

competition
ATECH PRO



User Guide

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Welcome

Welcome

Note: DO NOT CALIBRATE ACCELEROMETERS or ERASE ACCELEROMETER CALIBERATION on G-tech units which were shipped after August 2003. They have already been calibrated in the factory. Older G-techs will automatically request calibration. If you are unsure contact tech support.

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G-TECH / Pro Competition Performance Meter

Thank you for purchasing your **G-TECH / Pro Competition** Performance Meter.

I am very pleased and proud to present this product to you and welcome you to our G-tech users family.

As you read along and especially as you start having fun with your G-tech you will realize something. You will see that this is a precision instrument with a high level of sophistication usually found in products from large industrial conglomerates.

But in the case of the G-tech, the development comes from enthusiasts, guys who are not driven by the bottom line, guys who – just like you – have gasoline in their blood and a love for cars. Guys who have spent years of sleepless nights to perfect this product.

It's up to you to decide how far you want to take the G-tech. You can do 0-60 MPH and 1/4 mile measurements after only a brief setup procedure.

As you become more familiar with the G-tech's powerful capabilities, you will learn how to create very valuable tuning records and increase the consistency of your measurements.

For us, the G-tech has been a labor of love. It has all of the features you'll ever want and there is truly nothing else like it in the world. Our motto has always been to bring the latest technology and innovation into the hands of our customers and maybe contribute, in a small way, to brightening their day.

So, without further ado, go out there and have some fun.

Please drive safely.

Jovo Majstorovic
President, Tesla Electronics Inc.

Warning: Always obey all local and federal laws when using this device. This device is not intended for street or highway use. Use only in designated areas, closed courses and racetracks.

Warning: Adverse weather conditions can severely impair a vehicle's controllability, especially at high speed. When using this device, drive cautiously and within the limits of your vehicle under the conditions.

Warning: Don't take your eyes off the road. The G-tech will record your results for viewing and playback after the run. This device is designed as a test and tuning tool to measure performance and safety characteristics of a given vehicle. Use it for that purpose only.

Tesla Electronics, Inc. shall not be held liable for technical or editorial errors or omissions made herein; nor for incidental or consequential damages resulting from the furnishing, performance or use of this material.

Tesla Electronics, Inc. shall not be held liable in any way for any incidental or consequential damages to the vehicle, driver, passengers, and/or other involved parties or property occurring while using the G-tech.

TESLA Electronics Inc. reserves the right to make changes to this manual and other product specifications at any time without any further notice.

The content of this manual is for informational use only and is not intended as a commitment of any kind.

Please drive safely.

Basics

This section will give you a basic overview of the G-tech.

Every new user should read this section!!!

G-tech Front Side

We want you to be up and running in no time, so we have created a “Quick Setup Procedure” to streamline the process.

Please follow the steps described in this section to familiarize yourself with the product, and to set it up.

Note: In this manual, we will refer to the G-TECH / Pro Competition product simply as the “G-tech”.

All input to the G-tech is done through the buttons on the right-hand side.

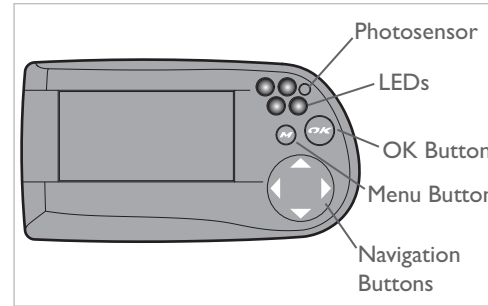


Figure 1: G-tech front

- **Photosensor** – measures ambient light
- **Light Emitting Diodes (LEDs)** – red lights that turn on under certain conditions
- **OK button** (☑) – used to confirm entry of data and make menu selections
- **MENU button** (☐) – brings up multi-line menus
- **Navigation buttons** (◀, ▶, ▲ and ▼) – used for moving cursor around in menus, graphs, etc.

G-tech Back Side

The back of the G-tech has 2 connectors as shown in Figure 2:

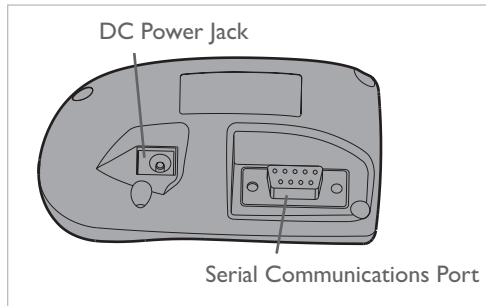


Figure 2: G-tech rear

- **DC Power Jack** – plug in either of the supplied DC power cables into this connector
- **Serial Communications Port** – plug in the supplied serial cable into this port to enable communications between the G-tech and a computer

Cables

The G-tech ships with 3 separate cables:

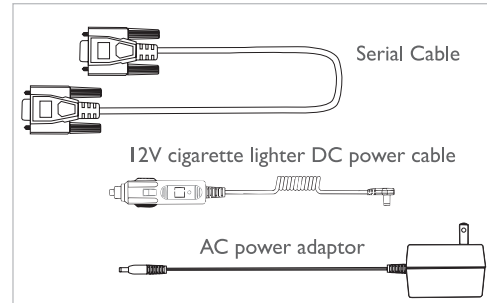


Figure 3: G-tech cables

- **Serial Cable** – used to connect the G-tech to a computer for data transfer
- **AC Power Adaptor** – this cable supplies power from any 120V AC wall socket
- **12V cigarette lighter DC Power Cable** – supplies power from vehicle's accessory (cigarette lighter) socket

The 12V cigarette lighter DC Power Cable has a fuse in the end that plugs into your vehicle. If the cable does not seem to provide power when the vehicle is running, the fuse may be blown and need replacing.

To replace the fuse, unscrew the tip and replace the fuse with a standard 1 AMP fuse. Fuses can normally be purchased at any automotive parts store.

Menu and Scroll Bars

Generally, pressing **↻** will bring up a multi-line text menu. An example of one of the G-tech's menus is shown in Figure 4:

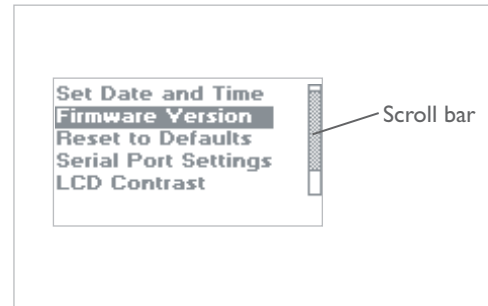


Figure 4: A G-tech menu with a scroll bar

Some menus have a *scroll bar* on the right hand side. This means that there are more items in the menu than the G-tech can display at once.

Use the **▲** / **▼** arrow keys to move through all the choices in the menu.

The shaded portion of the scroll bar will move as you scroll through the choices.

Operating Modes

The G-tech has two basic modes of operation:

- **Configuration Mode**
- **Drag Strip Mode**

You use **Configuration Mode** to tailor the G-tech to your vehicle and personal preferences.

In **Drag Strip Mode**, you can use the G-tech to make all sorts of popular measurements, including:

- 0-60 MPH Times
- 1/4 mile E.T. and trap speed
- Horsepower and torque measurements
- Braking distance measurements
- Cornering / lateral G measurements

The G-tech remembers which mode it was last in when you power off. When you power it on again, it starts up again in the same mode it was in before.

