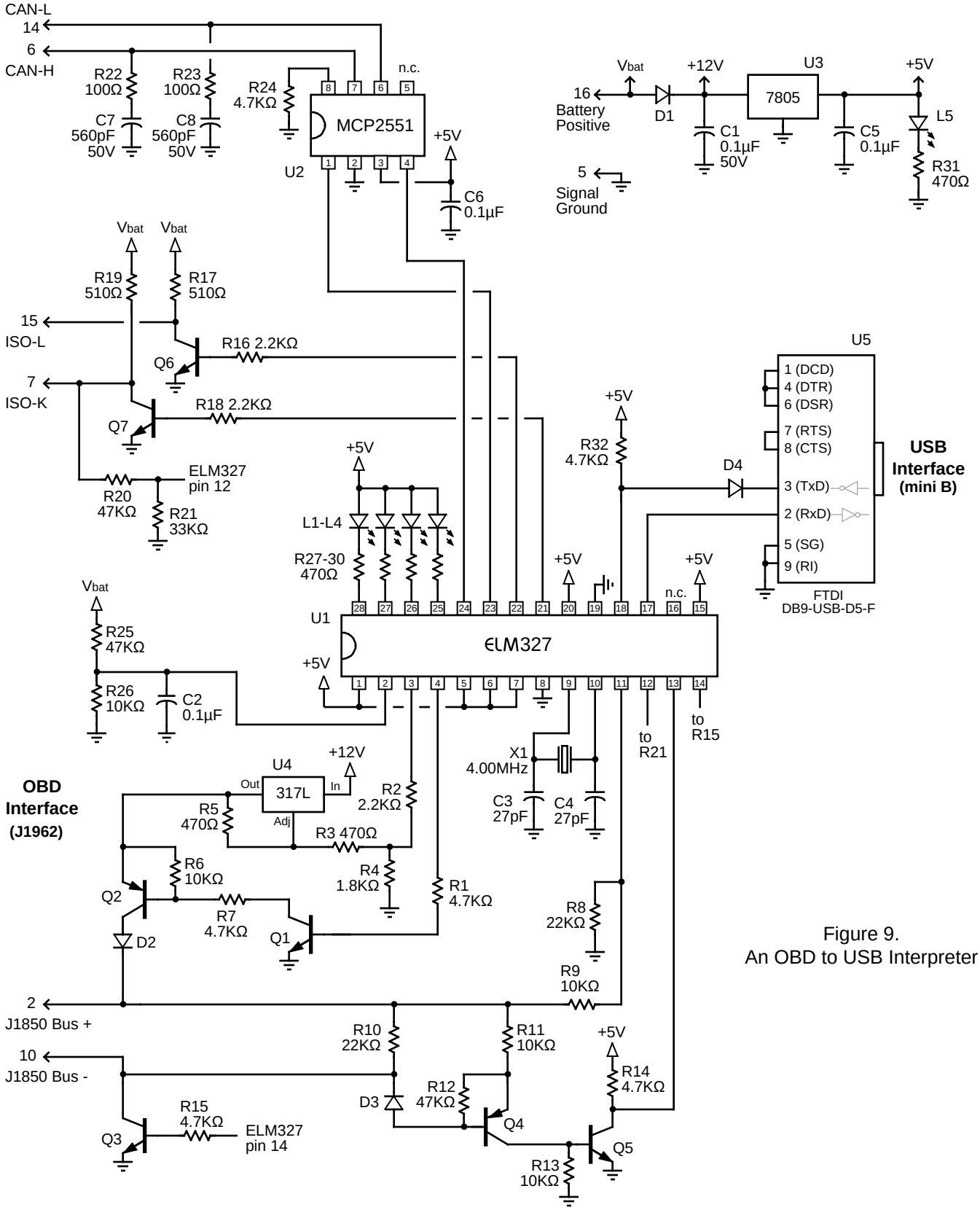

Figure 9.
An OBD to USB Interpreter

Example Applications (continued)

