

ScanGauge™ By Linear Logic **KR** EDITION

www.ScanGauge.com



User Manual

Plugs into the J1939 or J1708 diagnostic connector already built into most 1987 or Newer Diesel Pusher Motor Homes, RV's and Large Diesel Over-The-Road Trucks

Version 1.0



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Jim Fitzpatrick

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WARNING

Use of the ScanGauge while driving could lead to an accident and serious injuries. The primary attention of the driver should always be on safe driving. As with any gauge or other instrumentation system in a motor vehicle, the information should be observed as part of a normal sequence of observations performed in the operation of the vehicle. Changes to the selections in the ScanGauge should only be made when it is safe to do so. The driver must remain attentive to driving the vehicle.

The mounting of the ScanGauge and the routing of the cable connecting it to the vehicle should be done with suitable caution so it does not create an unsafe condition. This includes but is not limited to the following restrictions:

- **Do Not mount the ScanGauge where it can obstruct the view of the driver.**
- **Do Not mount the ScanGauge in a manner that could cause it to be propelled through the vehicle during an accident causing injury, such as over or near an air bag.**
- **Do Not route the cable in a manner that would interfere with the operation of the vehicle controls.**

RIGHTS AND OBLIGATIONS

The ScanGauge may be used on any number of vehicles. The software contained in the ScanGauge is copyright protected by Linear Logic and may not be transferred or disassembled and used in another product, in part or in whole. The artwork used in generation of the circuitry is also copyright protected and cannot be used in part or in whole by any person or entity without the express written permission of Linear Logic.

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Version 1.0 – Information in this manual and the specifications and operation of the ScanGaugeKR itself are subject to change without notice.

| | |
|---|-----------|
| Installing the ScanGauge | 8 |
| ScanGauge Overview | 9 |
| Basic Operation and Features | 10 |
| Installation | 12 |
| Initial Setup | 15 |
| Setting up your ScanGauge | 16 |
| Advanced Setup Options | 18 |
| Backlight Display | 24 |
| Refueling and Cost Adjustments | 26 |
| Operating Your ScanGauge | 28 |
| Digital Gauges | 29 |
| Drive the Right Speed — Maximize Your Profits | 32 |
| Trip Computers | 34 |
| Filling Up your Tank - The Fillup Procedure | 40 |
| Scan Tool | 44 |
| Advanced Features | 48 |
| X-GAUGE™ | 49 |
| Performance Monitor™ | 56 |
| Custom Commands | 63 |
| Troubleshooting | 66 |
| Where to Get Support | 67 |
| View Firmware Version of Your ScanGauge | 69 |
| Reset Your ScanGauge | 70 |
| Read or Set the Operating Mode | 71 |
| Warranty Information: | 72 |

Installing the ScanGauge

The ScanGauge is simple to install and requires no additional power source other than that provided by the diagnostic connector.

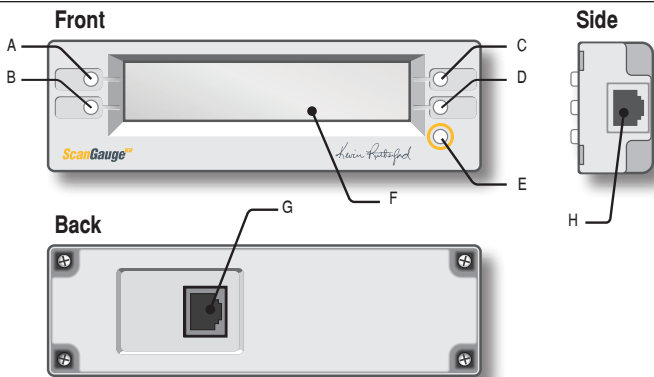
There are, however, some important considerations when choosing a location for your ScanGauge. Please see the Installation section for detailed information.

| | |
|---------------------------------------|----|
| ScanGauge Overview | 9 |
| Basic Operation and Features | 10 |
| Locating the J1939/J1708 Connector | 12 |
| Mounting Your ScanGauge | 12 |
| Connecting Your ScanGauge | 12 |
| Important Installation Considerations | 14 |

ScanGauge Overview

Package Contents

- ScanGaugeKR Edition
- Velcro® Strips
- Quick Start Guide
- 6-ft J1939/J1708 Cable
- User Manual



| | | |
|-----------|-----------------------------|--|
| A. | Function/Selection Button | The function buttons are used to make selections and to navigate the menu system of the ScanGauge. |
| B. | Function/Selection Button | |
| C. | Function/Selection Button | |
| D. | Function/Selection Button | |
| E. | HOME Button | Use the HOME Button to quickly get back to the Home Screen |
| F. | LCD Display Screen | Displays the information the ScanGauge records |
| G. | J1939/J1708 Connection Plug | Primary connector |
| H. | J1939/J1708 Connection Plug | Secondary connector or Daisy Chain interface |

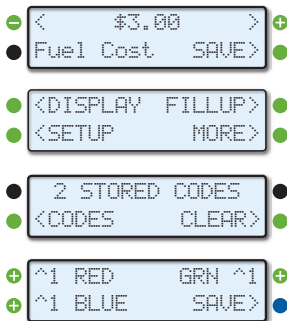
Basic Operation and Features

Menu and Selection Buttons

The ScanGauge interface is made up of 5 buttons; one HOME and 4 function/select buttons. The HOME button, located in the lower right corner of the front face and marked with a yellow circle, has a single function — to display the Home Screen. Pushing the HOME button will display the Home Screen as shown on the next page. If the ScanGauge is off, pressing the HOME button will turn it on.

The function/select buttons are located at each corner of the display. The function of these buttons will vary depending on the particular screen you are currently viewing.

Example Screens



In general, when a "<" or ">" is displayed next to the button, pressing the button will move you to the next or previous selection for the currently selected feature .

To the left are a few examples of screens you may encounter while using your ScanGauge. Use the diagram for an explanation of possible button functions.

Automatic Mode Recognition

Different vehicles use different types of signaling from their computers. In most cases, the ScanGauge can quickly determine which type your vehicle is using. You don't have to know which type it is for it to be used.

Automatic Repeat Buttons

Pressing the buttons and holding them for more than a second will cause them to automatically repeat at a rate of about 2 times a second. This allows for rapid stepping to a value without a lot of button pressing.

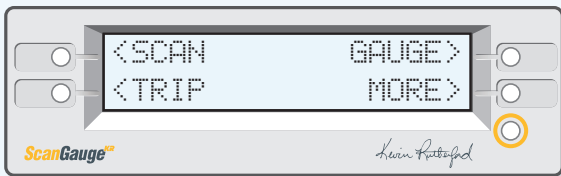
User Programmable Gauges

Up to 25 trip, vehicle specific or special gauges can be entered into the ScanGauge. These are stored in Flash memory and will be retained even if there is a power loss, but the user can change them as often as desired.

User Programmable Commands

Up to 10 commands can be generated, edited, saved and sent to the vehicle computer. This allows for future codes and some special commands to be added by the user.

| Button Symbols | |
|----------------|---|
| Symbol | Function/Action |
| > | Move to next selection or do action |
| < | Move to previous selection or do action |
| ^ | Increment up |
| + | Increment up or step forward |
| - | Increment down or step backward |



SCAN

Use the Scan Tool to view and clear Trouble Codes and turn off the check engine light

TRIP

Press the function button next to TRIP to access the built-in Trip computers. The Trip computers give you the ability to view and track useful information about the trip you take as you drive.

GAUGE

Use the function button next to GAUGE to display up to 4 real-time Digital Gauges

MORE

Press the function button next to MORE to access the settings and configuration options for the ScanGauge.

Flash Memory

The ScanGauge uses a type of memory that doesn't require batteries or a source of power to maintain. This means that your settings will not be lost if you disconnect the vehicle battery or disconnect the ScanGauge.

Automatic Sleep Mode

About 12 seconds after turning off the vehicle or pressing a button after the vehicle engine is turned off, the ScanGauge will automatically power down into a sleep mode. Starting the engine or pressing the HOME button will automatically reactivate the ScanGauge, and it will return to the screen and lamp settings it had just before it went to sleep.



If you need to disconnect the ScanGauge, wait until it has gone to sleep before you do it. This will allow all settings and trip information to be saved in Flash memory and restored when it is reconnected.

Customizable Backlight Color

Choose from 7 standard backlight colors or program your own for 63 possible colors. The backlight intensity is also adjustable and can be set to Off, Low and High intensities.

Installation

1. Locate the Diagnostic Connector

The connector is generally located under the dash at the fire wall on the driver side and is usually protected by a plastic cover. To remove the protective cover, you must push the cover while turning counter clockwise, then pull to remove it.



2. Determine Plug Type

The universal plug included with your ScanGauge is compatible with both the J1939 (9-pin) and J1708 (6-pin) diagnostic port. Match the end of the plug to the connector, but do not plug it in at THIS time.

6-pin connects to vehicles that use the **J1708** protocol



9-pin connects to vehicles that use the **J1939** protocol



3. Locate a Place For The ScanGauge.

You can use the sticky-back Velcro® supplied with the ScanGauge to attach it to the location you have chosen.



DO NOT mount the ScanGauge over an air bag cover where it could be propelled by a deploying airbag.

4. Route The Cable.

Route the cable from the ScanGauge to your vehicle's diagnostic connector. Be sure to keep the cord from interfering with the pedals or operating controls of the vehicle.

5. **Connect the small end of the cable**
Plug the small end of the cable into the back or side of the ScanGauge.

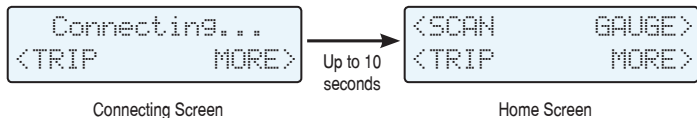
6. **Turn the vehicle on.**
Start your vehicle or turn the ignition to the ON position.

7. **Plug the ScanGauge Plug Into The Diagnostic Connector.**

While inserting in the plug, you may have to rotate the plug to align the connector pins. Once the pins are aligned, push firmly on the plug to complete the connection.

Once connected with the vehicle running or the ignition in the ON position, your ScanGauge will display the Connecting Screen, and then quickly switch to the Home Screen.

When the Home Screen is displayed, your ScanGauge is connected and has established communication with your vehicle's computer.



If it does not stop saying "Connecting..." or the screen goes blank after 60 seconds, refer to [Troubleshooting on page 67](#).

The TRIP and MORE buttons can be used even if a connection is not established. If communication with the vehicle ECU is not completed within about 75 seconds, the ScanGauge goes to sleep. It will continue to attempt to connect when the vehicle is restarted or the HOME button pressed. When communication has been established, the display will change over to that which was displayed the last time it went to sleep or to the Home Screen.

8. **If this is the first time it has been used on this vehicle, follow the procedures outlined in Setting Up Your ScanGauge, on page 16.**

Important Installation Considerations

The ScanGauge has an operating temperature range of 0°F to 160°F (-18°C to 71°C). At higher temperatures, the display will become dark and difficult to read. At lower temperatures, the contrast will be reduced and the characters will change more slowly. As long as the temperature doesn't exceed -22°F to 176°F (-30°C to 80°C), the display will return to normal operation when the ScanGauge temperature returns to the normal operating temperature range.

- A location in direct sunlight on the dashboard in a closed vehicle could exceed the normal operating temperature. The use of windshield shades or covering the ScanGauge with a piece of paper can significantly reduce this temperature. If attached with Velcro®, you can also move it temporarily to a location away from the sun.
- DO NOT mount the ScanGauge over an air bag cover where it could be propelled by a deploying air bag.
- A pin in the cable is connected to the vehicle's power system. DO NOT short any pins of the small connector to metal or other ground while the large end of the plug is plugged into the vehicle's diagnostic connector.
- The location should be where it can easily be seen from the normal driving position. It should not be placed where it will obstruct the driver's view outside the vehicle or of other gauges.

Initial Setup

To get the most out of your ScanGauge, it is important to follow the setup procedures to ensure your ScanGauge reports accurate information.

Setting Up Your ScanGauge

| | |
|---------------------------|----|
| Initial Setup Overview | 16 |
| Advanced Setup Overview | 18 |
| Backlight Display Options | 24 |

Refueling and Cost Adjustment

| | |
|-----------------------|----|
| Initial Setup | 26 |
| The Fill Up Procedure | 26 |
| Fuel Cost Screen | 26 |

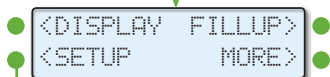
Setting Up Your ScanGauge

Initial Setup Overview

To properly use your ScanGauge, you must first set up the vehicle parameters. Basic setup parameters include, fuel tank size and units of measure. Advanced parameters are also available and are covered later in this chapter.

Access the Setup Options

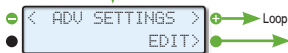
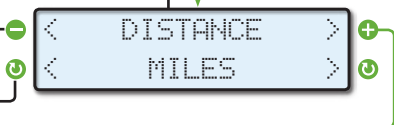
To access the setup screens, press the function button next to MORE on the Home Screen. Next press the function button next to SETUP.



