

Alarm History

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History

When I moved into my new house I found that it had already been hard-wired to support a Bosch alarm system. In fact the alarm system was still present in the house. However I was surprised after calling the alarm company whose name was on the unit – they would barely return my calls and, even after saying they would give me a quote to re-activate it, they never sent the quote.

Naturally, I wasn't impressed with their service, so I decided to use a previous ADT Blue system that I had from a prior house and adapt it to work with the hard-wired sensors.

The main challenge was to convert the hard-wired sensors to communicate over RF (I think ADT Blue used Zigby.)

One of the drawbacks of the ADT Blue system was that its keypad display doesn't display the status of the sensors. In other words there is no way to tell if you left a door or window open when you are arming the system. If you arm it with a window open it simply ignores that window. Not the best design in my opinion.

Since the existing system had a Bosch keyboard display already wired, I chose to convert this to be used as a display for the new system.

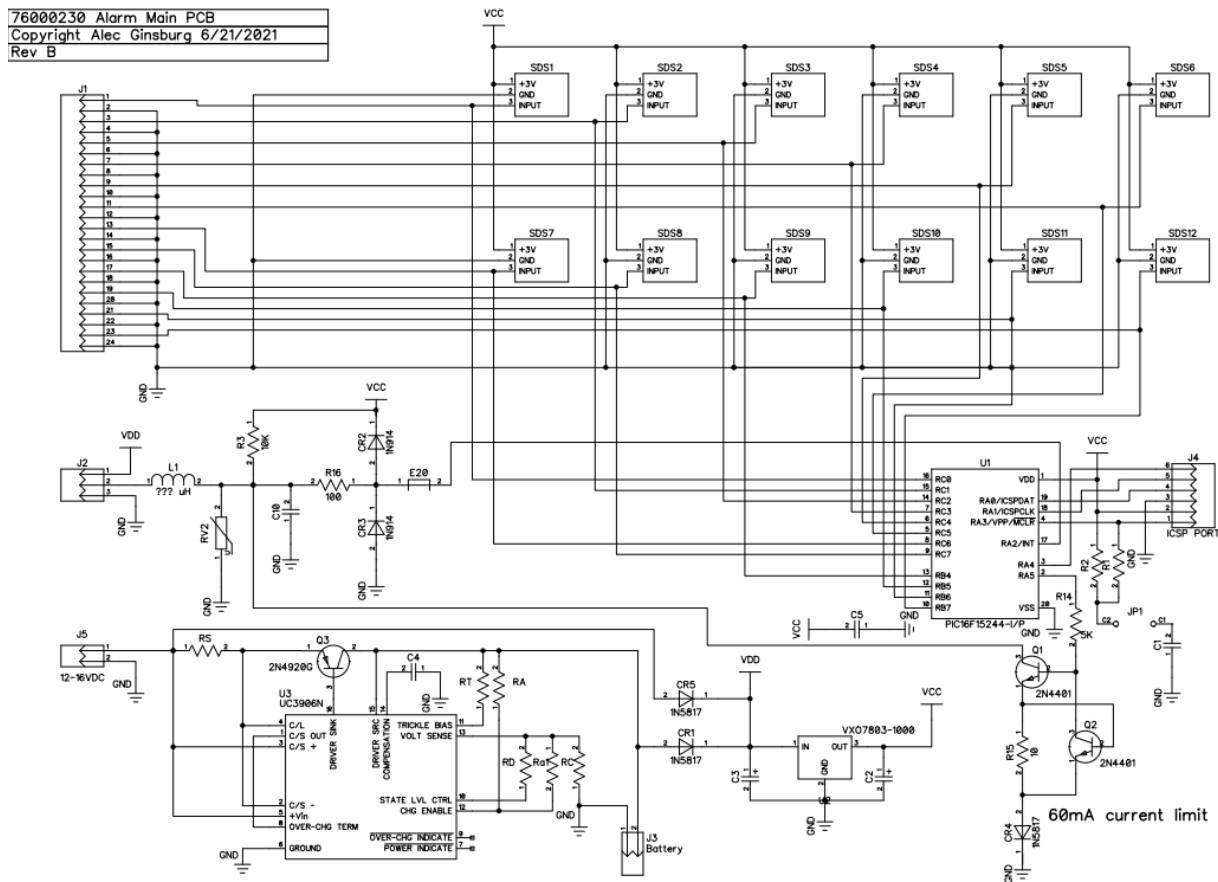


Converting hard-wired to RF

To convert the hard-wired signals to RF, I simply purchased enough ADT Blue door sensors so I had one for each hard-wired signal. They work by moving a magnet to-from a reed switch inside the sensor. I threw away the magnet and hard-wired each of my home hard-wired sensors across one of the reed switches of the door sensors. This eliminated having to implement the full RF protocol.



