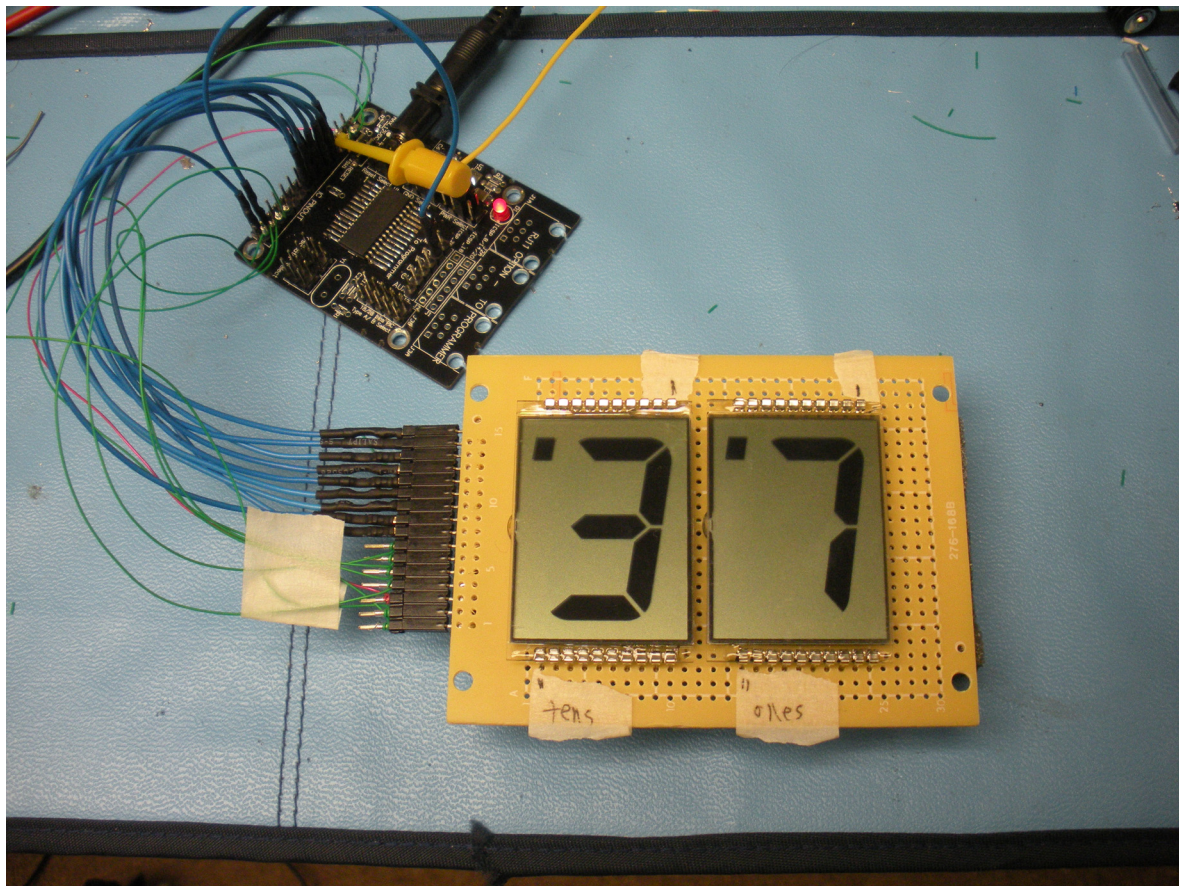**PROJECT NUMBER:** MP0010

PROJECT DESCRIPTION:

This project is a simple two digit timer that counts seconds as long as a set of external contacts (from a relay) are closed. It is intended for use in a video booth where it indicates the time in seconds that words (text) from a secondary video source have been displayed as an overlay on the main video signal. The timer is controlled by the video switch via a relay card in the video switch. A set of contacts from the video switch are closed as long as the secondary video source (text in this case) is overlaid on the main video. This allows the video switch operator to determine how long the text has been displayed. Since the text is typically only used as a temporary overlay, the timer tracks how many seconds the text overlay has been active. When the text has been displayed for enough time (usually about 45 seconds), the operator can press a button on the video switch to "take the words down" (disable the text overlay).

Two large (~1.4 inch [36 mm] high) LCD digits (7 segment type; Lumex LCD-S101D14TR) are used to count the seconds. The decimal points on the digits are used as status indicators to show if the text is on ("words up") or off ("words down"). I used the digits upside-down so that the decimal points are actually indicators above the digits, not in the usual place to the right of the digits at their baseline. See Photo 1.

Photo 1

The digits are driven by a Microchip PIC16F913 microcontroller. It has built-in LCD drive capability with memory mapped segment and common drive. All of the LCD multiplexing is done by the controller. These LCDs are of the static drive type. The SchmartBoard 710-0004-01 development board is used as the base for mounting the microcontroller. It has jumpers that are configured for this particular PIC controller (28 pins). The timer is intended to be mounted in a small plastic case with a battery compartment for four AA batteries. The only connection to the video switch is two wires to the relay contacts. The enclosure was still on back-order as of this writing.

