001 Transmitter for Fibre-Optic IR Extender

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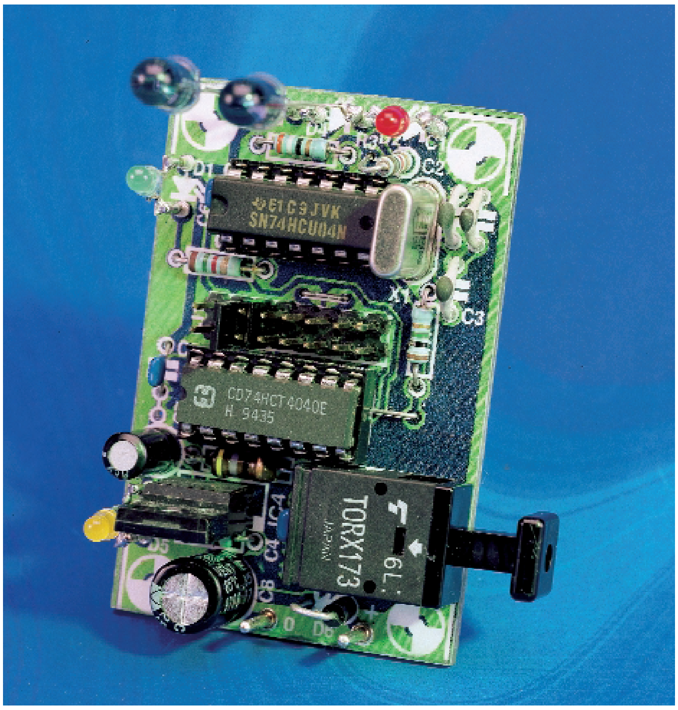
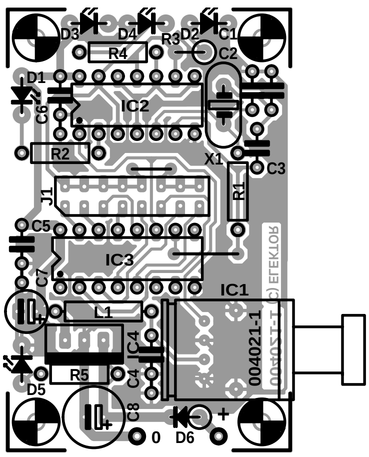
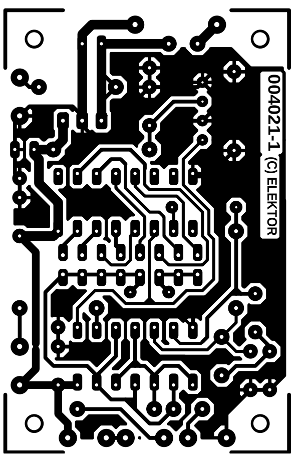
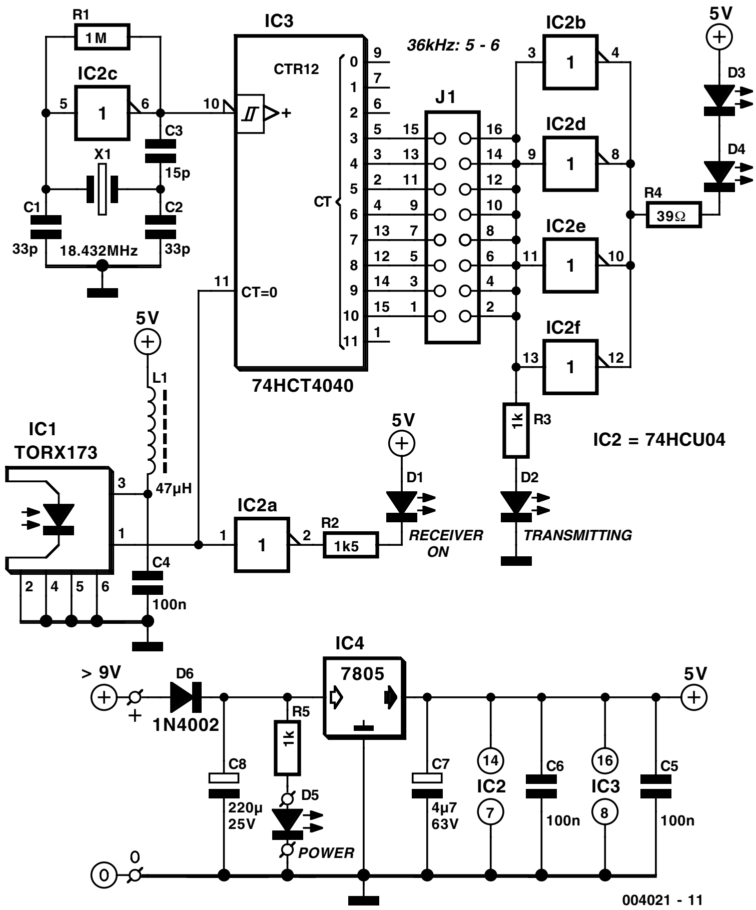
This circuit restores the original modulation of the signal received from the remote-control unit, which was demodulated by the receiver unit at the other end of the extender (see ‘Receiver for fibre-optic IR extender’).