I designed a PC board that supports 12 such inputs that are scanned by a PIC processor that is connected over a serial link to the Bosch keypad. This also supports a lead-acid battery charger so the unit continues to function during power failures.



Most of this is pretty straightforward; however I did run into one interesting issue.

Each ADT Blue door sensor had a Vcc, Gnd, and Sensor connection. I was expecting that the sensor connection would be Vcc when the sensor was open, and Gnd in the reverse state.

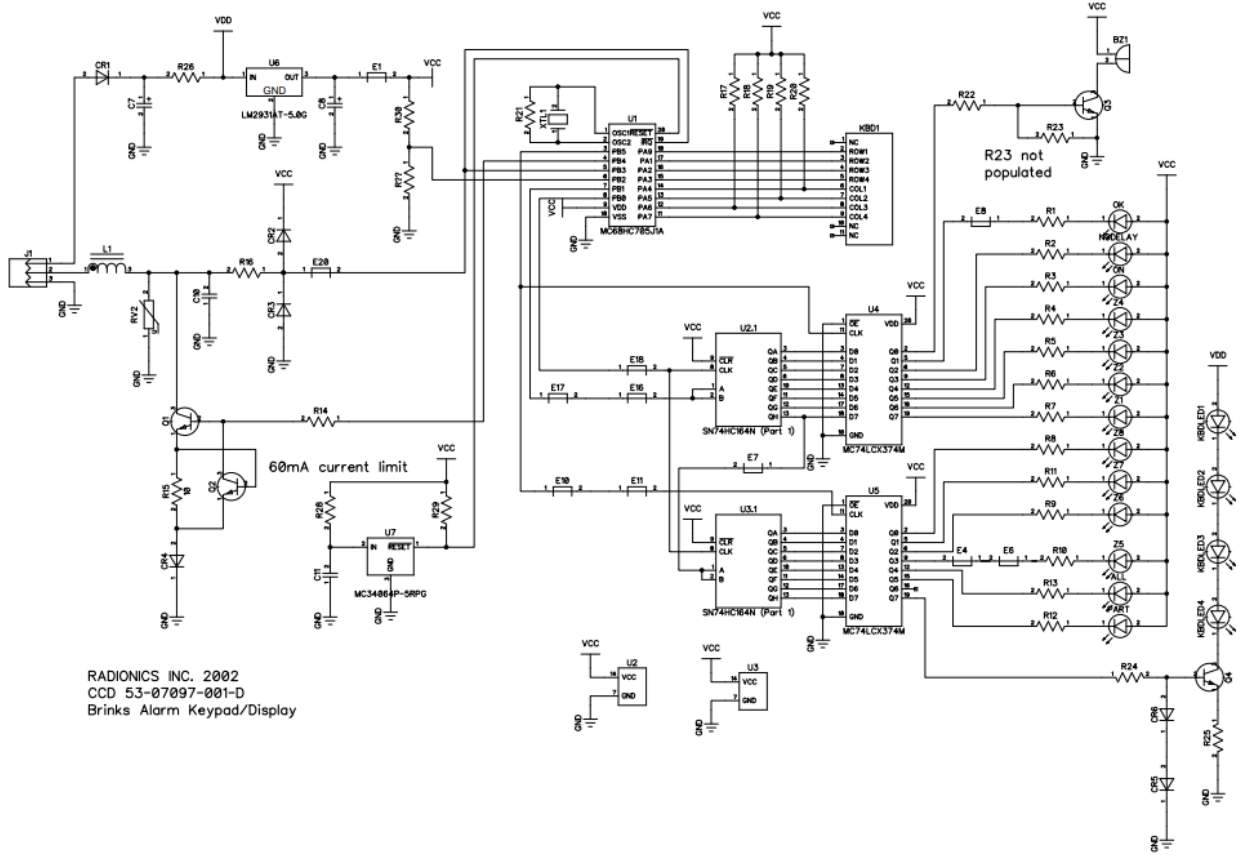
However, and it makes sense when you think about it, it was much more complicated due to the fact that the sensors were designed to be run from a 2032 3V watch battery for month at a time. Therefore the sensors were basically in 'sleep' mode most of the time and only woke up for brief periods to check if the sensor state had changed. This resulted in an unusual series of pulses on the Sensor connection as follows:

