Control system uses LabView and a PC's parallel port

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The circuit in this Design Idea controls the inbound and outbound traffic of cars in a parking lot. This project uses National Instruments (www.ni.com) LabView as the main programming tool and a PC's parallel port for I/O. Basically, the circuit uses the PC's status port, 379h, as an input for sensors, which a relay isolates to prevent damage on the PC (**Figure 1**). At the data port, 378h, the D0 bit controls a door, D1 is a stop signal, D2 is the go signal, and D3 is an indicator of when the parking lot reaches its limit. All the signals drive PN2222A transistors having an external power supply—in this case, the PC's power supply. In this way, you can use relays as loads and control ac voltage for the traffic lights and door motor. The transistor, which D0 drives, controls a DPDT (double-pole/double-throw) relay to invert the motor's polarity.

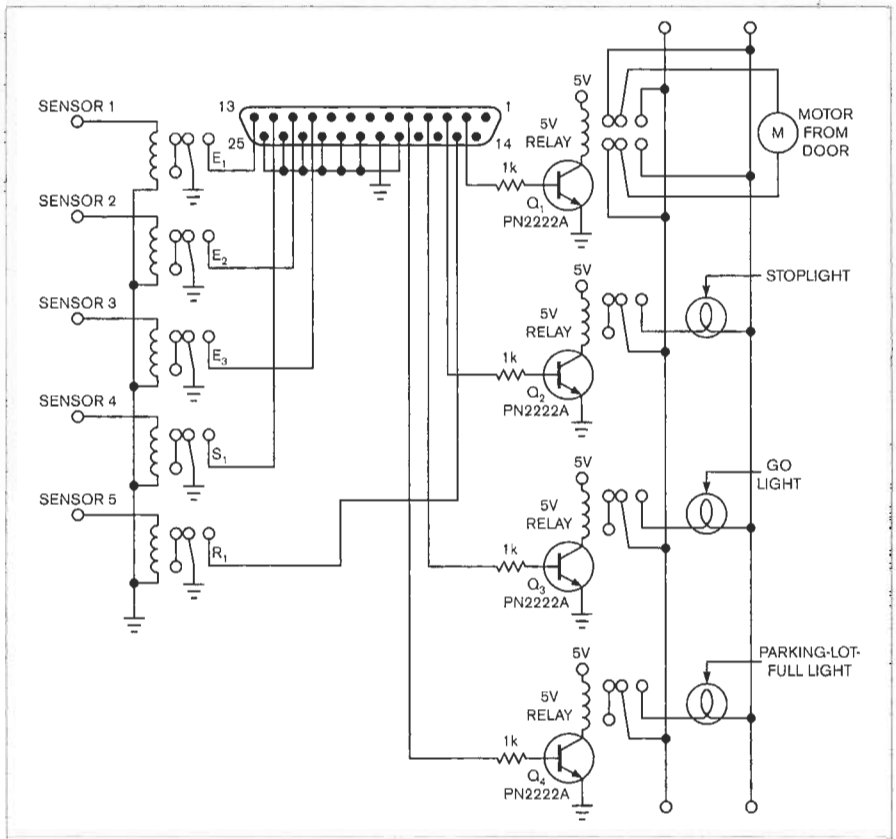

Figure 1 The sensors, indicator lights, and door motor of a parking lot connect through relays to the parallel port of a PC.

Figure 2 shows the LabView diagrammatic program for controlling the parking lot. The VI (virtual instrument) in **Figure 3a** changes the inputs to a low state because all inputs are high by default inside the status register. All inputs have a low state when you do not ac-

