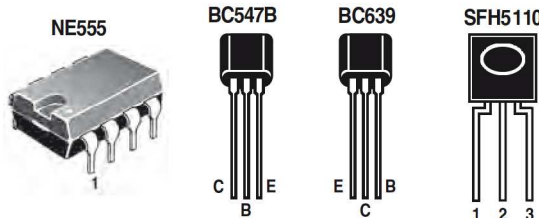
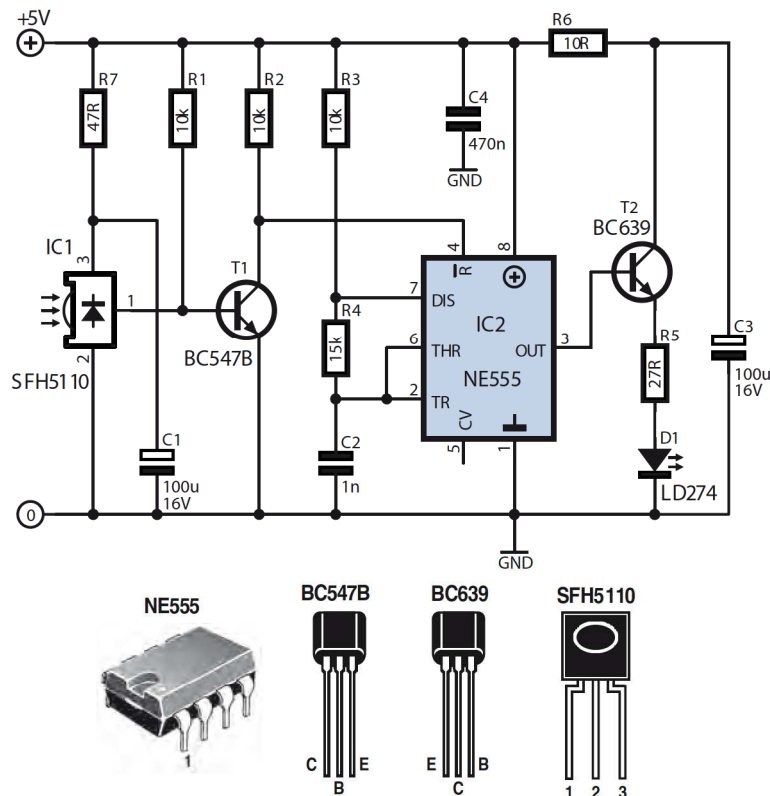




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Don't worry — we're not planning to reinvent the cable remote control units used in the 1960s. You can continue to use your stable of IR remote controls (a different one for every imaginable device), and using infrared remote control will be even more convenient than before. A normal remote control unit is helpless if the distance is too great or the device to be controlled is in a different room (or worse yet, concealed in a cupboard). We can change that.

Remote Control Extension



In brief terms, the operating principle of the solution presented here is that you place an IR receiver in a location where it is readily visible to your IR remote control unit. The received signal, in electrical form, is processed and sent further on its way via an IR transmitter LED (and a length of cable if necessary). This way you can not only increase the range, but also magically operate devices 'around the corner' under remote control. You can also turn down the music in the living room while the food is being served in the dining room, and much more.

With regard to IR remote control, you should be aware that there is no such thing as a single operating principle — instead, there is a host of signal types, modulation scheme and codes. Every manufacturer, be it Sony, Philips, Sharp or Panasonic, thinks it has to define its own standard. The only common factor is the use of pulsed IR light. In other words, the signals are transmitted as a series of short or long pulses of light at specific base frequency. The pulse widths are in the range of a few microseconds. Using modulated IR light provides better noise immunity with respect to sunlight and light from household lamps. The modulation frequency is typically in the range of 30 to 45 kHz. For the sake of simplicity, you can use a receiver with a typical average value of 36 kHz, since the receiver modules are not that highly discriminating.

The Osram SFH5110-36 (IC1) is a fully integrated IR receiver (see photo) that operates at 36 kHz and generates pulse signals from the received IR light. ICs of this type are available for a number of other frequencies, but experiments have shown that most remote control units also work with the 36-kHz version. Nevertheless, you can use an SFH5110-33 (33 kHz) or an SFH5110-40 (40 kHz) if it suits your purpose.

Here T1 simply acts as an inverter, so a signal with the right polarity for IC2 is available at R2. When IC1 receives IR light,

its output goes low and the collector of T1 goes high. This signal drives the Reset input of the timer IC (IC2), which acts as a controlled 36-kHz signal source.

IC2 acts as an oscillator. As long as T1 provides a 'high' signal, a pulse waveform at the desired frequency of 36 kHz is present at the output. The frequency is determined by R3, R4 and C2. Although the frequency may vary slightly due to component tolerances, this does not have a significant effect in practice. In summary, we can say that whenever the receiver sees IR light, the circuit emits IR light at a frequency of 36 kHz via IC2 and the IR LED (D1).

Transistor T2 is an amplifier stage that provides the current through the LED (approximately 60 mA). The current pulses are filtered by R6 and C3 to reduce the peak load on the power source. As the maximum supply voltage is 5.5 V, a 7805 is a good choice for providing a regulated supply voltage from an unregulated DC voltage in the range of 8 to 12 V. Take care that the light from the LED cannot fall on IC1, as otherwise the circuit will go into business on its own and constantly emit IR light, which makes it useless as remote control extender.

If necessary, you can use a length of cable to connect the IR transmitter LED to the circuit board. This worked quite well with the prototype for a distance of up to 3 metres with a twisted-pair cable. Even longer distances are probably possible.