- Closed state is when there has been no rising edge in over about 325mS
- Open state initially occurs with a 'long' positive pulse (2.25 seconds) followed approximately every 325mS with a positive pulse of about 45-50uS

Once I had this figured out it was relatively easy to code a state machine in the PIC to translate the pulse sequences into logical on/off states that could be displayed on the Bosch keypad.

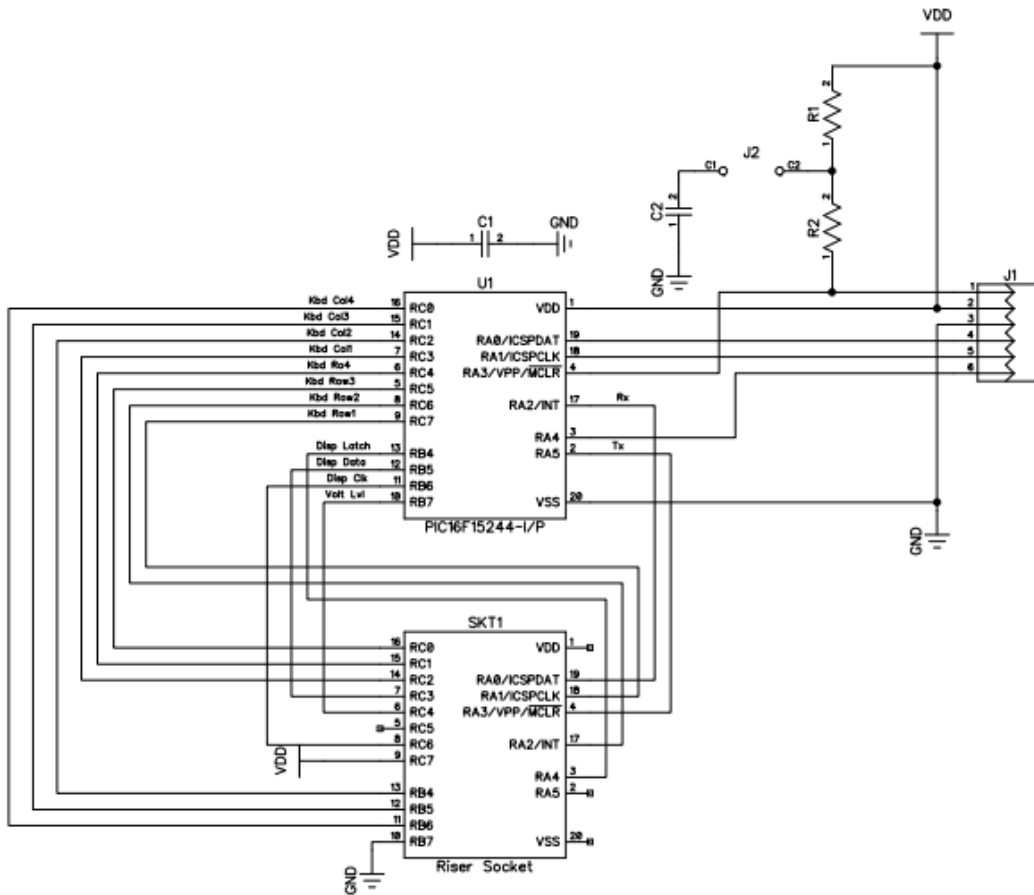
Displaying the Sensor States

I was able to find the schematic for the Bosch keypad online and it is pretty straightforward.



The main issue here was that it used a Motorola MC68HC705 processor chip and I didn't have any development tools for it, so I designed a small adapter board that would allow me to use a PIC16F15244 processor instead.

