Pro Mag A/Fuel Power Grid Controller
PN 8772

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Parts Included:
1 – Controller, PN 8772
4 - Vibration Mounts and hardware
6 - Gold Amp Terminals for Mag Pickup Trigger Cables
2 - Mag Pickup/Deutsch Connector Harness
1 – MSD View Software CD

OVERVIEW

The Pro Mag A/Fuel Power Grid Controller (PGC) is designed for use with the MSD Pro Mag 44 in drag racing applications. The Controller, PN 8772, allows the control of the ignition timing through the use of a PC or a mobile device. The PGC has dual outputs so it can be used with single or dual Pro Mag 44 Amp systems. It is recommended to use the Controller with a crank trigger system using MSD non-magnetic pickups. (It will function with the Pro Mag's internal pickup, but is not recommended for the most accurate timing.)

Programming the Controller is achieved through proprietary MSD software called MSDView. This software allows users to create and store up to 12 different timing maps that can be loaded quickly as track conditions change. See page 2 for installation of the View software.

Note: A heavy duty micro-switch is required as a wide open throttle switch. The micro-switch should

be mounted near the top of the pedal so it can react quickly. An air activated switch is not recommended unless it is a very fast responding design.

IMPORTANT: When the Power Grid A/Fuel Controller is installed, it is important to note that the ignition timing will be 5° retarded. This is due to the Controller's improved trigger pickup compensation circuit. The timing must be reset to your engine's specifications.

MSD VIEW SOFTWARE INSTALLATION

The View Software is included and can be downloaded. To install the software follow the procedure below.

1. Insert the supplied installation CD on your Windows based PC. Wait up to 30 seconds and the CD will auto run. If the process does not begin automatically, go to your PC's File Manager and locate the CD drive. Double click on "Setup File".
2. Select "Click here to Install Version 4.3.3.0 or higher.
3. Once loaded, your desktop will have an MSD View and MSD Review icon. Click on the MSD View icon and accept the agreement. Drive the installation to your program files folder, press the enter key. The installation will complete, select OK.
4. The View software is available to open and use. The Controller does not need to be connected to run the software.
5. When the View Icon is selected, a window will open. Go to File, Open and scroll down to 8772. Double click to open the program (Figure 1).
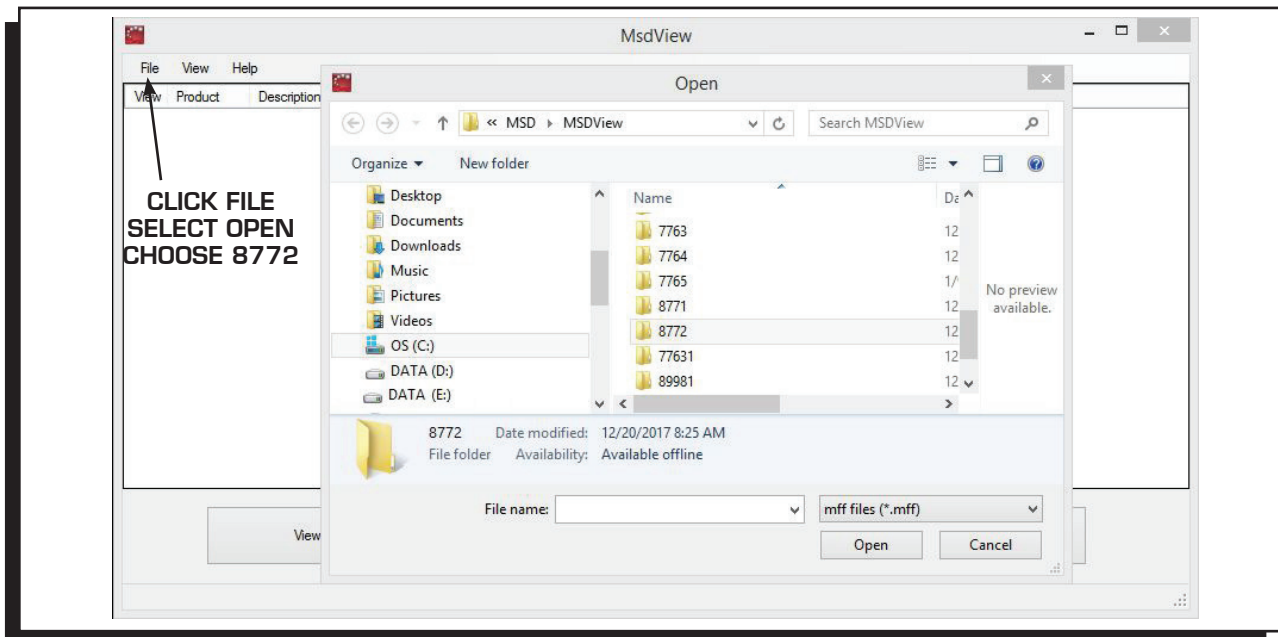

Figure 1 Open the View Program.

PROGRAMMING

The View Software can be opened without having it connected to the A/Fuel Power Grid Controller. This is recommended to get comfortable with the navigation and menus before connecting the PC to the Controller.