If you power on your G-tech and the display looks like Figure 5, your G-tech is in **Configuration Mode**.



Figure 5: Configuration Mode — Main Screen

If you power on your G-tech and the display looks like Figure 6, your G-tech is in **Drag Strip Mode**.



Figure 6: Drag Strip Mode — Main Screen

You can easily switch between the two modes, as shown in Figure 7.

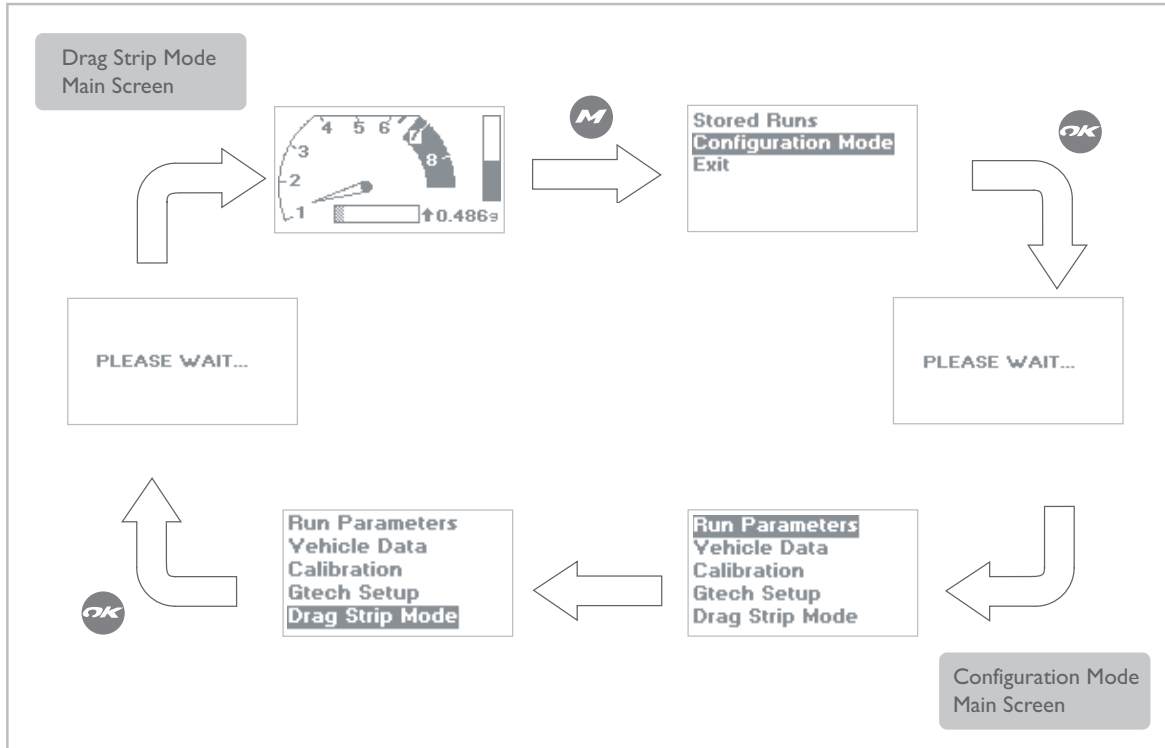


Figure 7: Switching between Drag Strip & Configuration Modes

Quick Setup

This section will get you up and running as quickly as possible.

This section must be completed to obtain accurate results!!!

Note: DO NOT CALIBRATE ACCELEROMETERS or ERASE ACCELEROMETER CALIBERATION on G-tech units which were shipped after August 2003. They have already been calibrated in the factory. Older G-techs will automatically request calibration. If you are unsure contact tech support.

Quick Setup and Use

Here you will customize the G-tech for your vehicle and your personal preferences.

The G-tech saves your configuration choices internally, even when it is powered off.

The table below summarizes the Quick Setup Procedure, and how much time each step will take to perform.

| Setup Item | Estimated Completion Time |
|--------------------------|---------------------------|
| Set time and date | 1 minute |
| Set vehicle redline | 1 minute |
| Set shiftlight setpoint | 1 minute |
| Set vehicle weight | 1 minute |
| Calibrate RPMs | 2 minutes |
| Calibrate accelerometers | 3 minutes |
| Mount G-tech | 2 minutes |

Setting Time and Date

The G-tech has an internal clock that keeps time and date, even when no power is applied.

Whenever you make measurements with the G-tech, it stores the time and date as well. This makes it easy to review your measurements and make sense of them.

Start in **Configuration Mode**.








Run Parameters
Vehicle Data
Calibration
Gtech Setup
Drag Strip Mode

- 2 Select "Gtech Setup" and press .

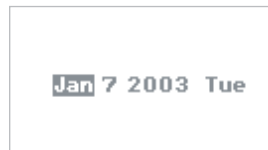







- 3 Select "Set Date and Time" and press .

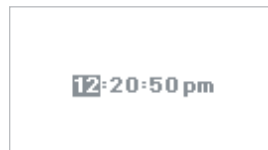


- 4 Set the date.
 and  move between fields,  and  change values.
Press  when done.

Note: Day of week (e.g. Tuesday) is calculated automatically and cannot be set.



- 5 Set the time.
Use , , , and  to move and adjust fields.
Press  when done.



Setting Vehicle Redline

You should set the vehicle redline value in the G-tech before using it.

This will allow the G-tech to display the graphical tachometer (p. 47) so that it matches your vehicle's own tachometer.

This step is essential for accurate RPM calibration (p. 25).

Start in **Configuration Mode**.



Run Parameters
Vehicle Data
Calibration
Gtech Setup
Drag Strip Mode

2

Select "Vehicle Data" and press .

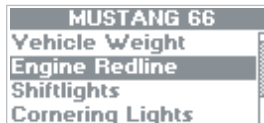


Run Parameters
Vehicle Data
Calibration
Gtech Setup
Drag Strip Mode

3

Select "Engine Redline" and press .

Note: You will see the text "MUSTANG 66" in many places throughout this document. This is because the G-tech can be used in multiple vehicles and allows you to name each one (p. 122). On a new G-tech, you will see the text "noname1" here.



MUSTANG 66
Vehicle Weight
Engine Redline
Shiftlights
Cornering Lights

4

Enter vehicle's engine redline.

Press **OK** when done or press **ESC** to abort and discard the changes.

```
Enter engine redline
for this vehicle.
UP/DN changes value.
LT/RT changes columns.
Press OK to finish
or MENU to cancel.
  6750 rpm
```

Setting the Shiftlight Setpoint

The shiftlights illuminate to indicate when you should upshift into the next gear.

If you have a manual transmission vehicle, or a vehicle whose gears can be shifted under driver control, this feature may be of interest to you.

If you do not have control over when your vehicle shifts gears, you probably want to disable the shiftlights altogether (page 110).

Before using the G-tech's shiftlights feature, you must set the shiftlight setpoint RPM value.

Some people set the shiftlight setpoint to the same value as their vehicle's redline value; other people set it to a lower value, so that the lights turn on before they reach redline in a run. It is your preference and can be changed at any time.

The shiftlight setpoint is also indicated on the graphical tachometer on the [G-Window](#) (page 47).

Note: This step must be performed in the vehicle, it cannot be performed when powered by the AC power adapter.

