Installation Instructions
TCI Transmission Control System for GM
Electronic Transmissions

T-Com™ WP User Guide
Version 1.010
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1.0 Introduction

Please check your new transmission control system contents. You should have received the following items:

- Transmission Control Unit (TCU)
- Complete wiring harness with labeled connectors
- T-Com™ WP software on 3 ½” floppy disc
- 5-ft communications cable for TCU to laptop

1.1 Overview

This TCI® Transmission Control Unit (TCU) system is designed to be used with the following transmissions: Ford AODE/4R70W, Ford E4OD/4R100, GM 4L60E/4L65E and GM 4L80E.

These transmissions are fully electronic and will not shift automatically with out a transmission control system connected to it. TCI's TCU, computer software and wiring harness enable the transmission to operate. The TCU is fully programmable; part throttle, Wide Open Throttle (WOT), shift firmness and speeds can be custom tailored to the application. The torque converter lock-up is also fully adjustable. All of the wiring harness wires are clearly labeled. You can refer to the wiring diagrams for more detail, but you should find that the system is set up as a 'plug-and-play' application.

2.0 Wiring Harness Guidelines

GM Wiring Notes

The supplied wiring harness has been designed to interface with the 4L60E/4L65E/4L80E transmission and all required sensors without any cutting/splicing required. Certain instances, where noted, call for the use of a TCI adapter harness to avoid splicing. Standard GM connectors have been utilized during harness construction to ensure compatibility with the most common sensors. Note: Pre-1993 4L80E transmissions will need to have an updated internal harness/connector installed to be compatible with the TCI TCU harness. Use either GM #24200161 harness or aftermarket equivalent.

The TCU itself is weatherproof so mounting it in the engine compartment is acceptable. Although there should be ample lengths of wire, it's best to lay out all the connections first to be sure everything reaches before permanently mounting the TCU.

Ford Wiring Notes

2.1 Harness Connector Faces

Every connector is labeled for ease of installation. Should the label become removed/lost, this section serves as a reference to identify the various connector faces on the harness. Note: Each connector has the terminal labels molded directly onto the connector body, i.e. A, B, C.
### 4L60E/4L65E

<table>
<thead>
<tr>
<th>CAVITY</th>
<th>FUNCTION</th>
<th>WIRE COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>SHIFT SOLENOID A (LOW)</td>
<td>LIGHT GREEN</td>
</tr>
<tr>
<td>B</td>
<td>SHIFT SOLENOID B (LOW)</td>
<td>YELLOW</td>
</tr>
<tr>
<td>C</td>
<td>PRESSURE CONTROL SOLENOID (HIGH)</td>
<td>ORANGE</td>
</tr>
<tr>
<td>D</td>
<td>PRESSURE CONTROL SOLENOID (LOW)</td>
<td>LIGHT BLUE</td>
</tr>
<tr>
<td>E</td>
<td>BOTH SHIFT SOLENOIDS, TCC SOLENOID AND 3-2 CONTROL SOLENOID (HIGH)</td>
<td>PINK</td>
</tr>
<tr>
<td>L</td>
<td>TRANSMISSION FLUID TEMPERATURE (HIGH)</td>
<td>DARK GREEN</td>
</tr>
<tr>
<td>M</td>
<td>TRANSMISSION FLUID TEMPERATURE (LOW)</td>
<td>PURPLE</td>
</tr>
<tr>
<td>N</td>
<td>RANGE SIGNAL &quot;A&quot;</td>
<td>GRAY</td>
</tr>
<tr>
<td>P</td>
<td>RANGE SIGNAL &quot;C&quot;</td>
<td>RED</td>
</tr>
<tr>
<td>R</td>
<td>RANGE SIGNAL &quot;B&quot;</td>
<td>DARK BLUE</td>
</tr>
<tr>
<td>S</td>
<td>3-2 CONTROL SOLENOID (LOW) NOT USED</td>
<td>WHITE</td>
</tr>
<tr>
<td>T</td>
<td>TCC SOLENOID (LOW)</td>
<td>BLACK</td>
</tr>
<tr>
<td>U</td>
<td>TCC PWM SOLENOID (LOW)</td>
<td>BLACK</td>
</tr>
</tbody>
</table>

### 4L80E

<table>
<thead>
<tr>
<th>CAVITY</th>
<th>FUNCTION</th>
<th>WIRE COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1-2 SHIFT SOLENOID &quot;A&quot; (LOW)</td>
<td>LIGHT GREEN</td>
</tr>
<tr>
<td>B</td>
<td>2-3 SHIFT SOLENOID &quot;B&quot; (LOW)</td>
<td>YELLOW</td>
</tr>
<tr>
<td>C</td>
<td>FORCE MOTOR (+)</td>
<td>ORANGE</td>
</tr>
<tr>
<td>D</td>
<td>FORCE MOTOR (-)</td>
<td>LIGHT BLUE</td>
</tr>
<tr>
<td>E</td>
<td>12 VOLTS +, IGNITION ON</td>
<td>PINK</td>
</tr>
<tr>
<td>L</td>
<td>TRANSMISSION FLUID TEMPERATURE (HIGH)</td>
<td>DARK GREEN</td>
</tr>
<tr>
<td>M</td>
<td>TRANSMISSION FLUID TEMPERATURE (LOW)</td>
<td>PURPLE</td>
</tr>
<tr>
<td>N</td>
<td>SWA</td>
<td>GRAY</td>
</tr>
<tr>
<td>P</td>
<td>SWB</td>
<td>RED</td>
</tr>
<tr>
<td>R</td>
<td>SWC</td>
<td>DARK BLUE</td>
</tr>
<tr>
<td>S</td>
<td>TCC SOLENOID (LOW)</td>
<td>WHITE</td>
</tr>
<tr>
<td>T</td>
<td>VOID - NOT USED</td>
<td>BLACK</td>
</tr>
</tbody>
</table>
Throttle Position Sensor (TPS)
Location: Engine Compartment

Input Speed Sensor (TISS - 4L80E only)
Location: Driver side of case, front sensor.

Economy/Performance (Optional)
Location: Dash mounted toggle or rocker switch

Output Speed Sensor (TOSS)
Location: 4L60E/4L65E 2WD - Tailhousing
4L60E/4L65E 4WD - Transfer Case
4L80E - Driver side of case, rear sensor.

Torque Converter Clutch (TCC - common)
Location: Next to TCU

Torque Converter Clutch (TCC - 4L80E)
Location: Next to TCU
2.2 Connections

Each of the connectors described in the following section has a corresponding connector number assigned to it that corresponds with the connector face diagrams in the preceding section, 2.1.