This installation guide is designed as more of an overview to get you into the software and programming. The View software has a concise and easy to use Help menu, navigation tips and by hovering the cursor over an area will bring up a pop up window with a definition or tip.
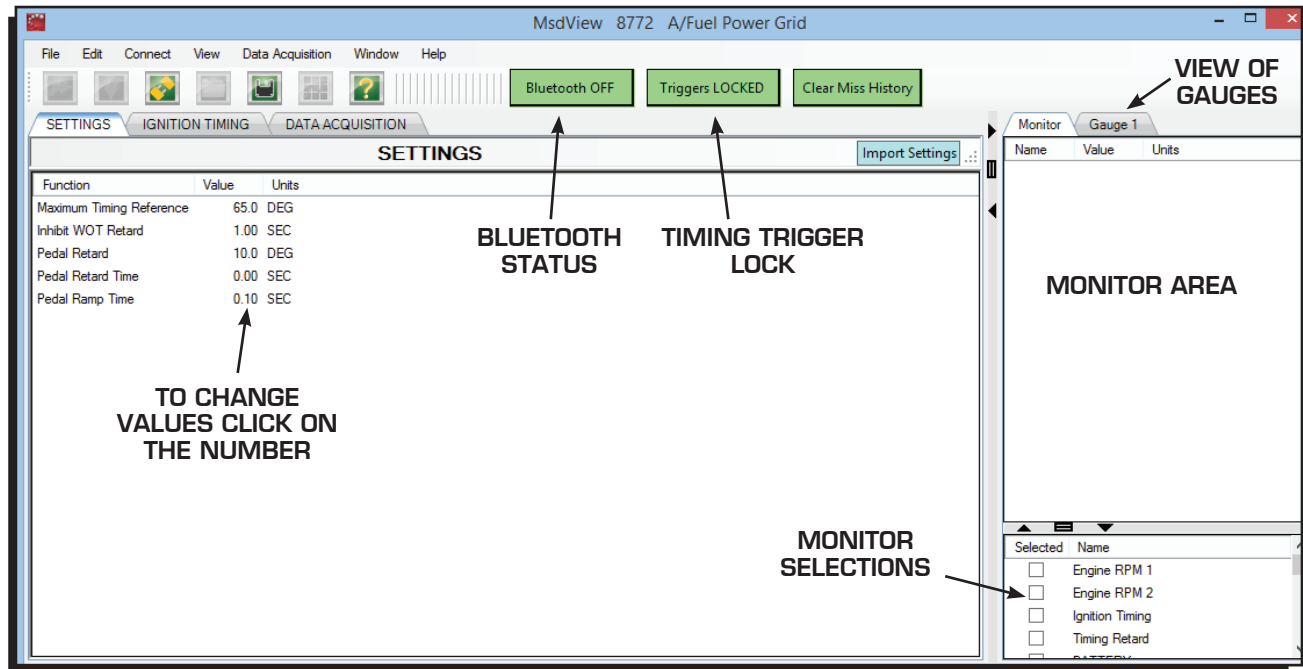
Figure 2 View Software Settings Screen.

The View Software has three tabs; Settings, Ignition Timing and Data Acquisition. The first two, Settings and Ignition Timing are used for programming the Controller. Data Acquisition will be covered later in this guide.

SETTING TAB

Maximum Timing Reference: This is the timing position of the crank trigger pickup. All timing adjustments are based on this value. It must match the timing light reading (when no retards are active).

Inhibit WOT Retard: This setting provides an amount of time to inhibit the Pedal Retard from occurring. This time is set from the launch point so the driver can pedal the car off the line without the timing being affected until the programmed inhibit time passes. Adjustable from 0-10 second.

Pedal Retard: Program a timing retard value that occurs when the pedal is lifted. Adjustable from 0°-30° in 0.1°increments.

Pedal Retard Time: Set the amount of time that it takes for the timing to ramp back to the timing curve. Adjustable from 0-2.50 in .01-second increments.

Pedal Ramp Time: Set an amount of time for the WOT retard to ramp back to 0° retard. Adjustable from 0-2.50 in .01-second increments.

IGNITION TIMING TAB

This tab allows you to easily create, store, compare and activate timing maps. On the left there are up to 12 different timing maps that you can view on the timing chart which shows time horizontally (0-6 seconds) and ignition timing retard from 0° - 30° retard.
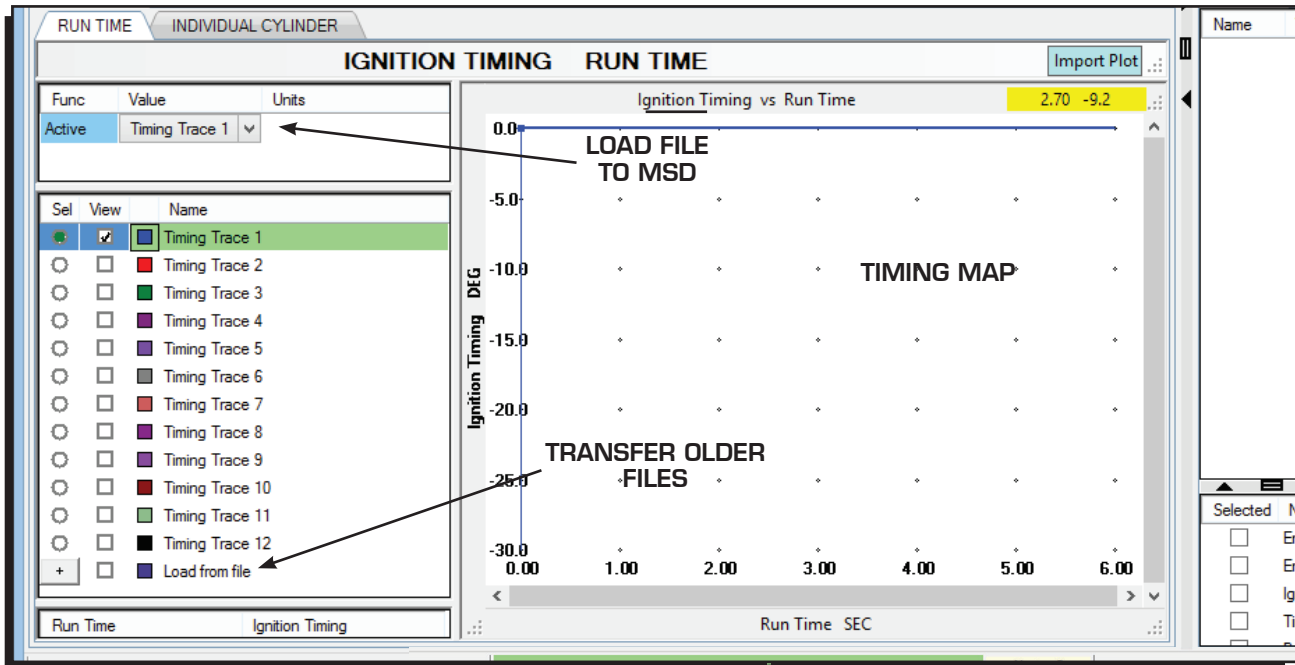

