WOODWARD

MotoHawk® Control Solutions
MotoTune® Reference Guide

Contents

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            MotoHawk
            MotoTune
            Woodward

The following are trademarks of their respective companies:
            MATLAB (The MathWorks, Inc.)

Warnings and Notices

Important Definitions

⚠️ This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

- **DANGER**—Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING**—Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION**—Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE**—Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT**—Designates an operating tip or maintenance suggestion.

⚠️ **WARNING** **Overspeed / Overtemperature / Overpressure**	**The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.** **The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.**

⚠️ **WARNING** **Personal Protective Equipment**	**The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:** • **Eye Protection** • **Hearing Protection** • **Hard Hat** • **Gloves** • **Safety Boots** • **Respirator** **Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.**

⚠️ **WARNING** **Start-up**	**Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.**

⚠️ **WARNING** **Automotive Applications**	**On- and off-highway Mobile Applications: Unless Woodward's control functions as the supervisory control, customer should install a system totally independent of the prime mover control system that monitors for supervisory control of engine (and takes appropriate action if supervisory control is lost) to protect against loss of engine control with possible personal injury, loss of life, or property damage.**

NOTICE **Battery Charging Device**	To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Electrostatic Discharge Awareness

NOTICE **Electrostatic Precautions**	Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts: • Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control). • Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards. • Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices. To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual *82715, Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules.*

Follow these precautions when working with or near the control.

1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
   - Do not touch any part of the PCB except the edges.
   - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.
   - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.

Chapter 1.
General Information

The MotoTune calibration tool provides the functionality needed for typical day-to-day calibration and programming tasked for the Woodward MCS control module family. The following quick start guide provides an overview of the key features of MotoTune needed to begin use.

Chapter 2.
Program Installation

Installing MotoTune and MotoServer

MotoTune and MotoServer can be installed from the included CD or downloaded from www.woodward.com. To install from the CD, insert the CD and follow the instructions in the install wizard.

To install from the website, download MotoServer Runtime and MotoTune to a temporary file location, unzip the files, and run the .mni install file. It is recommended that all previous versions of MotoServer and MotoTune be uninstalled using Windows Add/Remove programs prior to installation.

| **NOTICE**	**Prior to running the installation programs, run Windows Task Manager (CNTL-ALT-Delete) and ensure that there are no mnfeature.exe process running. If there are, end the processes in Windows Task Manager.**
	MotoServer should be installed first, followed by MotoTune.
	MotoServer Runtime and MotoTune must be the same version.

MotoTune is licensed by a silver USB token. You must have the USB token in the USB port of your PC and have the proper licensing on the token to be able to run MotoTune.

Chapter 3.
Port Configuration

Configuring Ports in MotoServer

1. Plug the MotoTune dongle into the USB port of your computer. This dongle provides the licensing for the MotoTune Software tool. Without it, all features are disabled.

2. Plug the Kvaser CAN tool into another USB port on your computer. Your computer will prompt you to install new drivers for the device. Click Next, and follow the install wizard.

3. Open MotoTune and check that your company's name appears in the upper left corner, which indicates that MotoTune has identified your license key in the dongle. If the key is not recognized, MotoTune will display "Unlicensed" in the upper left corner.
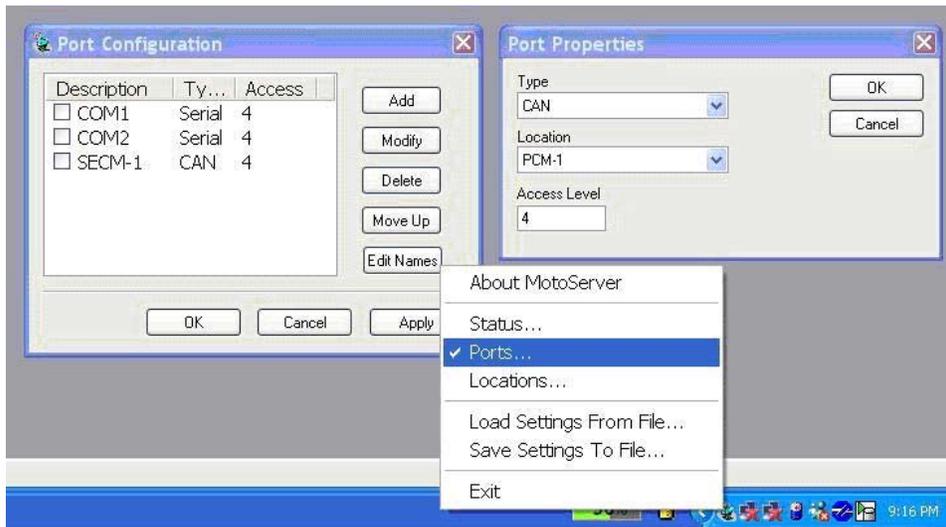
4. Next, configure the MotoServer ports by right-clicking on the satellite in the lower right corner of the computer screen, the system tray.

5. Select Port from the menu and click the Add button in the Port Configuration dialog box. Set up the pull-down menus in the Port Properties dialog box like the figure below. Click OK in the Port Properties dialog box. Un-check all of the ports in the Port Configurations except for the port(s) you wish to use for programming and/or calibration of your module(s). PCM-1 is the default port for most modules.