2.2.1 Main Transmission Connector - C1
The main transmission connector is the round gray one. It controls all of the internal transmission solenoids. Simply plug it into the connector of the transmission. **Note:** The connector is keyed to line up in one orientation only. Line the arrow on the TCI harness up with the notch on the case connector.

4L60E/4L65E - connector is located on the passenger side of the case.

4L80E - connector is located towards the rear of the driver side of the case. **Note:** Pre-1993 units will need to have an updated internal harness/connector installed to be compatible with the TCI TCU harness. Use either TCI 276610, GM #24200161 harness or aftermarket equivalent.

2.2.2 Throttle Position Sensor - C2
If you are installing the transmission in a vehicle that does not have a throttle position sensor (TPS), you must install one (the TCU needs to know the throttle position in order to determine proper shift points/firmness). TCI offers a remote-mount TPS for
If you are installing the 4L60E/4L65E/4L80E behind a fuel-injected engine, you can simply utilize the existing TPS sensor. TCI offers three different adapter harnesses that allow the TCU main harness to be pigtailed into an existing TPS while still functioning with the engine control module. This is a plug-and-play solution for splitting the TPS signal.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part #</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPS Adapter Harness for 2nd generation-style TPS</td>
<td>377200</td>
</tr>
<tr>
<td>TPS Adapter Harness for 1st generation-style TPS most commonly found on earlier computer-controlled carburetors</td>
<td>377201</td>
</tr>
<tr>
<td>TPS Adapter Harness for 3rd generation-style TPS with the round connector found on 1994-up OE applications</td>
<td>377203</td>
</tr>
</tbody>
</table>

### 2.2.3 TransComp Connection - C3
This connector allows the TCU to interface with your laptop. The TransComp connector plugs into the supplied, 5-ft. communication cable.

### 2.2.4 Distributor Connection - C4
The TCU also needs a connection to the factory distributor. This lets the computer know the engine RPM. The computer uses this information to control Wide Open Throttle (WOT) shift points. If you have a late model GM electronic distributor, you can buy a TCI distributor harness adapter (Part #377100) and plug the TCU connector into the adapter. If you do not have the harness adapter, you will need to splice into the vehicle distributor wiring.

Alternatively, you may utilize the tach output signal from an aftermarket ignition control. Connect the white wire going to Terminal A of connector C4 to the tach output.

### 2.2.5 Input Speed Sensor - C5
4L80E only - This connects to the input speed sensor (TISS) on the 4L80E transmission. This sensor is located in the driver side of the case, towards the front. The 4L60E/4L65E transmission does not use this input.

### 2.2.6 Economy/Performance Connection - C6
Optional - A neat feature of the T-Co m™ WP software is the ability to sharpen the shift feel at the flick of a switch. This is accomplished by hooking this lead to a dash/console-mounted toggle switch. Run the other switch pole to ground. The default position (off) will be the Economy setting. When switched on (grounded), the TCU will increase transmission line pressure by whatever percentage is prescribed by the user in the T-Co m™ WP software. See Part Two-5.2.1.1.9 for more information.

### 2.2.7 Output Speed Sensor - C7
This connects to the output speed sensor (TOSS/VSS) located in the tailhousing of the transmission. The TCU uses this input to calculate road speed. 1993-1995 4L60E & all 4L80E transmissions have this sensor located on the driver side. The 1996 & later 4L60E/4L65E transmissions with removable bellhousings have the VSS sensor located on the passenger side. Note: 1993-1995 4L60E speed sensors require a different connector.

### 2.2.8 Torque Converter Clutch (TCC - common) - C8
Labeled 'TCC'. The 4L80E and 4L60E/4L65E have slightly different pin outs for TCC activation. There are three separate leads for the TCC on the TCU harness, this being the common lead. It will need to be plugged into either connector C9 or C10 depending on which transmission you will be running.

### 2.2.9 Torque Converter Clutch (TCC - 4L80E) - C9
When running a 4L80E, this lead is to be plugged into connector C8, labeled 'TCC'.

### 2.2.10 Torque Converter Clutch (TCC - 4L60E/4L65E) - C10
When running a 4L60E/4L65E, this lead is to be plugged into connector C8, labeled 'TCC'.

### 2.2.11 Manual Shift Connection (Optional) - C11
The TCU is configured such that it's possible to have fully manual upshifts and downshifts at the flick of a switch like a bump stick. This works by first activating the manual mode with one switch to Terminal C. Once activated, the transmission can be bumped up (Terminal B) or down (Terminal C) through the forward gears via an On-Off-On momentary rocker switch.

The connections are to be made as follows:
- Terminal A (red wire) - momentary ground for bump down
- Terminal B (yellow wire) - momentary ground for bump up
- Terminal C (blue wire) - +12 volts to activate manual mode
Caution: Be aware that serious engine damage could occur due to over-revving if downshifts are made at too high of vehicle speed. T-Com™ WP cannot override your input while in the manual mode.

2.2.12 TCU Connection - C12
Plug this into the TCU bulkhead connector on the left-hand side. Snug the retaining bolt using a ¼" socket. Do not overtighten.

2.2.13 SCU Connection - C13
Optional: For vehicles equipped with analog (mechanical) speedometers, TCI offers a Speedometer Control Unit (Part# 377300) which uses the VSS signal to drive a standard style speedometer cable. Plug this into the SCU lead.
Note that there is a 5-amp inline fuse in the red, power supply wire going to terminal A.

2.2.14 Voltage Supply/Ground
The preferred method is to connect the ground wire on the wiring harness directly to the battery. This will reduce the amount of electrical noise to the TCU. The black wire with a ¾" ring terminal is the ground. The ground connection should be free of paint and corrosion if grounded directly to the chassis or engine block.
The Pink wire labeled ‘+12 V Switch’ is the 12-volt ignition wire. A 10-amp inline fuse should be utilized between the power source and the TCU. This wire should only be hot when the key is in the ON position.

2.2.15 Neutral Safety Switch
If your present shifter does not have provisions for a Park/Neutral safety switch and Reverse light switch, you may choose to utilize the switches built onto your transmission shift lever if so equipped.

2.2.16 Torque Converter Lock-up Release Switch
For smooth operation, it's suggested that the TCC wire be run through a factory brake pedal switch (NC) so the TCC will unlock when you apply the brakes. This is the white wire with black stripes labeled ‘TCC’ that terminates with connector C8.