1 Start your vehicle, and plug the G-tech into your vehicle's accessory power outlet.

2 Put the G-tech in **Configuration Mode**.



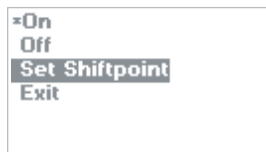
3 Select "Vehicle Data" and press .



4 Select "Shiftlights" and press .



5 Select "Set Shiftpoint" and press .



6

Enter RPM shiftpoint.

Press **OK** when done or press **ESC** to abort and discard the changes.

```
Enter shiftpoint for
this vehicle. UP/DN
changes value, LT/RT
changes columns.
Press OK to finish,
or MENU to cancel.
  6000 rpm
```

Setting Vehicle Weight

The G-tech uses your vehicle's weight in its horsepower and torque calculations.

Thus, it is extremely important that you enter an accurate weight for your vehicle before using the G-tech. Please refer to page 160 for details on determining an accurate vehicle weight.

Start in **Configuration Mode**.

```
Run Parameters
Vehicle Data
Calibration
Gtech Setup
Drag Strip Mode
```

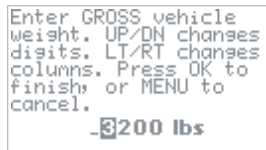

2 Select "Vehicle Data" and press **OK**.



3 Select "Vehicle Weight" and press **OK**.



4 Enter your gross vehicle weight.
Press **OK** when done or press **MENU** to abort and discard the changes.



Note: Be sure to include weight of fuel, driver, equipment, etc. (page 160)

Calibrating RPMs

Some of the most exciting features in the G-tech rely on good RPM measurements.

Since every vehicle has a unique electronic “RPM signature,” the G-tech must learn the RPM signature at two different points for your particular vehicle before it can measure and record RPMs.

Follow the steps below to calibrate the G-tech for your vehicle’s RPM signature.

Note: You must set the redline in the G-tech (page 20) prior to this step!

Note: For detailed information on calibrating RPMs, please refer to “RPM Calibration Tips” on page 145.


1 Start in **Configuration Mode**.

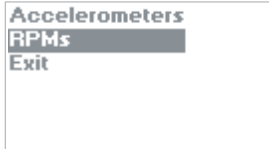


2 Select “Calibration” and press .





3

Select "RPMs" and press .




4

If the redline value is set properly, press  to continue. If not, press  to cancel, and then set the redline in the G-tech (page 20).




5

High RPM calibration: Match vehicle RPMs to G-tech. Then press  when vehicle RPMs are steady at the requested value.

Note: *The RPM value shown here may be different than the value your G-tech displays. During this process, use the value on your G-tech!*



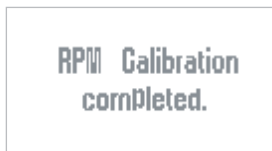
- 6** Low RPM calibration: Again match vehicle RPMs to G-tech, and press  when vehicle RPMs are steady at the requested value.

Note: *The RPM value shown here may be different than the value your G-tech displays. During this process, use the value on your G-tech!*



Please Rev your engine
to: **2000 rpm**
Use arrow keys to
adjust if necessary.
Press OK to continue,
or MENU to cancel.

- 7** You will see this screen briefly when the procedure is complete, and then you will be returned to the previous menu in Step 4.



**RPM Calibration
completed.**

For detailed information on calibrating RPMs, please refer to “RPM Calibration Tips” on page 145.

Calibrating Accelerometers

The G-tech contains high-precision measuring instruments called accelerometers.

Note: In order to obtain accurate measurements, the accelerometers must be calibrated. Do not skip this procedure, as it is very important!

Do not perform the calibration with the engine running. A running engine causes vibrations in the vehicle that can affect your calibration results.

The accelerometer calibration procedure does not need to be done inside the vehicle. You may find the procedure easier if you do it indoors using the AC adapter to power your G-tech.

The accelerometer calibration procedure will generally go faster if you can rest the G-tech on a flat, level surface such as a table or a console. Generally, the faster the calibration goes, the better the results.

Note: If you do not have the G-tech oriented properly during calibration (i.e. upside down, rotated by 90 degrees, etc.), it will reject the calibration and display a message notifying you of this fact. Just re-attempt the calibration and pay close attention to the instructions on the display.


Note: The G-tech functions best when calibrated at 2 different temperatures that are as far apart as possible (page 35). If you attempt to perform a calibration and the G-tech determines that it has already been calibrated at (or near) the current temperature, it will “reject” your calibration attempt and notify you with a message on the display. If you get this message, let the G-tech warm up or cool down so that its temperature is significantly different than the current temperature, and try again.

Please follow the steps below to calibrate the G-tech's accelerometers.

Note: DO NOT CALIBRATE ACCELEROMETERS or ERASE ACCELEROMETER CALIBERATION on G-tech units which were shipped after August 2003. They have already been calibrated in the factory. Older G-techs will automatically request calibration. If you are unsure contact tech support.

- 1 Start in Configuration Mode.

```
Run Parameters
Vehicle Data
Calibration
Gtech Setup
Drag Strip Mode
```

- 2 Select "Calibration" and press .

```
Run Parameters
Vehicle Data
Calibration
Gtech Setup
Drag Strip Mode
```

- 3 Select "Accelerometers" and press .

```
Accelerometers
RPMs
Exit
```

- 4 Select "Calibrate Axes" and press .

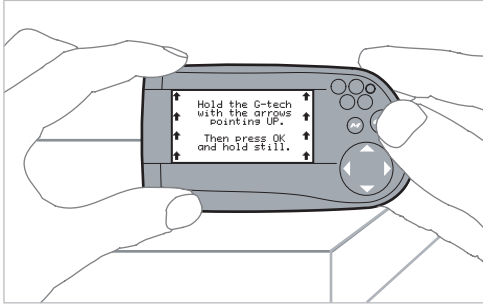
```
Calibrate Axes
X-Y-Z Gs Screen
Erase Calibration Data
Exit
```


- 5 You will see the following screen:

```
↑ Hold the G-tech ↑
↑ with the arrows ↑
↑ pointing UP. ↑
↑ Then press OK ↑
↑ and hold still. ↑
```

Note: DO NOT CALIBRATE ACCELEROMETERS or ERASE ACCELEROMETER CALIBERATION on G-tech units which were shipped after August 2003. They have already been calibrated in the factory. Older G-techs will automatically request calibration. If you are unsure contact tech support.

- 6 With the G-tech resting on a flat, level surface, orient it with the arrows pointing up to the sky as shown in the picture below.




- 7 Hold the G-tech very still, and then press . The G-tech will automatically move on to the next step once it takes some measurements.

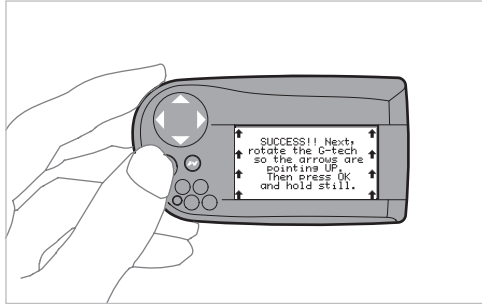
Note: If you are not holding the G-tech very still, you will see a blinking black bar on the display as shown below. If you see a display like this, you must hold the G-tech very steady until the black bar goes away.



Note: DO NOT CALIBRATE ACCELEROMETERS or ERASE ACCELEROMETER CALIBRATION on G-tech units which were shipped after August 2003. They have already been calibrated in the factory. Older G-techs will automatically request calibration. If you are unsure contact tech support.