Chapter 4.
Programming an ECU

During the MotoTune installation, MotoTune created an ECUFiles folder on the c: drive of the computer, with various folders underneath. All .cal files are placed in the Cals folder, .dis files in the Displays folder, .srz in the Programs folder, and .dll in the TBDLL folder. When an application is built with MotoHawk, MotoHawk places the .srz file in the Programs folder, and the .dll file in the TBDLL folder.

1. Install the correct ECU into the wiring harness and turn on key-power to the ECU.

2. In MotoTune, ensure that all calibration and display files are closed. Click the Program button and select the desired .srz file to program from the Programs folder. Or, you can use, File → Program in the top pull-down menus for programming.
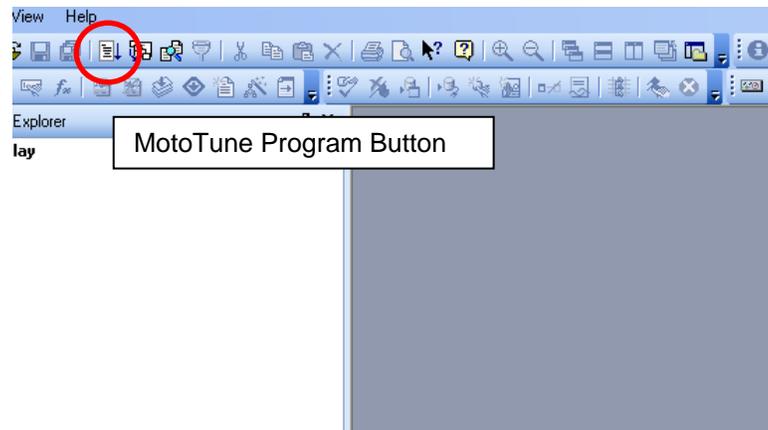
The following programming status bar should appear on your screen if PC is on-line with the ECU. If a programming error occurs, check for power to the ECU's ECUP (Key) pins and ECU ground. Also check CAN connections based on block diagram of ECU.
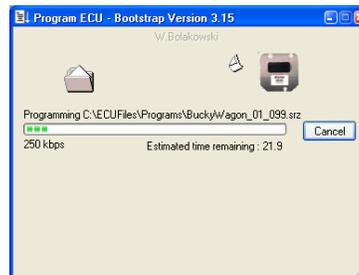
Once the ECU is programmed, and you are online with the ECU, you can open a New Online Calibration or New Online Display window under the File →Open menu at the top of the MotoTune toolbar. This will open a display or calibration window and pull the values from the ECU.

Chapter 5.
Creating a Program File

The MotoTune Merge feature allows the user to merge their calibration values with the .srz programming file. The .srz with the new calibrations can then be reprogrammed into the module.

1. Open the desired calibration offline using File, Open in the pull down menu.

2. Right-click on the calibration name in the calibration window and select Merge.
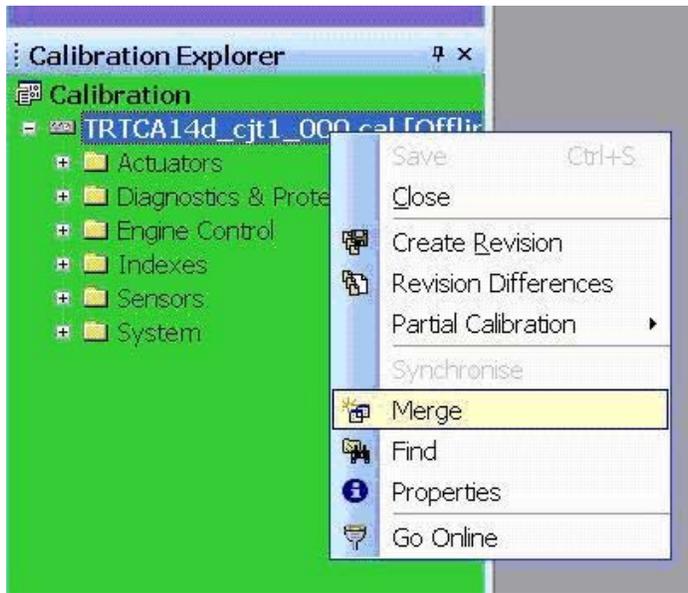
3. Select the production software .srz file into which you would like to merge the calibration. The software level must be the same as the calibration software level (first nine letters of the calibration). Select Open in the dialog box.

