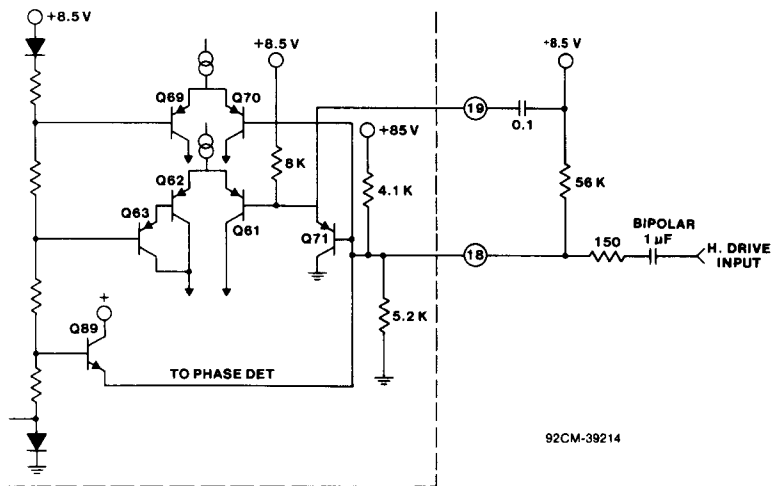
- PINS 14 & 15: VERTICAL AND HORIZONTAL FILTER
- PINS 16 & 17: CRYSTAL OSCILLATOR
- PIN 24: 60 HZ SIGNAL INPUT FOR LINE LOCK
- PIN 20: TRISTATE PHASE DETECTOR OUTPUT
- PINS 12 & 13: VCO CAPACITOR



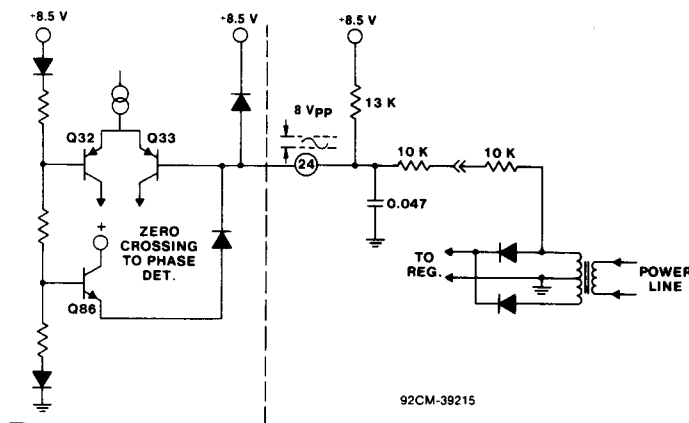
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## CA3254 INTERNAL/EXTERNAL CIRCUIT INTERFACE (Continued)

### PINS 18 & 19: HORIZONTAL DRIVE INPUT



### PIN 24: 60-HZ SIGNAL INPUT



## APPLICATION INFORMATION

### SYNC GENERATOR

The sync generator is a 24 pin IC requiring a single +8.5 V<sub>DC</sub> power source. It supplies all pulses required for 2:1 interlaced 525/60 Hz EIA RS-170 sync timing.

For 625/50 Hz operation, a CA3255 IC is available. A 24-pin IC socket permits easy changing of the sync generator IC for either 525/60 Hz or 625/50 Hz.

The normal mode of operation is a zero crossing line lock mode, but the generator may operate crystal controlled or be externally driven.

For crystal operation, the 525/60 Hz crystal frequency is 1.008 MHz and for 625/50 Hz, the crystal frequency is 1 MHz. For NTSC sync operation the 64 times horizontal crystal frequency is 1.006993 MHz and is externally phase locked to the 3.579545 MHz ( $f_c$ ) color sub carrier, where  $f_H = 2f_c/455$ .

### Circuit Operation

An AC sine wave signal is fed into Pin 24 to synchronize to the zero crossing of the power line. R44 and R45 form a voltage divider to optimize the zero crossing point. There is also a short circuit protection resistor in the externally power supply in series with R44 - (10K). This resistor is part of the zero crossing voltage divider. C33 filters any spikes which might occur at the zero crossing.

