



USER'S MANUAL

WaveSculptor LCD Display

TRI66.003 ver 1
14 May 2007

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1 INTRODUCTION

This document details the interface, installation, and usage requirements for the Tritium WaveSculptor LCD display product. It also provides information on programming the device to implement custom functionality.

The LCD display provides an easy way to show telemetry and control information for a Tritium WaveSculptor motor controller. The LCD display comes programmed from the factory configured with sensible default values that will work in a plug-and-play manner with a motor controller.

The microcontroller firmware for the device (in 'C') is available on the Tritium website under an open-source license, as are the hardware schematics and component overlays.

For further details on overall system configuration, please refer to the Wiring Engineering Reference document (TRI50.010), available on the Tritium website.

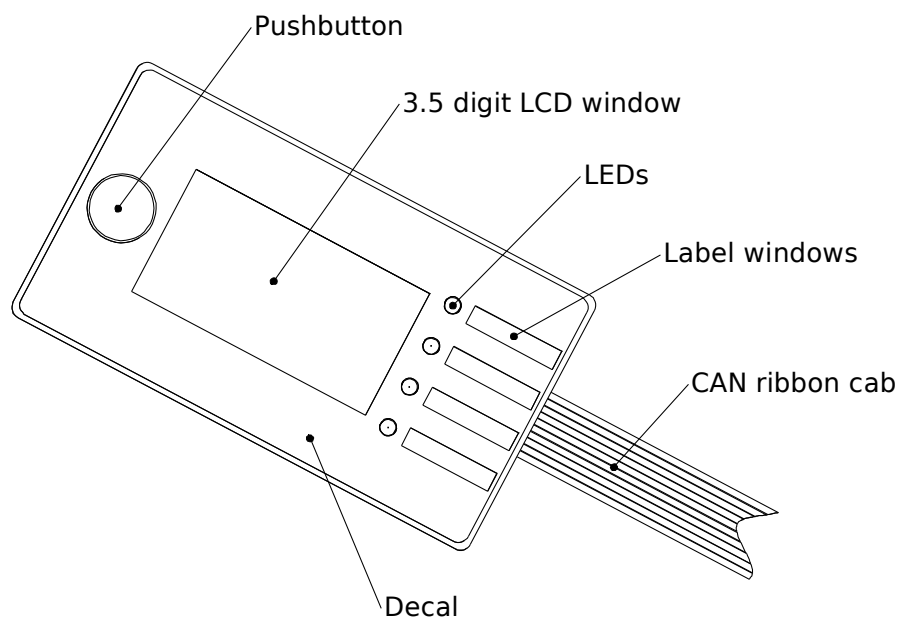
2 DEVICE OVERVIEW

The LCD display provides a 3.5 digit 7-segment liquid-crystal interface to show numbers from -1999 to 1999, with selectable decimal point position. Up to four different variables can be chosen to be displayed, one at a time.

The display receives data and power via a CAN bus running at up to 1 Mbit/second. It is a passive device on the bus and does not transmit or acknowledge packet activity on the network. Alteration of either the bit rate or the addresses for various data types currently requires reprogramming the microcontroller, although hardware support does exist to allow remote configuration in the future.

Four LEDs are provided on the front panel of the device to indicate which variable is currently being displayed.

With appropriate modification of the firmware, the display is capable of reading and displaying any variable on the CAN bus. It is not only restricted to Tritium devices.



3 HARDWARE

3.1 FRONT PANEL

An adhesive decal protects the front of the LCD and provides a single pushbutton switch to select between display variables. It is backed by a 0.8mm thickness stainless steel plate to provide a mechanically strong mounting surface.