4. Type a new .srz file name into the window of the Calibration Merge dialog box and select Save As.

5. Save the new .srz into the appropriate folder on the computer.

6. Follow the instructions above for Programming an ECU to program the new .srz onto the production ECU.
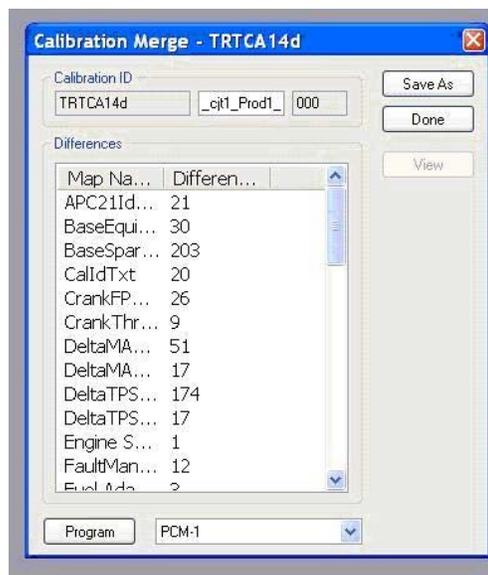
Chapter 6.
Transfer Upgrade

Transfer Upgrade Calibration into a New Software Level

1. Create a new cal from the new .srz file with File/New/Calibration From Programming File.

2. Select the correct new .srz and click Save.

3. Click the Transfer Upgrade button shown below.

4. In the window, double click on the old cal file. Then double click on the new cal file created in steps 1. and 2.

5. Click the Start button, and note the differences listed in the Report. Sometimes cal maps do not transfer upgrade, therefore these maps will need to be transferred manually using copy and paste. Using the Save Report button to save and view the report later for manual upgrades.

6. Click the Save As button and rename the calibration File Name such that it is the same as the Cal ID name.
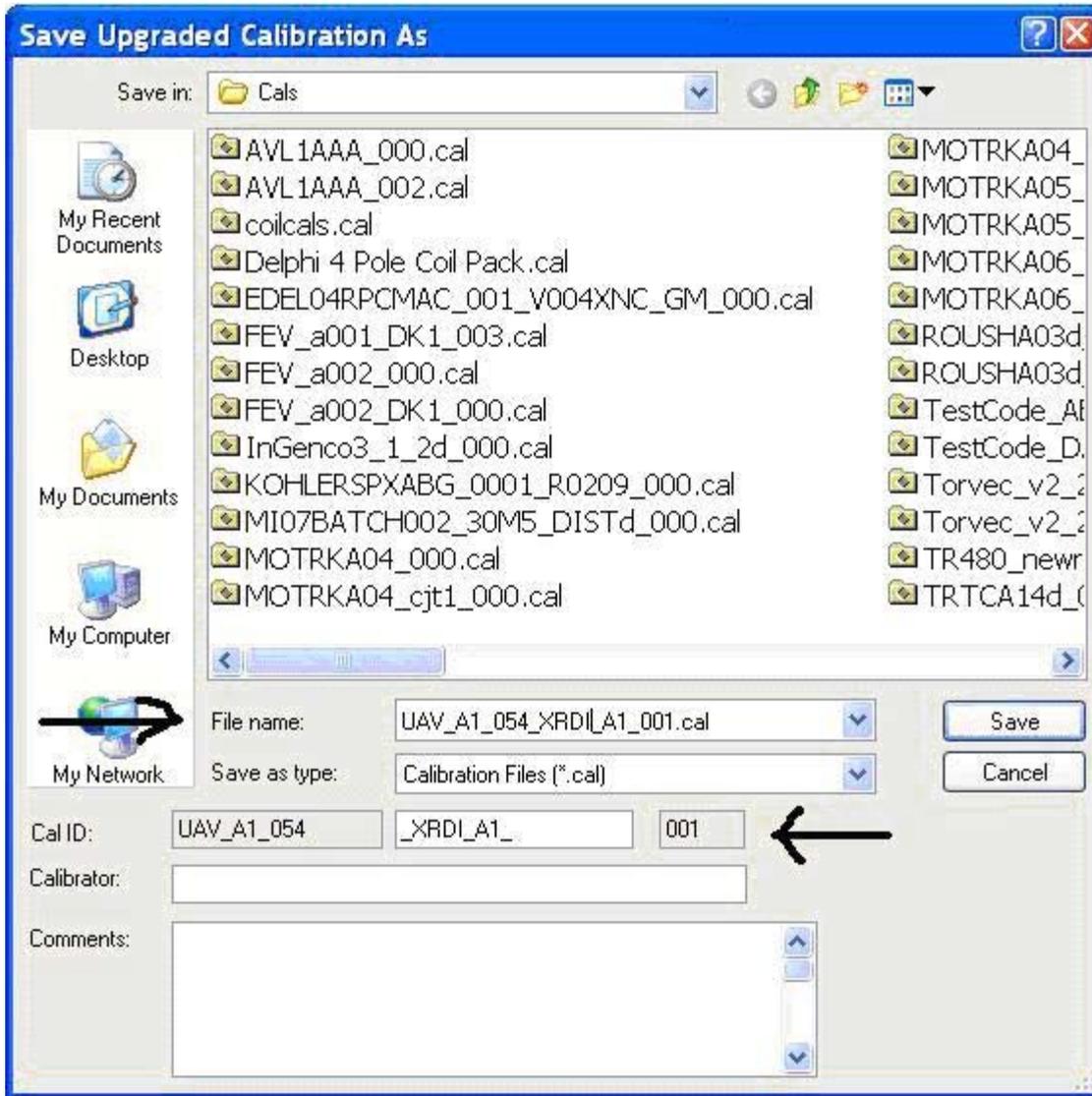
7. Program the ECU with the new software. Open the new, transfer upgraded cal and click yes when prompted to Sync the new cal.