3.0 Glossary

BOP ........ Buick, Olds, Pontiac, Cadillac
DIS ........ GM Distributor less Ignition used on Buick V6 (one coil for every two spark plugs)
ECU ........ Engine Control Unit
HEI .......... GM High Energy Ignition
IPU .......... Inductive Pickup Ignition — Racing crank trigger ignitions and magnetic pickup distributors
NC .......... Normally Closed
NO .......... Normally Open
PWM .......... Pulse Width Modulated — Varying the duty cycle of a solenoid to control the volume or pressure in a hydraulic circuit
SCU .......... Speedometer Control Unit — (TCI Part# 377300) uses the VSS signal to drive a standard style speedometer cable.
TCC .......... Torque Converter Clutch — controls the apply and release of the torque converter lock-up
TCU .......... Transmission Control Unit
TISS .......... Transmission Input Speed Sensor — magnetic pickup monitoring the forward clutch drum on a 4L80E
TOSS .......... Transmission Output Speed Sensor — magnetic pickup monitoring output shaft speed
TPS .......... Throttle Position Sensor — relays throttle opening/closing to ECU and/or TCU
VSS .......... Vehicle Speed Sensor
WOT .......... Wide Open Throttle
4.0 Troubleshooting

This section shows how to troubleshoot the transmission solenoids/internal harness connections via the TCU main connector C12. Set your multi-meter to read resistance and probe between the indicated terminals. Caution: Be careful not to damage the terminals in the connector with the multi-meter probes.

A short, open or resistance reading outside of the specification indicates a problem that needs to be investigated further. Note: The letters and numbers used to identify the terminals are molded to the connector body.

4.1 Troubleshooting 4L60E/4L65E Solenoids

SHIFT SOLENOID A
20 - 30 Ohms @ 70°F

PRESSURE CONTROL SOLENOID (PCS)
3.5 - 8 Ohms @ 70°F

3-2 DOWNSHIFT CONTROL SOLENOID

SHIFT SOLENOID B
20 - 30 Ohms @ 70°F

TCC SOLENOID (1993 - 1994 ON/OFF)
Note: Solenoid is polarity specific. Put positive test lead on pin L3.
20 - 30 Ohms @ 70°F

TCC SOLENOID (1995 - Later PWM)
10 - 15 Ohms @ 70°F
4.2 Troubleshooting 4L80E Solenoids

SHIFT SOLENOID A
20 - 30 Ohms @ 70°F

SHIFT SOLENOID B
20 - 30 Ohms @ 70°F

FORCE MOTOR
3.5 - 8 Ohms @ 70°F

TCC PWM SOLENOID
10 - 15 Ohms @ 70°F

5.0 Retrofit Tips
The mechanical portion of this transmission swap is similar to swapping a 700-R4 into an older model vehicle that was originally equipped with a Powerglide, TH-350 or TH-400 transmission. Depending on the application, the driveshaft may need to be lengthened or shortened.
The crossmember may need to be moved and the transmission mount, bellhousing and shift linkage may need to be modified. The starter may need to be replaced as well.
If you are installing a high performance aftermarket converter, you may even need to drill the flexplate holes oversize in order to accommodate larger-than-factory bolts. Be sure to check this before attempting the swap. (It's a hassle to have to remove the transmission from the car simply because the converter bolts would not go through the flexplate!)
Use the dimensions listed below to determine the proper amount to move your crossmember and the amount to have the driveshaft shortened or lengthened.
<table>
<thead>
<tr>
<th>Transmission</th>
<th>Overall Length</th>
<th>Distance to Crossmember Mount</th>
<th>Bellhousing Bolt Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>4L60E (1993-1996)</td>
<td>30 3/4&quot;</td>
<td>22 1/2&quot;</td>
<td>Chevy</td>
</tr>
<tr>
<td>4L60E/4L65E (1996-later w/ removable bellhousing, non-LS1)</td>
<td>30 3/4&quot;</td>
<td>23 3/16&quot;</td>
<td>Chevy</td>
</tr>
<tr>
<td>4L60E/4L65E (1998-later w/ LS1)</td>
<td>31 5/32&quot;</td>
<td>23 19/32&quot;</td>
<td>Chevy</td>
</tr>
<tr>
<td>4L80E (Std. 2WD)</td>
<td>32 11/16&quot;</td>
<td>30 3/8&quot;</td>
<td>Chevy</td>
</tr>
<tr>
<td>4L80E (HD 2WD)</td>
<td>31 15/16&quot;</td>
<td>30 3/8&quot;</td>
<td>Chevy</td>
</tr>
<tr>
<td>4L80E (HD long)</td>
<td>33&quot;</td>
<td>30 3/8&quot;</td>
<td>Chevy</td>
</tr>
<tr>
<td>700-R4/4L60</td>
<td>30 3/4&quot;</td>
<td>22 1/2&quot;</td>
<td>Chevy</td>
</tr>
<tr>
<td>200-4R</td>
<td>27 11/16&quot;</td>
<td>27&quot;</td>
<td>Chevy, BOP, Fit-all*</td>
</tr>
<tr>
<td>Powerglide</td>
<td>27 11/16&quot;</td>
<td>20 9/16&quot;</td>
<td>Chevy, BOP</td>
</tr>
<tr>
<td>TH-350 (6&quot; tailshaft)</td>
<td>27 11/16&quot;</td>
<td>20 3/8&quot;</td>
<td>Chevy, BOP, Fit-all*</td>
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<tr>
<td>TH-350 (9&quot; tailshaft)</td>
<td>30 11/16&quot;</td>
<td>20 3/8&quot;</td>
<td>Chevy, BOP, Fit-all*</td>
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<tr>
<td>TH-350 (12&quot; tailshaft)</td>
<td>33 27/32&quot;</td>
<td>20 3/8&quot;</td>
<td>Chevy, BOP, Fit-all*</td>
</tr>
<tr>
<td>TH-400 (C tailshaft)</td>
<td>28 3/8&quot;</td>
<td>26 19/16&quot;</td>
<td>Chevy, BOP</td>
</tr>
<tr>
<td>TH-400 (D tailshaft)</td>
<td>33 27/32&quot;</td>
<td>27 15/16&quot;</td>
<td>Chevy, BOP</td>
</tr>
<tr>
<td>TH-400 (13&quot; tailshaft)</td>
<td>37 7/8&quot;</td>
<td>27 21/32&quot;</td>
<td>Chevy, BOP</td>
</tr>
</tbody>
</table>

* Fit-all refers to a bellhousing configured to accept either a Chevy or BOP engine.

Both the 4L60E/4L65E and 4L80E have Chevy bellhousing bolt patterns. TCI has a full line of adapters to allow these transmissions to be bolted up to Buick, Olds, Pontiac engines as well as popular engines from Ford and Chrysler as well.