Displays the currently selected setup parameter

Use the upper buttons to move to the next or previous setup parameter

Use the lower buttons to adjust the currently selected setup parameter



See page 18 for Advanced Setup Options

Basic Setup Parameters

| Setup Parameter | Display | Options | Description |
|-------------------|----------------|---------------------------------|--|
| Distance Units | DISTANCE | Miles Kilometers | The Setup Parameters include multiple units of measure settings, including Distance, Fuel, Temperature and Pressure. Each is set independently of the others and can be used in any combination. |
| Fuel Units | FUEL UNITS | Gallons Liters | |
| Temperature Units | TEMP UNITS | Fahrenheit (°F) Celsius (°C) | Making changes to these settings causes your ScanGauge to use these units when reporting and measuring data. |
| Pressure Units | PRESSURE UNITS | PSI KPA MM IN | |
| Tank Size | TANK SIZE | 0 - 9999 Gallons/liters | Is adjustable in 1-gallon or liter increments depending on how you set the FUEL UNITS parameter. |
| Currency Type | CURRENCY | \$, £, ¥, ₪, € | Choose the currency symbol ScanGauge should use to display monitor values. |

Tips for Setting the Tank Size

The size will use Gallons or Liters depending on the selection you made in the Fuel Units Screen (FUEL UNITS). If the size in the manual is not in whole units, use the next lower value. For instance, if the capacity is 80.5 gallons, use 80 gallons.



It is dangerous to run a vehicle out of fuel and can damage the fuel pump. Do not rely on the fuel gauge or ScanGauge at low fuel levels or low remaining distance or time.

Can ScanGauge Display Liters per Hundred Kilometers?

By default, ScanGauge will express fuel economy in Liters per Hundred Kilometers (LHK), provided you have set fuel to LITERS and distance to KILOMETERS. For more information see LHK under Advanced Setup on page 18.

Advanced Setup Options

Overview

The Advanced Setup Options provide additional setup parameters you can use to adjust the functions and features of the ScanGauge to suit both your vehicle and your preferences.

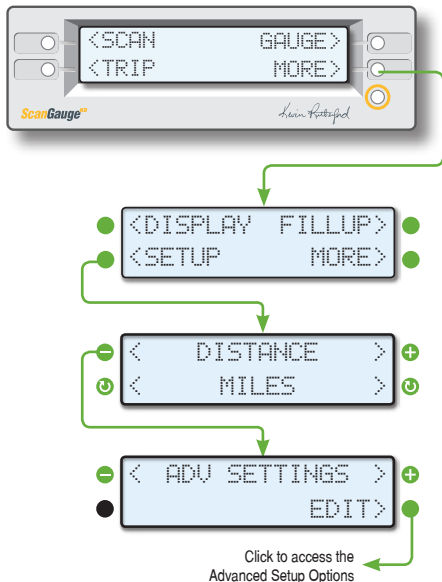
This section provides a brief overview of each of the advanced parameters but may not cover the full scope of the subject the setting applies to.

For more information, visit: www.ScanGauge.com/support.

Accessing the Advanced Setup Options

The Advanced Setup Options are located within the SETUP menu. To access the Advanced Setup Options screens, press the lower right function button next to MORE on the Home Screen. Next press the lower left function button next to SETUP.

Once on the Setup Screen, use the upper left or right function buttons to cycle through the available screens until the screen displays ADV SETTINGS. Press the lower right function button next to EDIT to enter the Advanced Setup Options.

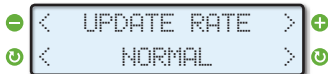


Advanced Setup Parameters

| Setup Parameter | Display | Options | Description |
|----------------------------------|-------------|--|---|
| Data Update Rate | UPDATE RATE | Slow Normal Fast Max | Sets the rate in which ScanGauge reports data. See page 20. |
| Speed Adjustment | SPEED | -99% - +99% | Sets the speed offset to compensate for inaccurate speed readings. See page 20. |
| Alternate Speed Reporting Method | SPEED PGN | NORMAL ALT | Sets the speed reporting method. See page 20. |
| Liters per Hundred Kilometers | LHK | OFF ON (Default) | Displays fuel economy in Liters per Hundred Kilometers. See page 21. |
| Sleep Event | SLEEP EVENT | COMM 0 RPM | Sets the ScanGauge power down event. See page 21. |
| ScanGauge wake event | WAKE EVENT | Low Volts Normal Volts High Volts | Sets the ScanGauge power up event. See page 21. |
| Horsepower Adjustment | HPR | -99% - +99% (Default 0) | Adjusts the Horsepower reading. See page 22. |
| Fuel Usage Adjustment | FUEL ADJ | -99% - +99% (Default 0) | Adjusts the fuel usage measurement. See page 22. |
| Trip Method | TRIPS | DAYS AB | Sets the method the ScanGauge uses to track and store trip data. See page 22. |
| Visual DTC Alerts | DTC Alert | OFF ON | Turns visual DTC alert on or off. See page 23. |
| Clear DTC method | CLR DTC | NORMAL ALT | Sets the method for clearing DTCs. See page 23. |
| PID Discovery Tool | PIDS | Show Capture | Used to show or capture vehicle PIDs. See page 23. |

Set the Update Rate

You can adjust the rate in which ScanGauge reports data. The update rate defaults to NORMAL which updates the display about every 2 seconds. The SLOW setting will reduce the update frequency to every 4 seconds, while the FAST setting will increase the update frequency to 1 second.



You may also set the update rate to MAX which allows ScanGauge to update displayed data at the full speed of the bus. If the vehicle reports data 10 times per second, then ScanGauge will update the gauge screen 10 times per second. In some instances, this may cause the display to appear blurry as the numbers change too quickly to read — particularly with speed and RPM gauges.

Set Speed Adjustments

The speed indicated by ScanGauge can be adjusted to compensate for changes in tire size, gear changes, tire wear or any other factor that may affect the accuracy of your vehicle's speedometer. It is important to note that this adjustment only affects the ScanGauge's indicated speed and distances, and it does not affect the vehicle speedometer or odometer readings.



While viewing the SPEED Screen, the lower left and right function buttons can be used to increase or decrease the selected adjustment in 1% steps.

The upper line displays the word SPEED and a percentage. The percentage is the adjustment factor. The lower line displays 2 numbers: the left number is the speed reported by the vehicle and the number on the right is the speed that will be shown by the ScanGauge after applying the correction factor.

An accurate way to set the speed is to use a GPS. With one person driving, the other person observes the speed on the GPS and adjusts the percentage until the lower right number agrees with the speed the GPS indicates.

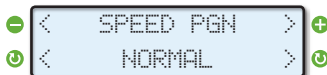
For more information about the various methods of calculating your speed adjustment, visit us online at www.ScanGauge.com/quick-tips/.



IMPORTANT: OBSERVE ALL SPEED LIMITS AND DRIVE SAFELY WHILE MAKING THESE ADJUSTMENTS. THE DRIVER MUST NOT BE DISTRACTED BY TRYING TO MAKE THESE ADJUSTMENTS WHILE DRIVING.

Speed PGN

Some vehicles use a different Parameter Group Number (PGN) for transmitting speed. If the ScanGauge does not report speed for either MPH or KPH, change the SPEED PGN setting from NORMAL to ALT.



LHK

Liters per Hundred Kilometers (LHK) is a popular way to express fuel economy in Europe.



By default, ScanGauge will express fuel economy in LHK, provided you have set fuel to LITERS and distance to KILOMETERS as outlined in the Basic Setup procedure (see page 16).

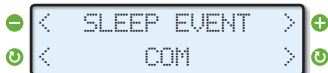
If you would prefer fuel economy to be expressed as Kilometers Per Liter (KPL), set the LHK parameter to OFF. With LHK set to OFF, and fuel and distance set to LITERS and KILOMETERS, the ScanGauge will now express fuel economy in Kilometers Per Liter (KPL).



IMPORTANT: Lower LHK values represent a higher fuel economy, unlike KPL where a higher number represents higher fuel economy.

Set the Sleep Event

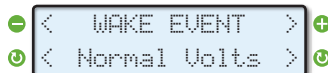
By default, the ScanGauge will shut down within 10-15 seconds of turning off the vehicle. If it does not shut down, there is a small risk that one of the vehicle's ECUs and ScanGauge will stay on and drain the battery.



If the ScanGauge does not shut down, you can set the SLEEP EVENT parameter to 0 RPM. This will have the effect of allowing ScanGauge to "sleep" when it sees 0 RPM for a period of 10-15 seconds.

Set Wake Event

The WAKE EVENT parameter allows you to set the signal level ScanGauge looks for to power up.



The default setting is Normal Volts. This should work for the majority of vehicles. If however, the ScanGauge has trouble either turning on, or staying powered down, you may need to set the WAKE EVENT parameter to either High Volts, or Low Volts.

Trouble Powering Up

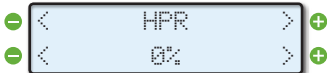
If the ScanGauge does not turn on when the vehicle is started, set the WAKE EVENT parameter to Low Volts.

Trouble Staying Powered Down

If the ScanGauge turns off but then turns on for a short time and then repeats this pattern, set the WAKE EVENT to High Volts.

Set a Horsepower Adjustment

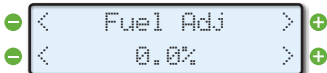
ScanGauge reports Horsepower (HPR) as a built-in digital gauge. This parameter allows you to make adjustments to the HP reading ScanGauge reports.



If a dynamometer is used to determine the horsepower, this adjustment can be done to make the ScanGauge agree with the dynamometer.

Adjust Fuel Usage

The FUEL ADJ function can be used to make the fuel use readings on the ScanGauge more accurate.

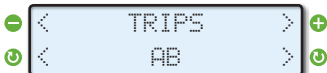


After each fill up of your vehicle's tank, you should use the built-in FILLUP function (see page 26), to tell ScanGauge the tank has been filled. If you notice a consistent discrepancy between the amount of fuel ScanGauge has reported as being used and the actual amount of fuel you put in the tank, you can make a global adjustment using this parameter.

For instance, if you fill up, and the pump said it took 55 Gallons to fill the tank, but the ScanGauge said you only used 50 Gallons, the error would be 10%. You would need to make the FUEL ADJ setting 10.0%. If ScanGauge reported more fuel had been used than the pump showed to refill the tank, the adjustment would be a negative percentage.

Set the Trip Computer Method

ScanGauge provides a number of trip computers which can be handled in one of two ways. Trips are automatically stored in alternating trip computers, TRIP A and TRIP B (the default method), or as TODAY and PREVIOUS DAY.



While in the default AB mode, ScanGauge will automatically track your trip data in both trip computers. Each trip can be reset independently of the other allowing you to track multiple trips. (See page 36)

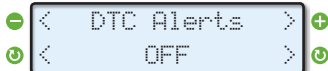
If you choose to set the trip computer method to DAYS, the ScanGauge will rely upon the power supplied by the diagnostic connector to automatically write TODAY and PREVIOUS DAY trip data to memory once the vehicle has been shut off. Some vehicles will cut power to the diagnostic connector the moment the vehicle is shut off, causing ScanGauge to be unable to write the trip data while in the DAY's mode. If this is the case for your vehicle, you should use the default TRIPS method, AB.

To learn more about the differences between the two trip storage methods, refer to the Trip Computer section beginning on page 34.

To test which method your vehicle should use, you can simply observe the ScanGauge when you shut off the vehicle. If the ScanGauge backlight shuts off in less than 2 seconds of turning off the vehicle, then you should use the default TRIPS method to AB.

Turn on Instant DTC alerts

When a DTC (diagnostic trouble code) is set, by default, ScanGauge will store that code for later review through the SCAN function (see page 44).



If you wish to be notified immediately when a DTC is detected, set the DTC Alerts parameter to ON.

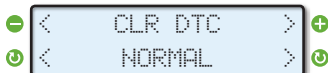
It is important to note that DTCs may occur even when there are no problems. For instance, when the key is turned on but the engine is not running, a “low oil pressure” DTC will be sent because there is no oil pressure until the engine is running.



This alert will be shown at each engine start. In this case and you can choose to IGNORE it.

Set Alternate DTC Clear Methods

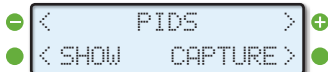
Some vehicles use a different commands to clear the DTCs. If you find that the DTCs are not being cleared from the vehicle computer when using the CLEAR function in the SCAN TOOL (see page 47), set the CLR DTC parameter to ALT and then try clearing the set DTCs.



Be aware that some DTCs will not be cleared if the problem has not been corrected and the vehicle's computer continues to report the problem.

PIDs (Parameter ID)

This ScanGauge model has a special feature built in that will allow us to provide you more gauges for your vehicle.



Your vehicle broadcasts over the data bus all kinds of information. You use the PIDs menu to record this data. Then you can write down what it captures and send it to us. We can analyze what you send us and then come up with XGauges you can add to make additional gauges.