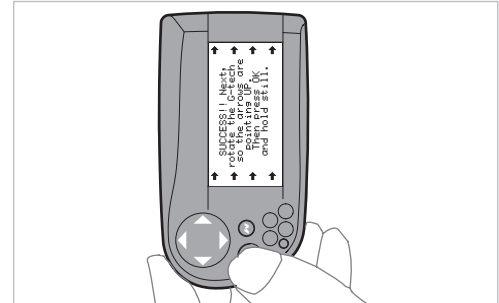
8

Next, orient the G-tech as shown and press .



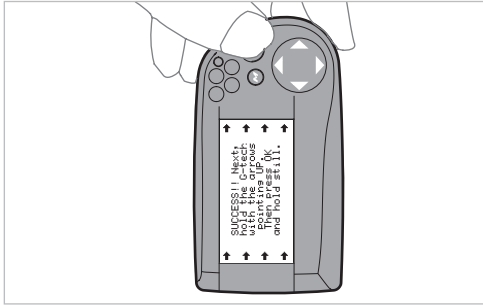
9


Next orient the G-tech as shown with the arrows pointing up, and press .

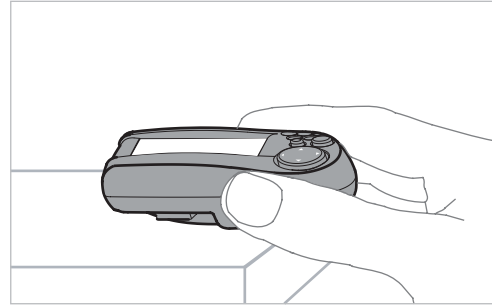


Note: DO NOT CALIBRATE ACCELEROMETERS or ERASE ACCELEROMETER CALIBERATION on G-tech units which were shipped after August 2003. They have already been calibrated in the factory. Older G-techs will automatically request calibration. If you are unsure contact tech support.


- 10** Again orient the G-tech as shown with the arrows pointing up, and press .

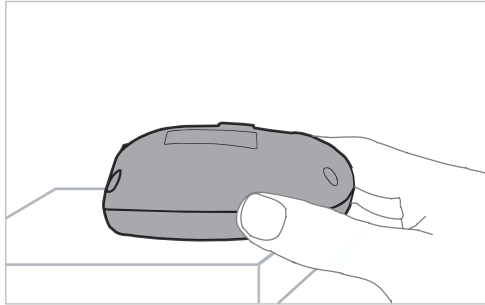



- 11** Lay the G-tech on a flat (horizontal) surface with the display facing up, as shown, and press .

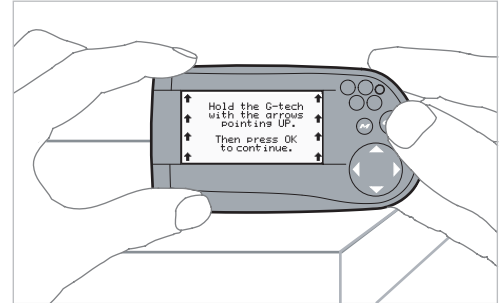



Note: DO NOT CALIBRATE ACCELEROMETERS or ERASE ACCELEROMETER CALIBERATION on G-tech units which were shipped after August 2003. They have already been calibrated in the factory. Older G-techs will automatically request calibration. If you are unsure contact tech support.

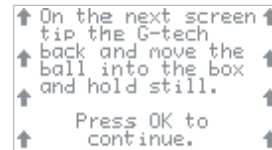
- 12** Orient the G-tech with the display facing down, as shown, and press .



- 13** Now it is time for some final checks. Orient the G-tech as shown, read the screen, and press .

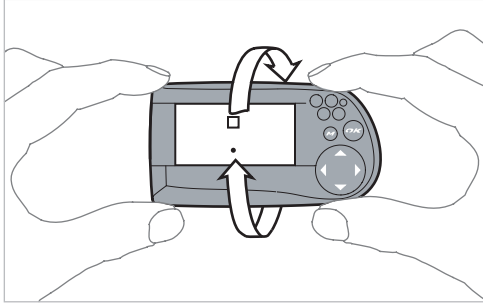


- 14** The following instruction screen will appear. Read it and then press .

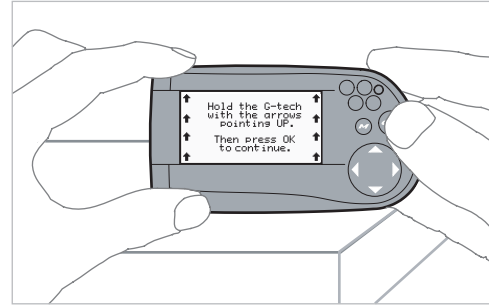



Note: DO NOT CALIBRATE ACCELEROMETERS or ERASE ACCELEROMETER CALIBRATION on G-tech units which were shipped after August 2003. They have already been calibrated in the factory. Older G-techs will automatically request calibration. If you are unsure contact tech support.

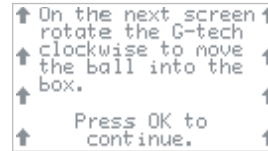
- 15** Tilt the G-tech back as shown, so the ball rests in the box. The G-tech will automatically advance to the next calibration step when you have accomplished this.



- 16** Re-orient the G-tech as shown and press .

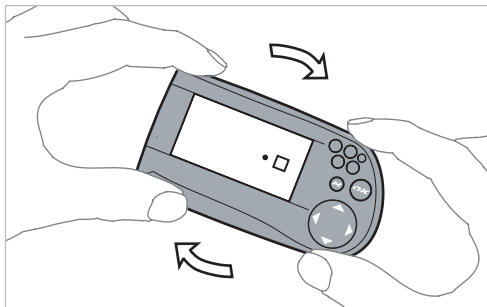


- 17** The following instruction screen will appear. Read it and then press .

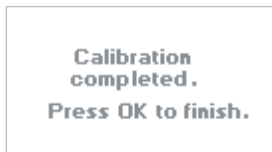


Note: DO NOT CALIBRATE ACCELEROMETERS or ERASE ACCELEROMETER CALIBRATION on G-tech units which were shipped after August 2003. They have already been calibrated in the factory. Older G-techs will automatically request calibration. If you are unsure contact tech support.

- 18** Tilt the G-tech clockwise as shown so that the ball rests in the square.



- 19** This screen indicates that the calibration procedure is complete.



For more information on calibrating the accelerometers, please refer to "Accelerometer Tips" on page 142.

Note: DO NOT CALIBRATE ACCELEROMETERS or ERASE ACCELEROMETER CALIBRATION on G-tech units which were shipped after August 2003. They have already been calibrated in the factory. Older G-techs will automatically request calibration. If you are unsure contact tech support.

Calibration & Temperature

The G-tech's accelerometers are sensitive to changes in temperature. Ideally, you will calibrate the G-tech at two different temperatures that are far apart. This helps the G-tech maintain accuracy across a wide range of temperatures.

To maintain accuracy, the G-tech monitors temperature with a built-in thermal sensor. When the G-tech detects that its current temperature is far from the calibration temperature, it displays a message as shown in Figure 8.

```
Two calibrations are
needed at different
temperatures for best
results. Please do a
calibration NOW. Go to
Configuration Mode,
choose Calibration,
then Accelerometers.
```

Figure 8: G-tech accelerometer calibration request

If this text automatically appears on your display, you should put the G-tech into **Configuration Mode** and then perform an accelerometer calibration ("Calibrating Accelerometers" on page 28).