**Additional 4L60E/4L65E notes:**

**Header/Exhaust Clearance** - There are several different bellhousing configurations for the 4L60E/4L65E transmission. The earlier models (1993-1996) have an integral bellhousing, identical to the 700-R4. In some cases, the dust cover mounting ears will have to be cut off to accommodate header collectors. This can easily be accomplished with a hacksaw. The later models (1996-later) have a fully circumferential, bolt-on bellhousing. It is important to use the correct bellhousing for your application. The LS1-style 4L60E/4L65E transmissions have a unique bellhousing and input shaft. These types are not direct replacements for the non-LS1 applications.

Some headers will interfere with the starter hump on the bolt-on bellhousings. It may be necessary to either dimple the header or cut off the starter hump.

**Starter Clearance** - The bellhousing may require modifications if you intend to use a stock starter. As an alternative to modifying the bellhousing, you may choose to install a TCI mini-starter.

**Shift Lever** - Many 1996-later, two-piece case transmissions (primarily trucks) have a shift lever that is about 1" longer than the early-style found on 700-R4, TH-350 & TH-400.

**Cooler Lines** - Your existing lines may have to be bent to connect to a 1996-later, two-piece case transmission. These units have fittings that are parallel to the ground instead of being angled down. You may also need to change the case fittings as many 1996 & later transmissions are equipped with the factory quick-connect style. **Caution:** Do not use Teflon tape if replacing cooler fittings. It can cause the case to crack due to over tightening.
Part Two - T-Com™ WP User Guide

1.0 Introduction

Congratulations! You have just purchased the finest aftermarket performance transmission control system available for the GM 4L60E/4L65E and 4L80E electronic transmissions. This control unit and programming software is designed to work with either unit. This reference manual provides you with a step-by-step guide to a PC-based control system for our Transmission Control Unit. This software allows you, through your PC, to take precise control and alter the feel of a gearshift, the timing of the gearshift and the application of the lock-up in the torque converter. T-Com™ also allows you to have the transmission shift at wide open throttle (WOT) solely as a function of engine rpm, while it continues to follow shift curves based on road speed and throttle position during part throttle driving.

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www.tciauto.com
1.2 System Overview
T-Com™ WP is designed to allow maximum tuning for the performance enthusiast. The system comes pre-loaded with a transmission calibration that works well in many performance applications. There are only four fields in the Global Calibration that MUST be entered for the system to function in its pre-programmed calibration. In order to get the system up and running you simply enter (1) rear tire diameter, (2) rear gear ratio, (3) number of engine cylinders, and (4) which transmission you are using (4L60E/4L65E or 4L80E).
Since different users can have wide-ranging expectations of how hard and when they want the transmission to shift, our easy edit features allow for 'customizing' the characteristics to meet those expectations.
CAUTION: Setting duty cycles to minimum line pressures on the force motor tables can result in slipping clutches. Changes in the line pressure duty cycle should be made in small increments.

1.3 System Requirements
PC: 80386 or higher CPU
Operating System: Microsoft® Windows 95/98/NT/ME/2000/XP
Graphics: VGA
RAM: 2MB minimum
Hard Disk: 1 MB minimum
RS-232: A free COM port (#1,2,3 or 4 without conflicting interrupts) is required. Use of a USB to RS-232 router is required in the event your PC is only equipped with a USB port.

2.0 Installation

2.1 Automatic Installation
Installation from a DOS prompt
- Insert the supplied T-Com™ WP disk in your floppy disk drive.
- At the DOS command prompt, type letter of of your computer's floppy drive, followed by: \install (for example, a:\install).
  Note: If using DOS 6.0 or earlier, use 'a\install2'.
- Follow the instructions that appear on the screen to complete the installation.

Installation from Windows
- Insert the supplied T-Com™ WP disk in your floppy disk drive.
  Option One
  - Select Start, Run.
  - At the command line box, type the letter of your computer's floppy drive, followed by: \install (for example, a:\install).
  - Follow the instructions that appear on the screen to complete the installation.
  Option Two
  - Open Windows Explorer.
  - Open the contents of your floppy disk drive.
  - Double click install.
  - Follow the instructions that appear on the screen to complete the installation.

2.2 Executing T-Com™ WP
To execute the program once it's installed, click on TComWP.exe or its shortcut. A shortcut is installed in the Start Menu Programs folder.

2.3 Special Notes
If the TCU is not connected and powered (key off) when T-Com™ WP is executed for the first time, T-Com™ WP will be in a 'demo' mode. In the 'demo' mode, all file-save functions and some communications features will be disabled. T-Com™ WP will remain in 'demo' mode until such time as a TCU is connected and successful communication is established.
If T-Com™ WP is executed after the TCU is powered up (key on) and connected (by the communication cable), communication will be attempted. You can also press the F2 key to cause T-Com™ WP to attempt communication with the
2.4 Loading and Saving Calibration Files

Calibration files can be loaded or saved in one of two ways. In offline mode, a calibration file can be loaded into your PC's memory so that you can make changes offline and save them to disk. In online mode, you will be sending calibration information directly to the TCU.

To load a file:

- From the pull down menu, select File/Read All Tables. (The hot key for this operation is \text{F11}.)
- Select a calibration file to load. You may either double click the file or click the file once to highlight it and then click Open.

When you are in offline mode, once the file is loaded, you may make any changes you wish and save the changes to disk. Once the changes have been made, the file can be programmed into the TCU when you are in online mode.

When you select a file to load in online mode, you should see a progress bar at the bottom of the screen. When the bar fills up, the new calibration file has been loaded into the TCU. The information you are viewing in the tables in online mode is what is actually programmed into the TCU. Any changes you make to any tables or fields are immediately programmed into the TCU.

To save a file:

- From the pull down menu, select File/Read All Tables. (The hot key for this operation is \text{F12}.)
- Enter a name to save the file under and press enter. The calibration file name you select will automatically be given a .TCT file extension.

2.5 Options

See Part Two-5.3 for information concerning communication options.

3.0 Status Bar

The status bar, on the bottom of your screen, always displays the communication status with an icon on the right hand side. When no TCU is connected or there is a communication error, the display will appear as follows with a white X inside a red circle:

The left hand side of the status bar will display the word 'Idle' in this mode. When the TCU is connected and in the On-Line mode, the display will appear as follows with two red or green dots in the icon:

While On-Line, the two dots in the icon will toggle between green & red indicating send receive status of the active RS-232 port on the PC.

Off-Line mode is indicated by a tan folder icon:

4.0 Using T-Com™ WP

4.1 Navigating with Keystrokes

Although a mouse should be used with T-Com™ WP, the following section will demonstrate how to use the keyboard for navigation and editing.

4.1.1 General

All menus can be navigated with the arrow keys $\downarrow$, $\uparrow$, $\rightarrow$, $\leftarrow$, the \text{Tab} key, the \text{Alt} key and the \text{Enter} key. The \text{Esc} key will generally back out from any menu.
A menu may be selected by simultaneously pressing the **Alt** key and the first, underlined letter of the desired menu. For example, to select the **File** menu, press **Alt** and **F**. The arrow keys **↓ ↑ → ←** may then be utilized to make a selection or change menus.