For more information and to submit PID data, visit: www.ScanGauge.com/pid

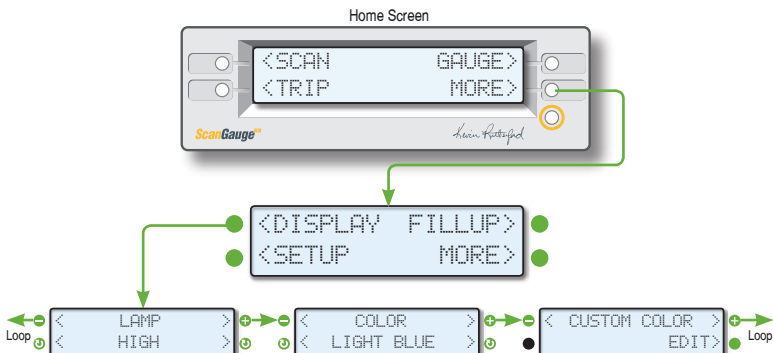
Backlight Display

Backlight Display Options

You can customize the backlight display of your ScanGauge. Options include the ability to set the intensity of the backlight, choose a standard built-in color for the backlight, and create your own custom color.

Access the Display Options

To access the Display Options Screen, press the function button next to MORE on the Home Screen. Next, press the function button next to DISPLAY. Use the upper left and right function buttons to cycle through the available options.



Change the Backlight Intensity

Use the lower left and right function buttons to adjust the backlight intensity. Options include:

| Backlight Color Options | |
|-------------------------|----------------|
| Sequence | Setting |
| 1 | HIGH (Default) |
| 2 | LOW |
| 3 | OFF |



Change the Backlight Color

Use the lower left and right function buttons to cycle through the available colors.



Use lower function buttons to choose a backlight color

Backlight Color Options

| Sequence | Color |
|----------|-----------------------------|
| 1 | Light Blue |
| 2 | User Defined (Custom Color) |
| 3 | Blue |
| 4 | Green |
| 5 | Blue-green |
| 6 | Red |
| 7 | Violet |
| 8 | Amber |

Set a Custom Backlight Color

The backlight can be customized by setting the intensity of the three basic colors — Red, Green and Blue — for a total of more than 60 possible colors. The example to the right is what you would see for a Pink backlight.

To create your own color, start by pressing the function button next to a color. This will cause it to sequence through 4 possible values ranging from off — a setting of 0, to full intensity — a setting of 3. As you press the buttons, the backlight will change to show the color result of the current selections.

If you have previously set the intensity at LOW, the display will show the color at the low intensity level. If you had set it at HIGH, the display will show the color at the high intensity level. Note: there may be a small difference in color between LOW and HIGH.

When you have the color you want, press the function button next to SAVE. This will save the color in Flash memory. You can change the color as often as you want.



Custom Color Adjustments

| Value | Color Intensity |
|-------|-------------------|
| 0 | 0 intensity (Off) |
| 1 | 1/4 intensity |
| 2 | 1/2 intensity |
| 3 | Full intensity |

Refueling and Cost Adjustment

Improving the Accuracy of Your ScanGauge

The accuracy of your ScanGauge can be improved by following the Refueling and Cost Adjustment procedures outlined in this section. Entering accurate values for Fuel Cost and Your Rate will also directly affect the accuracy of the Profit/Loss gauges.

These functions also directly effect the fuel based trip computers – TANK and TANK TO EMPTY. See page 39.

The Fill up Function

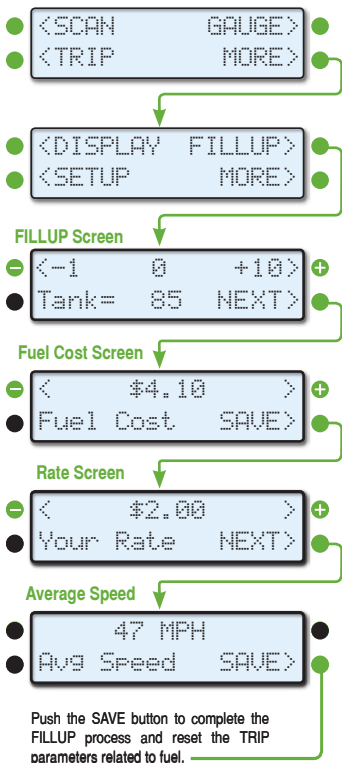
The FILLUP function allows you to adjust and enter the fuel level and cost values to help ScanGauge maintain accurate TO EMPTY and FUEL COST and PROFIT/LOSS computations.

During initial setup, if you are not filling the tank to capacity, you will need to estimate the amount of fuel in the tank.

Initial Setup

To set the tank level initially, access the FILLUP screen and use the upper left and right function buttons to adjust the "TANK=" value to what you estimate is in the tank.

For instance, if your vehicle's fuel gauge indicates there is a half a tank of fuel, then adjust the "TANK=" value to match 1/2 of the tank capacity.



For a more detailed explanation of the Fill Up Procedures, see "Filling Up Your Tank" on page 40.

Using the FILLUP Screen

Use the FILLUP screen each time you put fuel in the tank. Adjust the number shown in the top line using the upper left and right function buttons until the number matches the amount of fuel you put in the tank.

You can increase the number in 10 gallon/liter steps and decrease in 1 gallon/liter steps.

If you're tank is full, press the function button next to "+10" until the "TANK=" value is the same as the tank capacity.

Fuel Cost Screen

When you're done adjusting the fuel, press the NEXT button to access the Fuel Cost Screen. Use the upper left and right function buttons to adjust cost per gallon/liter, then press NEXT to proceed.

Rate Screen

Enter your per Mile/Km reimbursement rate. This will be the combined rate for distance, fuel, ect. For example, if you are reimbursed at \$1.20 per-mile driven plus \$0.75 per-mile for fuel cost, you would adjust the top line to read \$1.95. ($\$1.20 + \$0.75 = \1.95).

You can also adjust the Rate to show \$0.00. This will cause the cost base calculations to simply show the actual cost of fuel being used.

Average Speed

The Average Speed screen simply shows you your average speed since the last time you preformed the fill-up procedure. This number is useful if you are tracking your fuel at www.MyGauges.com. Write this number down on your fuel receipt, so you can record it later in your **MyGauges** account.

Helpful Hints

- If you fill up your fuel tank with your vehicle on an incline, it can have an effect on the amount of fuel the pump can dispense into your tank.
- When filling your tank, let the pump shut off automatically. Do not top off.
- To maintain the most accurate "TO EMPTY" information, it is best to fill the tank to its capacity
- If you have no need to track the time and distance values of the "TO EMPTY" and "TANK" but still want to track fuel costs, you can simply skip the FILLUP Screen by pressing NEXT and then entering the Fuel Cost. When you're done, press the lower right function button next to SAVE.

Operating Your ScanGauge

The ScanGauge features a simple and easy-to-use, menu-driven design. After each button is pressed, new selections will appear in the display prompting you for what can be done next.

The HOME button (button with a yellow-orange circle around it) will take you back to the starting point at any time, or activate the ScanGauge if asleep.

Digital Gauges

| | |
|---|----|
| Overview | 29 |
| Digital Gauge Abbreviations | 30 |
| Drive the Right Speed — Maximize Your Profits | 32 |

Trip Computers

| | |
|-----------------------------|----|
| Trip Computer Overview | 34 |
| Alternate Trip Computers | 36 |
| Time-based Trip Computers | 37 |
| Resetting Current Trip Data | 38 |
| Fuel-based Trip Computers | 38 |
| Filling Up Your Tank | 40 |

Scan Tool

| | |
|------------------------------|----|
| Scan Tool Overview | 44 |
| What to Do if DTCs Are Found | 45 |
| Clearing Trouble Codes | 47 |

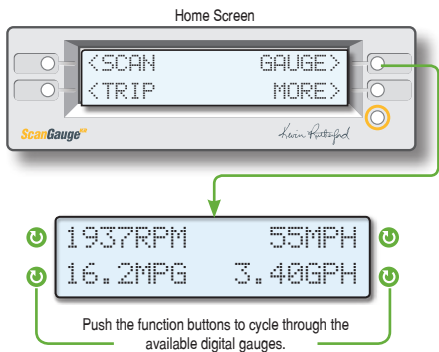
Digital Gauges

Overview

The ScanGauge can display up to 4 digital gauges at a time. The gauges are updated in real time when your vehicle is running and can be used to monitor the operating condition of your vehicle.

Access the Digital Gauges

From the Home Screen, pressing the button next to GAUGE causes the display to change to show the currently selected gauges.



Selecting the Gauges

Pressing the button next to one of the gauges will allow you to change the gauge that is displayed in that position. Pressing a button repeatedly, allows you to cycle through all the available gauges.

The selection will continue through all of the gauges and then loop back to the starting gauge. This gives you the ability to customize the gauge display to show the gauges you're most interested in.



The information available will vary from vehicle to vehicle. If the information is not available for a certain gauge, no data will be shown for it. If the same gauge is selected for more than one position, only one of them will show data (if it is available). The other positions will show the abbreviation, but no data.

Gauge Abbreviations

The following table shows what the gauge names. In some cases, the unit selections made in the **Basic Setup Parameters** (see page 16) will determine the gauge abbreviations.

The information available will vary from vehicle to vehicle. If the information is not available for a certain gauge, no data will be shown for it. If the same gauge is selected for more than one position, only one of them will show data (if it is available). The other positions will show the abbreviation, but no data.

| Gauge | Name | Description |
|---------------------------------|--|--|
| BST | Boost Pressure | This indicates the pressure in the intake manifold. It is reported in PSI by default but can be changed to KPA, MM, or IN if desired. |
| MPG KPG MPL LHK KPL | Miles Per Gallon Kilometers Per Gallon Miles Per Liter Liters Per 100Km Kilometers Per Liter | Instant fuel economy is updated about every 2 seconds at the NORMAL update rate . Small changes in throttle position or load while driving will show almost immediate changes in this gauge. |
| MPH KPH | Miles Per Hour Kilometers Per Hour | Speed in the units selected |
| RPM | Revolutions Per Minute | The RPM of the engine |
| TPS | Throttle Position Sensor | In some vehicles, a closed throttle will read 0 and full throttle will read 100. Other vehicles will have a higher value than 0 for a closed throttle and a full throttle value less than 100. |
| FWT CWT | F° - Water Temperature C° - Water Temperature | Water/Coolant temperature A vehicle with a 50/50 mix of coolant and water will not boil over until about 265° F at sea level. This will be reduced at higher elevations. |
| AVG | Average Fuel Economy | This is the current average fuel economy and is updated about every 2 seconds (normal rate). |
| \$PH | Profit/Loss Per Hour | Shows the the real-time Profit or Loss rate you are achieving per hour. See "Drive the Right Speed — Maximize Your Profits" on page 32. |
| EGT | Exhaust Gas Temperature | Displays the current exhaust gas temperature as reported by your vehicle's computer. |

Add Custom Gauges

The ScanGauge features the exclusive X-GAUGE™ programmable gauge system allowing you to add custom, vehicle specific gauges to the digital gauge set.



For an overview of the X-GAUGE™ system, see page 49. To submit PID data to determine the XGauges available for your vehicle, please see page 23 or visit us online at: www.scangauge.com/pid

| Gauge | Name | Description |
|--------------|--|---|
| \$PM \$PK | Profit/Loss Per Mile Profit/Loss Per Kilometer | Shows the the real-time Profit or Loss rate you are achieving per mile/kilometer. Learn how to Maximize Your Profits on page 32. |
| VLT | Battery Voltage | Normal running battery voltage is between 13 and 15. When the engine is off it should be between 11 and 13. Voltages higher than 15 volts can damage batteries and electrical components. Voltages below 13 when the vehicle is running could indicate poor charging of the battery. Voltage below 11 when the engine is off could indicate a low battery charge or a shorted battery cell. |
| FIA CIA | F° - Intake Air Temperature C° - Intake Air Temperature | Temperature of the air going into the engine. At highway speeds, this will typically be a few degrees higher than the outside air temperature. At idle or low speed, it may be much higher in temperature than the outside temperature due to the low airflow into the engine and the high under-hood temperatures warming it up. |
| TFT | Transmission Fluid Temperature | This indicates the transmission fluid temperature in either F° or C° as selected in the setup procedure |
| GPH LPH | Gallons Per Hour Liters Per Hour | Fuel consumption rate in the selected units. This is sensitive to throttle, gear and loading changes. |
| OIL | Oil Pressure | This indicates the engine oil pressure in the units (PSI/IN/KPA/MM) as selected in the setup procedure |
| LOD | Engine Loading | This is a percentage of the maximum power available currently being generated. In some vehicles it is the maximum available at the present RPM. |
| HPR | Horsepower | Displays the calculated Horsepower your vehicle is currently making. This value can be adjusted for accuracy through the Advanced Setup parameters (see page 84). |

Drive the Right Speed — Maximize Your Profits

The ScanGaugeKR includes a special set of features designed to help any professional driver who makes income by the hour and by the mile, achieve the maximum amount of profit while driving. These features include a set of real-time digital gauges dedicated to showing you your actual profit or loss as it relates to your fuel usage and driving style.

The Answer to “What is the best speed to drive?”

The question, “What is the best speed to drive?”, comes up often. It is common knowledge that driving slower increases fuel economy and reduces your cost-per-mile. If this were the only thing to consider, driving slower would be the best thing to do. In the real world, you get paid by the mile, so going slower reduces the amount you are paid for the time you are driving. Since fuel-economy drops very quickly as your speed goes up, there will be an “optimum” speed where your rate minus your fuel cost will give you the most income-per-hour. Although speed is not the only thing affecting this, it is the dominant one.