Pin 23 is the +8.5 V<sub>DC</sub> input and is filtered by C34.

Pin 22 is the common and is tied to case ground.

Pin 21 is the injector input to operate part of the logic. The injector requires +0.85 V<sub>DC</sub> at approximately 50 mA DC. To save power, the injector voltage is taken in series with the filament of the vidicon. C35 is a filter for the injector. A 150-ohm/0.5 watt resistor to +8.5 V may be used in place of the 30-ohm resistor and vidicon filament in series.

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## Circuit Operation (cont'd)

Pin 20 is a filter for the internal Phase Line Lock Loop with components R52, R54, C41, and C42 forming the filter required for vertical stability.

Pin 19 detects the presence of horizontal by the charging of C36 when external sync is used.

Pin 18 is the external horizontal input with an input impedance of about 2 K. R120 is part of the input bias of the stage - the remainder is inside the IC. C37 provides DC blocking and R48 is a series limiting resistor. Typical input is 4 V p-p, but will operate between 3 V p-p and 6 V p-p.

Pin 17 is grounded in the normal Line Lock mode of operation by a jumper wire in place of C38.

Pins 17 and 16 are used in the Crystal mode of operation - refer to the Crystal Option section of the drawing. R49 is the load resistor for the crystal oscillator. Capacitor C38 and C39 establish the 180° phase shift required for Crystal Y1 to oscillate, and R51 assists in starting the oscillator.

Pin 15 is the Vertical Voltage Controlled Oscillator (VCO) input. The vertical VCO is operational in the line lock mode, but not in the crystal mode.

Pin 14 is the Horizontal Voltage Controlled Oscillator (VCO) input and is automatically switched in when horizontal drive or sync is present.

Pins 12 and 13 are terminals to the internal circuit and add the required capacitor C48 to operate the Voltage Controlled Oscillator (VCO) used during the line lock and external drive modes.

Pin 11 is a horizontal rate 8 V p-p positive output pulse which is 2  $\mu$ s wide and is used to drive the clamp circuit in the video amplifier.

Pin 10 is the horizontal drive output.

Pin 9 is a horizontal rate negative going output pulse driving the horizontal deflection. It is 10  $\mu$ s wide and has a 0.65 V p-p amplitude. The amplitude is limited to 0.65 V p-p by the emitter base junction of Q7 in the Horizontal Deflection Circuit.

Pin 8 is the composite sync output and delivers 8 V p-p positive going pulses to the video amplifier to add to video. The signal contains vertical sync, horizontal sync, equalizing and serrating pulses per RS-170 specifications.