If no signal is received, the Toslink transmitter in the receiver is active, so a High level is present at the output of the Toslink receiver in this circuit. Buffer IC2a then indicates via LED D1 that the receiver unit is active. The received data are re-modulated using counter IC3, which is a 74HCT4040 since the Toslink module has a TTL output. In the idle state, IC3 is held continuously reset by IC1. The oscillator built around IC2c runs free. When the output of the Toslink receiver goes Low, the counter is allowed to count and a carrier frequency is generated. This frequency is determined by the oscillator frequency and the selected division factor. Here, as with the receiver, we assume the use of RC5 coding, so a combination has been chosen that yields exactly 36 kHz. The oscillator frequency is divided by 2^9 on pin 12 of the counter, and 18.432 MHz ÷ 2^9 = 36 kHz. The circuit board layout has a double row of contacts to allow various division factors to be selected, in order to make the circuit universal. You can thus select a suitable combination for other standards, possibly along with using a different crystal frequency. The selected output is connected to four inverters wired in parallel, which together deliver the









drive current for the IR LEDs D3 and D4 (around 50 mA). A signal from the counter is also indicate that data are being transmitted, via LED D2. This has essentially the opposite function of LED D1, which goes out when D2 is blinking.

In the oscillator, capacitor C3 is used instead of the usual resistor to compensate for the delay in IC2c. As a rule, this capacitor is needed above 6 MHz. It should have the same value as C_{load} of the crystal, or in other words 0.5C1 (where C1 = C2). At lower frequencies, a 1kΩ to 2kΩ2 resistor can be used in place of C3.

A yellow LED is used for the power-on indicator D5. The current through this LED is somewhat higher than that of the other LEDs. If you use a red high-efficiency LED instead, R5 can be increased to around 3kΩ3.

The circuit draws approximately 41 mA in the idle state when the receiver is on. If the receiver is switched off, the transmitter emits light continuously, and the current consumption rises to around 67 mA.

The PCB shown here is unfortunately not available ready-made through the Publishers' Readers Services.

(004021-1)

COMPONENTS LIST

Resistors:
R1 = 1MΩ
R2 = 1kΩ5
R3,R5 = 1kΩ
R4 = 39 Ω

Capacitors:
C1,C2 = 33pF
C3 = 15pF
C4,C5,C6 = 100nF ceramic
C7 = 4µF7 63V radial
C8 = 220µF 25V radial

Inductors:
L1 = 47µH

Semiconductors:
D1 = high-efficiency LED, green
D2 = high-efficiency LED, red
D3,D4 = LD271
D5 = high-efficiency LED, yellow
D6 = 1N4002
IC1 = TORX173 (Toshiba)
IC2 = 74HCU04
IC3 = 74HCT4040
IC4 = 7805

Miscellaneous:
J1 = 16-way double contact row, plus jumper
X1 = 18.432MHz quartz crystal