### 4.1.2 'Hot Keys'
Pressing a 'Hot Key' will abort the current process and immediately execute the associated function.

- **Help** - This takes you straight to the help section.

- **Toggle On-Line/Off-Line Mode** - If a box with two red dots displays in the status bar in the lower, right-hand side of the screen, the system is Off-Line and allows you to read and edit a file without making changes to the TCU. When a box with two green dots is present, you are On-Line and any editing will now be permanently stored in the TCU's memory. **NOTE:** TCU must be powered up by having your ignition key on.

- Not used.

- Not used.

- **TCU Configuration**

- Not used.

- Not used.

- **Data Log** - This takes you straight to the data logger.

- **View Sensors** - Any entries in the dashboard that are RED in color are warnings that warrant further investigation. This indicates the sensor is outside of its normal operating parameters.

- Not used.

- **Load from Disk** - Brings up the interface to load a calibration file from a disk drive.

- **Save to Disk** - Brings up the interface to save a calibration file to a disk drive.

### 4.1.3 In a Menu
With a keyboard, use the arrow keys to highlight the desired selection from the menu. Use the **Enter** key to select it.

### 4.1.4 In a 2D Table

- Allows the user to force the currently selected area to a desired value; e.g., entering a '4.2' will force the cells in the selected area to a 4.2.

- Moves the edit cursor around the map. If the [Shift] key is pressed while navigating with the arrow keys, the edit cursor will split, allowing the selection of a cell range.

- Toggles between multiple graphs. In a 2D table with more
than one graph displayed, the [Tab] key will toggle the cursor between the different graphs. The following figure of the Part Throttle Gearshift MPH vs. TPS demonstrates the cursor moving between the bottom 1→2 shift graph and the middle 2→3 shift graph.

![Part Throttle Gearshift MPH vs. TPS](image)

- **Page Up** Allows the user to slew the current selection up by one step. If the [Ctrl] key is pressed while slewing the current value, larger increments will be made.
- **Page Down** Allows the user to slew the current selection down by one step. If the [Ctrl] key is pressed while slewing the current value, larger decrements will be made.
- **Home** Moves the edit cursor to the first position in the map. If the [Shift] is pressed while also pressing the [Home] key, the selected area will enlarge from the current position to the first position on the map.
- **End** Moves the edit cursor to the last position in the map. If the [Shift] is pressed while also pressing the [Home] key, the selected area will enlarge from the current position to the last position on the map.
- **I** Interpolates new values for the selected area from the data existing at both ends of the currently selected area.
- **=** Allows the user to force the currently selected area or point to a desired value; e.g., entering a '4.2' will force the cells in the selected area to a '4.2'. The value currently contained in the first selected cell will be displayed in the edit box as the default value. The number may reflect more precision than can be viewed on the table.
- **+** Allows the user to add a desired value to the existing values in the selected area; e.g., entering a '5' will increase the values in the selected area by 5. Entering a '-3.2' will decrease the values in the selected area by 3.2.
- ***** Allows the user to change the values in the selected area by a desired percentage multiplier; e.g., "110" will net a positive increase of 10%, an "80" will net a decrease by 20%.
- **%** Allows the user to change the values in the selected area by a desired percent; e.g., "10" will net a positive increase of 10%, a "-20" will net a decrease by 20%.

### 4.1.5 In the Data Record Screen

- **Moves the edit cursor through the graph using the left and right arrow keys.**
  - As the cursor is moved through the data, the dashboard in the lower portion of the window will display sensor
If the [Ctrl] key is pressed while moving through the data, larger steps will be made.

If the [Shift] key is pressed while moving through the data, a second cursor will appear and the sensor values in the dashboard will display the average data for the time between the cursors.

Space
Begins the immediate collection of data for the current default dashboard.

D
Activates the Real Time Logging Setup interface to select a different dashboard.

E
Allows the user to export the data as text from the current logging session to a text file.

A
Activates the Real Time Logging Setup interface to set the desired sensor and trigger level of the auto-trigger function based on a percentage of full-scale reading.

L
Allows the user to load data from a previously saved logging session.

R
Activates the Real Time Logging Setup interface to select the frame refresh rate for logging (1-20 frames per second).

S
Allows the user to save the data from the current logging session to a file.

4.2 Navigating with the Mouse

4.2.1 General
All menus are navigable via a mouse just as any standard Windows-style interface.

4.2.2 In a 2D Table
The cursor location along a given curve can be selected by simply clicking the mouse in the desired location on the graph. (In the case of multiple parameters on the same graph, the Tab key is required to toggle between the various parameters. See Part Two-4.1.4)
The value of any single point along the X-axis can be changed by simply holding the left mouse key (the cursor will appear as a small hand) and dragging the point to the desired value.

The value of a range of points along the X-axis can be changed simultaneously as follows. First, select your starting point by clicking the desired X-value on the curve. Next, while holding the Shift key, click the end point of your range. The selected range will appear highlighted. Now click and drag the curve to the desired values along the Y-axis.
(Highlighting a range as above may also be done with the keyboard by selecting the starting point, holding down the Shift key and using the← or → keys.)

Many functions for manipulating the graph values are available by clicking the right mouse key, which will bring up additional menus. These functions may be applied to single points or data ranges. See section Part Two-5.2.3.3 for more detailed information.

5.0 Main Menu
There are six drop down menus at the top of the T-Com™ WP interface.

5.1 File Menu
Provides access to save or load files.
5.1.1 Read All Tables from a File
Permits the retrieval of previously stored calibration data from a disc file. T-Com™ WP uses the .TCT file extension for calibration files. (The hot key for this operation is \[F1\].) Note: When working Off-Line, a calibration file must be loaded before any configuration tables can be viewed.

5.1.2 Save All Tables to a File
Permits storage of calibration data to a disc file. (The hot key for this operation is \[F2\].)

5.1.3 Dashboard Setup
To assist the user in calibration and monitoring, an array of sensors is available for display in any of the dashboards. All of the sensors have pre-programmed warning limits that will change the color of the sensor reading when the value exceeds these limits. Sensors are selected when editing a dashboard or when selecting an auto-trigger for data-logging.

The Edit Dashboards interface permits up to 15 custom dashboards to be configured in addition to the Global Dashboard, which, by default, contains all the available sensors. Simply highlight the desired sensor/sensors and click the Add button to place those sensors on the dashboard.

The name of each dashboard can also be customized by selecting the desired dash and clicking the Edit button.