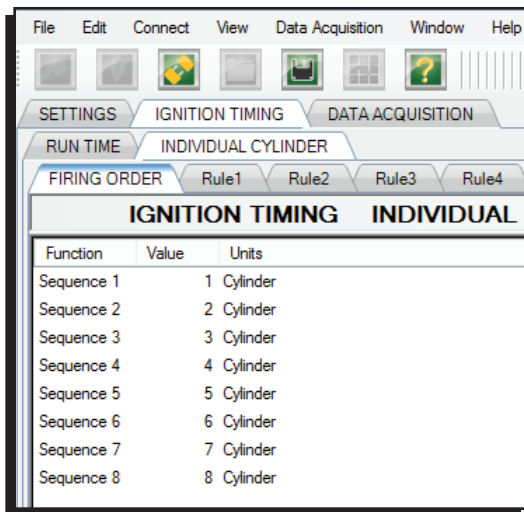Figure 3 View Software Ignition Timing Screen.
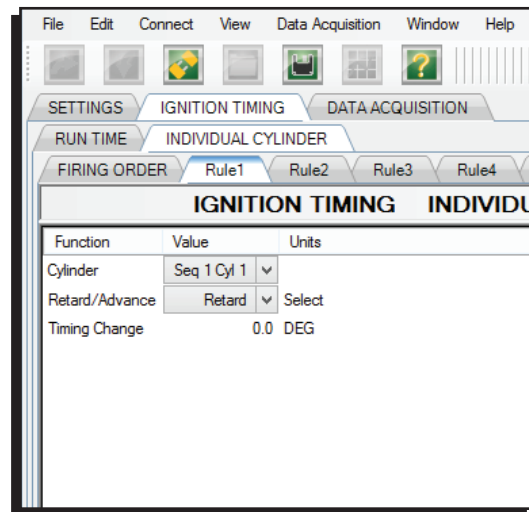

Figure 4 Firing Order

Figure 5 Firing Order Cylinder Rules

INDIVIDUAL CYLINDER

FIRING ORDER

Verify or update the firing order of the engine.

Note: A CAM sensor must be used for individual cylinder timing. The Firing order determines which cylinder will be affected by the individual cylinder timing setting.

RULE 1,2...8 TABS

    Cylinder - The timing offset will be applied to the selected cylinder.

    Retard/Advance - Determine if the applied timing will be retarded or advanced compared to the MainTiming.

    Timing Change - The absolute value of changed timing.

TIMING TRACE BOX

The timing trace box on the left of the screen shows 12 Timing Traces. This allows you to program different files for use as track and weather conditions change. Each trace can be viewed on the timing map, but only one can be modified at a time. There are two columns, Sel for Select and View.

Select: This determines which Trace you want to modify on the map. Only one can be selected at a time.

View: When selected, this shows the Trace on the map. Multiple Traces can be viewed at one time to compare.

Renaming: The name of each file can be modified by right clicking on the name.

Color: The color of each trace can be changed by clicking on the color box and selecting a new color.

Figure 6 View Software Ignition Timing Screen.

GENERAL TIPS TO CREATING A TIMING MAP

The best way to familiarize yourself with the software is to use it and create different curves and changes but following are a few steps and tips.

- Select the Timing Trace to be modified.
- With the cursor positioned over the timing map, right click to add a dot to create the timing points. Also note that when you right click, you have the ability to Copy, Paste, Zoom and Pan.
- When a dot is highlighted, the values are shown on the screen.
- A dot can be moved with the keyboard arrows as well as with the mouse.
- To input values manually, place the cursor in the Run Time or Ignition Timing columns under the Timing Trace menu. Note that any timing values MUST be entered with a negative (-) value.
- Any modifications to a curve are instantly saved as that Trace.

TRANSFERRING A TIMING CURVE TO THE CONTROLLER

To activate a Timing Curve, the Controller must be connected via the USB or through Bluetooth. Locate the area above the 12 Timing Traces that shows "Active" with a pull down menu next to it. Select the Timing Trace to be loaded and click on it. Notice that the bar at the bottom of the screen that is green with "On Line" changes to orange while the file transfers. Also, note that the Trace that is active in the Controller is now highlighted with a green bar in the list of timing traces.