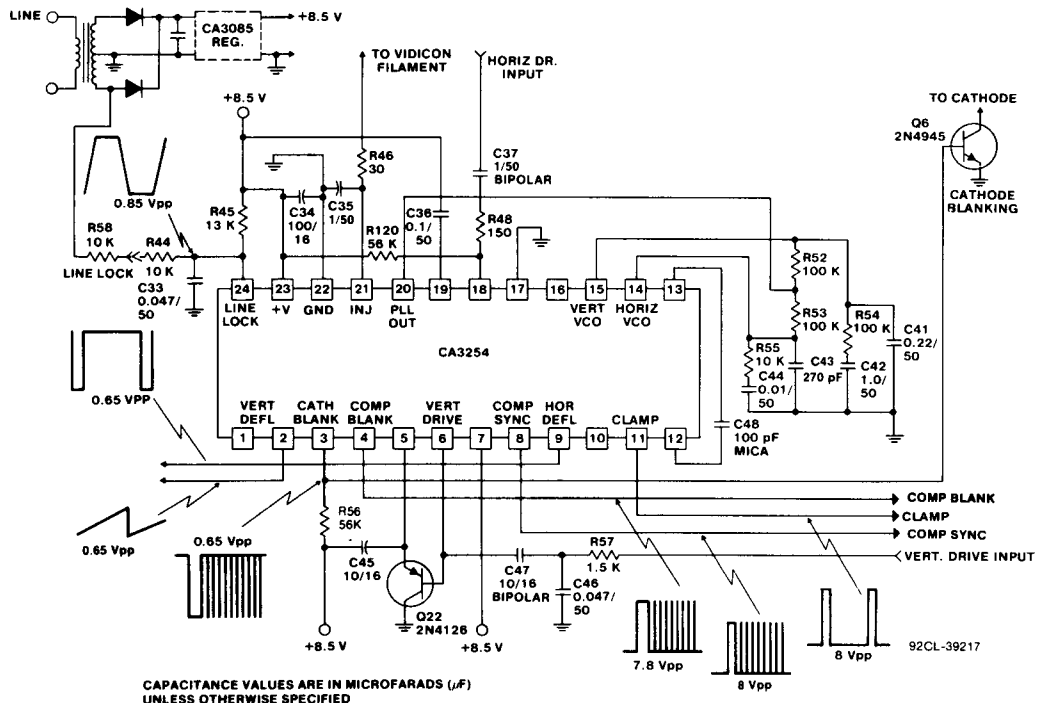


Fig. 2 - Application of the CA3254 device.  
(Shown in line lock mode)

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## Circuit Operation (cont'd)

Pin 7 if not used is tied to the +8.5 V<sub>cc</sub>. It is a vertical stripped sync input equivalent to vertical drive input.

Pin 6 is the external vertical drive or composite sync input normally requiring 4 V p-p, but will operate between 3 and 6 V p-p. R57 and C46 integrate the signal to remove horizontal and C47 is a DC blocking capacitor.

Pin 5 detects the presence of external vertical drive by the charge placed on C45. Q22 is a follower used to prevent C45 loading the vertical drive input on Pin 6.

Pin 4 supplies positive going 7.8 V p-p mixed horizontal and vertical blanking pulses to the video amplifier per RS-170 specifications. Vertical blanking is approximately 1.3 ms and horizontal blanking is approximately 11  $\mu$ s.

Pin 3 supplies negative going horizontal and vertical 0.65 V p-p pulses to the cathode blanker Q6. The amplitude of the pulses are limited to 0.65 V p-p by the emitter base of Q6. The width of the vertical pulses are approximately 200  $\mu$ s and the horizontal is 7  $\mu$ s. R56 is a pull up resistor for Pin 3 bias.

Pin 2 supplies negative going pulses to the vertical deflection circuit. These pulses act as a switch during vertical retrace time and appear as a sawtooth due to capacitor C32 in the vertical deflection circuit. This sawtooth is typically near 0.65 V p-p.

Pin 1 is the vertical drive output.

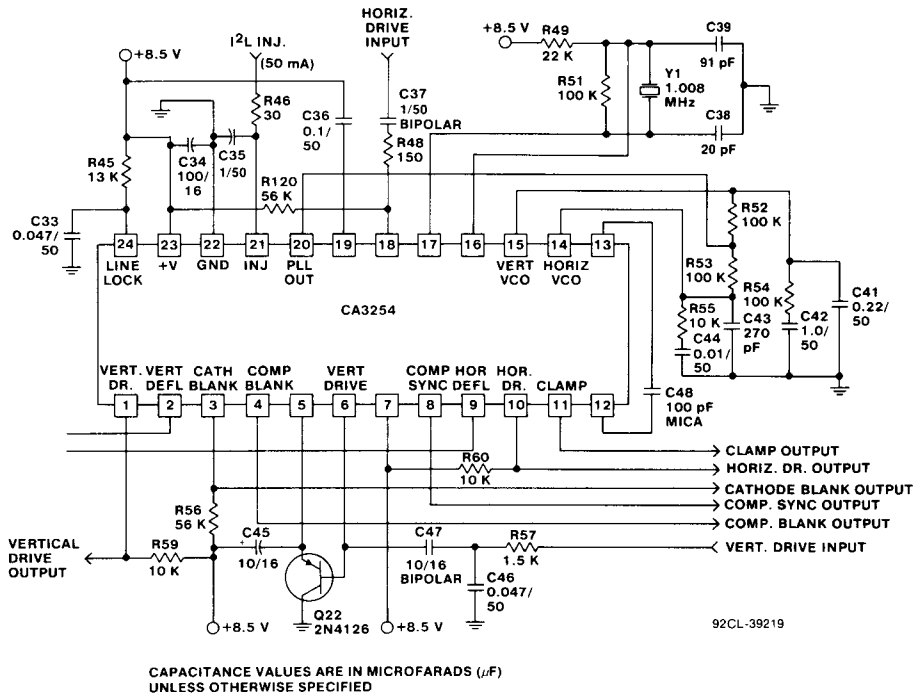
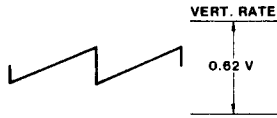


