Wide-range pulse generator displays timing parameters

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In this circuit, cascaded decade counters provide adjustable pulse width, period, and delay from 0.1 microsecond to 10 seconds. This generator contains an LED digit display, too, for direct readout of the various pulse parameters.

The 7490 counters, D_1–D_8, serve simultaneously as a frequency divider and preset counter unit. Depressing the momentary-contact switch S resets D_1–D_8 and gates the 10-megahertz clock through to the counters, whereupon they advance upward from zero.

When operated in the automatic mode (switch S_1), the unit will generate pulses with repetition frequency and width controlled by the clock frequency and the position of two sets of taps at the output of the 7442 4-to-10-line decoders. Here taps a'–h' bring output flip-flop F_1 low
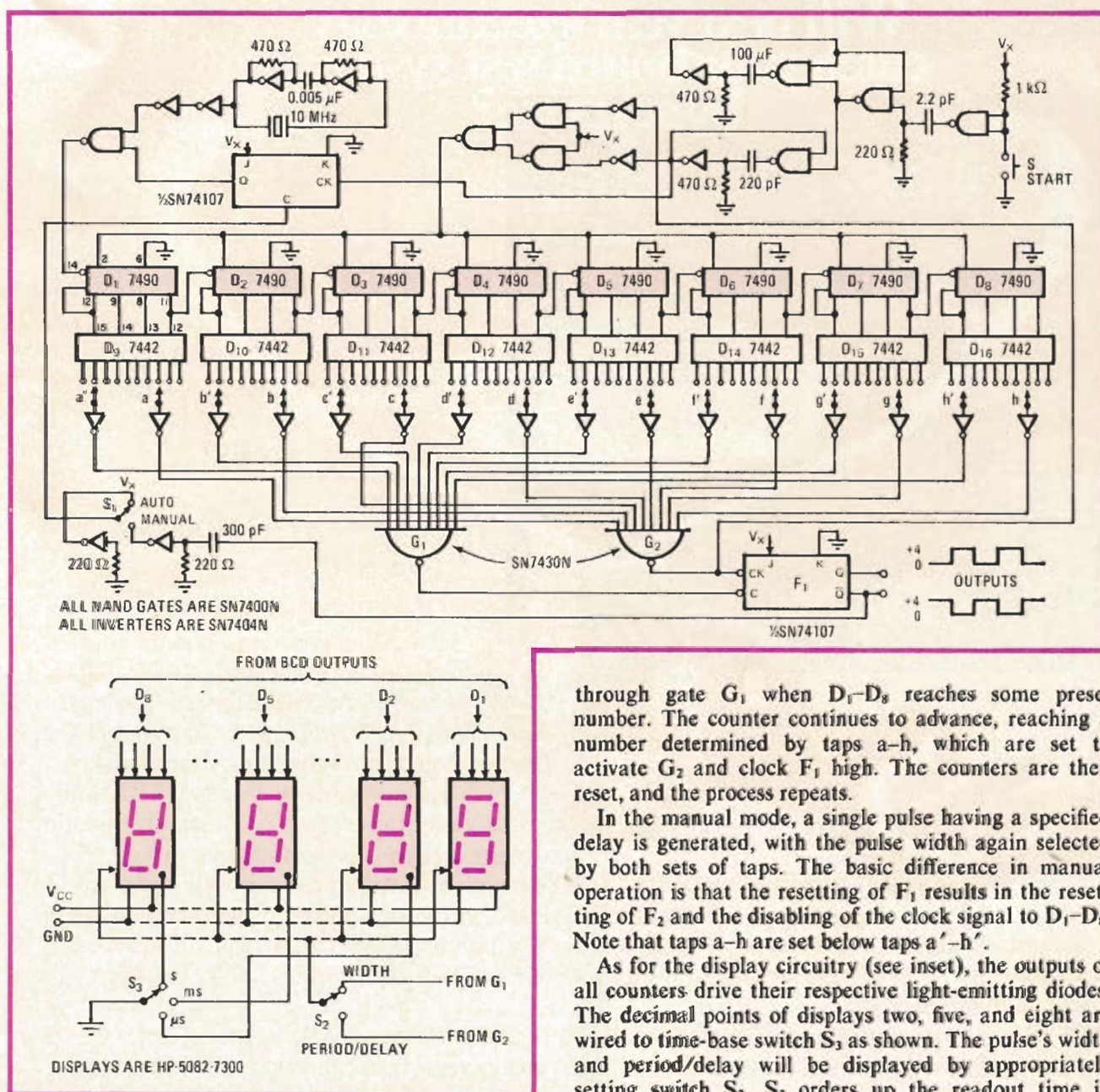
Watching width. Pulse generator provides adjustable width and period over a 0.1-microsecond-to-10-second range. A single pulse of specified delay may also be generated. LED-digit display gives direct readout. Wiring of display-switching circuitry (inset) is simple.

through gate G_1 when D_1–D_8 reaches some preset number. The counter continues to advance, reaching a number determined by taps a–h, which are set to activate G_2 and clock F_1 high. The counters are then reset, and the process repeats.

In the manual mode, a single pulse having a specified delay is generated, with the pulse width again selected by both sets of taps. The basic difference in manual operation is that the resetting of F_1 results in the resetting of F_2 and the disabling of the clock signal to D_1–D_8. Note that taps a–h are set below taps a'–h'.

As for the display circuitry (see inset), the outputs of all counters drive their respective light-emitting diodes. The decimal points of displays two, five, and eight are wired to time-base switch S_3 as shown. The pulse's width and period/delay will be displayed by appropriately setting switch S_2. S_3 orders up the readout time in seconds, milliseconds, or microseconds. □