MONITOR AND GAUGES

The View Software allows you to monitor the engine in real time during warm up or anytime the PC is connected. On the right of the screen there are two tabs, Monitor and Gauge. At the bottom there is a selection of parameters to view. By selecting one, or all of the choices, the engine parameter will show up in the top window.
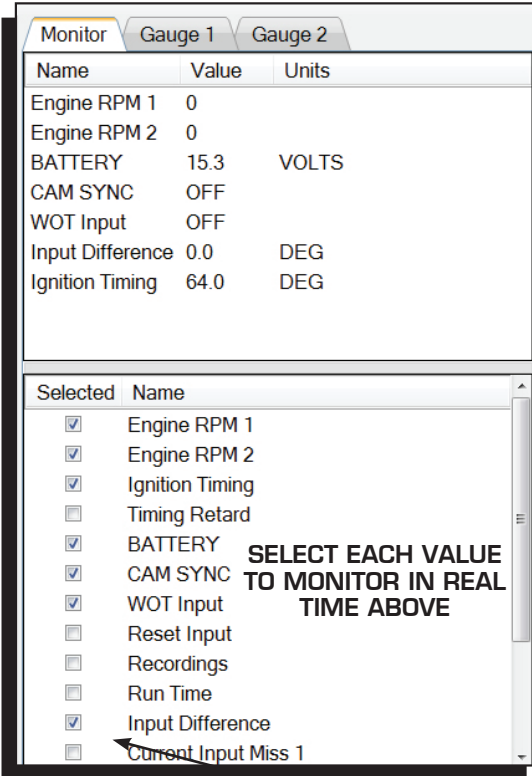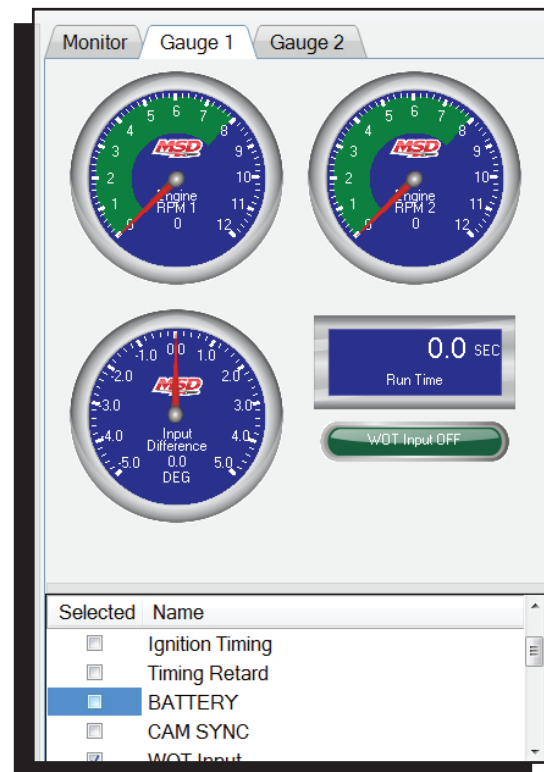

Figure 7 View Software Monitor.

Figure 8 View Software Gauges.

WIRING

PIN	Color	GA	Function
	SYNC OUT 2-PIN SOCKET		
1	LIGHT BLUE	18	SIGNAL
2	BROWN	18	REF GROUND
	CAM - 3-PIN SOCKET		
1	RED	18	12V
2	VIOLET/BLUE	18	SPEED
3	GREEN	18	REF GROUND
	TACH - 3-PIN DEUTSCH		
1	GRAY	18	TACH A
2	WHITE	18	TACH B
3	BLACK	18	GROUND
	8-PIN DEUTSCH CONNECTOR		
1	RED	18	SW 12V Via PN 8830 Capacitor
2	BROWN/GREEN	18	GROUND OUT
3	BROWN/GREEN	18	GROUND OUT
4	WHITE/BLUE	18	TIMER RESET SW
5	BLUE	18	SIGNAL INPUT - Controller Timer begins when ground is supplied
6	WHITE	18	LED - Ground, Alerts when Timer begins
7	GRAY	18	LED - Ground , Alerts when Timer reset and armed.
8	BLACK	18	GROUND - Battery Negative through PN 8830 Capacitor
	MAG PICKUP, 4-PIN DEUTSCH		
1	GREEN	18	MAG-
2	VIOLET	18	MAG+
3	YELLOW	18	TRIGGER OUTPUT WIRE
4	BLACK	18	SHIELD
	CAN, 4-PIN DEUTSCH		
1	WHITE	18	CAN HI
2	BLACK	18	CAN LO
3	RED	18	12V
4	BLACK	18	GROUND

GROUND
JUMPER
WIRE

MSD
IGNITION

MSD
PRO MAG
44

RED   BLACK

MSD
PRO MAG 44

VIOLET   GREEN   NOT USED

CONNECTOR IS
SUPPLIED

CLEAR WIRE
CONNECTS
TO VIOLET

TO GROUND
ON CYLINDER
HEAD

BATTERY
GROUND

CHASSIS
GROUND   CLEAR

MAG
(-)
BLK

RED   MAG
(+)

PN 8151
HARNESS

TO PC   USB CABLE   4 PIN

LED

PRO MAG
MSD

CAM

NOT USED

SYNC OUT

TACH OUTPUT
A & B

TO RACEPAK

CAN

BROWN/GREEN   WOT SWITCH
DARK BLUE

BROWN/GREEN
WHITE/BLUE   RESET JUMPER OR SWITCH

WHITE   TO 12V
GRAY   TO 12V

12V FROM
BATTERY

BATTERY
GROUND

BLACK
RED

CAPACITOR
PN 8830

Figure 9 Wiring the Power Grid Pro Mag Controller with a Single Mag.

GROUND
JUMPER
WIRE

MSD
IGNITION

MSD
PRO MAG
44

RED   BLACK

MSD
PRO MAG 44

VIOLET GREEN   NOT USED

CONNECTOR IS
SUPPLIED

CLEAR WIRE
CONNECTS
TO VIOLET

CHASSIS
GROUND

CLEAR

PN 8151
HARNESS

BLK

RED

MAG
(-)

MAG
(+)

TO PC

USB CABLE

4 PIN

LED

4 PIN

CAM

SYNC OUT

TACH OUTPUT
A & B

TO RACEPAK

CAN

BROWN/GREEN

BLUE

BROWN/GREEN

WHITE/BLUE

WHITE

GRAY

WOT SWITCH

RESET JUMPER OR SWITCH

TO 12V

TO 12V

TO GROUND
ON CYLINDER
HEAD

BATTERY
GROUND

OPTIONAL SECOND
PICKUP FOR
REDUNDANT
OPERATION

MAG
(+)

RED

BLK
MAG
(-)

CLEAR

GROUND
JUMPER
WIRE

MSD
IGNITION

RED   BLACK

MSD
PRO MAG
44

MSD
PRO MAG 44

VIOLET GREEN

NOT USED

BATTERY
GROUND

12V FROM
BATTERY

BLACK

RED

CAPACITOR
PN 8830

Figure 10 Wiring the Power Grid Pro Mag Controller with a Dual Mag.