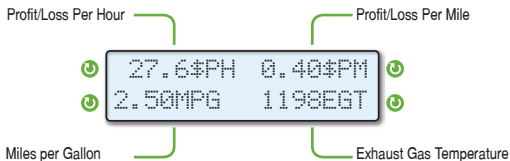
Your maximum hourly profit will change due a number of factors, such as those listed to the right. Although, not a complete list, these factors will have an effect over the “optimum” speed in which to drive to maximize your hourly profits.

Drive the Right Speed - Maximize Your Profits The Profit/Loss feature built into your ScanGauge combines your reimbursement rate, fuel cost-per-gallon/liter (see page 27) and your actual fuel economy to give you direct feedback of your income-per-hour, while you drive. This Patent-Pending measurement appears as the digital gauge \$PH, and as the parameter \$/HOUR within the Trip Computer functions (see page 34).

Adjusting your speed, gearing and other factors you control will effect your income-per-hour reading. The \$PH gauge can be used to find the maximum income point for the current driving conditions.

Factors that Will Effect Your Hourly Profits

1. Cost of Fuel
2. Reimbursement Rate
3. Load
4. Grade
5. Wind
6. Road Surface
7. Follow Distance
8. Temperature
9. Altitude



Example Setup For Real-time Profit/Loss feedback

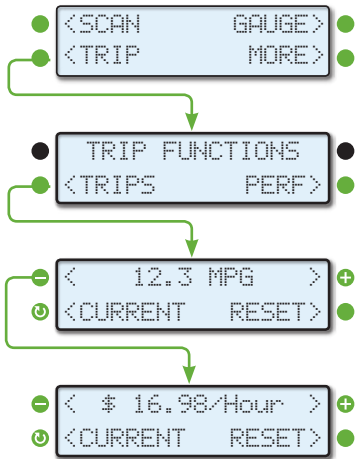
It's important to note - The \$PH gauge and \$/Hour trip parameter use an 8 second smoothing average to reduce the effects of minor, short-term changes.

Fine Tuning the Process

Using the \$/HOUR parameter in the CURRENT trip computer can be very useful and help you to “fine tune” your driving technique for maximum profit.

Use the steps below to find the “optimum” driving technique to maximize your profits.

1. To get started, navigate to the CURRENT Trip computer screen. Use the upper left or upper right function buttons to select the \$/Hour parameter.
2. With the \$/Hour trip computer displaying, begin driving. Once you reach a stable speed, push the lower right function button RESET
3. Continue driving at a steady speed. Wait for the reading to stabilize. This will usually happen in a mile or two.
4. Make a note of the reading
5. Change your speed, gearing or anything else you think may affect income. As before, let the numbers stabilize.
6. Repeat Steps 3-5



As you repeat these steps under different driving conditions, you will become better at predicting the best speed, and/or gearing needed to find the optimum conditions to maximize your profits.

You can also use TRIP A or B to find the best conditions for an entire section of a route. For instance, if one part of the route takes you through the mountains, reset Trip A or B at the start of that section. When you have passed through this section, you can then view what your income was for that section.

The next time you are driving that section, try different speeds, gearing, boost, etc. and see if you make more or less per hour.

ScanGauge can't automatically give you a raise, but it will give you the tools necessary to take control of your own income potential. Use ScanGauge to find the optimum driving technique so you can maximize your profits.

ALWAYS REMEMBER - Driving comes first. Use the ScanGauge as you would any other gauge. Use short glances to get readings or change displays, do not fixate on the gauge and do not ignore changing traffic and/or road conditions.

Trip Computers

Overview

The ScanGauge features 5 built-in trip computers. The trip computers automatically store a set of useful information about the trips you have taken in your vehicle and are updated in real time as you drive.

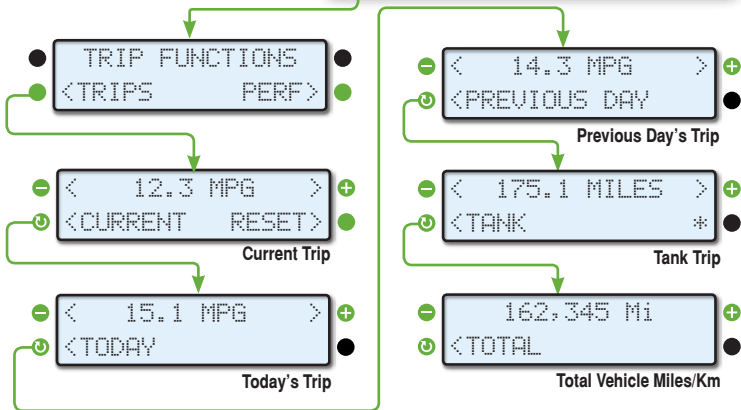
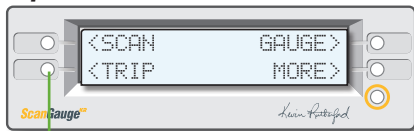
| Built-in Trip Computers | | |
|------------------------------|--|---|
| Trip Computer | Display Name | Available Information |
| Current Trip | CURRENT | Trip MPG |
| | | Trip Fuel Used |
| First Trip | TRIP A | Maximum Coolant Temperature |
| | | Distance |
| Second Trip | TRIP B | Maximum RPM |
| | | Trip Elapsed Time |
| Today's Trips/ First Trip | TODAY | Maximum Speed |
| | | Average Speed |
| Previous Trips | PREVIOUS DAY | Trip Fuel Cost |
| | | Income Per Hour (See page 33) |
| | | Trip MPG |
| Tank Trips | TANK | Trip Fuel Used |
| | | Distance |
| | | Trip Elapsed Time |
| | | Average Speed |
| | | Trip Fuel Cost |
| | | Income Per per Hour (See page 33) |
| | | Fuel Remaining for the Current Tank |
| | TANK TO EMPTY | Distance Remaining Before Tank Is Empty |
| | | Time Remaining Before Tank Is Empty |
| | | Total Distance |
| TOTAL | Displays the total Miles/Km as reported by the engine's ECU. | |

The TODAY and PREVIOUS DAY trip computers are an optional method for tracking trip data. You can activate these trip computers through the ADV SETTINGS menu. See page 18.

For ScanGauge to maintain accurate tank information, you must follow the **Fill-up Procedure** outlined in the **Filling Up Your Tank** section on page 40.

Accessing the Trip Computers

From the Home Screen, press the lower left function button next to TRIP, then push the function button next to TRIPS to access the trip computers. Pushing the lower left function button allows you to cycle through the available trip computers.



Viewing Available Trip Data

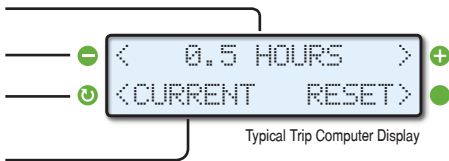
Pressing the upper right or left button will allow you to cycle through available information for the selected trip computer. Selecting the lower right button next to RESET, allows you to reset current trip data.

Displays the data stored for the currently selected Trip Computer

Push the upper left and right function buttons to cycle through the available Trip data

Push the lower left function button to cycle through the available Trip computers

Displays the currently selected Trip computer

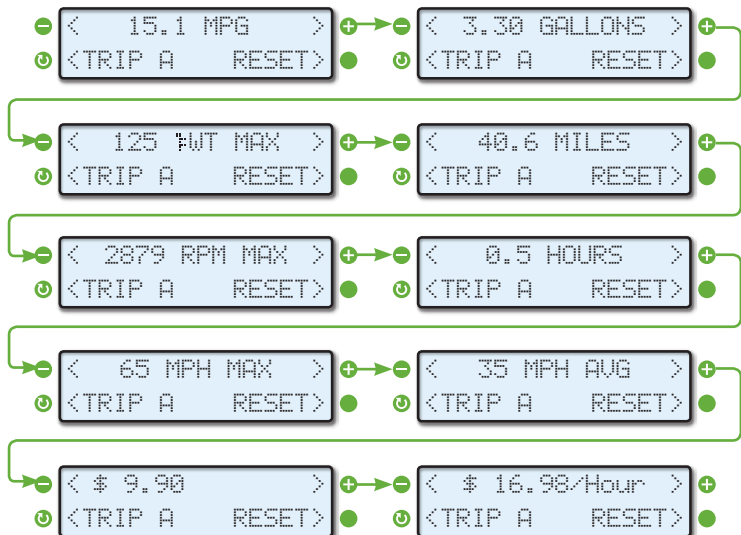


Alternate Trip Computers

Each trip computer (Trip A & Trip B) will track all trips, but will allow you to RESET them independent of each other at any time.

To view the trip data, push the upper left or right function buttons to cycle through the available data.

The diagram below uses the **Trip A** screens as an example.



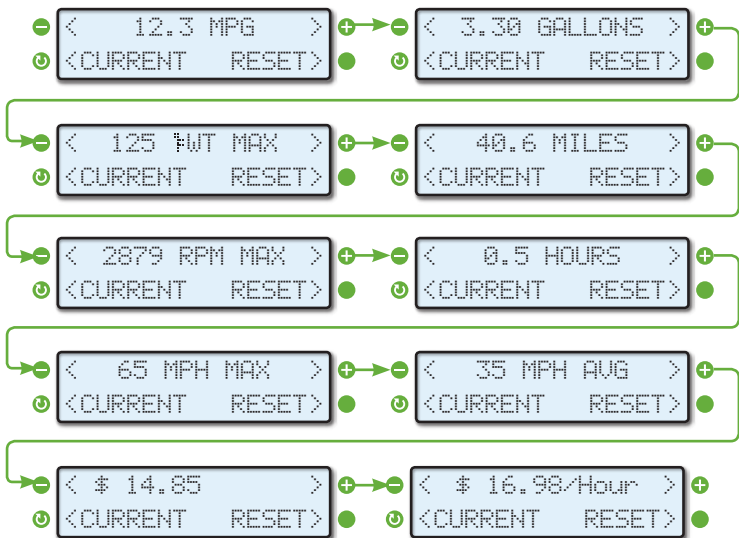
Time-based Trip Computers

The Current Trip (CURRENT) automatically records trip data as you operate your vehicle. The information from the Current Trip is automatically reset each time you shut off your vehicle for more than 3 minutes.

If you have set ScanGauge to use the DAY's trip method as outlined in the section Set the Trip Computer Method in the Advanced Setup (see page 22), then the trip information from the Today's Trip is automatically transferred to the Previous Day's Trip when the engine has been shut off for 8 to 10 hours.

To view the trip data, push the upper left or right function buttons to cycle through the available data.

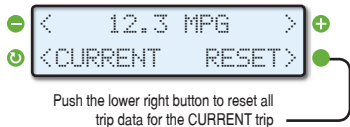
The diagram below uses the Current Trip screens as an example.



Resetting Current Trip Data

The Current Trip data is automatically reset after about 3 minutes of the ScanGauge being asleep.

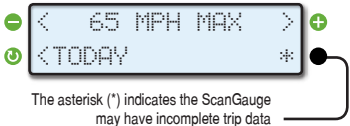
You can reset the trip data at any time for the Current Trip computers. To reset trip data, simply press the function button next to RESET as shown in the example above.



Push the lower right button to reset all trip data for the CURRENT trip

Today's Trip Data

Notice that there is no RESET for TODAY. The Today Trip will automatically reset after the engine has been off for 8 to 10 hours (as when sitting overnight). The values for TODAY will be transferred to the Previous Day's Trip and the values that were in Previous Day's Trip are discarded.



The asterisk (*) indicates the ScanGauge may have incomplete trip data

The asterisk (*) in the lower right corner indicates that the ScanGauge was disconnected for at least part of the day and the data may not be complete. This will be transferred to the Previous Day's Trip along with the data.



If the vehicle is driven early in the morning and then not again until late that evening, the data will be transferred to the previous day. If the vehicle is driven until late at night and then used again very early in the morning, the data will stay in the Today's Trip. The end of the Today's Trip requires the vehicle be off, the ScanGauge connected, and the vehicle not driven for 8 to 10 hours.

Fuel-based Trip Computers

The Tank Trip (TANK) and To Empty (TANK TO EMPTY) trip computers can tell you much about the current tank of fuel. For instance, you can learn how much fuel you have used and how far you have traveled since your last fill-up, or how much fuel you have left and the approximate distance you can travel before needing to fill up.



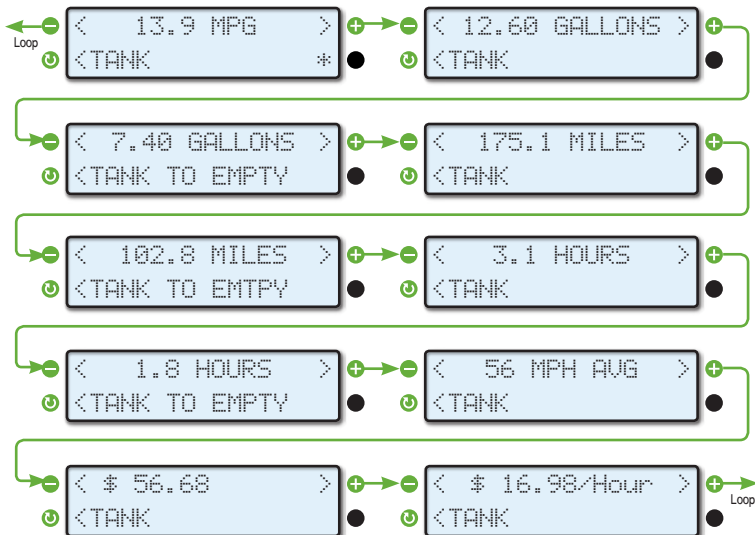
For ScanGauge to maintain accurate Tank Trip information, you must follow the Refueling and Cost Adjustment procedures during initial setup outlined on page 26 and follow the **Fill-up Procedure** outlined in the **Filling Up Your Tank** section on page 40, for each subsequent refueling.