Chapter 7.
Data Logging

Logging Data Using MotoTune

1. To select a variable in Display to log, right-click on the variable value, and the following properties block will appear.
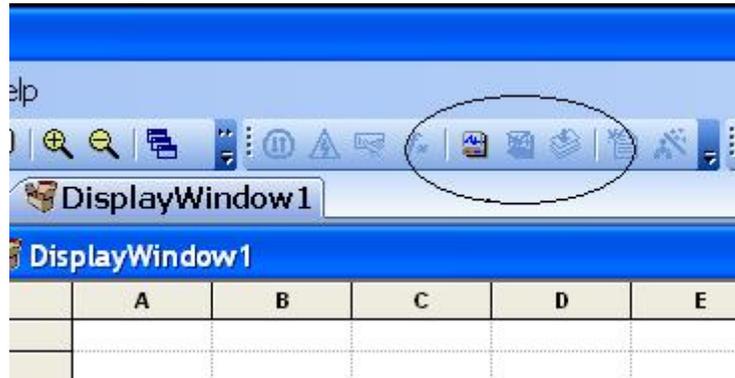
2. To change the rate at which data is logged, use the Set Fast button, or manually input the desired values on the left. Down-sampling will occur if too many variables are added to the chart at the fastest rate.

3. To add the variable to the log, select the Add To Chart/Log box. Note that new variables dragged into the Display page will be defaulted to Add To Chart/Log.

4. Also note the Apply To All button – this will apply the settings from this dialog box to all of the variables on the Display Sheet currently selected.

5. To set up the chart, go to Chart | Chart Setup in the menu headings, and the following dialog box will appear.
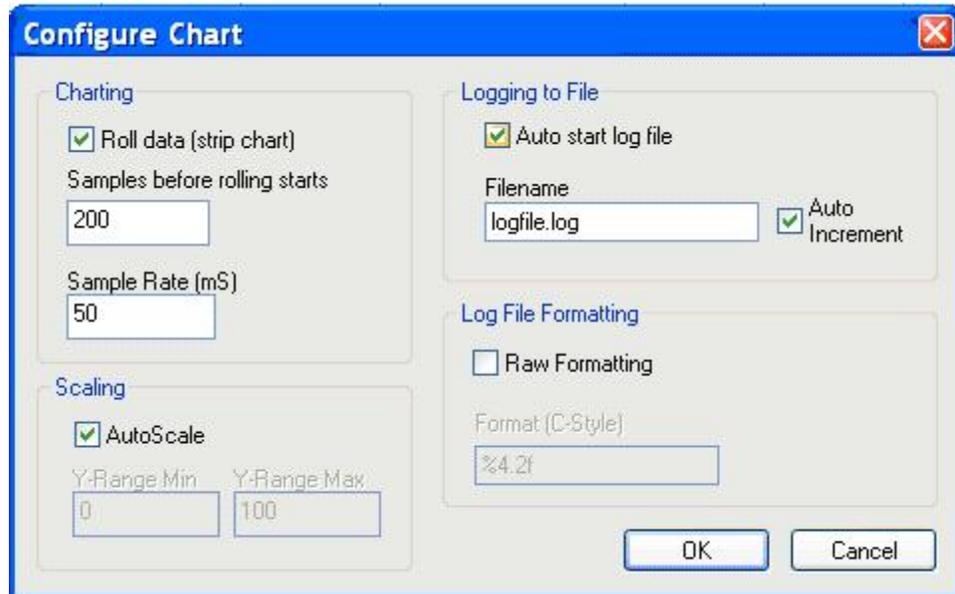
6.   In general, it is useful to select both the Auto Start Log File and the Auto Increment tab. But if you wish to view a running chart without logging data, deselect the Auto Start Log File tab. The Auto Increment feature appends the .log file name with an (#), which increments each time a log is started with the same filename.

7.   Type the file name the log is too be saved as in the Logging folder of ECU Files.

8.   To disable the AutoScale feature and specify the y-axis scale, uncheck the AutoScale button.

9.   Raw Formatting records enumerated values by their integral value, and not their text equivalent. In addition, units will not be recorded with the variable values. To plot .log files using Excel or MATLAB, check the Raw Formatting box.

10. With Display connected and the window active, use Chart | Open Chart from the menu headings to start a chart/log. Or use the buttons illustrated below. These buttons will be highlights when Display is on-line.

Chapter 8.
Working with Displays

The Display Window

The display window displays both display only values, that can be viewed but not changed and calibratible values. Whether a value is display only or able to be calibrated via the display window is determined by the application program. Display values that cannot be calibrated will show up with a white box, calibratible values will show up as a box with lines (appear grey).

A display can be opened from a previously saved .dis file, or by opening a new on-line calibration while MotoTune is online with the ECU (File →New).