INITIAL START UP

Once the Power Grid Controller is installed and ready to fire, there are a few items to take into consideration. We've outlined a couple of the key items.

Reset Jumper

A connector is supplied that jumps the Brown/Green and White/Blue wires together that should be installed during engine warm up and burnouts. This keeps the timer of the Power Grid from starting and running through the timing settings. Once the car is poised to make a pass, this connector should be removed. It can also be wired through a switch.

Pickup Input Difference

During warm-up in the pits, it is required to check the input difference of the two crank trigger pickups (on dual mag setups). The PC needs to be connected with the engine running. This will help you 'zero-in' on the pickups being at exactly the same timing. It is important to note that if there is a failure to one pickup circuit, the Power Grid will use the other pickup to trigger both channels. If the two pickups are not equal, the change in timing could affect the engine's performance.

With the View software open, go to the Monitor window and select "Input Difference" from the menu in the bottom window (Figure 11). In the gauge window, a gauge will show up and will display the timing difference between the two pickups when the engine is running. Note that the button on top must be selected as "Triggers Unlocked". This can be verified with a timing light.

WOT SWITCH

When ground, BROWN/GREEN, is applied to the BLUE wire, it indicates a Wide Open Throttle (WOT) condition.

The Controller Timer begins when ground is applied to the BLUE (WOT) wire, if not in RESET mode.

When ground is removed from the BLUE (WOT) wire, it is in PEDAL MODE.
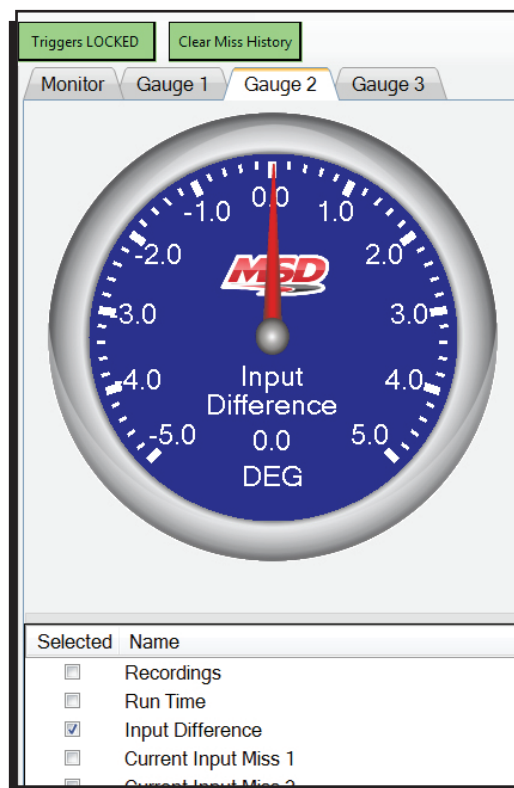
Figure 11 Input Difference Gauge.

BLUETOOTH

The Power Grid Controller is equipped with Bluetooth technology so a PC does not need to be connected through a cable. Once the Power Grid is paired with a PC, it will always search for that PC first. The connection is password enabled and will not allow a connection from a different PC (more than one PC can be configured).

For the initial setup of the Bluetooth connection, the unit must be powered on and connected through the USB to the PC. Open the View software. Next, locate the Bluetooth icon on your desktop and click it (Figure 12) and select Open Settings. Another window will open and you MUST select "Allow Bluetooth Device to find this computer".

Move the cursor back to the View software and click on the green Bluetooth ON button in the top center of the screen. A menu will open and show your device, click Pair to activate the connection. To confirm that the Bluetooth connection at any time, it is verified at the lower left corner of the View software by showing a COM#_BT, (Figure 13).

IMPORTANT: Program changes cannot be made via Bluetooth when the engine is running though you can still monitor the engine's variables. There will be no communication when the engine is running over 3,000 rpm.
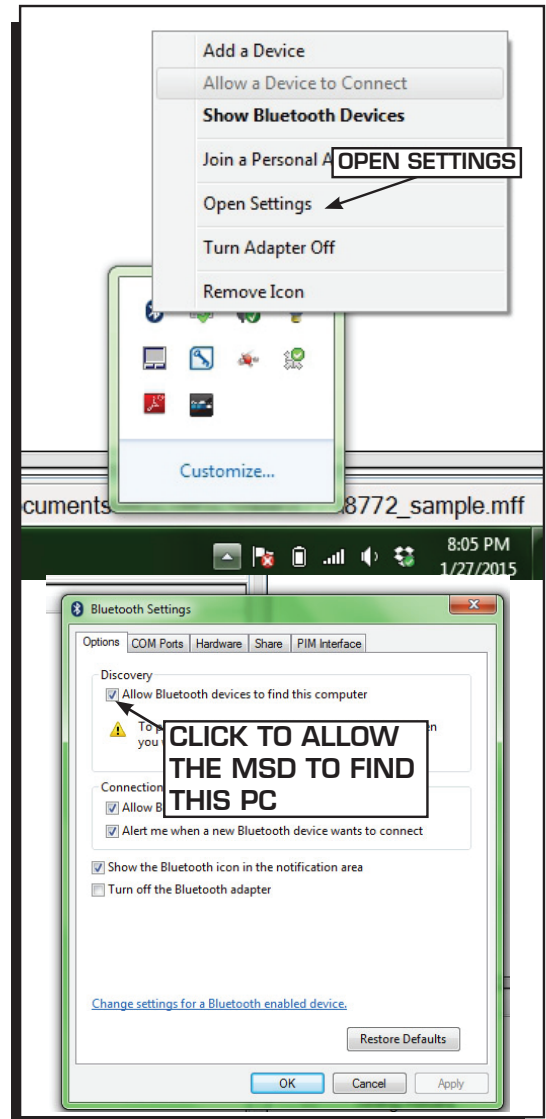