Tank and Tank to Empty Trip Computers

The Tank Trip shows different types of information in some cases from the other trips. The Tank Trip substitutes TANK TO EMPTY data in place of MAXIMUM data.

For instance, the Tank Trip can show you MPG as well as the distance and the amount of time you have traveled on the current tank of fuel. In contrast, the TANK TO EMPTY trip data will show you the amount of remaining fuel in your tank and the approximate distance and time you can travel before needing to refuel.

The Tank Trip information is reset each time you fill up your tank, and follow the **Fill-up Procedure** shown on page 34.



The displays above tell you that if your mileage remains the same as it has since the last fill-up, you have approximately 7.4 gallons of fuel remaining, and that you will run out of fuel in 102.8 miles in about 1.8 hours.

The estimate of distance and time to empty is based on the economy that has been obtained so far on

the current tank of fuel. Right after refueling, these values will change fairly quickly. As more of the fuel has been burned from the tank, the readings will stabilize.

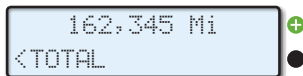
It is possible to see the distance and time to empty increase as you drive. The distance can increase as you drive at a steady fuel-efficient speed. This causes the fuel economy for the tank to rise; and applying this higher fuel efficiency to the fuel remaining in the tank can actually result in more remaining distance. If you drive slower than the average speed of the tank so far, the time to empty can increase.

To maintain accurate **To Empty** information, you must use the following **FILLUP** procedure shown under **Filling Up Your Tank** to indicate the vehicle tank has been refilled. It is also necessary to fill the tank to make the TO EMPTY information correct.

TOTAL Trip computer

The TOTAL trip computer displays the Miles/Km recorded by the engine ECU. This may be different from the odometer if the computer has been replaced at some time in the vehicle's past. You may get different readings if you select different modes (J1708 or J1939). This is because the computer may or may not be the same for both and would report the Miles/Km for that computer.

Displays the total Miles/Km as reported by the vehicle's ECU



Filling Up Your Tank

To maintain accurate information in the **Tank Trip** and **To Empty** computers, you must tell your ScanGauge that you have added fuel to your vehicle's tank. To maintain the most accurate **To Empty** information, you should fill that tank to capacity each time you put fuel in the vehicle. If this is not possible, then you should enter the amount of fuel you put in the tank.

Important Considerations

You should refill the vehicle when there is above 50 miles/km remaining. Pushing below 50 could result in running out of fuel.

When filling your tank, let the pump shut off automatically. Do not top off.

To maintain the most accurate TO EMPTY information in the ScanGauge's trip computers, you should fill your tank to capacity.

The Fill Up Function

The FILLUP function allows you to adjust and enter the fuel level and cost values to help ScanGauge maintain accurate TO EMPTY and FUEL COST computations. To access the FILLUP screen from the Home Screen, press the lower right function button next to MORE. Next, press the upper right function button next to FILLUP.

Filling the Tank to Capacity

To tell ScanGauge you have filled the tank, use the upper left and right function button to adjust the "TANK=" value until it matches the tank capacity. When you're done, press the NEXT function button to continue to the Fuel Cost Screen.

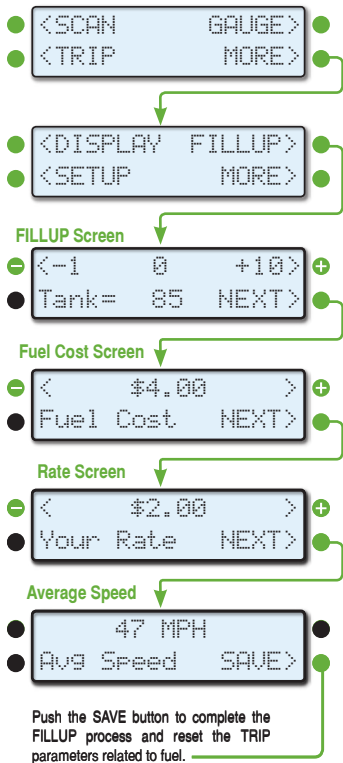
Partially Filling the tank

To tell ScanGauge you have added fuel to the tank, use the upper left and right function button to adjust the value in the top line until it matches the amount of fuel you actually put in the tank. As you adjust the bottom value next to "Tank=" will reflect the amount of fuel ScanGauge believes in the tank.

When you're done, press the NEXT function button to continue to the Fuel Cost Screen. There will be variations in the agreement of the pump fuel used and the ScanGauge indicated fuel use from tank to tank due to:

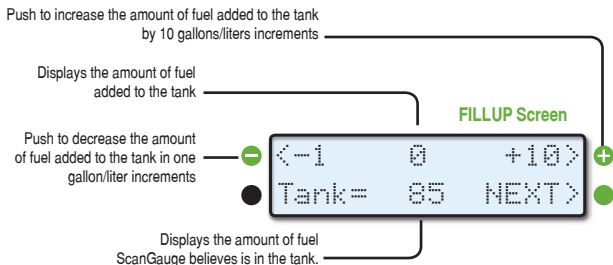
- Different shutoff levels of the fuel pumps
- Different tilt of the vehicle at the fuel pump due to ground slope or vehicle loading
- Different temperature of the fuel (changes in density – best to refill in the morning when the fuel is colder)
- Variations in vehicle sensors due to temperature and time
- Pump accuracy limits

These are just some of the variables that limit absolute accuracy and show why you should never trust a low reading of DISTANCE in the Tank to Empty Trip to believe you will be able to make it to the next gas station.



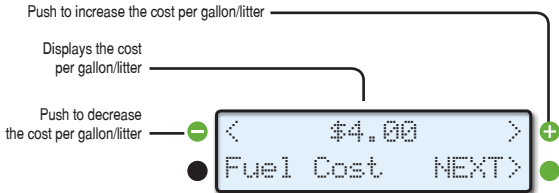
Fill Up Screen

The Fuel Cost screen allows ScanGauge to track accurate trip fuel costs. Use the upper left and right function buttons to adjust the cost per gallon/liter. When you're done, press NEXT



Fuel Cost Screen

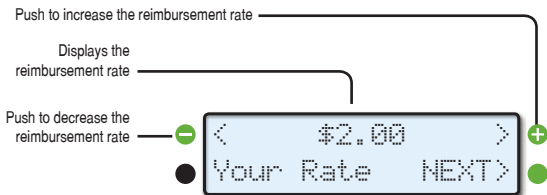
The Fuel Cost screen allows ScanGauge to track accurate trip fuel costs. Use the upper left and right function buttons to adjust the cost per gallon/liter. When you're done, press NEXT



Rate Screen

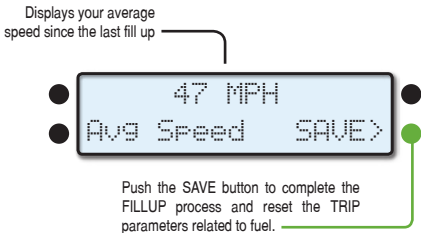
Enter your reimbursement rate you per Mile/Km. This will be the combined rate for distance, fuel, ect. For example, if you are reimbursed at \$1.20 per-mile driven plus \$0.75 per-mile for fuel cost, you would adjust the top line to read \$1.95. ($\$1.20 + \$0.75 = \1.95).

You can also adjust the Rate to show \$0.00. This will cause the cost base calculations to simply show the actual cost of fuel being used.



Average Speed Screen

The Average Speed screen simply shows you your average speed since the last time you performed the fill-up procedure. This number is useful if you are tracking your fuel at www.MyGauges.com. Write this number down on your fuel receipt, so you can record it later in your **MyGauges** account.

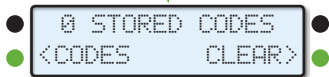
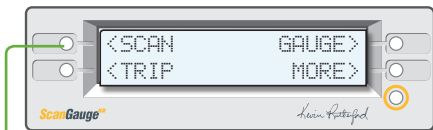


Scan Tool Overview

The ScanGauge features a built-in Scan Tool that you can use to view and clear Diagnostic Trouble Codes (DTCs), view the parameters that were present when a Trouble Code was logged, and turn off the Check Engine light.

Access the Scan Tool

From the Home Screen, press the function button next to SCAN to access the built-in Scan Tool. When you press SCAN, the ScanGauge immediately checks your vehicle's computer for any DTCs. Generally, a Trouble Code will cause your Check Engine light turn on.



No Codes Found

If no codes were found and your Check Engine light is still on, you can use the CLEAR function.



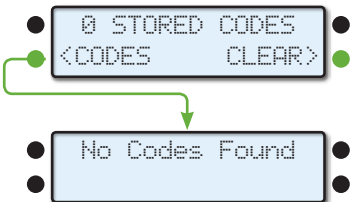
Trouble Codes Found

If ScanGauge detects Trouble Codes, the top line will indicate the number of codes found. See page 45 for more information about what to do when Trouble Codes are found.

If No Codes Are Found

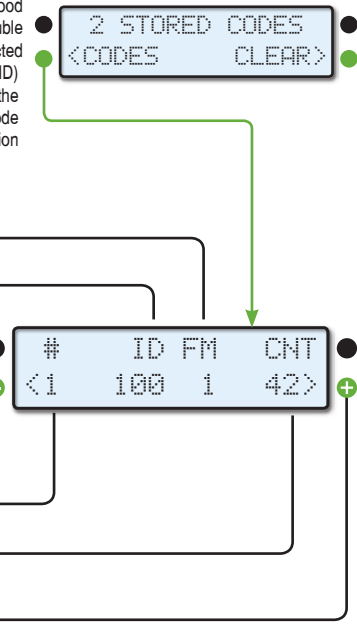
If no codes were found and your Check Engine light is still on, you may need to use the CLEAR function.

If this does not turn off the check engine light, you may need to adjust the setting of CLR DTC parameter to ALT in the Advanced Setup (see page 23). Then, use the CLEAR function again.



What to Do if DTCs Are Found

If your vehicle's Check Engine light is on, that's a good indication that your vehicle may be storing Trouble Codes (DTCs). If ScanGauge indicated it has detected DTCs, you can access the specific Error Code ID (ID) and related Failure Mode ID (FM) by pressing the function button next to CODES. If more than one code is stored, you can use the lower left and right function buttons to step through the stored codes.



Decoding DTCs

DTCs or Detected Trouble Codes, vary from vehicle to vehicle. The DTC for vehicles that use J1939 and J1708 protocols are made up of two parts; an Error Code ID and a Failure Mode ID. The two parts combine to form the DTC.

Error Code ID (ID)

The Error Code number indicates the system or component that has reported the problem. There are hundreds of possible error codes, so finding information about your specific code can be a challenge. An excellent way to determine the system or component the Error Code refers to is to use a good search engine on the Internet.

Use the Error Codes along with the model and year of your vehicle as the search words. You can add your engine type to narrow the search.

Failure Mode ID (FM)

The Failure Mode ID (FM) indicates the nature of problem that was detected. The table to the right lists the standard Failure Mode IDs.

Example DTC Code

The code shown in the example screen to the upper right - "100 1" would indicate:

Low Oil Pressure

ID 100 = Oil Pressure

FM 1 = Data valid but below normal operating range



The above example indicates low oil pressure.

Failure Mode IDs

| ID | Description |
|----|---|
| 0 | Data valid but above normal operational range |
| 1 | Data valid but below normal operational range |
| 2 | Data erratic, intermittent or incorrect |
| 3 | Voltage above normal or shorted high |
| 4 | Voltage below normal or shorted low |
| 5 | Current below normal or open circuit |
| 6 | Current above normal or grounded circuit |
| 7 | Mechanical system not responding properly |
| 8 | Abnormal frequency, pulse width, or period |
| 9 | Abnormal update rate |
| 10 | Abnormal rate of change |
| 11 | Failure mode not identifiable |
| 12 | Bad intelligent device or component |
| 13 | Out of calibration |
| 14 | Special Instructions |
| 15 | Reserved for future assignment |

Clearing Trouble Codes

After Scanning for codes, pressing the lower right function button next to CLEAR will result in a prompt from ScanGauge to verify that you want to clear the Trouble Code(s) and turn off the Check Engine light.

If you want to continue and clear the Trouble Codes, press YES. If you decide you do not want to clear the Trouble Codes, press NO.

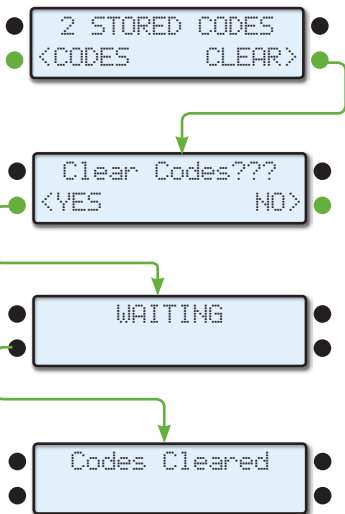
When the YES button is pressed, ScanGauge will send out a signal to clear all of the Trouble Codes.