Sensor Descriptions
- **RPM**: Actual Engine RPM (0-12,750)
- **BUMPUP**: Bump stick A/D voltage to upshift
- **BUMPDN**: Bump stick A/D voltage to downshift
- **SPARE**: Not Used
- **MPH**: Calculated Road Speed
Flags1  Internal Diagnostics
Flags2  Internal Diagnostics
Flags3  Internal Diagnostics
Flags4  Internal Diagnostics
PSM Fault  Error Codes
Gear Select  Selected Gear at Shifter
Line Press.  Line Pressure Duty Cycle (0 = max., 100 = min.)
TCC Press.  Torque Converter Lockup Duty Cycle (0 = max., 100 = min.)
TCC On  Torque Converter Lockup Flag
RPM Error  Internal Diagnostics
Perf. Mode  Economy/Performance Mode Flag
Upshift MPH  Must exceed MPH for the next upshift
Downshift  Must drop below MPH for next downshift
MPH
TENTHT  Internal Diagnostics
TPS (%)  Throttle Position Sensor Position (0-100%)
TOT (°C)  Transmission Oil Temperature
MAP (kPa)  Not Used
Ignition (V)  Switched Battery Voltage
AUTOML  Bump stick Mode Flag
Act. Gear  Actual Gear the Transmission is in
filtrd_PAC  Internal Diagnostics
Shift Time(s)  Minimum time between shifts

5.1.4 Custom Colors
Permits the colors used for tables and to represent data to be customized. Simply double-click the color box beside the desired parameter, select a color and click OK.

5.2 View Menu
Provides access to the various system configuration options and transmission operational parameters.

5.2.1 System Configuration

5.2.1.1 Operational Parameters
There are four discreet parameters that must be entered first in the Operational Parameters menu in order to properly configure the TCU for your application. These are Rear Tire Diameter, Rear Gear Ratio, Number of (engine) Cylinders and select the correct transmission being used. Note: It is also highly recommended to set your TPS parameters before test driving the vehicle.

These parameters and the others in this menu are manipulated as follows.
5.2.1.1 Rear Tire Dia. (inches)
Allowable Limits: 12.0 - 35.0 inches
Enter the actual rear tire diameter (not wheel size) in inches. Used to accurately determine vehicle speed.

5.2.1.1.2 WOT Minimum Shift Time (sec.)
Allowable Limits: 0.0 - 25.0 seconds
Contains a default setting; no need to change. Must be set to a minimum of 0.5 seconds. Allows for time delay from shift signal to actual shift by transmission to avoid stacked shifts.

5.2.1.1.3 Part Throttle Shift Time (sec.)
Allowable Limits: 0.0 - 25.0 seconds
Contains a default setting; no need to change. Must be set to a minimum of 0.5 seconds. Allows for time delay from shift signal to actual shift by transmission to avoid stacked shifts.

5.2.1.1.4 Minimum TPS for WOT (%)
Allowable Limits: 50 - 100%
While this parameter contains a default setting, it's best to adjust this for your application. Determines what throttle position the TCU interprets as Wide Open Throttle to place the shift timing to RPM control. With the ignition on, key off, depress the accelerator to WOT and note the TPS reading on the dashboard. It's recommended that this parameter be set a couple percentage points below actual WOT. Example: The dashboard shows TPS at 85% at WOT. Enter 83% in this parameter.

5.2.1.1.5 Maximum TPS for Idle (%)
Allowable Limits: 0 - 100%
While this parameter contains a default setting, it's best to adjust this for your application. With the ignition on, key off, note the TPS reading on the dashboard. It's recommended that this parameter be set a couple percentage points higher than actual idle position. Example: The dashboard shows TPS at 17% at idle. Enter 19% in this parameter. Note: This affects TCC Lock-up operation at idle. Also, the TCU will interpolate between your idle TPS setting and WOT TPS setting so that the part throttle shift schedule (TPS vs. MPH) can be determined.

5.2.1.1.6 Downshift Hysteresis (MPH)
Allowable Limits: 0 - 25 MPH
Contains a default setting; no need to change. This figure is the difference in upshift to downshift mph during part throttle driving; e.g., if the 2nd gear upshift occurs at 20 mph, then a downshift will not occur until the vehicle mph falls below 15 if this is set to 5 MPH. This is to prevent gear 'hunting' or busyness.

5.2.1.1.7 Gear Ratio
Allowable Limits: 1.00 - 7.97
This is the actual rear gear ratio for the vehicle. Used to accurately determine vehicle speed.

5.2.1.1.8 Rev. LP Kick (%)
Allowable Limits: 0 - 25%
Contains a default setting; no need to change. Defines the percentage increase of line pressure when the transmission is in Reverse.

5.2.1.1.9 Econ/Perf LP Kick (%)
Allowable Limits: 0 - 25%
Contains a default setting; no need to change. Defines the increase of line pressure curves when the performance mode is selected in the Econ/Perf wiring option.

5.2.1.1.10 Number of Cylinders (4,6,8)
Allowable Limits: 4, 6 or 8 cylinders only
Enter the number of cylinders in the engine. Used to determine proper engine RPM.

5.2.1.1.11 Radio Buttons (Transmission Type)
Select the appropriate transmission model for your application.

5.2.1.2 Wide Open Throttle Parameters
When the TCU interprets WOT based on the TPS settings (see Part Two-5.2.1.1.4), these shift parameters come into effect.

5.2.1.2.1 Wide Open Throttle Upshift Parameters
Allowable Limits: 0 - 12,750 RPM
In this menu you can enter the RPM that you desire for each gear change independently. You will find three boxes, one for each gear change; (1→2), (2→3) and (3→4).

5.2.1.2.2 Wide Open Throttle Downshift Parameters
Allowable Limits: 0 - 255 MPH
There are also three boxes determining downshifts at WOT. Enter the maximum MPH you desire for a forced downshift to the stated gear. The MPH must be below the specified amount before the transmission will allow downshift to the stated gear. Caution: If set too high for any given gear, you may float the valve springs or hit the engine rev-limiter.

5.2.1.3 TCC Lock-up Parameters
These variables control the torque converter lock-up functions.

5.2.1.3.1 Minimum MPH for TCC Lock-up
Allowable Limits: 10 - 255 MPH
Enter the MPH that you DO NOT want the torque converter lock-up to function below. Example: Entering 45 will prevent the TCC from operating below 45 MPH.

5.2.1.3.2 TCC Lock-up Rate
Allowable Limits: 1 - 255
This function only applies to the 4L80E, which is equipped with a pulse-width modulated TCC solenoid. The smaller the number you enter in this field, the longer the amount of time between the solenoid starting to open and being fully open. The smaller the number, the softer the apply feel of the torque converter. Note: Although 1995 & later 4L60E/4L65E transmissions are equipped with a PWM TCC solenoid, it is operated as an on/off solenoid.