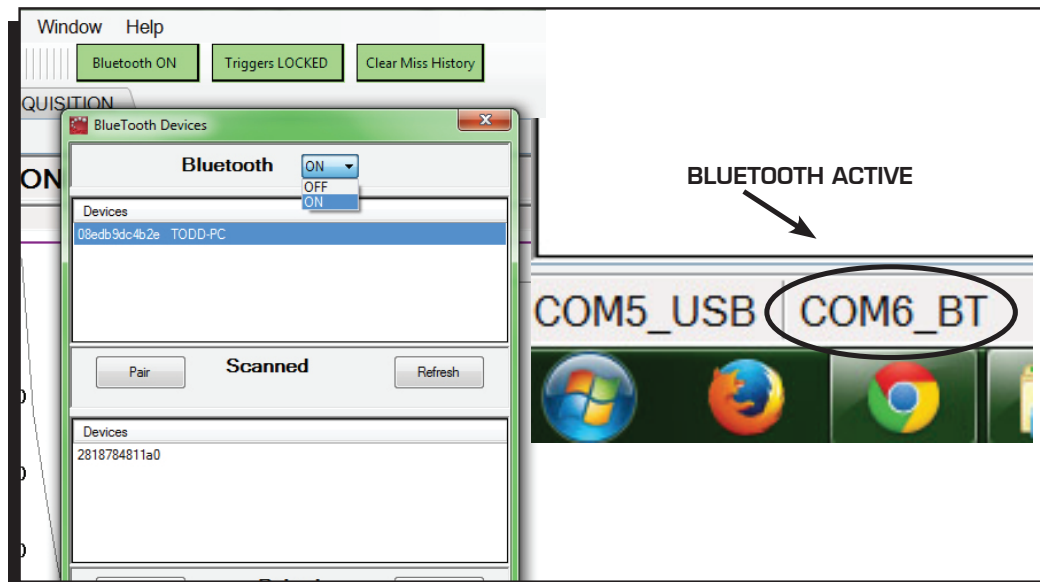Figure 12 Configure Bluetooth Discovery.

Figure 13 Bluetooth Connection.

DATA ACQUISITION

The ignition data from each run is saved on an 8M internal flash memory chip that will hold approximately 30 minutes of data recording. After saving events to your PC, erase the files from the Power Grid to ensure new recordings will be available.
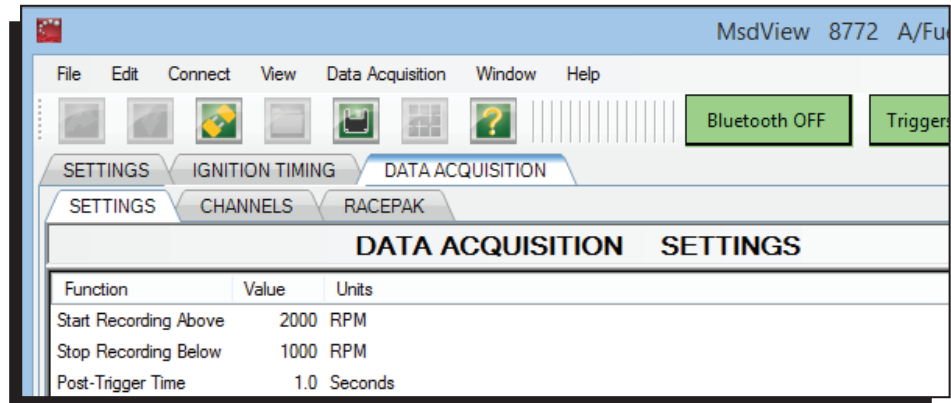

Figure 14 Recording Parameters.

The Power Grid System Controller will also easily send the data it records to compatible Racepak data acquisition systems. To connect the two systems simply plug the included VNet connector into an available space on the on the Racepak system. To be compatible the user must have a Racepak Data VNet Logger using DatLink Software v3.7.4 or higher. Default settings will send 5 channels of data to the RacePak system.

Within the Data Acquistion Tab of the View software, there are three sub-tabs; Settings, Channels and Racepak.

Figure 15 Data Acquisition Channels.

SETTINGS

This tab has three settings controlling when to start and stop a recording.
Start Recording Above: Select an rpm value to start the recording of data when the reset jumper is removed.
Stop Recording Below: Select an rpm value that stops the recording.
Post Trigger Time: Add more recording time after the Stop Recording condition has been met.

CHANNELS

Each available data trace within the Power Grid is listed on the Channels tab. Each trace can be disabled individually in order to remove unneeded data and generate smaller files. The Ignition In channel and the Ignition Out channel are high resolution and they generate the most data at high engine rpm. For definitions of each channel, hover the cursor over the function.