While ScanGauge is waiting for a response from the vehicle, the screen may display the message WAITING.

If the process is successful, the display will show CODES CLEARED. This should also turn off the Check Engine light on the dashboard and clear any stored data related to the DTCs

If the display shows NO RESPONSE, the clear codes command was unsuccessful and your vehicle is not responding to the clear command.

This may indicate that your vehicle uses a different command to clear the DTC. To set ScanGauge to use an alternate method for clearing codes, refer to Set Alternate DTC Clear Method section in the Advanced Setup Options on page 23.



Advanced Features

The ScanGauge includes a number of advanced features and functions, such as the exclusive X-GAUGE™ programmable gauge system, the built-in vehicle Performance Monitor™ and the ability to send your vehicle's ECU Custom Commands.

The logo for X-GAUGE features the text "X-GAUGE" in a bold, italicized, sans-serif font. The letters are white with a thick yellow outline and a red shadow effect, giving it a three-dimensional appearance.The logo for Performance MONITOR features the word "Performance" in a red, italicized, sans-serif font with a white outline, and the word "MONITOR" in a smaller, black, all-caps, sans-serif font below it.

Program Custom Gauges with X-GAUGE™

| | |
|------------------------------------|----|
| X-GAUGE Overview | 49 |
| Add or Edit an X-GAUGE | 50 |
| Display a Trip Value as an X-GAUGE | 54 |
| Using an X-GAUGE | 55 |

Performance Monitor

| | |
|--|----|
| Performance Monitor Overview | 56 |
| Recording a Performance Run | 57 |
| Accessing Performance Monitor Data | 58 |
| Reading Performance Monitor Data | 59 |
| Set a Gauge for Performance Monitoring | 61 |
| Save a Performance Run | 62 |
| Helpful Tips | 62 |

Custom Commands

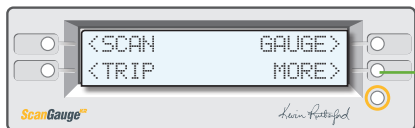
| | |
|-----------------------------------|----|
| Custom Commands Overview | 63 |
| Enter and Save a Command | 64 |
| Send a Command and Get a Response | 65 |

Overview

Your ScanGauge features the exclusive X-GAUGE™ Programmable Gauge System that provides you a method to tap into this additional information. The X-GAUGE feature allows you to extend the capabilities of your ScanGauge to include things like: vehicle specific gauges, trip data as gauges, and special function gauges.

The fastest way to obtain the codes for new X-Gauges is to submit PID data to Linear Logic on-line, to determine the XGauges available for your vehicle. Please see page 23 or visit us online at: www.scangauge.com/pid

Programming a new X-GAUGE and saving it to your ScanGauge is simple and easy. Each X-GAUGE consists of specific alpha-numeric strings, or "codes," you enter into the ScanGauge via the front panel push buttons. Your ScanGauge provides enough internal memory to save up to 25 X-GAUGES



Accessing X-GAUGE Features

From the Home Screen, press the lower right function button twice, next to MORE.

Next, use the upper left and right function buttons to cycle through the available options until the screen titled X-GAUGE appears.

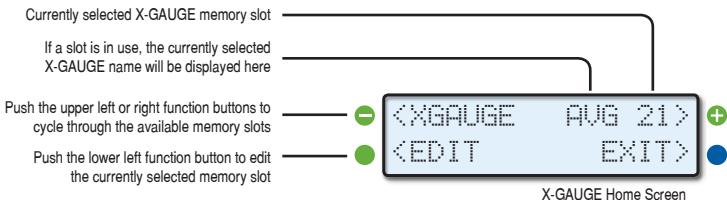
Finally, press the lower right function button next to EDIT to enter X-GAUGE.



The X-GAUGE Home Screen

From the X-GAUGE Screen, pressing the upper left and upper right buttons allows you to cycle through the 25 available memory slots (0-24). Each memory slot can store an individual X-GAUGE.

If the memory slot is in use, the 3-letter name for the gauge will be shown in the top line next to the memory number. If no name is shown, this memory slot is not being used.



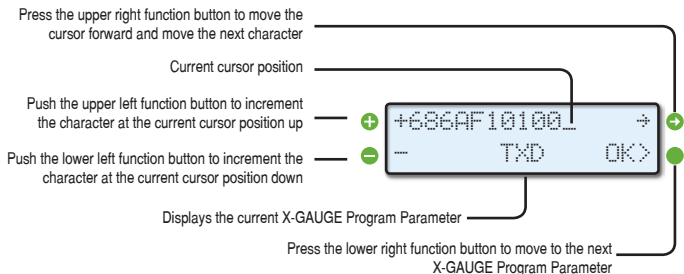
Add or Edit an X-GAUGE

To add a custom X-GAUGE to your ScanGauge, you will need to program the gauge parameters into the ScanGauge using the X-GAUGE Program Parameters Screens. In order to read the data from the vehicle and set up a functional X-GAUGE, you need to have the following information:

- Command to send
- How to identify a response to the command
- Where to find the data in the response
- How to scale, offset and display the data.

The X-GAUGE Program Parameter Screen

An X-GAUGE is entered into the ScanGauge through a series of X-GAUGE Program Parameters. Each X-GAUGE consists of 4 program parameter screens — TXD, RXF, RXD and MTH — as well as one gauge name screen.



Programming Your Own X-GAUGE

Step 1 - Select an Empty Memory Slot

Start by selecting an empty memory slot by using the upper left and right buttons. Next, press the EDIT button.

Step 2 - Enter the TXD Data

The TXD on the lower line means that the value being entered is the command that will be transmitted to the vehicle's computer.



IMPORTANT: Entries must be an even number of characters. If an odd number of characters is entered, a 0 will be appended to the string to make it even.

A nonspace entry must be made in the first character location, or the X-GAUGE will not be an active gauge.

If the TXD value is blank, no name will be shown; and this X-GAUGE memory will not appear as a selectable gauge.

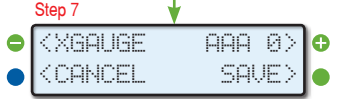
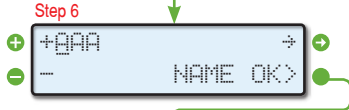
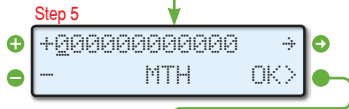
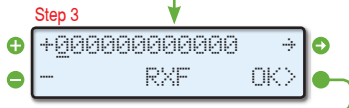
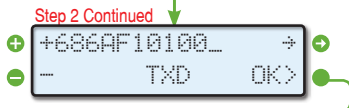
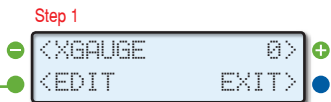
Step 3 - Enter the RXF Data

The RXF Screen is the entry for the receive filter. This value tells the ScanGauge what to look for in a response from the vehicle's computer.

Also, some of the entries tell the ScanGauge how to display the data. Choices are integer, tenths, hundreds, hexadecimal or on/off. There are also some fields that can turn any trip value into a gauge. When you're done, press the OK button to proceed to the next step.

Step 4 - Enter the RXD Data

The RXD Screen is the entry that tells the ScanGauge where the data and its size is in the response. Entry in this screen is done the same as the other X-GAUGE entry screens. When you're done, press the OK button to proceed to the next step.



Step 5 - Enter the MTH Data

The MTH (math) screen tells the ScanGauge the math needed to scale and/or offset the value received for the X-GAUGE entry screens. When you're done, press the OK button to proceed to the next step.

Step 6 - Give Your Gauge a Name

The Name Screen allows you to input a 3-letter designator for the name of the gauge you are making. This screen allows a complete ASCII set of characters to be used. This includes punctuation and symbols. You can give the gauge any 3-character name. Please note, you can give your new gauge a name that matches those that are already defined. This should be avoided as it can cause confusion. When you're done, press the OK button to proceed to the next step.

Available ASCII Characters

| | | | | | | | | | | | | | | | |
|---|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P |
| Q | R | S | T | U | V | W | X | Y | Z | a | b | c | d | e | f |
| g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v |
| w | x | y | z | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | ! | @ |
| # | \$ | % | ^ | & | * | (|) | - | + | { | | } | ! | ~ | ; |
| : | " | , | < | . | > | / | ? | [|] | _ | ← | ▣ | | | |

Step 7 - Saving Your X-GAUGE

To save your new X-GAUGE programming, press the lower right function button next to SAVE. If you wish to discard the changes you have made, press CANCEL. This will cause all the modifications to the X-GAUGE memory slot to be canceled and not saved.



Pressing SAVE will return you to the X-GAUGE Home Screen. The new X-GAUGE name will also appear in the top line, next to the memory slot number.

Copying an X-GAUGE To a Different Memory Slot

If you want to program a new X-GAUGE that is very similar to one you have already entered, you can copy the program parameter data in one X-GAUGE memory slot to another.

Step 1 - Select an X-GAUGE to Copy

Start by selecting the X-GAUGE you would like to copy. Use the upper left and right function buttons to cycle through the X-GAUGE memory slots until you locate the X-GAUGE you want to copy. Next press the lower left function button next to EDIT.

Steps 2-6 - Edit The Program Parameters

Step through the settings and edit the selected X-GAUGE's program parameters as needed for the new X-GAUGE.

Step 7 - Change Memory Slot and Save

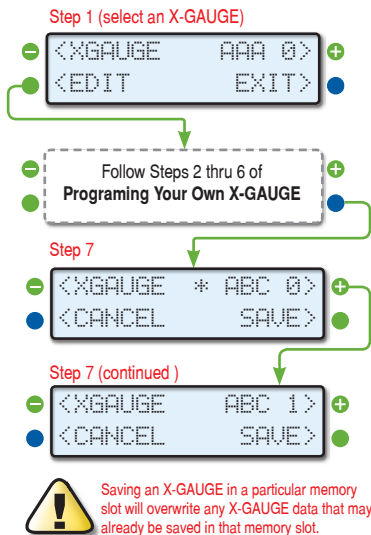
Before pressing SAVE, use the upper left and right function buttons to select a new memory slot.

If an asterisk (*) is present in the top line next to the new X-GAUGE name, then there is already an X-GAUGE saved in that memory slot. Saving the new X-GAUGE in that particular slot will overwrite any X-GAUGE data already present in that memory slot. Once you have the desired memory slot selected, press lower right function button next to SAVE. All the data will be written to that X-GAUGE memory slot, leaving the previously selected memory slot unchanged.

Disabling an X-GAUGE

To disable an X-GAUGE already in memory, start as if you were going to edit the gauge. In the TXD Screen, change the first character to a space. Continue to step through the editing fields by pressing the lower right function button next to OK and press SAVE to exit the screen. This will disable the X-GAUGE.

If you put transmit data back into this gauge, it will be reactivated.



Displaying a Trip Value as an X-GAUGE

You can set any of the built-in trip values and have them displayed as a gauge. This allows you to monitor trip functions along with other gauge functions.

In the example to the right, a custom X-GAUGE that displays the Time Driven Today is set up.

Step 1

To get started, choose an empty memory slot from the X-GAUGE Screen. Then press the lower left function button next to EDIT.

Step 2

In the TXD Screen, the first character determines which trip function will be displayed. Choose a number from the **Available Trip Parameters** chart on the next page.

The second character determines which trip to use. Choose a number from the **Trip Designations** chart on the next page.

When you're done, press the lower right function button next to OK to move to the next screen.

Step 3

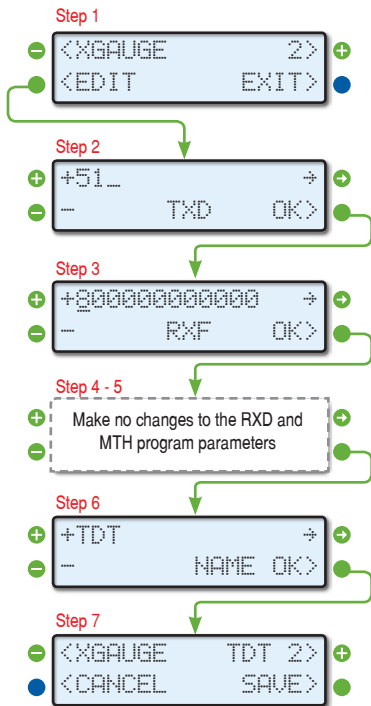
For RXF, make the first character an 8 as shown to the right.

An 8 as the first character is a special condition that tells the ScanGauge that this is to be a trip gauge. All values after the 8 are ignored.

When you're done, press the lower right function button next to OK to move to the next screen.

Steps 4 and 5

Do not make any changes to the RXD and MTH screens. Simply press the lower right function button next to OK until you reach the name screen.