5.2.1.3.3 Converter Lock-up Delay (sec.)
Allowable Limits: 0 - 25 seconds
Contains a default setting, no need to change. This provides a time delay between the converter lock-up apply and release. This prevents the torque converter from locking and unlocking in rapid succession, which is known as hunting. Once the torque converter is signaled to unlock, it will not apply lock-up again until the designated number of seconds has elapsed.

5.2.1.3.4 WOT TCC Lock-up
Checking this box enables the TCC to apply at WOT once the specified minimum MPH parameter is satisfied, bypassing any specified time delay. If not checked, the TCC will apply exactly according to all set conditions.

5.2.1.4 Engine Braking Parameters
Contains a default setting, no need to change. This controls line pressure if the transmission is downshifted at too much speed for the selected gear to avoid harsh deceleration.

5.2.1.5 Slapstick Parameters
Used only when the Manual Shift Mode is selected (see Part One-2.2.11).

5.2.1.5.1 Manual Mode Shift Time (sec.)
Contains a default setting, no need to change. Must be set to a minimum of 0.5 seconds. This is a time delay to prevent advancing more than one gear per shift within a set time period. This parameter has a .1 sec. resolution and allows for settings between 0-25.5 seconds.

5.2.1.6 Enable Option File
This is to facilitate upgrades or options to the TCU through a file furnished by the manufacturer.

5.2.2 Force Motor Tables

5.2.2.1 Overview
These tables enable you to edit individual pressure curves for each gear. This allows you to adjust the 'feel' of the shift relative to the TPS position. The number on the Y-axis is the percentage of duty cycle of the pulse-width modulated (PWM) solenoid that controls line pressure. The closer the number is to zero, the higher the line pressure. At zero, the solenoid is not bleeding off any pressure; thus the transmission will be operating at maximum line pressure. Typically, the user will want less line pressure at the lower throttle positions (lower percentage opening). This will provide for a smooth (mild) shift when the vehicle is being driven at an easy throttle position, building to a firmer (harsh) shift as the driver gives the vehicle more and more throttle. It is recommended that you increase the line pressure of he curves when installing torque converters with higher-than-OEM stall speeds.
Caution: Setting duty cycles to minimum line pressures on the force motor tables can result in slipping clutches/bands. Changes in the line pressure tables should be made in small increments to avoid severe transmission damage.
5.2.2.2 Example of Force Motor Table

5.2.3 Part Throttle Shift Table

5.2.3.1 Overview

This table controls what gear the transmission is in at any given time as long as the TPS position is lower than the percentage designated as WOT (see Part Two-5.2.1.1.4). Decisions are a function of TPS position and road speed. Each curve can be edited to adjust the transmission shift timing to the vehicle or driver preference.

5.2.3.2 Editing Part Throttle Shift Points

Use the Tab key to move the cursor to the next curve. The and keys (or keys) will increase or decrease the upshift MPH for a given throttle position.

The mouse can also be utilized to manipulate the shift timing curves. See Part Two-4.2.2 for more details.

5.2.3.3 T-Com™ Table Tuning Tips

The following types of changes can be made in all graphs. Multiplying, adding, subtracting and forcing values can be accomplished by doing the following.

5.2.3.3.1 Increase/Decrease by Percentage

To multiply by a certain percentage, right click the graph and select Percentage Trim or use the following keystrokes. Hit the and keys simultaneously or . The program will then prompt you for the percentage change. Example: 100 would represent 100% (no change). For 10% more type 110 or for 10% less, type 90. Then hit the key. This will automatically change the curve/graph.

5.2.3.3.2 Increase by Addition

To add a fixed amount, right click the graph and select Additive Trim or hit the and simultaneously. The program will then prompt you for the amount. Enter the number and hit the key to make the change take place.
5.2.3.3 Decrease by Subtraction

To subtract a fixed amount, right click the graph and select Additive Trim or hit the Shift and the + simultaneously. The program will then prompt you for the amount. Hit the minus or - key, then the number and hit the Enter key to make the change take place.

5.2.3.4 Change by a Forced Value

To force a value, simply type the number, followed by the Enter key.

5.2.3.5 Highlight Function

To make more than one calibration change at a time, use the Highlight function. First, select your starting point by clicking the desired X-value on the curve. Next, while holding the Shift key, click the end point of your range. The selected range will appear highlighted. Now click and drag the curve to the desired values along the Y-axis.

Highlighting a range as above may also be done with the keyboard by selecting the starting point, holding down the Shift key and using the ¥ & ¤ keys.

Now use the above-mentioned functions to change the whole area at one time. Hitting the Home or - keys makes the cursor immediately traverse to the beginning or the end of the curve/graph.

5.2.3.6 Copy/Paste

Any selected single point or data range can be copied by right clicking it and selecting Copy. This data can then be transferred to another location by right clicking the new location and selecting Paste.

5.2.3.7 Show Dash/Select Dash

Only works in online mode. Selecting Show Dash will allow the dash sensor values to be displayed underneath the current table. The desired dash can be specified by picking from the list under the Select Dash option. For additional information about configuring the various dashboards see Part Two-5.1.3.

5.2.4 Dashboard

Selecting this option or pressing F9 displays the global dashboard containing all the available sensors.
5.3 Communications Menu

T-Com™ WP can be configured to communicate in one of two ways:
- Direct serial port connection from a PC to the ECU
- Internet connection from a remote PC to another PC connected directly to the ECU

5.3.1 Setup

Several communication options are available to the user by clicking on the Communications menu. Select Setup to configure the available communication options. Make sure the TCU is connected to the PC using the provided communication cable, and that the TCU is powered up.

The Communication Configuration window will open allowing the method of communication to be selected. The most common method used will be a COM port.

The settings under the COM Port tab will determine which COM port is utilized and the desired number of retry attempts. If the "Online" message appears, the communication setup directions may be skipped from now on. If the "Online" message does not appear, make sure that the TCU is properly connected to the PC and verify that the COM port is functional and properly configured. The COM port configuration settings are located in the Windows Device Manager.
5.3.2 Connect

This command will attempt to establish communication between the PC and the TCU. The F2 key is the hot key for this function.

The status bar, on the bottom of your screen, always displays the communication status with an icon on the right hand side. When no TCU is connected or there is a communication error, the display will appear as follows with a white X inside a red circle:

The left hand side of the status bar will display the word 'Idle' in this mode. When the TCU is connected and in the On-Line mode, the display will appear as follows with two red or green dots in the icon:

While On-Line, the two dots in the icon will toggle between green & red indicating send receive status of the active RS-232 port on the PC.