Display Sheets and Pages

1. To add a sheet to an existing Display Page, go to the Display menu heading and select Add Sheet.
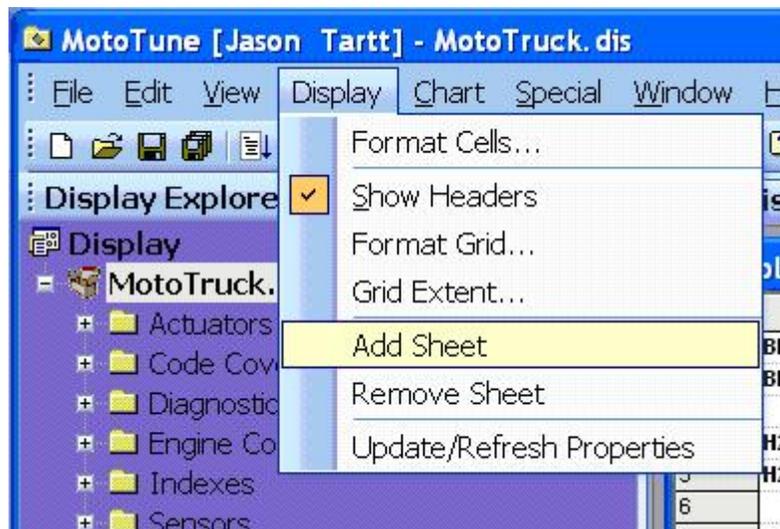
2. The sheet name defaults to Sheet 1 – to rename the sheet, double click on the name and type in the new desired name.

3. A Display Page may have multiple sheets, but only one sheet may be active at a time, and therefore only one chart from that Display Page may be active at a time. To have multiple charts open, add a second Display Page by right-clicking on the Display name and selecting Insert Page.
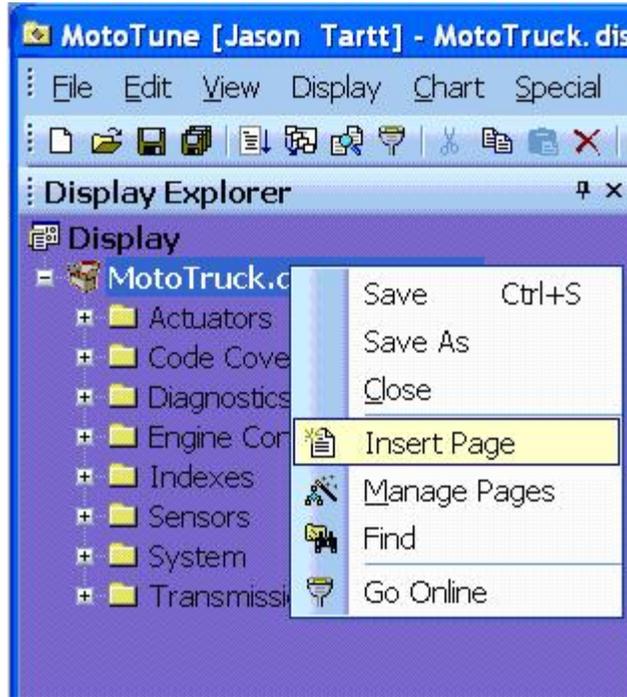
4. Step through the Set-up Wizard to create the page. To turn pages on and off from the screen, use the Manage Pages feature shown in the image above and check the Page you would like to show or remove.

Chapter 9.
Display Warning Limits

In the Display page, variables can be configured to change color or sound when the value exceeds a configured limit.

The Warning Limits configuration page can be accessed by either right clicking on the display variable value, or by going to Tool Bar button shown in the above figure.
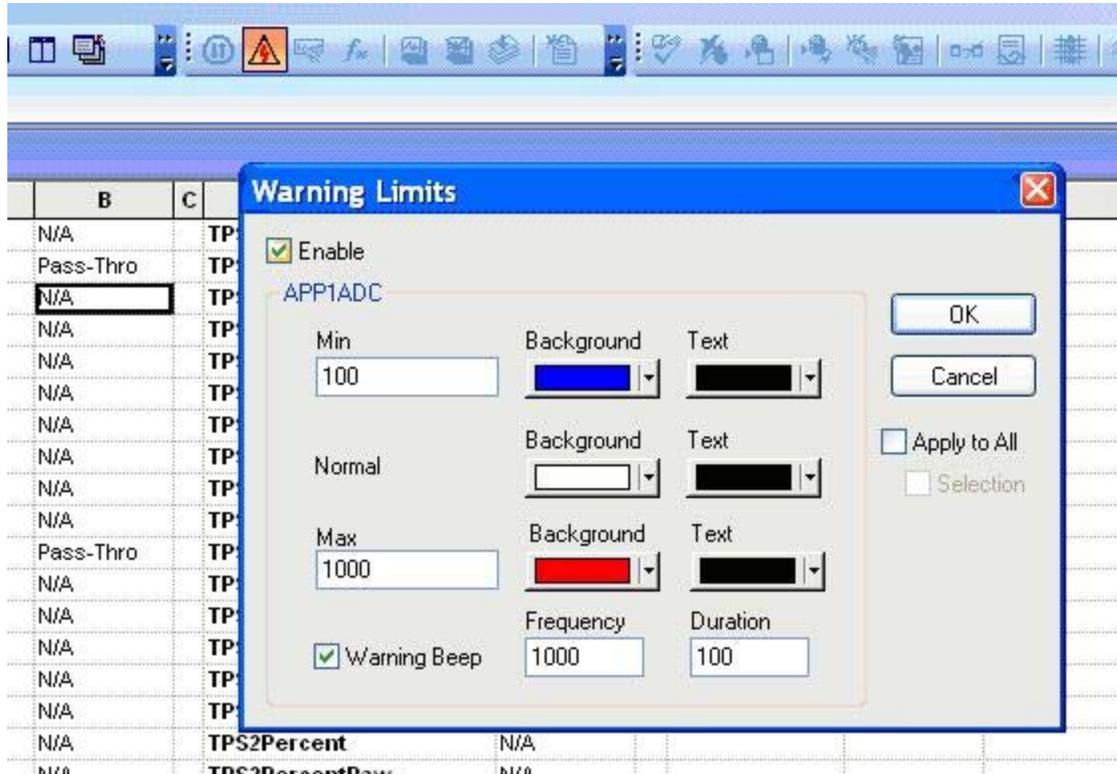
To set up this feature, select the enable button and configure the cell color and text color to be used when the value exceeds the min/max threshold. If the Warning Beep is enabled, the computer will beep at the selected Frequency and Duration when either the min or max threshold is exceeded. Warning Limits can either be configured on a per cell basis, or for the entire page by selecting the Apply to All button. Care should be taken, as too many warning limits can starve the MotoTune process and cause delays in display updates or result in the display freezing.