For more information on accelerometers, calibration, and accuracy, please refer to “Accelerometer Tips” on page 142.

Mounting the G-tech

The G-tech is shipped with a sophisticated mounting system that is used to hold the G-tech steady in your vehicle.

This section describes:

- the different pieces of the mounting bracket
- how to assemble the mounting bracket
- how to mount the bracket in your vehicle

Note: *In order to obtain accurate measurements, the G-tech must be mounted properly. Please read this section carefully, it is very important!*

For directions on removing the mounting bracket from your windshield, please refer to “Removing the bracket” on page 150.

For directions on permanently mounting the bracket in your vehicle, please refer to “Permanent Mounting” on page 151.

Note: DO NOT CALIBRATE ACCELEROMETERS or ERASE ACCELEROMETER CALIBERATION on G-tech units which were shipped after August 2003. They have already been calibrated in the factory. Older G-techs will automatically request calibration. If you are unsure contact tech support.

Figure 9 shows the different pieces of the G-tech mounting bracket.

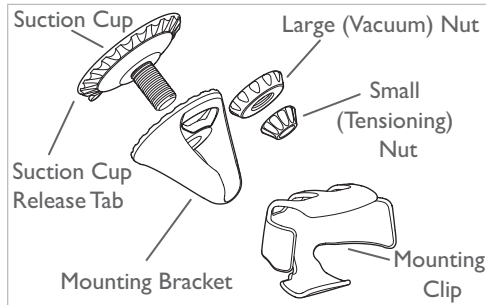
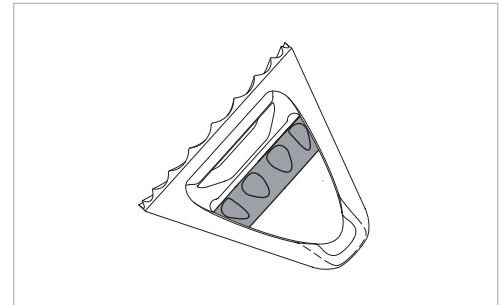


Figure 9: Mounting bracket parts

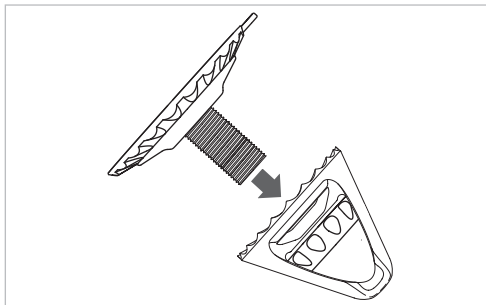
Assembling the Bracket

Note: Steps 1-3 may already be performed on your mounting bracket at the factory. These steps are provided so that you can always properly re-assemble your mounting bracket from its pieces if necessary.

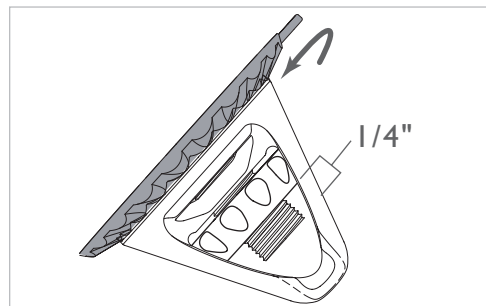
Insert the Large Vacuum Nut into the Mounting Bracket.



- 2** Insert the suction cup into the mounting bracket.

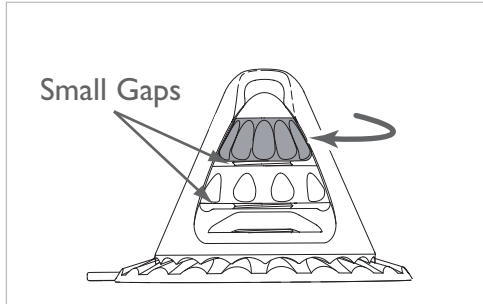


- 3** Turn the suction cup clockwise into the Large Vacuum Nut until approximately 1/4 inch of threads protrude.



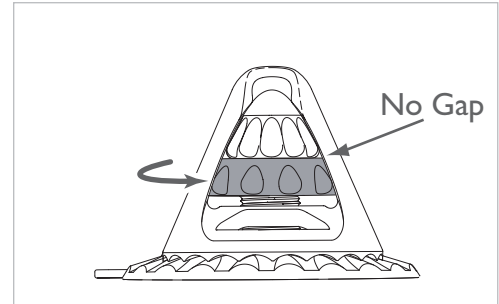
4

Place the Small Tensioning Nut on the threaded spindle, and turn it clockwise until it is snug on the stem. There should be a small gap between the Small Tensioning Nut and the Large Vacuum Nut.



5

Now back off the Large Vacuum Nut counter-clockwise until it touches the Small Tensioning Nut.



6

Gently insert the rubber ball of the mounting clip into the mounting bracket. It should go in with little force and fit snugly.



Mounting the Bracket

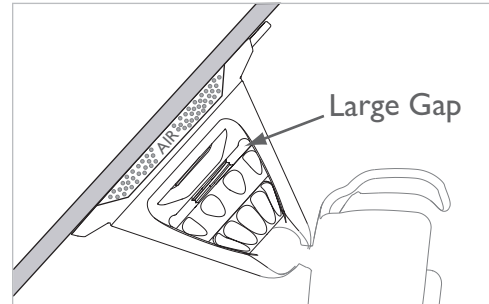
1

Find a place on your vehicle's windshield where you can mount the G-tech without affecting visibility.

Note: Make sure the mounting area on the windshield is very clean and dry; otherwise, the mounting bracket may not work properly.

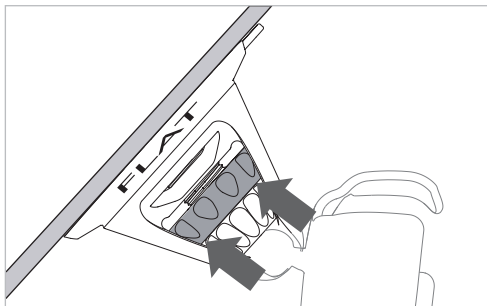
2

Place the large rubber suction cup on the mounting area of the windshield. Make sure there is a large gap between the Large Vacuum Nut and the mounting bracket.



3

Push the Large Vacuum Nut firmly towards the windshield to expel all air between the suction cup and the windshield. **This is a very important step to ensure proper operation of the mounting system.**

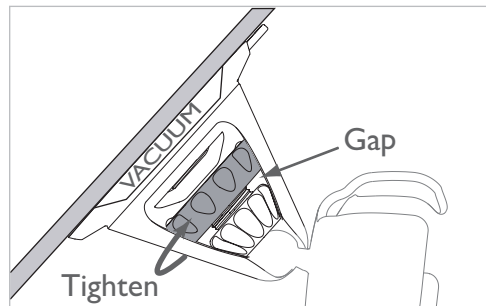


4

At this point, the mounting bracket should stay attached to the windshield when you remove your hands. If it doesn't, inspect the rubber suction cup for cracks or tears, and make sure the windshield surface is clean.

