One-chip multiplexer simplifies eight-trace scope

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Displaying eight analog signals simultaneously with only a single-trace oscilloscope, this switching circuit can be built for even less ($35) than the one proposed by Wright.[1] Circuitry is simplified, too, by the use of a one-chip, eight-channel differential multiplexer. And unlike most other arrangements, this unit is more versatile, having a chopped-mode and alternate-mode option and trace-positioning controls for each analog input.

In the chopped mode, which can be used at sweep speeds up to 50 microseconds/centimeter, all traces are referenced in time to input 1, which is the signal used to trigger the scope. Operational amplifiers (see inset) may be added for handling floating inputs. The 555 timer,

operating as an astable multivibrator, switches the 74191 4-bit counter at a 9-μs rate, the sampling-bit time. This action in turn sequentially switches the DG507 multiplexer. As each input is selected, it is added to the dc output voltage of its positioning potentiometer (R_1–R_8).

At sweep speeds of 1 millisecond/cm and faster, the unit's alternate-mode option may be used. The 555 is deactivated and each analog input is switched in turn at any sweep speed selected by the user. The resulting display, devoid of most switching transients, is somewhat cleaner than can be achieved in the chopped mode. All other settings remain the same. A gating signal is required to synchronize the 4-bit counter, however. This signal is supplied by the scope's +GATE port.

More than 8 traces can be displayed on a dual-trace scope. With an additional 8-trace switching unit of the type previously described, 16 traces can be displayed. A large screen scope such as the Tektronix 7603 will be required for suitable resolution in this case. □

References
1. George O. Wright, "Eight-trace scope display checks analog or digital signals," *Electronics*, Aug. 4, 1977, p. 108.
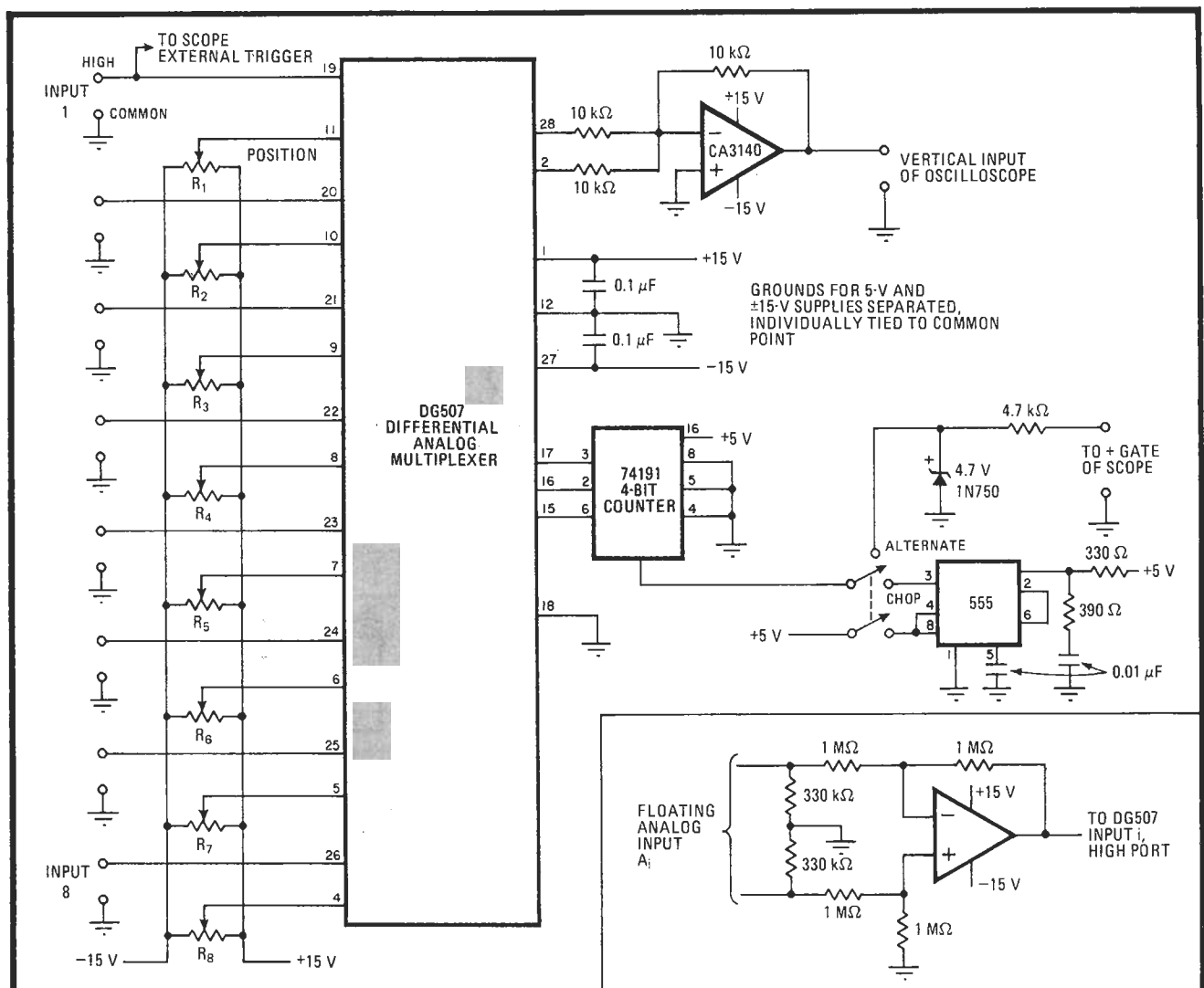
Sweep switch. Low-cost circuit displays eight analog signals on single-trace scope with aid of one-chip analog multiplexer. Alternate-mode (flicker-free above 200 μs/cm) and chopped-mode options are available. Each trace may be individually positioned on screen.