Chapter 10.
Changing the City ID

The City ID is the communication ID that MotoTune uses to communicate with the module. You must program and/or calibrate using the City ID defined by default for the module or redefined by the CAN definition block in the application model. The default City ID for most modules is 11 (0x0B). To create a new port with a different City ID:

1.   Right click on the MotoServer icon and open up the Ports configuration window.

2.   Select Edit Name, select Add, select CAN kingdom, and select Next.
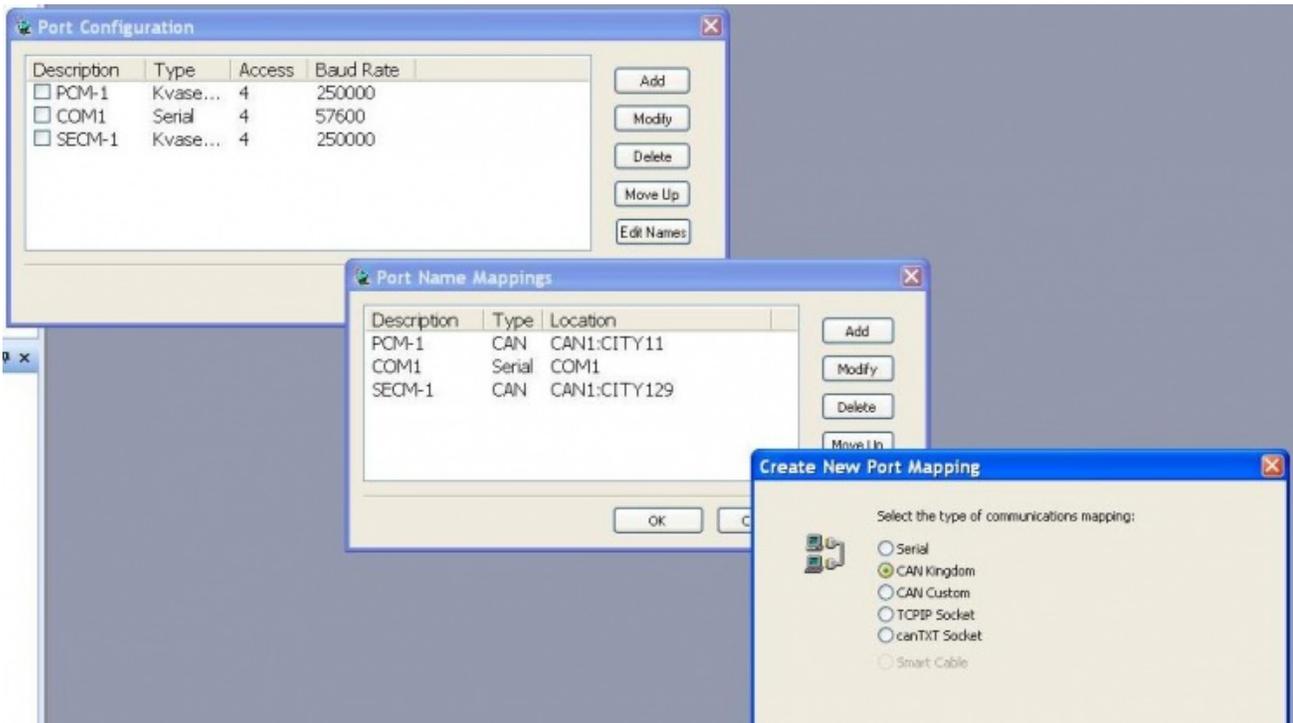
3. In the new window, rename the port to something descriptive (PCM-2 or PCM-B) and set the City ID to the desired ID.