5

Turn the Large Vacuum Nut clockwise in order to create a vacuum between the suction cup and the windshield. **Be sure to turn the Large Vacuum Nut as far as possible.**

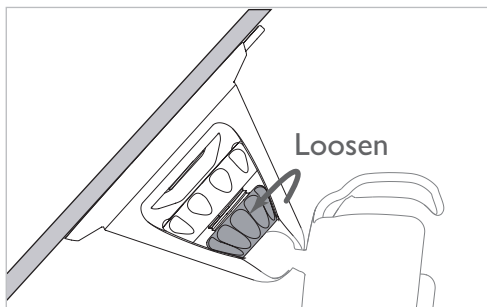


6

The mounting clip should be steady and should not move easily. If this is not the case, slowly turn the Small Tensioning Nut counter-clockwise just enough to secure the mounting clip.

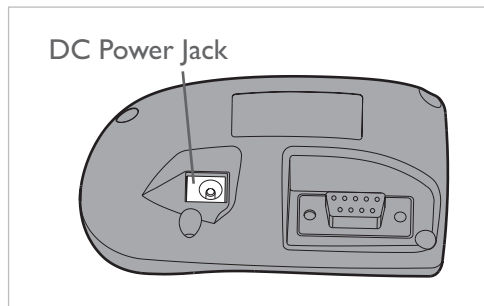
Note: You should only need to use the Small Tensioning Nut for fine adjustments the first time you mount the G-tech. After the initial mounting, you would secure the clip by turning the Large Vacuum Nut clockwise to tighten it.

Note: The clip should be completely rigid. A G-tech which slips during a run will lead to inaccurate results.



7

Insert the small end of the power cord into the DC jack, which is located on the back of the G-tech.

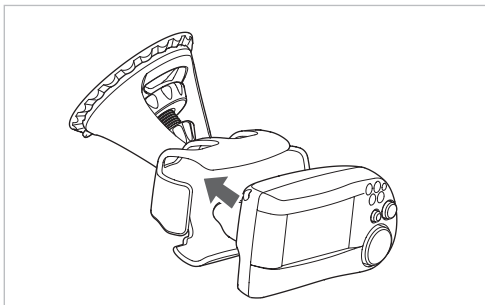


8

Snap the G-tech into the mounting clip.

Note: Do not move the mounting clip if you need to adjust the orientation of the G-tech! This will damage your mounting system and will not be covered under warranty.

To safely re-orient the mounting clip for easier viewing, please refer to “Adjusting the bracket” on page 149.



9

Plug the large end of the power cord into your vehicle's 12V cigarette lighter socket. The G-tech will power on.

Note: Some vehicles supply power to the 12V socket only when the ignition is in the ACCESSORY position or when the vehicle is running.

Note: The G-tech does not have an ON/OFF switch. Please be sure to unplug the G-tech when exiting your vehicle so as to not drain your vehicle's battery.

G-Window

This section will show you how to use the G-tech to monitor your vehicle's performance as you are driving.

Drag Strip Mode Basics

Put the G-tech into **Drag Strip Mode** (Figure 7 on page 15) to measure the performance of your vehicle.

In **Drag Strip Mode**, you can use the G-tech:

- to monitor your acceleration and RPMs on the G-Window during everyday driving
- to measure straight-line performance (1/4 mile, 0-60 MPH, etc.) on the Run Window

When you first come up in **Drag Strip Mode**, the G-tech automatically begins measuring acceleration and RPMs, and displays the G-Window (Figure 10):

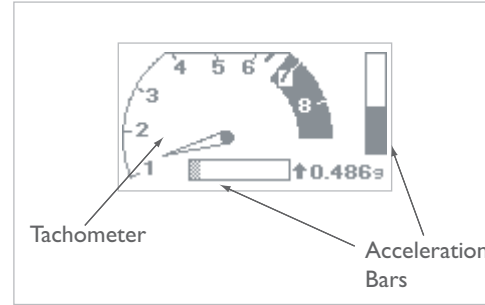


Figure 10: Drag Strip Mode — G-Window screen

The G-Window has two main indicators:

- **Tachometer** – displays vehicle RPMs
- **Acceleration Bars** – indicate forward and lateral (cornering) G force in real time

G-Window: Tachometer

The tachometer (Figure 11) indicates the vehicle redline and shiftlight shiftpoint that you entered during the Quick Setup Procedure.

The tach needle displays the vehicle RPMs in real-time.

Note: When the G-tech is powered by the 12V DC wall adapter, there is no RPM signal, and the tachometer reading is meaningless.

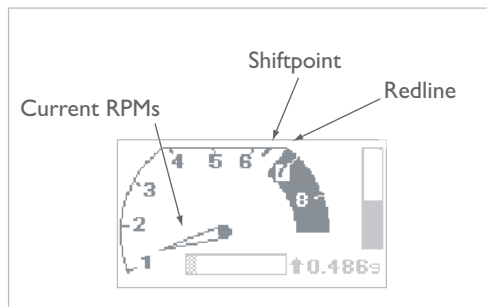


Figure 11: G-Window tachometer

G-Window: Acceleration Bars

This section explains how to read the acceleration indicators on the [G-Window](#).

Note: For the acceleration bars to be meaningful, you must have already (1) calibrated your accelerometers (page 28) and (2) done at least one acceleration run (page 52).

Note: If you have moved or re-oriented the G-tech mounting clip since your last forward acceleration run, the acceleration bars will not be accurate! See page 49 for more information.

The acceleration bars show instantaneous forward and lateral vehicle acceleration.

When you punch the accelerator, you will see a surge in the forward acceleration indicator.

When you turn your vehicle, you will see a surge in the lateral acceleration indicator.

Dominant acceleration is indicated by the dark (solid) bar; the shaded (grey) bar indicates lesser acceleration.

Figure 12 illustrates the major components of the acceleration bars.

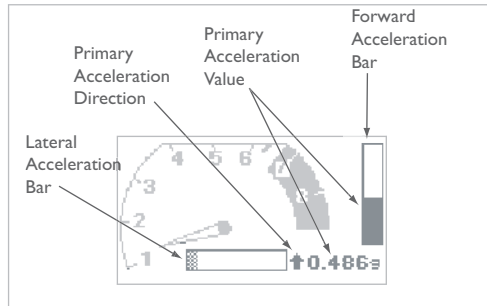


Figure 12: Acceleration Bars & Primary Acceleration Indicator

- **Lateral Acceleration Bar** – indicates amount of lateral (cornering) Gs – like you see in car magazines for skid-pad tests
- **Forward Acceleration Bar** – indicates amount of forward Gs
- **Primary Acceleration Value** – shows amount of dominant acceleration

- **Primary Acceleration Direction** – shows direction of dominant acceleration

Figure 13 summarizes how to read the Primary Acceleration Direction Indicator.

| If you see... | It means you are... |
|---------------|-------------------------------|
| | Accelerating forward strongly |
| | Braking strongly |
| | Turning left |
| | Turning right |

Figure 13: Primary Acceleration Direction Indicator

Self-leveling the G-tech

Note: If the G-tech is mounted in your vehicle and the vehicle is not moving, both acceleration bars should register very close to 0.000g. If not, you need to “self-level” the G-tech.

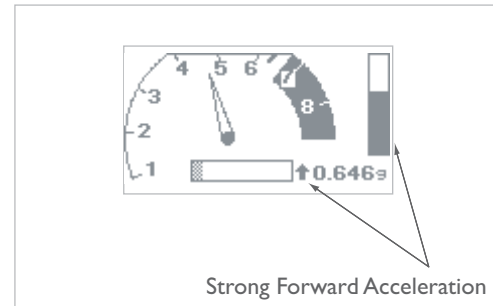
If your G-Window acceleration bars do not read zero when your vehicle is stopped, you need to help the G-tech determine which direction is forward. We call this process “self-leveling.”