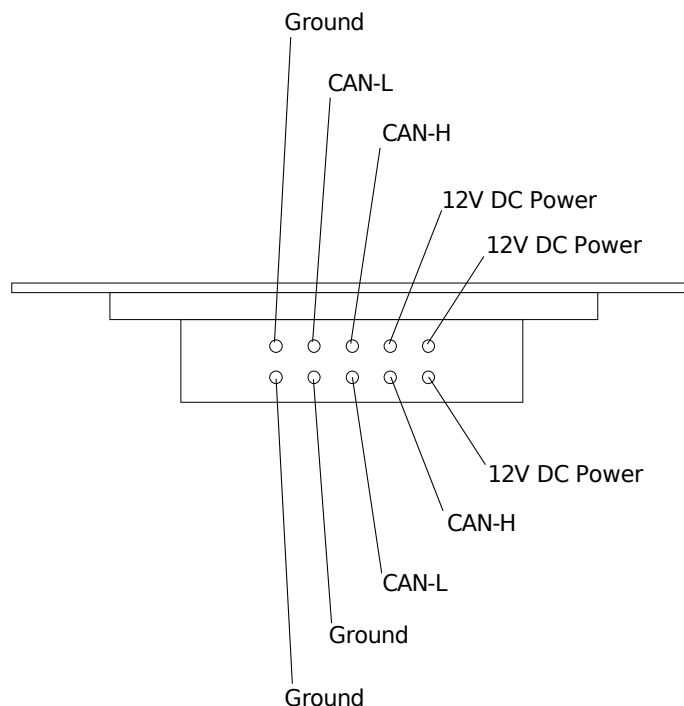
3.2 LABELS

Four transparent windows are present in the decal to allow placement of a paper label behind the decal. This label is inserted at the factory to match the four variables chosen for display, and once in place cannot be removed.

If you will be programming the display with your own firmware, please specify that your display be delivered unassembled, so that you can insert your own labels once you have finalised your firmware modifications.

3.3 CONNECTOR

The CAN bus connector is a male 10-pin IDC ribbon cable connector. The pinout is shown below, as viewed when looking into the connector on the display:



3.4 POWER INPUT

Power for the display needs to be supplied along the CAN bus cable. The display contains an internal regulated power supply and will operate successfully with a supply of between 9V and 15V DC. The display uses less than 20mA when operational.



4 MOUNTING

The LCD display is mounted by using double-sided adhesive tape to hold it into position in a cutout in a flat panel. It is lightweight, and the ribbon cable for the CAN bus does not present a high load, so it can easily be supported by two short lengths of tape.

The display requires a rectangular mounting hole cutout of 60 x 40mm, with panel thicknesses of up to 1.5mm.

5 PROGRAMMING

5.1 OVERVIEW

The LCD display is based around a Texas Instruments (TI) MSP430 16-bit embedded low-power microcontroller, operating from a clock derived from a multiplied 32.768kHz watch crystal as default. CAN bus support is provided via a Microchip MCP2515 CAN controller and TI SN65HVD234 CAN transceiver. The display is not isolated from the CAN network.

5.2 SCHEMATICS & SOURCE CODE

Schematics and PCB component position overlays in PDF format are available for download on the Tritium website. A zip file is also provided containing the default source code for the microcontroller, written in 'C' and available under a BSD open-source license.

Please refer to these references if developing custom firmware for the display.

5.3 TOOLCHAIN

The example default code provided is configured to work with the freely-available open-source MSP430 GCC toolchain, which provides a command-line driven compiler, binutils, download, and real-time debug capability through a JTAG header present on the back of the display PCB. Please refer to the README file with the source code for download and installation instructions.

An adapter is provided with every display product that converts the TI standard 14-pin JTAG debug header to the smaller 8-pin flexible printed circuit (FPC) header used on Tritium devices. Tritium recommends the use of the USB programmer part number MSP-FET430 UIF available from TI or their distributors, although lower cost and slower performance parallel-port devices are also useable.

5.4 CODE DOWNLOAD

Connect the 8-pin FPC ribbon to the header on the display PCB, with the Pin 1 indication arrows matching on both the display and the adapter board.

Follow the instructions in the README file to compile your 'C' source, produce an object file for loading into the microcontroller, and download the new firmware to flash memory in the microcontroller. Please feel free to email any questions or comments to James Kennedy, james@tritium.com.au.



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6 REVISION RECORD

<i>REV</i>	<i>DATE</i>	<i>CHANGE</i>
1	14 May 2007	Document creation (JMK)