The schematic is shown in Figure 1. The SchmartBoard and PIC16F913 processor are at the heart of the system. Power from the batteries is connected through a power on-off switch to the power input connector J9 on the SchmartBoard. An on-board regulator provides 5 volts to the processor and LCD digits. The J2 connector provides the connection to the video switch relay contacts. The internal Port B weak pullup is used for the input pin. Connections to the microcontroller are through the SchmartBoard headers that bring all 28 controller pins to one edge of the board. The digits connections and relay contact input to the controller are made through a 28 pin header (P1/J1). An intermediate connection between the LCDs and controller is not shown for clarity.
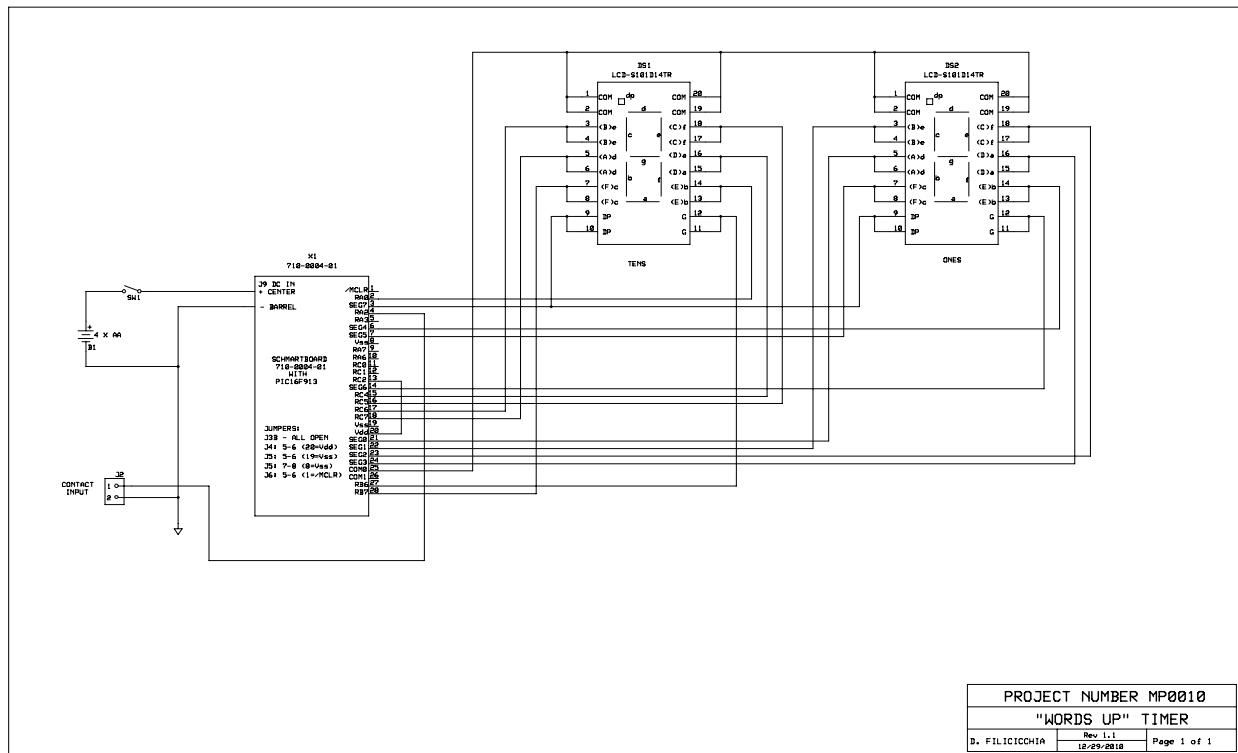

Figure 1

SOFTWARE:

The main loop of the program does initialization of the controller and a few variables and then watches for the relay contacts to be closed from the video switch. When the contacts are open, the "words up" indicator (decimal point) is off and the digits are blank. When the video switch operator needs the text overlay, they press a button on the video switch, the text overlay becomes active and the relay contacts close. When the contacts close, the "words up" indicator is on and the digits count up the seconds as long as the relay contacts remain closed. It is up to the video switch operator to press the video switch button to remove the text overlay (take the words down) when the proper time has elapsed. When the video switch button is pressed, the relay contacts in the video switch open and the "words up" indicator goes off and the digits go blank. The timer is then ready for the next cycle. Since the timer rarely is used past 45 seconds, the time count saturates at 99 seconds.

BILL OF MATERIAL:

1	710-0004-01	SchmartBoard development board
2	LCD-S101D14TR	Lumex LCD seven segment digit
1	PIC16F913-I/SO	Microchip MCU
1	HH-3633	Bud Industries battery holder
1	HH-3580-BCB	Bud Industries enclosure
1		J2 connector
1		P1 connector
1	Generic	slide switch - power
4	Generic	AA batteries
A/R	Generic	hookup wire
1	276-168	Radio Shack PCB for LCDs