To self-level the G-tech, simply do an acceleration run (page 52). You need only go far enough to trigger the G-tech and start the E.T. clock... just a few feet.

Once you have done this, **DO NOT** move the G-tech mounting clip. Leave it in exactly the same mounting position that it was in when you did the acceleration run.

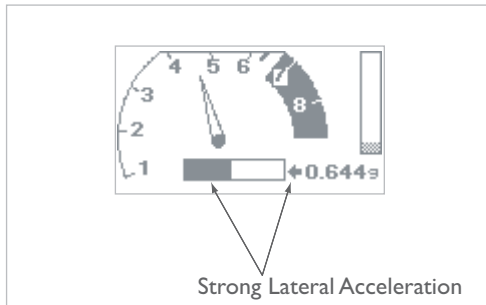
When you get back to the G-Window, the G-tech’s acceleration bars should read very close to 0.000 when the vehicle is stopped.

Example 1: Typical display during forward driving



- **Forward Acceleration Bar** is darkly shaded – indicates that forward acceleration is dominant, i.e. stronger than lateral acceleration
- **Primary Acceleration Direction** is pointing up – indicates that acceleration is forward (arrow would point down if you braked hard)
- **Primary Acceleration Value** reads 0.646g – indicates amount of forward acceleration
- **Lateral Acceleration Bar** is lightly shaded and very small – indicates the vehicle is not quite going in a straight line (if vehicle were going perfectly straight ahead, there would be no lateral acceleration, only forward)

Example 2: Typical display accelerating out of a corner



- **Lateral Acceleration Bar** is darkly shaded – indicates that lateral (sideways) acceleration is dominant, i.e., stronger than forward acceleration
- **Primary Acceleration Direction** is pointing left – indicates that lateral acceleration (and turn) is to the left (arrow would point right if vehicle were turning to the right)
- **Primary Acceleration Value** reads 0.644g – indicates the amount of lateral acceleration, like a skidpad rating for a car
- **Forward Acceleration Bar** is lightly shaded and small – indicates the vehicle is not experiencing significant lateral acceleration

Acceleration Runs

This section will show you how to use the G-tech to measure your vehicle's straight-line performance.

Measuring Your Runs

To perform a timed measurement of your vehicle's straight-line acceleration, the G-tech has a special display called the Run Window.

You will use the Run Window to make measurements such as:

- 1/4 mile E.T. and speed
- 0-60 MPH measurements
- braking distance measurements
- horsepower and torque measurements

To get to the Run Window:

- Make sure that the G-tech is in **Drag Strip Mode**, displaying the tachometer on the G-Window
- Press 

You will initially see the Staging Screen as shown in Figure 14.



Figure 14: Staging Screen

Note: If your G-tech does not look like Figure 14, that means it is configured to use the reaction time light tree. Please refer to “Reaction Time / Start Mode” on page 128 for information on disabling the reaction time light tree.

At this point, the G-tech is making sure that the vehicle is completely stopped. This process takes about 1 second, and is called “staging” in this manual.

After about 1 second, the Upper Left LED will begin blinking, and the screen will appear as in Figure 15. At this point, the G-tech is ready for you to perform an acceleration run.

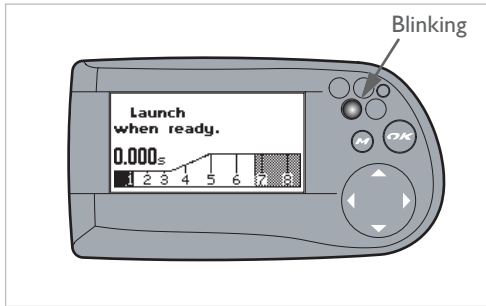


Figure 15: G-tech is staged and ready to go

Note: If your G-tech continues to read “Staging...” for more than 1 second after the screen in Figure 14 appears, the accelerometers need to be re-calibrated. Press **CAL** to go back to the G-Window screen with the tachometer and refer to “Calibrating Accelerometers” on page 28 for details on this procedure.

To begin an acceleration run, press the throttle and accelerate your vehicle briskly off the line.

The G-tech will detect the forward acceleration and automatically start the E.T. clock. The blinking LED will go off once you have launched successfully.

Note: To avoid false starts, the G-tech requires a decent amount of “oomph” off the starting line, so don’t baby it! If your G-tech doesn’t start its E.T. clock, try launching your car with more force.

During the acceleration run, the horsepower, torque, and RPM indicators will be updated in real-time. The E.T. clock will continue to run as well.

As you move forward and pass certain milestones, the G-tech will automatically display them for you, as shown in Figure 16:

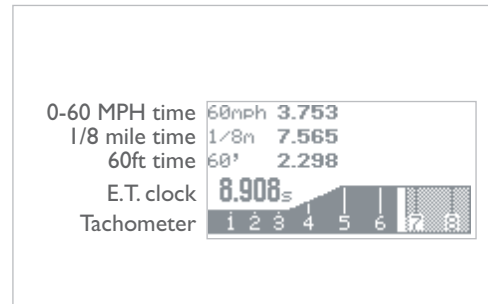


Figure 16: G-tech screen during a run

- **Tachometer** — indicates instantaneous vehicle RPMs

- **E.T. clock** — indicates elapsed run time


The G-tech stores the time for each of the following mile-stones as you pass them:

- 60 ft. time (displayed in real-time)
- 330 ft. time
- 0-60 MPH time (displayed in real-time)
- 660 ft. (1/8 mile) time and speed (displayed in real-time)
- 1000 ft. time
- 1/4 mile time and speed

Note: *You don't need to do a full 1/4 mile to get results. The G-tech will automatically give you all results up to the point when the run stopped. The next section describes the conditions that cause a run to stop.*

Stopping the E.T. clock

Simply letting off the gas and coasting for a brief period will cause the G-tech's clock to stop automatically. In fact, any one of the following conditions will cause the clock to stop:

| | |
|-----------------|--|
| User... | presses  button |
| Vehicle... | coasts for a little over 1 second |
| Speed... | exceeds 300 MPH |
| Distance... | exceeds 4000 ft. |
| Elapsed Time... | approaches 1 minute |

Note: *If you brake strongly at the end of a run, the E.T. clock will continue running. This is to allow braking distance measurements. If you are not interested in braking distance, simply let off the throttle and coast until the E.T. clock stops.*

When the E.T. clock stops, the display freezes and shows you the latest measured values (Figure 17).

If you completed a full 1/4 mile run, the E.T. clock will show the E.T.; otherwise, it will show the value when the clock stopped.

The HP value that is displayed represents the peak horsepower measured during the run

For information on viewing peak HP & TQ, please refer to "HP & Torque vs RPMs" on page 72.

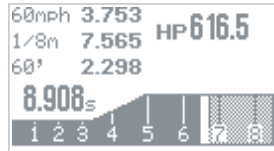


Figure 17: G-tech screen at completion of 1/4 mile run

When you are done viewing the information on this screen, press to leave the Run Window and view the Run Viewing Menu.