RACEPAK

The Racepak tab allows the user to configure the Power Grid to their Racepak. There are five values that can be recorded directly to a Racepak system: Engine RPM, Ignition Timing, Wide Open Throttle (WOT), Reset Input and Input Different. The type of Racepak system being used must be selected, either VNet or Pro III systems.
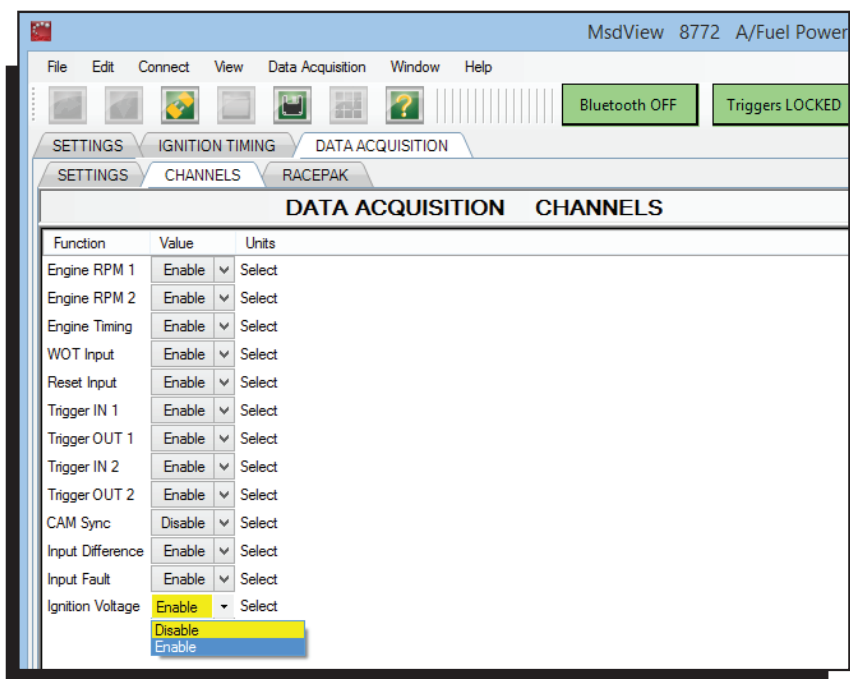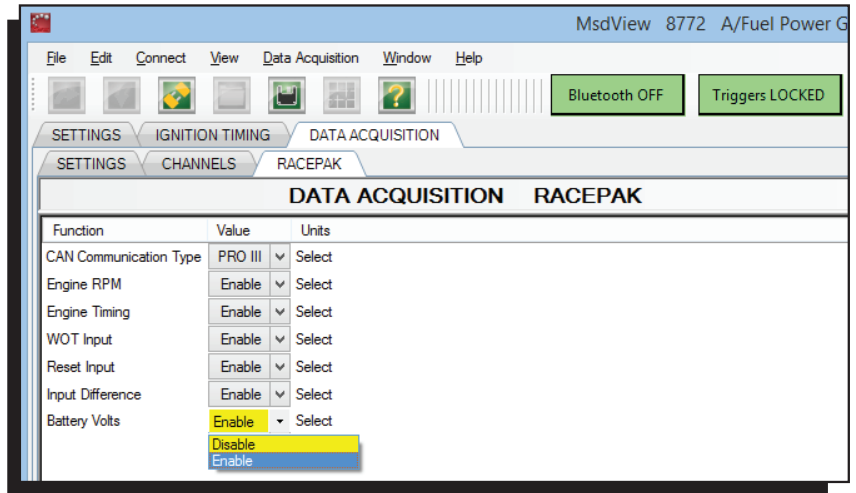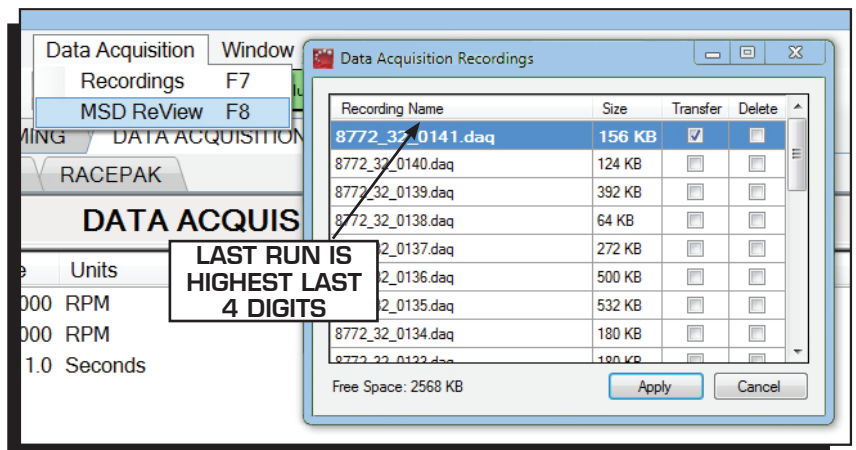
OPEN A DATA FILE

To open a data file after a pass, click on Data Acquisition on the top menu bar of the View screen and select Recordings (Figure 17). The latest run will always have the highest four digits in the file.

Figure 16 Racepak Settings.

Click Apply. A small window will appear that allows you to input useful data from the run, or can be canceled. From there, the ReView program will launch.

One a file is opened, you'll notice a chart in the middle with the data menu on the left. These are all the items that the Power Grid records. By double clicking on each file, the data will open in the screen for your review (Figure 16).