> Hex A == Decimal 10
>
> Hex B == Decimal 11
>
> Hex C == Decimal 12
>
> Hex D == Decimal 13

Chapter 11.
Product Support and Service Options

Product Support Options

If you are experiencing problems with the installation, or unsatisfactory performance of a Woodward product, the following options are available:
1.   Consult the troubleshooting guide in the manual.
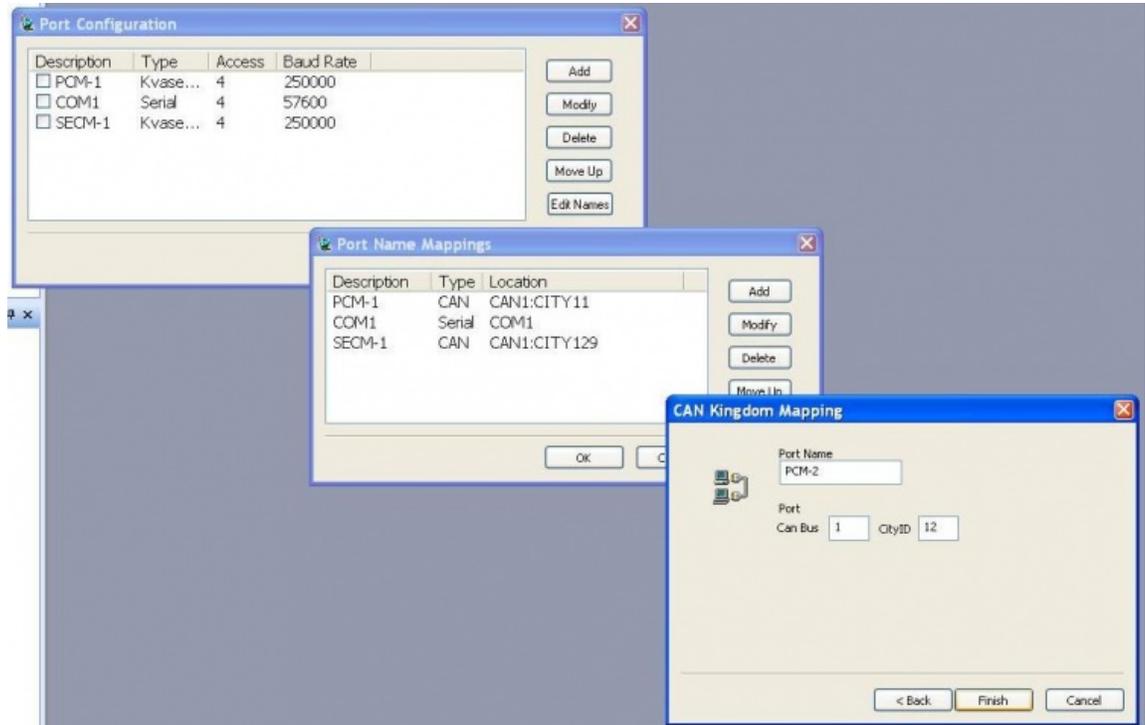2.   Contact the **OE Manufacturer or Packager** of your system.
3.   Contact the **Woodward Business Partner** serving your area.
4.   Contact Woodward technical assistance via email (**EngineHelpDesk@Woodward.com**) with detailed information on the product, application, and symptoms. Your email will be forwarded to an appropriate expert on the product and application to respond by telephone or return email.
5.   If the issue cannot be resolved, you can select a further course of action to pursue based on the available services listed in this chapter.

OEM or Packager Support: Many Woodward controls and control devices are installed into the equipment system and programmed by an Original Equipment Manufacturer (OEM) or Equipment Packager at their factory. In some cases, the programming is password-protected by the OEM or packager, and they are the best source for product service and support. Warranty service for Woodward products shipped with an equipment system should also be handled through the OEM or Packager. Please review your equipment system documentation for details.

Woodward Business Partner Support: Woodward works with and supports a global network of independent business partners whose mission is to serve the users of Woodward controls, as described here:

- A **Full-Service Distributor** has the primary responsibility for sales, service, system integration solutions, technical desk support, and aftermarket marketing of standard Woodward products within a specific geographic area and market segment.

- An **Authorized Independent Service Facility (AISF)** provides authorized service that includes repairs, repair parts, and warranty service on Woodward's behalf. Service (not new unit sales) is an AISF's primary mission.

- A **Recognized Engine Retrofitter (RER)** is an independent company that does retrofits and upgrades on reciprocating gas engines and dual-fuel conversions, and can provide the full line of Woodward systems and components for the retrofits and overhauls, emission compliance upgrades, long term service contracts, emergency repairs, etc.

A current list of Woodward Business Partners is available at **www.woodward.com/directory**.

Product Service Options

Depending on the type of product, the following options for servicing Woodward products may be available through your local Full-Service Distributor or the OEM or Packager of the equipment system.
- Replacement/Exchange (24-hour service)
- Flat Rate Repair
- Flat Rate Remanufacture

Replacement/Exchange: Replacement/Exchange is a premium program designed for the user who is in need of immediate service. It allows you to request and receive a like-new replacement unit in minimum time (usually within 24 hours of the request), providing a suitable unit is available at the time of the request, thereby minimizing costly downtime.