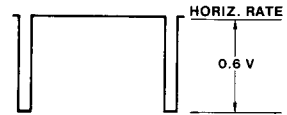
Fig. 3 - Crystal mode of operation.



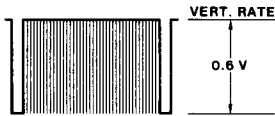
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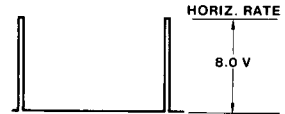
**PIN 2 — VERTICAL DRIVE**



**PIN 9 — HORIZONTAL DRIVE**



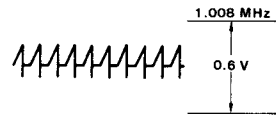
**PIN 3 — CATHODE BLANKING**



**PIN 11 — CLAMP**



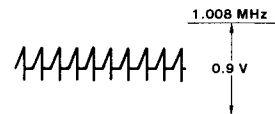
**PIN 4 — COMPOSITE BLANKING**



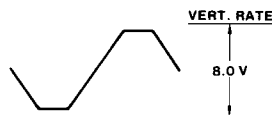
**PIN 12 — OSCILLATOR**



**PIN 8 — COMPOSITE SYNC**



**PIN 13 — OSCILLATOR**



**PIN 24 — LINE LOCK**

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Fig. 4 - Waveforms (See Fig. 2)

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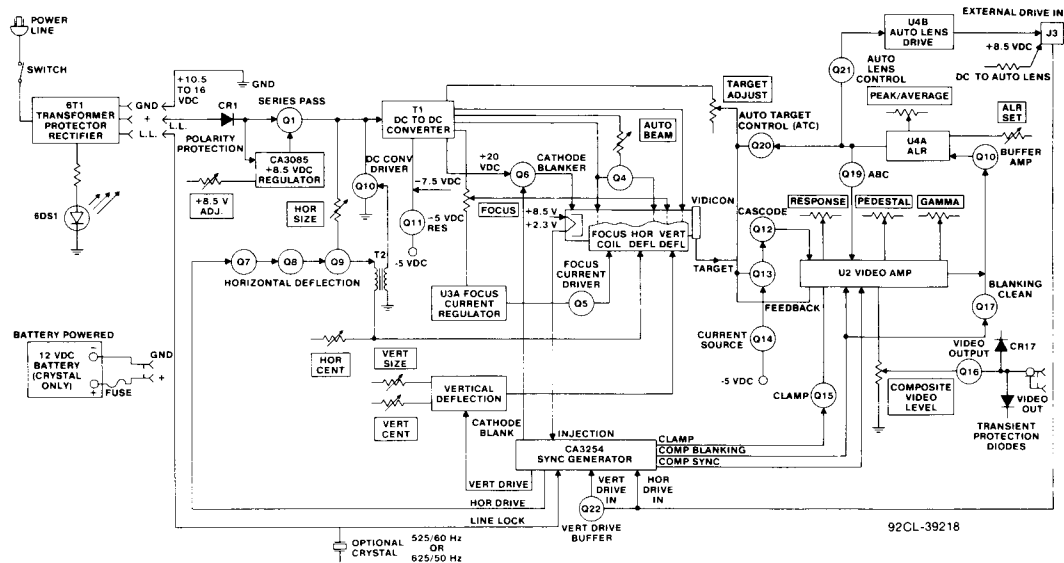


Fig. 5 - Block diagram of camera system.  
(RCA-TC2000 series CCTV camera)