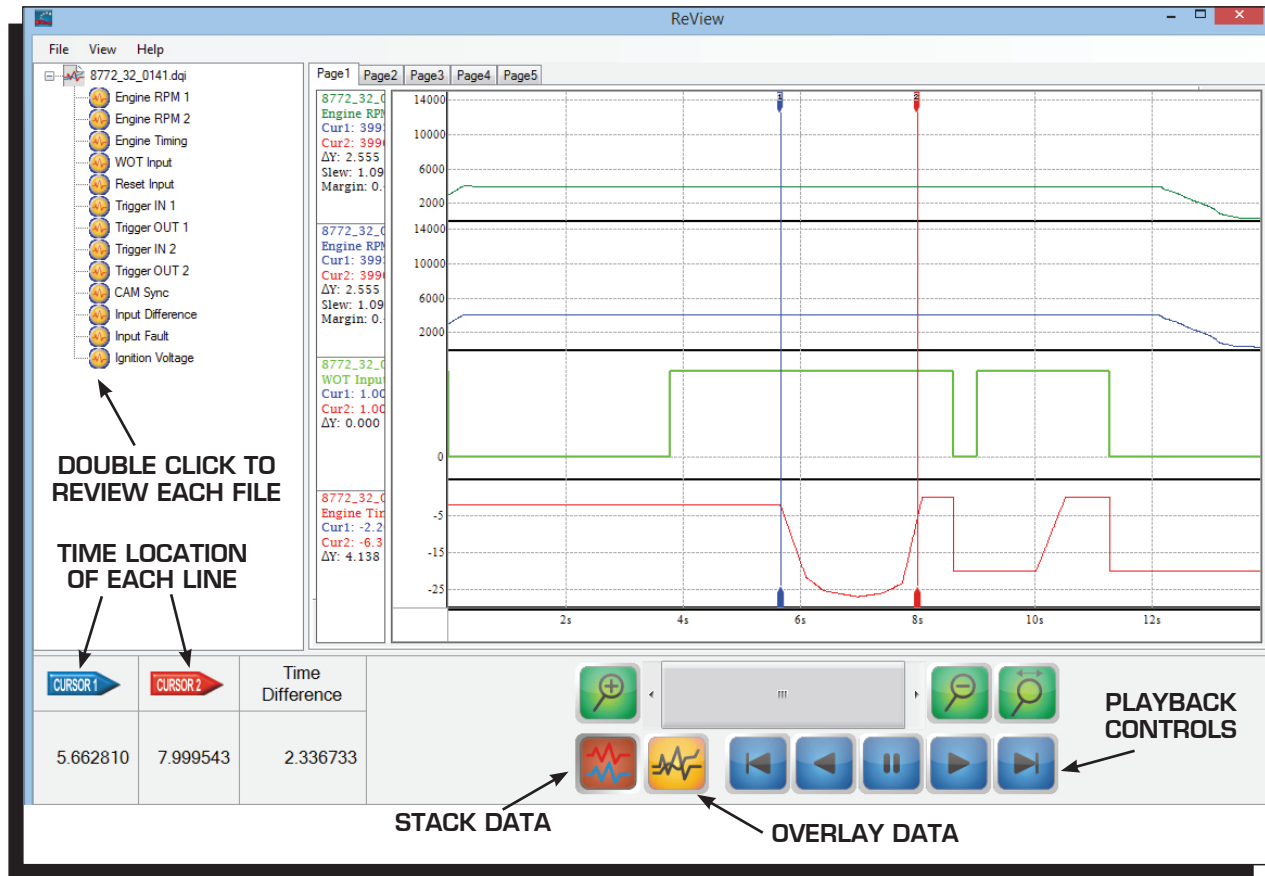**Figure 17 Transferring a Data File.**

Figure 18 MSD ReView Data Acquisition Files.

LED

There is an LED on the end panel of the Power Grid that will display Orange, Green or Red. There are also two external wires that can be used to have two cockpit mounted LEDs.

ORANGE: During the first 0-1 second of power, the LED will glow Orange when input voltage is greater than 5 volts.

GREEN: Once powered up and when the reset wire is 'inactive', the jumper is removed and the inputs are locked, the LED will be a steady Green. If there are any Alerts active, the LED will blink Green.

RED: The LED will be a solid RED during the run when the reset wire is 'active'. If there is an Alert, the LED will flash RED. After the run, the LED will be off (when no Alerts are present).

There are two wires that can be connected to 12 volts to power an externally mounted LED to put into the cockpit or a panel for viewing:

LED 2: This is controlled by the White wire. It will be on when the reset wire is active.

LED 3: This is controlled by the Gray wire. It will light when the system is armed and the reset wire is not active with the run-time at zero.

ALERTS

There are a variety of alerts that can arise in the Power Grid System Controller. If there are any errors or other causes of alert, the LED on the front of the controller will show red. Any time the red light shows the alerts should be checked so that errors can be corrected. By default, a pop-up box will appear as soon as an alert is registered. The pop-up window has a check box to disable the pop-ups if desired. The alerts window can also be opened manually two ways. On the bottom bar of the program window pane there is an alert counter that will show the number of alerts present. A single click on the alert counter at any time will open the alert window. The alert window can also be opened by going to the View menu on the task bar.

Low Battery Voltage	Alert becomes active when battery voltage is less than 5V, and engine speed is greater than 50RPM, for 5 seconds consecutively.
High Battery Voltage	Alert is active if battery voltage is greater than 20V.
No Cam Sync	Alert becomes active if no Cam Sync is detected and one or more individual cylinder rules are implemented.
Data Acq. Memory Overflow	Alert becomes active when the data-acquisition event queue overflows.
EEPROM CRC Error	Alert becomes active if the calculated EEPROM data checksum doesn't match with the value stored in EEPROM.
EEPROM Write Error	Alert becomes active if attempting to write to EEPROM failed 3 times.
Data Acq. Memory Protection	Alert becomes active when the data-acquisition queue has 90% of pending events or more.
Flash Write Error	Alert becomes active if attempting to write a flash page failed 20 times.
Bluetooth Configuration Fail	Active if the Bluetooth module could not be initialized correctly.
Trigger 1 Input Fault	Active when 2 or more consecutive Trigger 2 inputs occurred without a trigger 1 input.
Trigger 2 Input Fault	Active when 2 or more consecutive Trigger 1 inputs occurred without a trigger 2 input.
Flash Free Space Error	Active if the number of stored recordings is greater than 100 or the Flash chip is running out of usable memory.
Flash Error	Active if the flash chip could not be initialized correctly.

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