Off-Line mode is indicated by a tan folder icon:

5.3.3 Ping ECU

Re synchronizes the TCU with T-Com™ WP by testing for a valid device and reading the TCU memory into its buffers.

5.3.4 Start Server

Internet Connection from a remote PC to another PC connected directly to the ECU

Note: One of the two PCs must be directly connected to the TCU as described above.

From the PC connected to the TCU:

Establish a connection to the Internet. Once this connection has been established, start T-Com™ WP (if not already running) but leave it Off-Line. Select Start Server from the Communications pull down menu.
From the remote PC:

Establish a connection to the Internet. Once this connection has been established, start T-Com™ WP. Select Setup from the Communications pull down menu. Under the "General" tab, select "Network" for the TCU communication method. Click the "Network" tab. On this screen, enter the IP address of the PC connected directly to the TCU.

If you are able to communicate successfully over the Internet, a chat window will appear. You may use this chat window to communicate with the other PC.

6.0 Data Logging

6.1 Data Log Overview

A complete data logging and analysis system is included inside T-Com™ WP. Data from any dashboard can be logged and analyzed in real time or stored for analysis at a later time. Up to fourteen sensors can be logged at a time. Auto triggering can be engaged with any sensor or parameter via a user defined trigger threshold or manual triggering can be used if desired.
Data logging configuration parameters are automatically stored for quick access to logging functions. In addition, the last data is automatically stored on the hard disk.

### 6.1.1 Open Data Log File

This function allows you to retrieve a previously stored data log file from a disk. The default directory will be called 'Log' and is a subdirectory within the T-Com™ WP directory. Data logs have the '.log' file extension.

### 6.1.2 Open Previous Log

This function retrieves the last viewed data log file from the hard disk.

### 6.1.3 Setup Realtime Logging

#### 6.1.3.1 Max Logging Rate

**Allowable Limits**: 1 - 20 Frames/Second

This determines the resolution of your data log. Increasing the frames/sec. will enable more subtle variations in sensor values to be recorded, which can be useful when troubleshooting.

#### 6.1.3.2 Max Logging Time

**Allowable Limits**: 1 second - 30 minutes 59 seconds

Use this parameter to set the length of time for the data log. Be aware that longer logging times coupled with higher frames/second rates will result in sizable files.

#### 6.1.3.3 Log Dash Name

Select the dash containing the sensors you are interested in logging. See Part Two-5.1.3 for additional information regarding dashboard setup.

#### 6.1.3.4 Trigger Set Point

Set the desired sensor and trigger level of the auto-trigger function based on a percentage of full-scale reading. Select the desired sensor from the drop down box. Use the slider on the bottom to set the point at which the logger will automatically begin recording.

You may also elect to manually trigger a data log by depressing the [space] bar. **Note**: The TCU must be powered up and communicating with T-Com™ WP to record.

The cursor will begin traversing the screen and will continue until it reaches the end of the screen or the [space] bar is depressed again.

### 6.1.4 Arm Realtime Logging

If 'Manual Trigger' is selected as the Trigger Set Point during Realtime Logging Setup, the following screen will appear as Arm Realtime Logging is selected.
When auto triggering has been specified, a screen similar to above will indicate that T-Com™ WP is waiting for the trigger point to begin logging.

6.1.5 Send Log Config to Data Logger

T-Com™ WP can be used with the remote FAST Data Logger. Because the Data Logger has no built-in knowledge of any of the ECU’s calibration parameters, it must be programmed into the logger through the logger configuration utility of T-Com™ WP. Please refer to the FAST Data Logger instructions for more detail.

6.1.6 Read Data Logger

Please refer to the FAST Data Logger instructions for more detail.

6.2 Reviewing a Data Log

Once the data log is complete, a series of colored traces will appear in the data log window. The colors of the traces will correspond to the colors of the text for each of the sensors in the dashboard. There are several features in the data log viewer designed to make reading the data logs easier.

The graph can be inspected by moving the cursor across the screen with the ← or → arrow keys. You may also select a point on the graph and click on it with the mouse. As you scroll across the screen, the dash reflects the status of the recorded sensors at the cursor's current position.

To display average sensor values between two time frames simply click the first point and drag the cursor while holding the mouse button down. The sensor values shown are the average values within the highlighted area of the graph. This can also
be accomplished with the keyboard by selecting your starting point, holding down the Shift key and the ← or → arrow key simultaneously.

Double-clicking on any sensor in the dashboard at the bottom of the window will hide the corresponding trace in the data log. On logs with a large number of sensors, this helps reduce "clutter" and makes reading other sensors easier. Double-clicking the sensor again will make the trace re-appear.

6.2.1 Right Click Menu
By clicking the graph with the right mouse button, an option menu will appear.

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replay</td>
</tr>
<tr>
<td>Zoom</td>
</tr>
<tr>
<td>Filter Log Data</td>
</tr>
<tr>
<td>Export Log Data</td>
</tr>
<tr>
<td>Load File</td>
</tr>
<tr>
<td>Save As</td>
</tr>
</tbody>
</table>

6.2.1.1 Replay
Selecting this function will replay the data log in real time starting from the current cursor position on the graph. The replay can be stopped at any time by pressing the Esc key or right clicking the mouse and selecting Stop Replay.

6.2.1.2 Zoom
The Zoom function is only available when a series of time frames have been highlighted as shown above. Selecting the Zoom will stretch the highlighted time frames across the entire screen for a closer look. To unzoom, right click the graph again and select Unzoom.

6.2.1.3 Filter Log Data
This will bring up a dialog box prompting you to enter a filter value between 0 and 0.9 as a gain factor for how much filtering will be applied to the traces in the data log. Filtering is a "smoothing effect" that will greatly reduce the sharp spikes often seen in data logs. 0.9 will apply the maximum amount of filtering, and 0.0 will return the log to its original unfiltered form.

6.2.1.4 Export Log Data
This function allows the current log to be saved as either a text file (for viewing from Notepad or any word processing application) or a comma-delimited text file for import into a spreadsheet program.

6.2.1.5 Load File
This function allows you to retrieve a previously stored data log file from a disk. The default directory will be called 'Log' and is a subdirectory within the T-Com™ WP directory. Data logs have the '.log' file extension.

6.2.1.6 Save As
Allows the data log to be saved on a disk with a filename of your choice. It will be saved as a .log file that may be opened and analyzed later using T-Com™ WP. If the 'Close Window' box is selected prior to saving the data log, you will be prompted to save the file before exiting.

7.0 Help

7.1 Contents
Displays a menu of T-Com™ WP help contents.

7.2 About T-Com™ WP
Displays a window containing pertinent T-Com™ WP program information. Version number and serial number will be displayed in this window.