NetMedia

Basic Express BX-35
Application Note

Decoding Infrared Data Stream Using Serial Input

Infrared sensor interface

This application note describes how to interface an IR detector to a BX-35 computer.

A built-in BX-35 serial communications channel is used to decode the IR data stream. This technique tends to be more efficient than a purpose-written program that looks for patterns in IR pulses. The IR encoding scheme needs to be a reasonably close match to the asynchronous serial data formats supported by the BX-35's Com3 port regarding start bits, stop bits and data bits. Com3 can be connected to any of the BX-35s I/O pins.

What makes Com3 unique is that instead of using predefined baud rates (i.e. 1200, 2400, 9600), you can define arbitrary baud rates ranging from 300 to 19 200 baud. Although this flexibility might not be very useful for communicating with serial devices that adhere to industry standard baud rates, it can be ideal for reading those notoriously strange IR data streams. You might not think of your TV's remote control as a serial device, but after its 30 kHz to 44 kHz carrier signal is demodulated, what's left over is an ordinary looking (although strangely timed) binary data stream.

It is mostly this strange data timing that prevents IR data streams from being read by a serial port set to a standard baud rate. The sizes of IR "words" and internal timings vary greatly depending on device and manufacturer.

Hardware needed

To complete this application note you will need to purchase the following two items from your local Radio Shack store or find comparable substitutes.

- IR detector module (Radio Shack Cat. No. 276-137B)
- ITZA 2 Universal Remote Control (Radio Shack Cat. No. 15-1998 or 15-1999).

Programming your universal remote

If you're using the recommended remote control, you should program it with TV code 0032. If you have another type of universal remote you will need to program it to emulate a Samsung or Abex TV. The code is more than likely 0032 or 032. Some universal remotes will only allow you to program each feature (i.e. VCR code, TV code) once and will not accept any code changes until you remove the batteries, thereby erasing the program memory.

Hardware setup

Figure 1 illustrates the required connections between the BX-35 and the IR detector module. The connections are very straightforward. If you wish to avoid soldering altogether you can use three jumper wires with header connectors on each end. This would allow you to simply plug everything in. You should position your IR detector so its input aperture is not pointing toward any potential sources of IR interference such as fluorescent lights or sunlight.

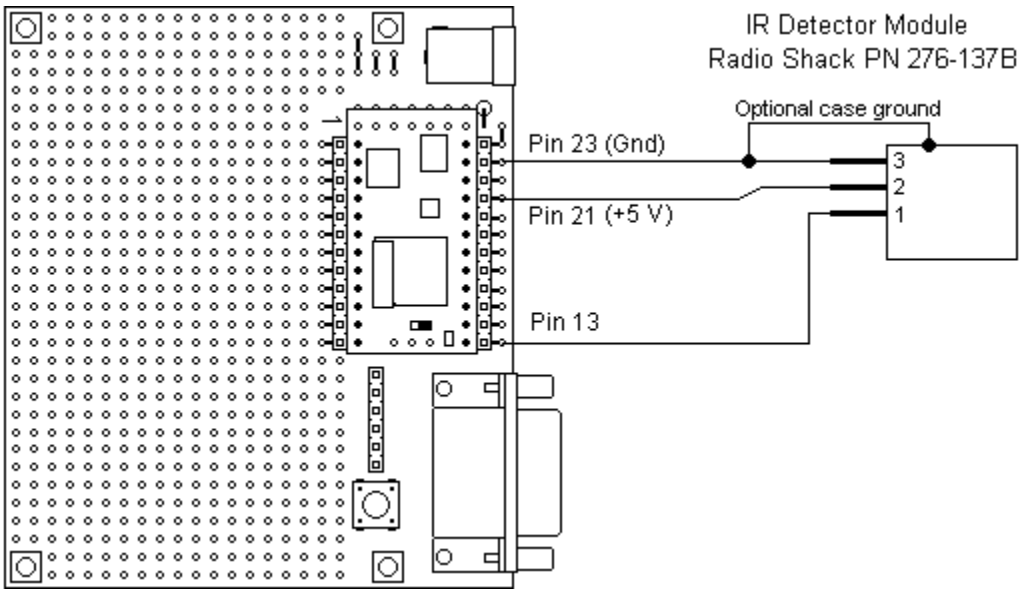

Figure 1

The connection marked “Optional case ground” is used to prevent interference from outside RF sources. This is not a required connection but may be necessary if you are receiving large amounts of bad or unreliable data.

Example code

There are two example programs that accompany this application note (IRLightsSer.bas and IRLights.bas). Both programs are designed to decode IR data streams only from remotes that are set to the device code as specified above.

The first of these two programs (IRLightsSer) will decode IR key presses and display data in the BasicX monitor window. You can also toggle the green LED by pressing the Volume +/- keys. The red LED can be controlled similarly with the Channel +/- keys. This program is a useful way to find all the assigned values for your remote's various buttons.

In order to see the decoded data, you need to select and open the BasicX downloader's “Monitor Port”. Click on “Monitor Port” in the downloader window and select the PCs Com port number to which your BX-35 system is connected. It will be the same port number selected under the “Download Port” menu.

The second program (IRLights.bas) is identical to IRLightsSer but does not send anything to the PC serial port.

Finding the IR baud rate

The baud rate (893) in both example programs was determined empirically by connecting an oscilloscope to the output pin on an IR detector and capturing a sample of the signal. The baud rate is determined by measuring the width of a single data bit (see Figure 2). The baud rate is determined by taking the inverse of the 1-bit pulse width (about 1.1 ms in this case).

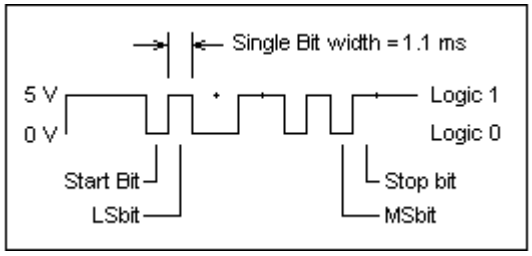

Figure 2