Semiconductors	Resistors (1/8W or greater, except as noted)
D1 = 1N4001	R22, R23 = 100 Ω
D2, D3, D4 = 1N4148	R3, R5, R27, R28, R29, R30, R31 = 470 Ω
L1, L2, L3, L4 = Yellow LED	R17, R19 = 510 Ω 1/2W
L5 = Green LED	R4 = 1.8 KΩ
Q1, Q3, Q5, Q6, Q7 = 2N3904 (NPN)	R2, R16, R18 = 2.2 KΩ
Q2, Q4 = 2N3906 (PNP)	R1, R7, R14, R15, R24, R32 = 4.7 KΩ
U1 = ELM327	R6, R9, R11, R13, R26 = 10 KΩ
U2 = MCP2551 or MCP2561	R10, R8 = 22 KΩ
U3 = 7805 regulator (5V 1A)	R21 = 33KΩ
U4 = 317L adjustable regulator (100 mA)	R12, R20, R25 = 47 KΩ
U5 = FTDI DB9-USB-D5-F usb module	
	Capacitors (16V or greater, except as noted)
Misc	C3, C4 = 27pF
X1 = 4.000MHz crystal	C7, C8 = 560pF 50V
DB9M connector for OBD cable?	C1 = 0.1uF 50V
IC Socket = 28 pin 0.3" wide (or 2 x 14pin)	C2, C5, C6 = 0.1uF

Figure 10. Parts List for Figure 9

sub-circuits of Figures 11 and 12.

Figure 11 shows a discrete RS232 interface, that may be connected directly to the ELM327. This circuit uses a resistor, diode, and capacitor between the two RS232 signal lines to 'steal' power from the host computer. In this way, the required RS232 negative voltage is obtained without adding a complicated power supply to the ELM327 circuit. The RS232 connections shown are for a standard 9 pin connector. If you are using a 25 pin one, you will need to compensate for the differences. This circuit works well at baud rates of 57600 bps or less, but begins to show some errors at rates of 115200 bps and above.

The circuit of Figure 12 offers another RS232 solution that works well at higher baud rates. It uses a Maxim product (the MAX3222E) that is capable of operating at up to a 250 kbps rate (be sure to visit www.maximintegrated.com for more information).

The MAX3222E RS232 transceiver contains internal charge pump circuitry that generates the voltages required for RS232 communications, in addition to the analog interface circuitry needed. All you have to do is provide a few capacitors, and it does

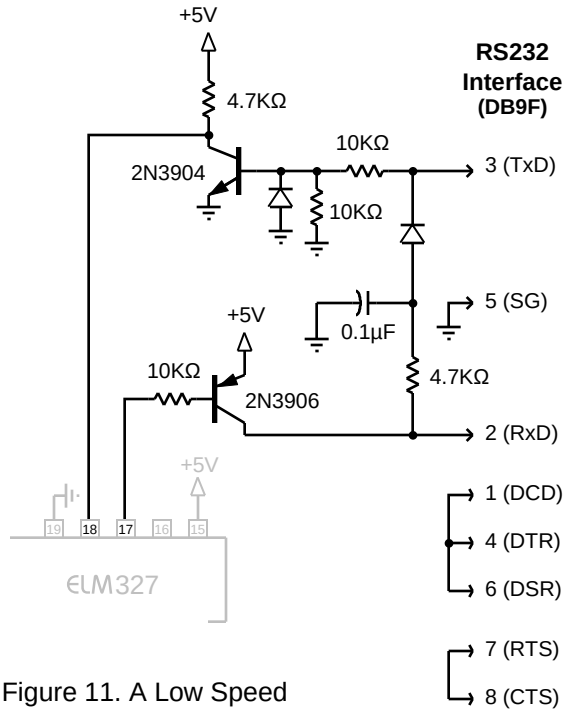

Figure 11. A Low Speed RS232 Interface (≤ 57.6 kbps)