The bottom of this board plugged into the existing uP socket on the Bosch board and had a socket for the new PIC uP on the top.

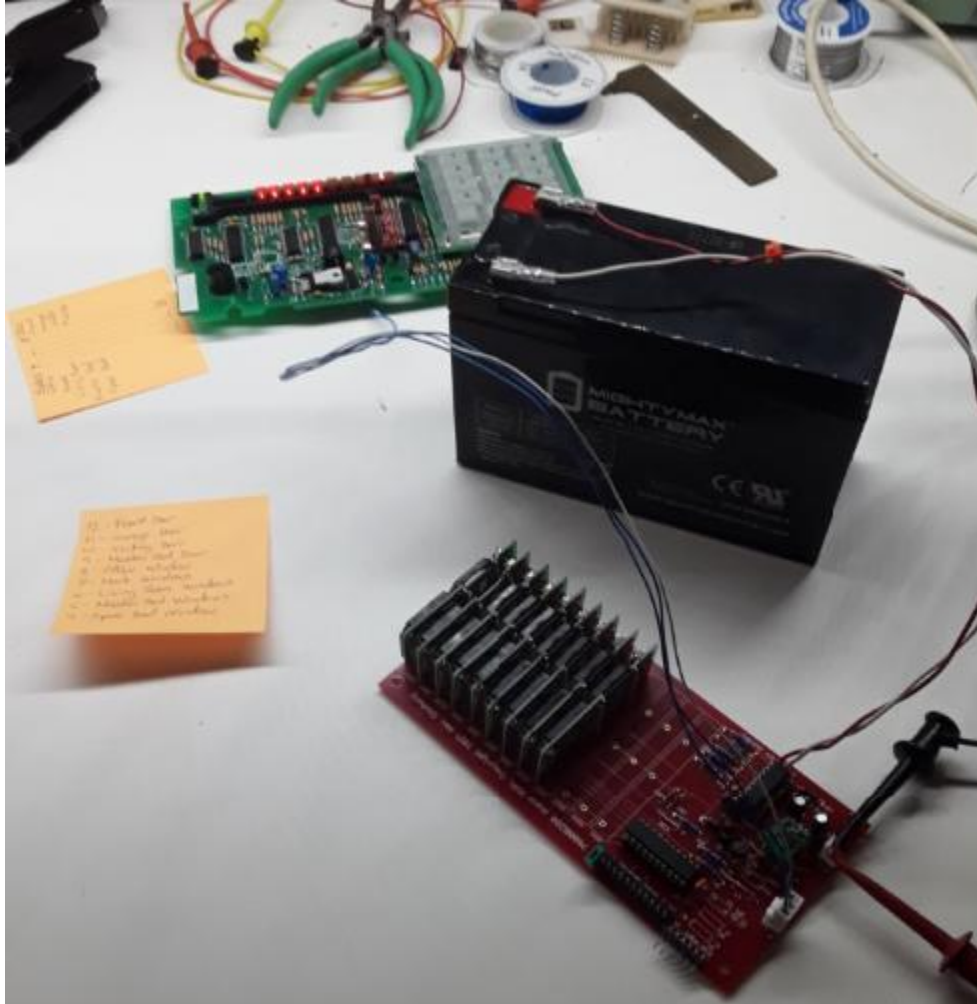


76000330 Alarm Keypad Processor
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Rev A

It was then a simple matter to program it to use the LEDs to display the state of the hard-wired sensor that were received over the serial port from the main board.

Final Product

Here you can see the main board (red) populated with 9x of the ADT Blue RF door sensors, connected to the Bosch keypad board (green) which is displaying the state of the open circuits, and the lead acid battery.



Here is an image of the product in its final mounting inside the original Bosch metal enclosure connected to all of the home hard-wired sensors. I mounted a telephone punch-down block in the enclosure to clean up the connections and facilitate future modifications.



Appendix

Source Code & Gerber Files

- 760002xx Alarm Main PCB
 - [Microchip source code.](#)
 - [Gerber files.](#)
- 760003XX Alarm Keypad PCB
 - [Microchip source code.](#)
 - [Gerber files.](#)