

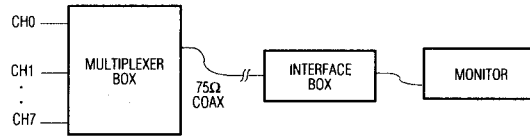
# DESIGN SHOWCASE

## Single Coax Carries Video, Power, and Channel-Select Signals

In the video system of **Figure 1**, a single coaxial cable carries power to the remote location, selects one of eight video channels, and returns the selected signal. The system can choose one of several remote surveillance-camera signals, for example, and display the picture on a monitor near the interface box.

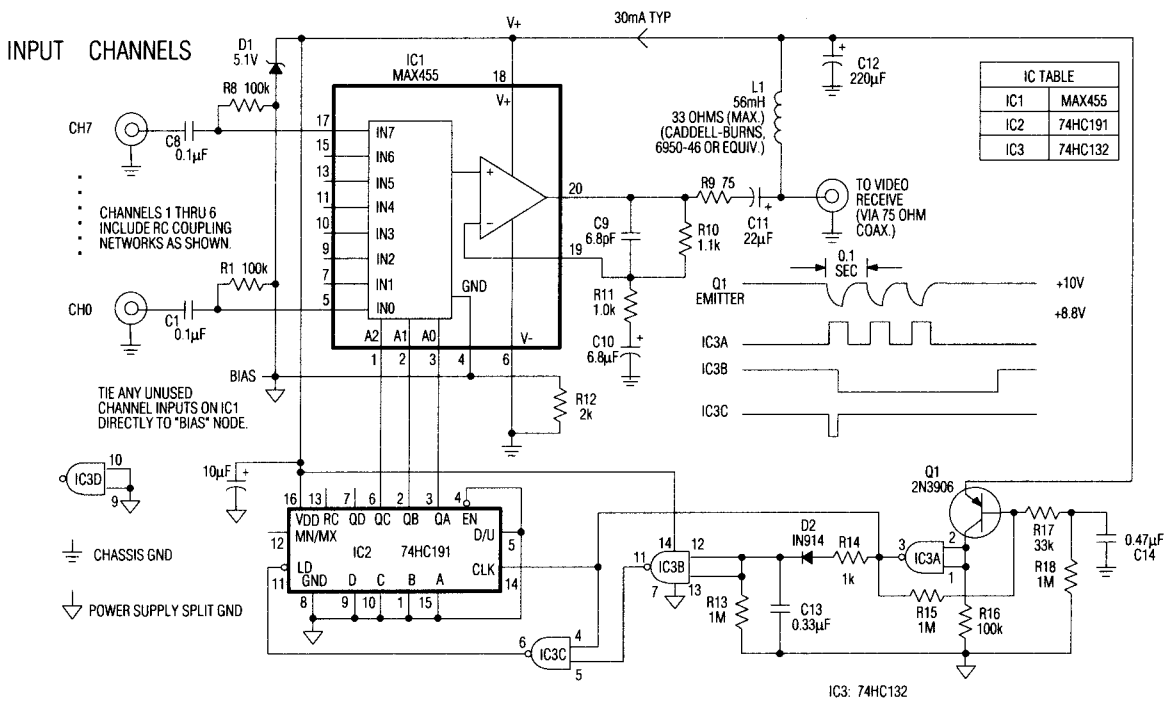
The heart of the multiplexer box (**Figure 2**) is a combination 8-channel multiplexer and amplifier (IC<sub>1</sub>). C<sub>11</sub> couples the multiplexer's baseband video output to the coax, and L<sub>1</sub> decouples the video from DC power arriving on the same line. This power – approximately 30mA at 10V – supplies all circuitry in the multiplexer box.

Channel-select signals generated at the interface box (1 pulse for channel 0; 8 pulses for channel 7) pulse the 10V supply to 8.8V and back at a 10Hz rate. Q<sub>1</sub> and associated components in the mux box



**Figure 1.** This minimum-cable system delivers power, control, and composite video (NTSC, PAL, or SECAM) on a single run of coax. Length of the terminated coax is limited only by the minimum acceptable level of signal attenuation.

convert these pulses to 5V-logic levels, which clock the 4-bit counter IC<sub>2</sub>, which in turn selects the desired multiplexer channel. The first pulse of a burst selects channel 0. Subsequent pulses, arriving before discharge of the timeout network R<sub>13</sub>C<sub>13</sub>, advance IC<sub>2</sub> by one count each. Thus, channel 0 appears almost instantly, and channel 7, when selected, appears near the end of a 0.8sec burst.