This option allows you to call your Full-Service Distributor in the event of an unexpected outage, or in advance of a scheduled outage, to request a replacement control unit. If the unit is available at the time of the call, it can usually be shipped out within 24 hours. You replace your field control unit with the like-new replacement and return the field unit to the Full-Service Distributor.

Flat Rate Repair: Flat Rate Repair is available for many of the standard mechanical products and some of the electronic products in the field. This program offers you repair service for your products with the advantage of knowing in advance what the cost will be.

Flat Rate Remanufacture: Flat Rate Remanufacture is very similar to the Flat Rate Repair option, with the exception that the unit will be returned to you in "like-new" condition. This option is applicable to mechanical products only.

Returning Equipment for Repair

If a control (or any part of an electronic control) is to be returned for repair, please contact your Full-Service Distributor in advance to obtain Return Authorization and shipping instructions.

When shipping the item(s), attach a tag with the following information:
- return number;
- name and location where the control is installed;
- name and phone number of contact person;
- complete Woodward part number(s) and serial number(s);
- description of the problem;
- instructions describing the desired type of repair.

Packing a Control

Use the following materials when returning a complete control:
- protective caps on any connectors;
- antistatic protective bags on all electronic modules;
- packing materials that will not damage the surface of the unit;
- at least 100 mm (4 inches) of tightly packed, industry-approved packing material;
- a packing carton with double walls;
- a strong tape around the outside of the carton for increased strength.

NOTICE	**To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.**

Replacement Parts

When ordering replacement parts for controls, include the following information:
- the part number(s) (XXXX-XXXX) that is on the enclosure nameplate;
- the unit serial number, which is also on the nameplate.

Engineering Services

Woodward's Full-Service Distributors offer various Engineering Services for our products. For these services, you can contact the Distributor by telephone or by email.
- Technical Support
- Product Training
- Field Service

Technical Support is available from your equipment system supplier, your local Full-Service Distributor, or from many of Woodward's worldwide locations, depending upon the product and application. This service can assist you with technical questions or problem solving during the normal business hours of the Woodward location you contact.

Product Training is available as standard classes at many Distributor locations. Customized classes are also available, which can be tailored to your needs and held at one of our Distributor locations or at your site. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability.

Field Service engineering on-site support is available, depending on the product and location, from one of our Full-Service Distributors. The field engineers are experienced both on Woodward products as well as on much of the non-Woodward equipment with which our products interface.

For information on these services, please contact one of the Full-Service Distributors listed at **www.woodward.com/directory**.

Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory published at **www.woodward.com/directory**.

You can also contact the Woodward Customer Service Department at one of the following Woodward facilities to obtain the address and phone number of the nearest facility at which you can obtain information and service.

Products Used In Electrical Power Systems	Products Used In Engine Systems	Products Used In Industrial Turbomachinery Systems
Facility----------------Phone Number	**Facility----------------Phone Number**	**Facility----------------Phone Number**
Brazil -------------+55 (19) 3708 4800	Brazil -------------+55 (19) 3708 4800	Brazil -------------+55 (19) 3708 4800
China ----------- +86 (512) 6762 6727	China ----------- +86 (512) 6762 6727	China ----------- +86 (512) 6762 6727
Germany:	Germany------- +49 (711) 78954-510	India ---------------+91 (129) 4097100
Kempen----+49 (0) 21 52 14 51	India ---------------+91 (129) 4097100	Japan-------------- +81 (43) 213-2191
Stuttgart--+49 (711) 78954-510	Japan-------------- +81 (43) 213-2191	Korea-------------- +82 (51) 636-7080
India ---------------+91 (129) 4097100	Korea-------------- +82 (51) 636-7080	The Netherlands- +31 (23) 5661111
Japan-------------- +81 (43) 213-2191	The Netherlands- +31 (23) 5661111	Poland---------------+48 12 295 13 00
Korea-------------- +82 (51) 636-7080	United States---- +1 (970) 482-5811	United States---- +1 (970) 482-5811
Poland---------------+48 12 295 13 00		
United States---- +1 (970) 482-5811		

For the most current product support and contact information, please visit our website directory at **www.woodward.com/directory**.

Technical Assistance

If you need to contact technical assistance, you will need to provide the following information. Please write it down here before contacting the Engine OEM, the Packager, a Woodward Business Partner, or the Woodward factory:

General

Your Name	
Site Location	
Phone Number	
Fax Number	

Prime Mover Information

Manufacturer	
Engine Model Number	
Number of Cylinders	
Type of Fuel (gas, gaseous, diesel, dual-fuel, etc.)	
Power Output Rating	
Application (power generation, marine, etc.)	

Control/Governor Information

Control/Governor #1

Woodward Part Number & Rev. Letter	
Control Description or Governor Type	
Serial Number	

Control/Governor #2

Woodward Part Number & Rev. Letter	
Control Description or Governor Type	
Serial Number	

Control/Governor #3

Woodward Part Number & Rev. Letter	
Control Description or Governor Type	
Serial Number	

Symptoms

Description	

If you have an electronic or programmable control, please have the adjustment setting positions or the menu settings written down and with you at the time of the call.

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 51449.

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