038 COMPUTERS

I/O-FRIENDLY KEYBOARD

Not all computers have a keyboard, yet it is often essential to have the use of one. Two circuits are presented here that enable a keyboard facility to be produced with the aid of only six or seven I/O lines.

Fig. 1 shows a circuit based on a 74HCT148 and a 74HCT138 that can serve 56 or 64 keys. The circuit in Fig. 2, based on a 74HCT147 and a 74HCT138, can address 72 keys via seven I/O lines. The choice between the two circuits depends on the number of available I/O lines and the wanted number of keys.

In either circuit, the key rows are selected by the bits on the A, B or C input of the HCT138. The combination of these bits determines which of the outputs Y0–Y7 goes low. As long as no key is depressed, the inputs of the HCT148 in Fig. 1 or the HCT147 in Fig. 2 are high. When a key is pressed, the inverted binary information at the output of the ICs show which key it is.

In Fig. 1, the 0 input of the HCT148 is not used, because the code associated with that input is the same as that generated when no key is pressed. The output, pin 14, of this IC is used to detect whether a key has been pressed. It goes low when a key has been pressed.

In Fig. 2, four 1s at the output indicate that no key has been pressed.

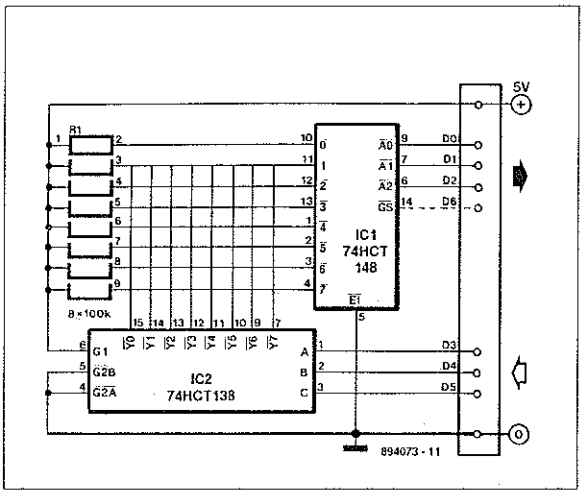


Fig. 1.

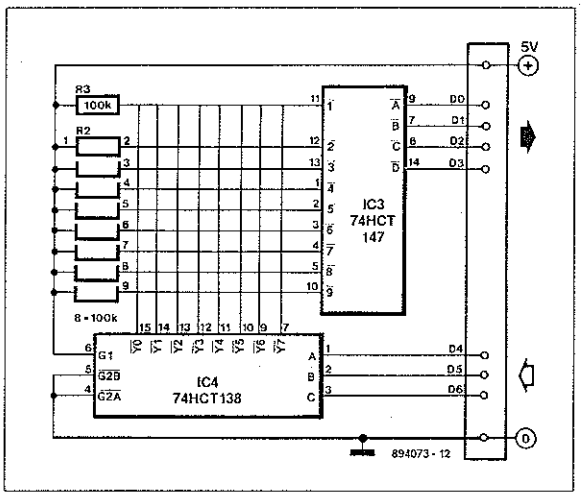
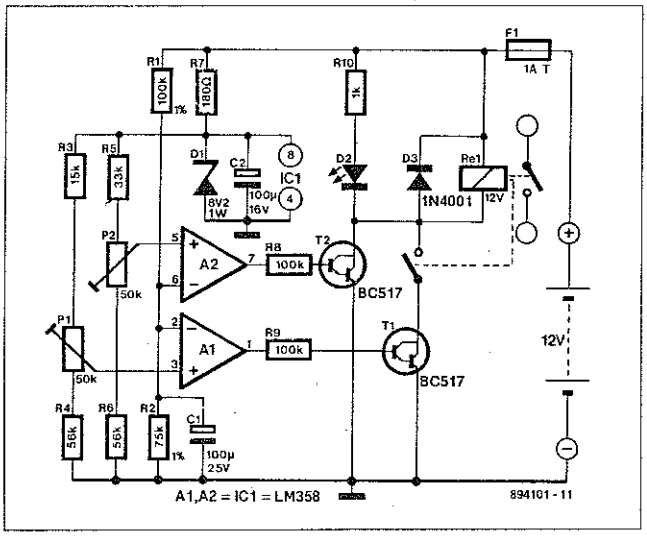


Fig. 2.

039 CAR ELECTRONICS

ENERGY CONTROL FOR BATTERY CHARGERS



In most automatic battery chargers, the power transformer remains connected to the mains even after the the battery (or batteries) has been charged. In many cases, considerable energy savings can be achieved by disconnecting the transformer from the mains when the battery is fully charged. This circuit performs this function for 12 V car battery chargers.

The battery voltage is monitored by an adjustable window comparator around opamps A1 and A2, which are powered by a stabilized supply voltage of 8.2 V (R7-D1). The high and low switching thresholds, U_H and U_L, are set by presets P1 and P2 respectively. The reference voltage for the opamp is obtained from junction R1-R2 and is a function of the battery voltage. With the given values of R1 and R2, a voltage divide factor, D, is obtained

$$D = R2 / [R1 + R2] = 0.43.$$

Taking into account the series resistors connected to the presets and the use of an 8.2 V supply voltage, the span of P1 is

7.2 / D = 16.7 V (max) to 3.8 / D = 8.9 V (min)