Available Trip Parameters

| Parameter | Trip Name |
|-----------|---|
| 0 | Average Fuel Economy |
| 1 | Fuel used |
| 2 | Max Coolant Temperature or Fuel Remaining for TANK trip |
| 3 | Distance |
| 4 | Max RPM or Distance to Empty for TANK trip |
| 5 | Time |
| 6 | Max Speed or Time to Empty for TANK trip |
| 7 | Average Speed |
| 8 | Cost |

Step 6

Enter a name for your new X-GAUGE. For this example, we used TDT for Time Driven Today. When you're done, press the lower right function button next to OK, to move to the next screen.

Step 7

To complete this X-GAUGE, press lower right function button next to SAVE. Once saved, the new X-GAUGE will be available on the GAUGE screen along with other gauges (see page 29).

Trip Designations

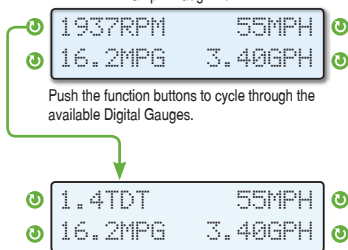
| Designation | Trip Name |
|-------------|----------------------------|
| 0 | Current Trip |
| 1 | Trip A/Today's Trip |
| 2 | Trip B/Previous Day's Trip |
| 3 | Tank Trip |

Using an X-GAUGE

After an X-GAUGE has been created, it can be selected like any other gauge. In the Gauge screen (see page 29), press the function button next to the gauge position you want to use for the X-GAUGE. Keep pressing as needed until the X-GAUGE name appears.

For instance, if the following screen were visible, pressing the button next to RPM a number of times would eventually reach TDT.

Example Gauge Screen



Performance Monitor

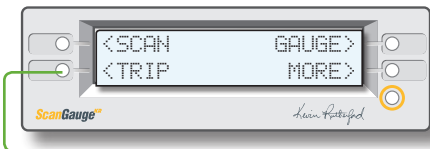
Overview

The **Performance Monitor™** provides the ability to track the performance of your vehicle over short periods of time, distance and acceleration. You can also designate a specific digital gauge to track, as well as store and recall the recorded data. You can think of the Performance Monitor as a performance-based Trip computer with a specialized purpose.



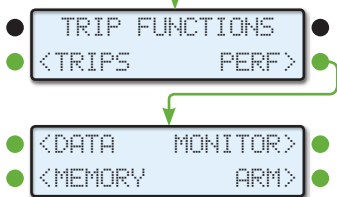
Accessing the Performance Monitor Features

From the Home Screen, press the lower left function button next to TRIP. Next, press the lower right function button next to PERF. Follow the diagram shown below.



Performance Run Data

The Performance Monitor records key data parameters during the course of the Performance Run. These include the elapsed time, speed, distance traveled and a user-defined digital gauge. See information below to select a built-in digital gauge for monitoring. The chart below outlines the data parameters the Performance Monitor records and a brief description of these parameters.



Available Performance Data Parameters

| Parameter | Description |
|-----------------|---|
| Time | The amount of elapsed time at each data point from the beginning of the Performance Run to the end of the run |
| Speed | The speed of the vehicle at each data point |
| Distance | The total distance traveled at data point |
| Monitored Gauge | Use the Monitor Function to select a built-in digital gauge to monitor. Data will be recorded for the selected gauge. |

Recording a Performance Run

To record a Performance Run you must first arm your ScanGauge. Arming the ScanGauge is easy—simply press the lower right function button next to ARM.

Arming the ScanGauge

ScanGauge will enter the **Armed** state and begin monitoring your speed. The Performance Monitor uses a MPH trigger to determine when to begin recording.

The ScanGauge will remain in the Armed state until a change in your speed is detected. Once a change is detected, the Performance Monitor is “triggered,” and recording automatically begins.

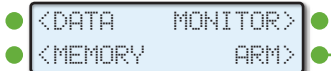
The Recording Screen

While recording, ScanGauge will display the Recording Screen. This screen shows your vehicle’s current speed and the elapsed time of the run. It will continue to record data for a period of 24 seconds or until ScanGauge detects a speed of 0 MPH. You can also manually stop the record process anytime by pressing the upper right function button next to STOP.

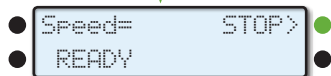
The Postrun Screen

Once the Performance Run is complete and recording has stopped, ScanGauge will then display the Postrun Screen. This screen allows you to immediately view or save the recorded data, or rearm for a second run.

Performance Monitor Home Screen



Armed



Recording Screen



Postrun Screen



Pressing ARM discards any unsaved data from a previous run.



IMPORTANT: OBSERVE ALL SPEED LIMITS AND DRIVE SAFELY WHILE USING PERFORMANCE MONITOR™.

Accessing the Performance Monitor™ Data

There are multiple ways to access the data screens. You can view the data immediately after a Performance Run from the Postrun screen. You can also access the most recent run currently in temporary memory from the Performance Monitor Home Screen. In addition, you can recall and load a saved Performance Run from the Memory Screen.

Access Data Immediately After a Performance Run

Once a Performance Run is complete, the ScanGauge will display the Postrun Screen. To view the data immediately after a Performance Run, push the upper left function button next to VIEW DATA. The Performance Run data will remain in temporary memory until you save the date or rearm the ScanGauge.

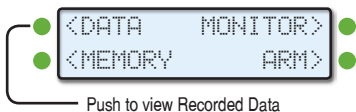
Postrun Screen



Access Data From the Performance Monitor Home Screen

ScanGauge will store the most recent Performance Run in temporary memory. To access the most recently recorded data from the Performance Monitor Home Screen, press the upper left function button next to DATA.

Performance Monitor Home Screen

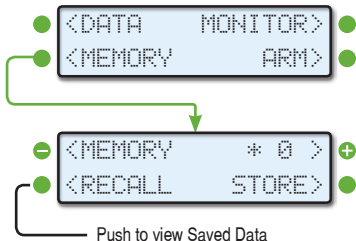


Recall and Load a Saved Performance Run

ScanGauge can store up to 8 Performance Runs. You can access a saved Performance Run through the Memory Screen.

From the Performance Monitor Home Screen, press the lower left function button next to MEMORY. Next, use the upper left and right function buttons to select a memory. An asterisk (*) next to the memory slot number indicates that the selected memory slot contains saved data. Finally, push the lower left function button next to RECALL and load the saved Performance Run data.

Performance Monitor Home Screen

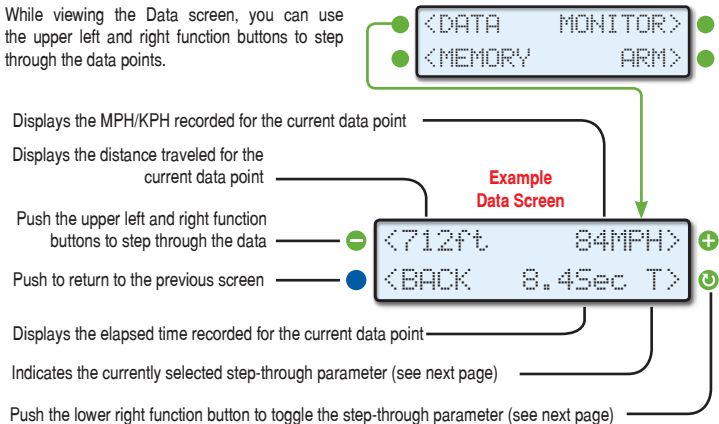


An asterisk (*) next to the memory slot number indicates that the selected memory slot contains saved data.

Reading Performance Monitor™ Data

The data the Performance Monitor records can be read through the DATA screen. The data screen displays the speed, distance and elapsed time for each data point. A data point is generated each time the Performance Monitor records data.

While viewing the Data screen, you can use the upper left and right function buttons to step through the data points.

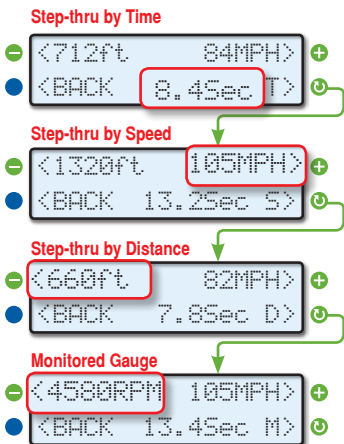


Stepping Through Recorded Data

The lower right function button toggles the step-through mode, allowing you to step through the data points using the different criteria. The currently selected step-through mode is shown next to the lower right function button.

The information layout on the DATA screen maintains a consistent layout as you switch between data step-through modes. For instance, Distance (ft/m) is shown in the upper left of the screen, while speed (MPH/KPH) is shown in the upper right of the screen, and elapsed time (Sec) is shown near the bottom middle portion of the screen.

See the chart below; **Step-Through Parameters and Recording Rates** for more information about each Data parameter and step-through intervals.



| Step-through Parameters and Recording Rates | | | | |
|---|--|---|---|--|
| Parameters | Display | Step Thru Intervals | | |
| Time | T | Data is recorded and can be viewed incrementally every: - 0.2 seconds with MONITOR Turned OFF - 0.4 seconds with MONITOR turned ON | | |
| Speed | S | Data can be viewed incrementally every 5 MPH/KPH | | |
| Distance | D | <table border="0"> <tr> <td>While DISTANCE units are set to Miles (see page 16), data can be viewed incrementally every 100ft with special data points at: 60ft, 330ft (1/16 mile), 660ft(1/8 mile), 1320ft (1/4 mile), 2640ft (1/2 mile), 5280ft(1 mile)</td> <td>While DISTANCE units are set to KM (see page 16), data can be viewed incrementally every 25m with special data points at: 18m, 101m, 201m, 402m, 802m, 5280ft.</td> </tr> </table> | While DISTANCE units are set to Miles (see page 16), data can be viewed incrementally every 100ft with special data points at: 60ft, 330ft (1/16 mile), 660ft(1/8 mile), 1320ft (1/4 mile), 2640ft (1/2 mile), 5280ft(1 mile) | While DISTANCE units are set to KM (see page 16), data can be viewed incrementally every 25m with special data points at: 18m, 101m, 201m, 402m, 802m, 5280ft. |
| While DISTANCE units are set to Miles (see page 16), data can be viewed incrementally every 100ft with special data points at: 60ft, 330ft (1/16 mile), 660ft(1/8 mile), 1320ft (1/4 mile), 2640ft (1/2 mile), 5280ft(1 mile) | While DISTANCE units are set to KM (see page 16), data can be viewed incrementally every 25m with special data points at: 18m, 101m, 201m, 402m, 802m, 5280ft. | | | |
| Monitored Gauge | M | Data is recorded and can be viewed incrementally every 0.4 seconds Only Available if a monitored gauge was set for the Performance Run | | |

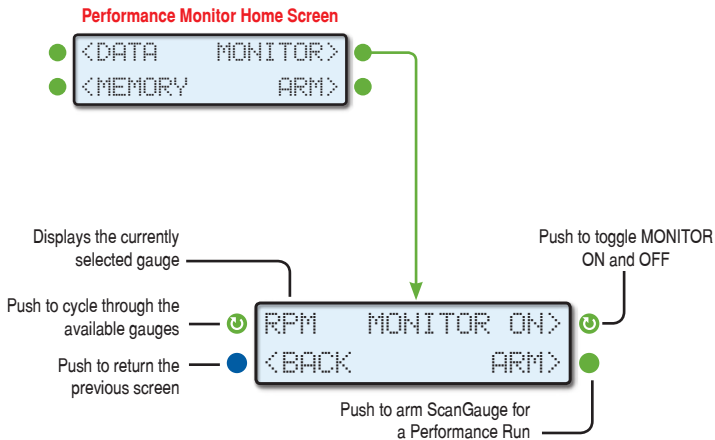
The rate at which data is recorded may vary for each data parameter. Factors that can affect the recording rate include the particular protocol your vehicle uses (see page 71), whether or not you have set the Performance Monitor to monitor a built-in gauge (see page 61), and even the vehicle itself.

Set a Gauge for Performance Monitoring

In addition to the three key performance data parameters; distance, speed and time, the Performance Monitor also allows you to set an additional data parameter for recording. The MONITOR function allows you to select and “turn on” any one of the built-in digital gauges (see page 30).

To access the MONITOR function and set a digital gauge to be monitored, start by pressing the upper right function button next to MONITOR on the Performance Monitor Home Screen. Next, use the upper left function button to cycle through the available gauges. Once you have the gauge you want to monitor selected, press the upper right function button to toggle MONITOR to ON.

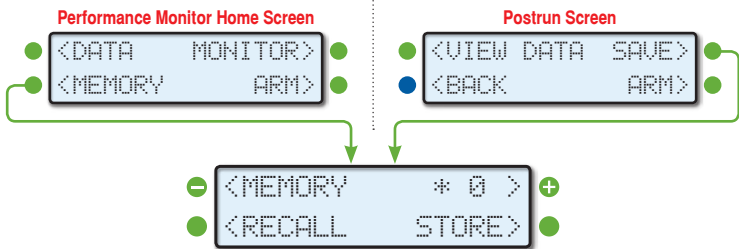
When you're ready, you can arm the ScanGauge for a Performance Run by pressing the lower right function button next to ARM. With a digital gauge selected, and the Monitor set to ON, the Performance Monitor will now record data for the selected gauge.



Save A Performance Run

You can save a Performance Run for later review. ScanGauge provides storage slots for up to 8 Performance Runs in the Memory Screen. You can save a Performance Run anytime after it has been recorded - the most recent run will remain in temporary memory until you either rearm the Performance Monitor or until ScanGauge is turned off or unplugged.