**Figure 2.** The multiplexer circuit of **Figure 1** receives power and control signals over the coaxial cable while driving the cable with the currently selected video signal.

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In the interface box (Figure 3), a desired channel is encoded by three bits, set either by switches as shown or by an applied digital input. Momentary depression of the Send Button triggers down-converter IC<sub>1</sub> and gated oscillator IC<sub>2A</sub> to initiate a channel-selection burst. (Maxim's MAX635 and MAX638 switching converters, operating on 12V, can generate the ±5V supply required for the interface circuitry.)

Supply current flows to the remote multiplexer box through Q<sub>1</sub> (normally on and saturated), R<sub>27</sub>, and the coax center conductor. R<sub>27</sub> also terminates the coax via C<sub>21</sub>. When Q<sub>1</sub> turns off momentarily, forward bias across D<sub>3</sub> and D<sub>4</sub> develops a negative 1.2V channel-select pulse. This 1.2V drop in supply voltage does not affect the remote multiplexer's video

output. Consequently, the video monitor's display does not flip during channel changes, provided the channel signals have common sync timing.

The short time constant associated with coupling of video to the coax (C<sub>11</sub> and R<sub>9</sub> in the mux box and R<sub>27</sub> in the interface box) enables selection of any channel in less than one second, but it also allows the composite video's sync-pulse baseline to shift with picture content. To counter this shift and its effect on the monitor's video synchronization, peak detector IC<sub>3A</sub> drives DMOSFET Q<sub>3</sub>, which applies DC restoration ahead of the video buffer IC<sub>3B</sub>: During each negative sync pulse, Q<sub>3</sub> turns on just long enough to reclamp the pulse tip at 0V.

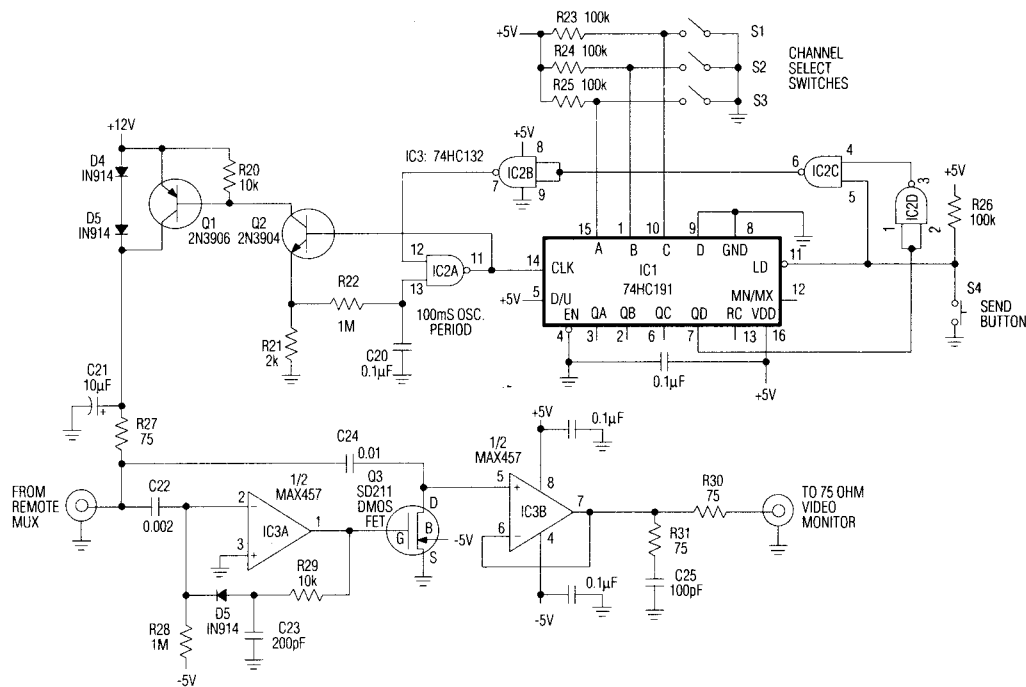


Figure 3. The interface end of the Figure 1 circuit delivers 10V power down the cable, pulses the supply voltage to transmit channel-change commands, and buffers the received video signal.

(Circle 4)