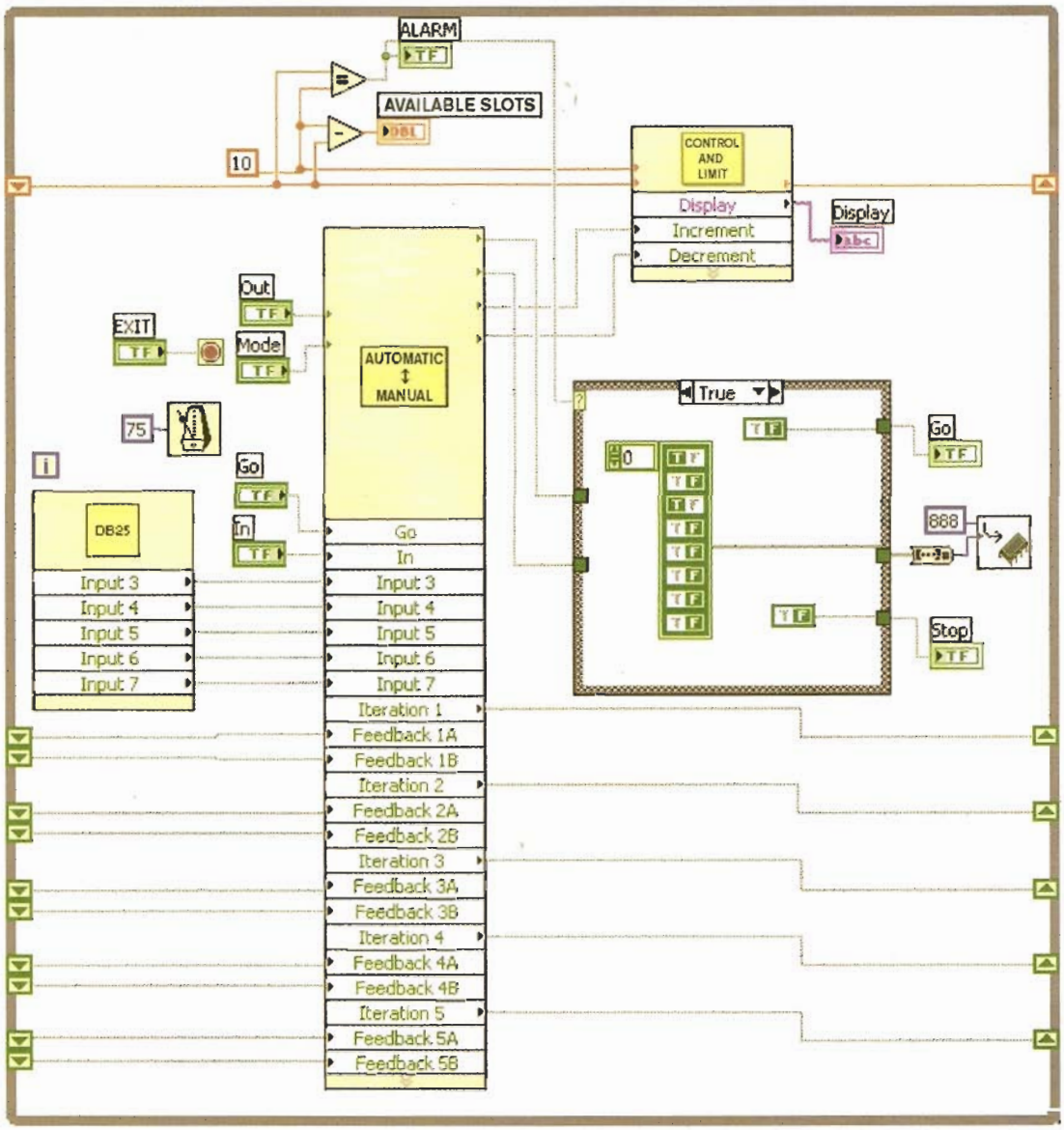

Figure 2 This LabView VI (virtual instrument) controls the operation of a parking lot.

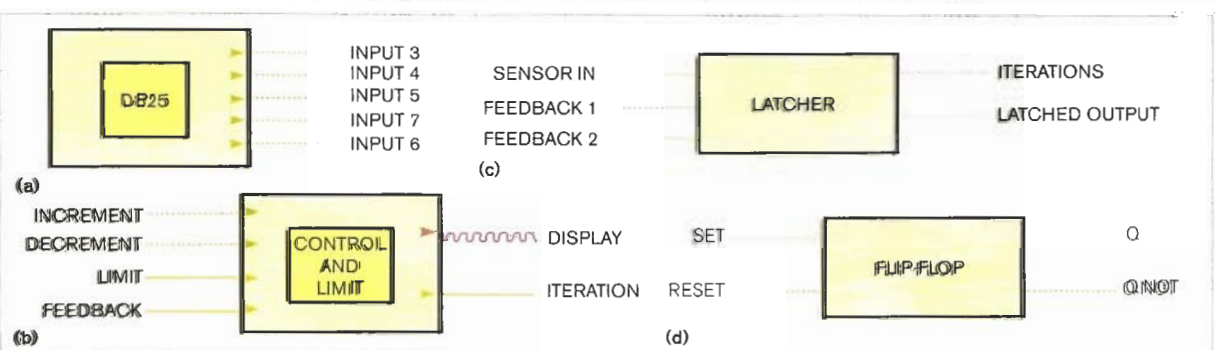

Figure 3 These VIs change the inputs to a low state (a), determine a limit for the number of cars in the parking lot (b), work as a latch-on-release circuit (c), and act as a flip-flop (d).

tivate the sensors. The VI in **Figure 3b** determines a limit for the parking lot, allowing incrementing and decrementing the number of cars parked. This VI also drives a user-oriented display and the shift-register connectors, feedback and iteration, on a "while" loop. The VI in **Figure 3c** works as a latch-on-release circuit; it generates a pulse upon an iteration when the circuit releases the high state on any of the input signals. The VI in **Figure 3d** works as a flip-flop. The VI in **Figure 4** allows switching from automatic to manual mode. Feedback and iteration terminals connect to shift registers, so the latches and the flip-flops inside the VI work correctly. EDN

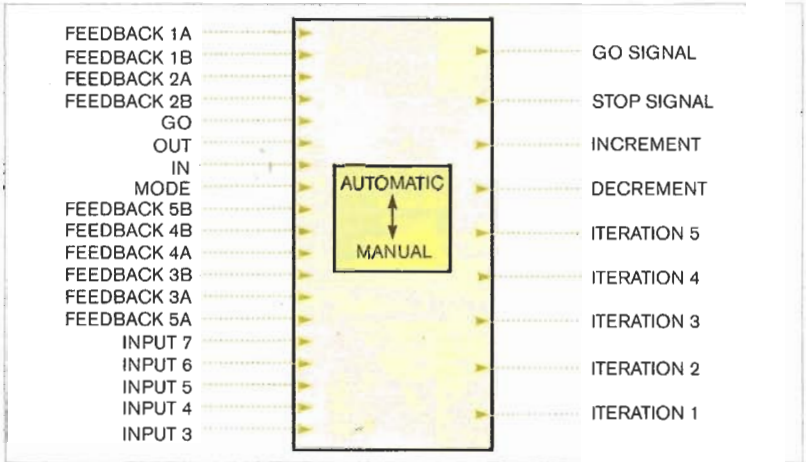

Figure 4 This VI allows switching from automatic to manual mode.