The Memory screen is accessible from a few different locations including the Performance Monitor Home Screen, the Postrun Screen, and the Postrun Screen as shown in the diagram below.



An asterisk (*) next to the memory slot number indicates that the selected memory slot contains saved data.

Helpful Tips

The Performance Monitor can provide a wealth of information about your vehicle's performance. Here are a few quick tips on how to use the data after a Performance Run.

Get Your 1/4-mile time

On the Data Screen, set the step-through parameter to Distance (D) and step through the data until distance shows 1320ft.

Get Your 0-60 MPH time

On the Data Screen, set the step-through parameter to Speed (S) and step thru through data until speed (MPH) shows 60MPH. The time displayed on the bottom line is your 0-60 time.

Get Braking Performance

60-0 MPH and Braking Distance

On a closed course, start by bringing your vehicle up to speed, **just below 60 MPH**, and hold your speed while your passenger arms the Performance Monitor. Then, bring your vehicle's speed up to 60 MPH and then begin braking. Once your speed reaches 0, the Performance Monitor will automatically stop recording data. Finally, set the step-through parameter to Speed (S) and step through the data until speed shows 0 MPH. Read the distance (ft) parameter for breaking distance and the time (Sec) parameter for braking time.

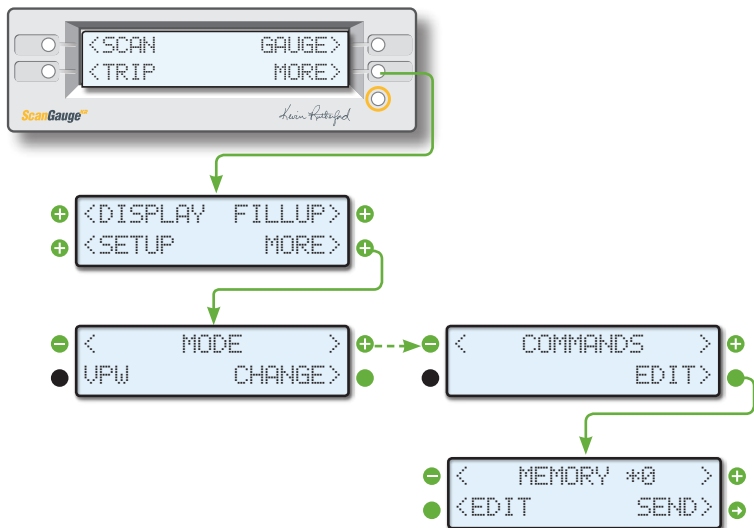
Custom Commands Function

Custom Commands Overview

The Custom Commands function allows you to create and save any arbitrary commands and then send those commands to your vehicle's ECU for a response. This advanced function can be especially useful when troubleshooting communication issues between your ScanGauge and your vehicle's ECU as well as for those individuals who are familiar with the J1939 and J1708 protocols.

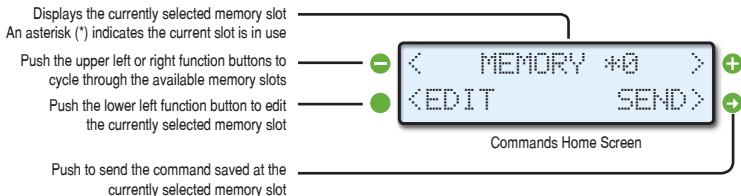
Accessing the Commands Feature

From the Home Screen, press the lower right function button twice, next to MORE. Next, use the upper left and right function buttons to cycle through the available options until the screen titled COMMANDS appears. Finally, press the lower right function button next to EDIT to enter Commands Menu.



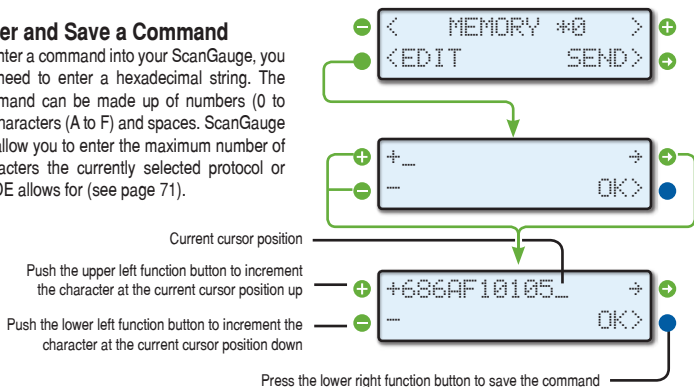
The Commands Home Screen

From the Commands Home Screen, pushing the upper left and upper right buttons allows you to cycle through available memory slots. Each memory slot can store an individual command.



Enter and Save a Command

To enter a command into your ScanGauge, you will need to enter a hexadecimal string. The command can be made up of numbers (0 to 9), characters (A to F) and spaces. ScanGauge will allow you to enter the maximum number of characters the currently selected protocol or MODE allows for (see page 71).

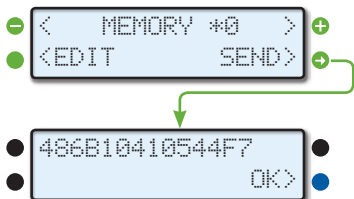


Send Command and Get a Response

Pressing SEND causes the command to be sent to the vehicles ECU. If there is a response to the message, it will be shown.

The first response returned after the command is sent is displayed. If there is a lot of traffic on the bus, this may not be the response to the command you sent. It may be necessary to resend the command and check for the correct response.

Pressing the lower right function button next to OK will return you to the Command Home Screen.



Troubleshooting

This section provides basic troubleshooting information. For more comprehensive information, please visit us online at: www.ScanGauge.com/support.

| | |
|--------------------------------|----|
| Basic Troubleshooting | 67 |
| View Firmware Version | 69 |
| Reset Your ScanGauge | 70 |
| Read or Set the Operating Mode | 71 |

Basic Troubleshooting

Where to Get Support

Below is a list of the more common troubleshooting tips. For a more comprehensive list of troubleshooting tips, tricks and frequently asked questions, please visit us online.

Online: www.ScanGauge.com/support
www.facebook.com/ScanGauge

Toll Free: 1-888-433-5664

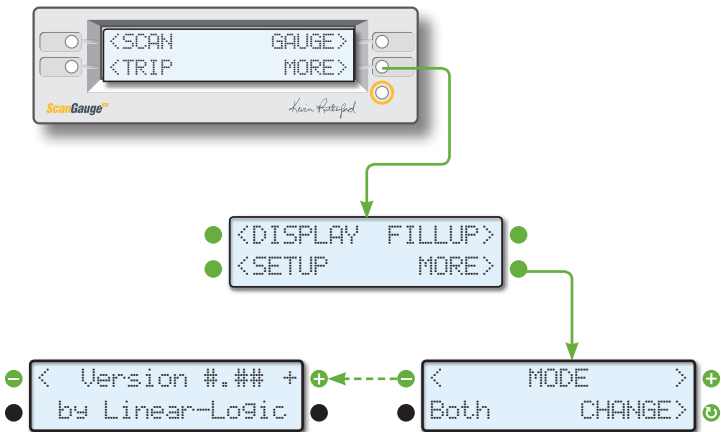
E-mail: support@linear-logic.com

| Problem | Possible Cause | Solutions |
|------------------------------------|---------------------------------------|--|
| Nothing displayed and no backlight | Vehicle has a blown fuse | Replace blown vehicle fuse. |
| Never stops saying "Connecting..." | Vehicle ECU not on | Turn key to RUN or start engine |
| | ECU not responding properly | Use MORE>MORE>CHANGE and try selecting a specific mode. If you used the 6-pin side of the universal connector, select J1708 If you used the 9-pin side of the connector, select J1939 or J1708 |
| | Vehicle is not J1708/J1939 compatible | None — ScanGaugeKR requires vehicle to be either J1708 or J1939 compatible. |

| Problem | Possible Cause | Solutions |
|--|---|--|
| Connects and then goes to sleep after 10 to 15 seconds | Engine is not running | Start engine. |
| | Loss of communication between the ScanGauge and vehicles ECU | Check cable and connections. Try using an alternate connector on the ScanGauge |
| Unable to clear trouble codes | Vehicle is not responding to the Clear Codes command | Sometimes multiple attempts are needed to clear the codes. You may also try clearing the codes with the vehicle not running, and the key in the on position. |
| | | Try setting the CLR DTC parameter in the Advanced Setup options from NORMAL to ALT. See Set Alternate DTC Clear Methods on page 23. |
| | | Some vehicles don't respond properly to the Clear Codes command and the codes cannot be cleared by the ScanGauge. |
| Some gauges are blank | Some sensors are not used in the vehicle or data is not reported by ECU | If Speed is not being reported, try setting the SPEED PGN in the advanced setup menu to ALT. See page 20. |
| ScanGauge does not store trip data after shutting off vehicle while using the DAYs trip method (see page 22) | Some vehicles cut power to the bus the moment the vehicle is shut off | Set the TRIPS parameter in the Advanced Setup Options back to the default AB. See page 22 for more information. |

View Firmware Version of Your ScanGauge

From the Home Screen, push the lower right function button twice next to MORE. Next, use the upper left and right function buttons to cycle through the available options until you reach the screen titled Version.



Reset Your ScanGauge

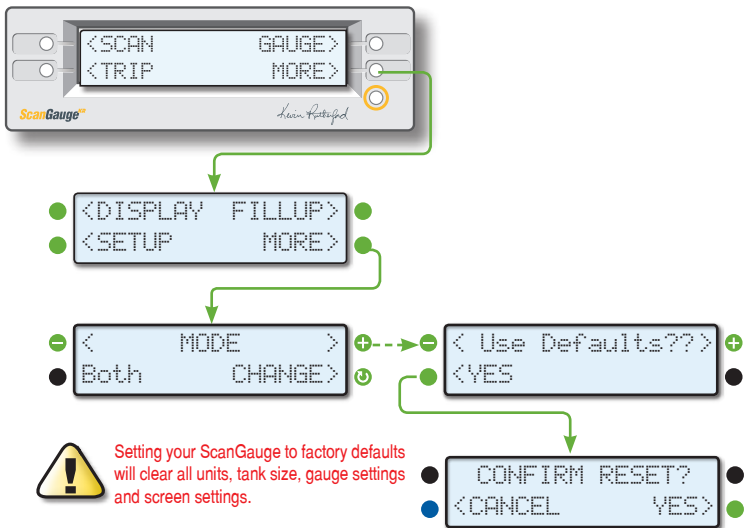
You can reset your ScanGauge to factory defaults and clear all custom settings and saved data.

To Reset Your ScanGauge

From the Home Screen, push the lower right function button twice next to MORE. Next, use the upper left and right function buttons to cycle through the available options until you reach the screen titled **Use Defaults??**.

To begin the process, push the lower left function button next to YES.

The next screen will ask you to confirm the reset. To complete the process, push the lower right function button next to YES.



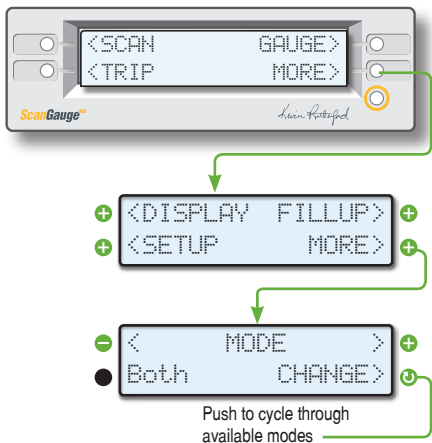
Read or Set the Operating Mode

ScanGauge allows you to view the operating mode your ScanGauge is using to communicate with your vehicle's ECU. You may also manually set the mode.

From the Home Screen, push the lower right function button twice next to MORE. The current mode will be displayed in the lower left corner of the screen.

To manually set ScanGauge to use a particular mode, push the function button next to CHANGE, to cycle through the available modes

The mode should be set this way only if it cannot be determined automatically.



Limited Warranty

Linear Logic will repair this product with new or rebuilt parts, free of charge, for a period of 3 years from the date of original purchase in the event of a defect in materials or workmanship.

Warranty Service can be obtained by sending the product to:

Linear Logic LLC
ATTN: Warranty Service
2222 S Dobson Rd Suite 800
Mesa, AZ 85202

Include your name, address, telephone number and/or e-mail address along with a copy of the Receipt or Packing List.

Also include information about the problem, including the type of vehicle you are using it on and a description of the problem.

An e-mail to service@Linear-Logic.com may be able to assist in solving a problem and will not diminish your rights to the full warranty.

Limits and Exclusions:

There are no express warranties except as listed above.

Linear Logic SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF THIS PRODUCT OR ARISING OUT OF ANY BREACH OF THIS WARRANTY. ALL EXPRESS AND IMPLIED WARRANTIES, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO THE APPLICABLE WARRANTY PERIOD.

If a problem with this product develops after the warranty period, you may contact our service department via the mail address or e-mail address listed above for a cost estimate on repairs to the unit.

If the problem is not handled to your satisfaction, contact our customer care department at customer.care@Linear-Logic.com.

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Version 1.0
SGD-KR-UM-101