Note: *If you do not reach at least the 60 ft. mark during a run, no results will be saved and you will be returned immediately to the G-Window instead.*

Viewing Run Results

When a run has completed and you press , you will see the Run Viewing Menu as in Figure 18.

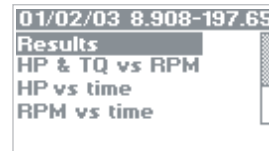


Figure 18: G-tech Run Viewing Menu

The G-tech automatically assigns a name to each run you make. The name is based on the date and the run results. Every run can be renamed, but for now let's concentrate on viewing the results.

Since "Results" is already selected in the menu, simply press to view the results for the run you just did.

The first screen you will see (Figure 19) shows the 1/4 mile results, reaction time and rollout distance:

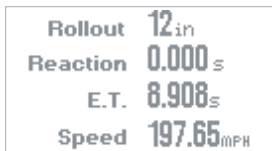



Figure 19: G-tech 1/4 mile results screen

Note: In this example, we did not use the Reaction Time measuring feature (page 128). Thus, the “Reaction” field reads 0.000.

Note: If you do not travel a full 1/4 mile, the “E.T.” and “Speed” fields will read 0.000.

To view all the milestones from your run, press  again to get the Milestones screen (Figure 20).

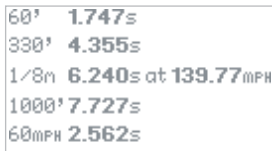



Figure 20: G-tech milestones screen

Note: The G-tech will display “0.000” for any milestone that you did not reach during the run.

After you have reviewed the run milestones, press  to return to the Run Viewing Menu (Figure 18).

There are other entries in the Run Viewing Menu that we will explore soon, but for now let’s concentrate on the basic functionality.


Press  to leave the Run Viewing Menu, and you will see the Run Save Menu (Figure 21).



Figure 21: Run Save menu

At this point you can:

- **Save the run** with the title that was created automatically by the G-tech (see “Saving a run / default name” on page 58)
- **Rename the run** to a title that you prefer and then save the run (see “Renaming and saving a run” on page 60)
- **Discard this run** altogether (i.e., discard the results)

- **View Run Again** and return to the Run Viewing Menu

For now, let's just discard these results, since we are just getting familiar with the G-tech. We will come back to the other choices later in this manual.

Discarding Run Results

Discarding a run causes you to lose all the information about the run forever.

Therefore, when you select "Discard this run" from the Run Save Menu, the G-tech requires that you confirm this decision (Figure 22).



Deleting this run:
01/02/03 8.908-197.65
To confirm press: OK
To exit press: MENU

Figure 22: Confirmation before discarding run

Press  to confirm. The G-tech will discard all the results, and return to the main window in **Drag Strip Mode**, the G-Window.

Saving a run / default name

As mentioned before, once you finish a run, you will press **EXIT** to view the Run Viewing Menu (Figure 18 on page 55).

You will be presented with a menu similar to Figure 23:



Figure 23: G-tech Run Viewing menu

To reach the Run Save Menu at this point, you can either scroll down to the menu item labeled "Exit" and press **EXIT**, or you can simply press **ENTER**. Now you will see the G-tech Run Save menu (Figure 24):



Figure 24: G-tech Run Save menu

To save the run with the standard name, select "Save this run" and press **ENTER**.

The G-tech will display a message as shown in Figure 25 as it saves all the run data into its internal memory.



Figure 25: G-tech display while run is being saved

Notice that the G-tech gives you an update on how much free memory you have left after saving the run.

G-tech Stored Runs Capacity

The G-tech can store approximately 300 total seconds of racing. For example:

| Typical Run Length | Typical Number of Runs Stored |
|--------------------|-------------------------------|
| 10 seconds | 30 runs |
| 12 seconds | 25 runs |
| 15 seconds | 20 runs |
| 20 seconds | 15 runs |

This is a rough guideline — you should always be aware of how much free storage memory you have left (See “Checking Free Memory” on page 62.)

The G-tech imposes a limit of 30 runs total that can be stored, regardless of length. Enthusiasts who store many short runs might encounter this situation. If you do encounter this situation, you will see the following screen when you attempt to store the 31st run:

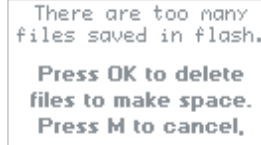


Figure 26: G-tech 30 file limit warning

Press **OK** to delete a file to make space for the run you just performed. You will then be presented with the following screen:

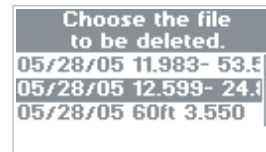


Figure 27: Choose a file to delete

Press **M** to cancel, or press **OK** to automatically replace the selected file with the new run.

The G-tech Keyboard Screen

Some of the G-tech features allow you to enter text. The G-tech has an on-screen keyboard to allow this.

- Use ◀ ▶ ▲ ▼ to move the selection cursor around the keyboard
- Press **OK** to append the currently-selected character to the text in the entry area
- To erase a letter in the entry area, move the selection cursor to the back-arrow (←), and press **OK**.

When done, press the **MY** button or move the cursor to “Enter” on the keyboard, and press **OK**.



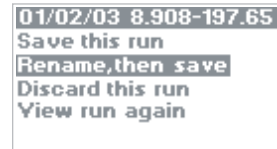
Renaming and saving a run

By default, the G-tech auto-names every run that you save by using the date and run results to create the name.

However, there may be times where you wish to rename a run with information (such as the track name, the vehicle, weather conditions, etc.) that is more meaningful to you.

Refer back to the G-tech Run Save menu in Figure 24. However, instead of accepting the default name, this time we will rename the run.

Select “Rename, then save”.



2

Use the keyboard (page 60) to edit the run name. First you will erase the original name.



3

Now use the keyboard (page 60) to enter the new run name.



4

To finish, either move the selection cursor to the “Enter” key on the keyboard and press **ESC**, or simply press **ENTER**.



5

The run will be saved with the new name.



Checking Free Memory

Since the G-tech allows you to store runs internally, over time you may begin to use up the free memory.

Deleting stored runs (p. 96) will free up memory. Also, you may want to download your runs to the PC (p. 99) for future analysis before deleting them.

The length of the stored run determines how much memory it uses inside the G-tech (longer runs take up more memory).

You can use the following procedure to check how much free memory you have left in your G-tech.

Start in **Drag Strip Mode**.



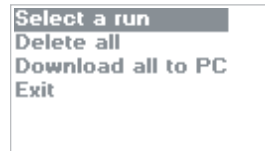
2

Press **MEM** to bring up the Drag Strip Main Menu, then press **OK** to select "Stored Runs."



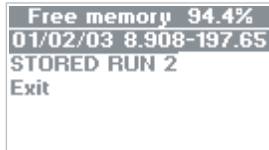
3

Press **OK** to choose "Select a run."



4

A screen such as this will appear (yours may look a little different). The top line of the display shows you how much free memory you have.



Saving a run / low on memory

Suppose you perform a run and then want to save the run, but the G-tech doesn't have enough free memory.

In this situation, the G-tech will give you an opportunity to delete one or more of your saved runs to make room for the new run.

Should this occur, you will see a screen such as Figure 28.



Figure 28: Low on Memory Warning

At this point, you have two choices:

- If you decide you don't want to save the run, press **M**
- If you want to save the run, press **OK** to delete one or more of your stored runs in order to make room

If you press **DEL**, a screen resembling Figure 29 will appear:

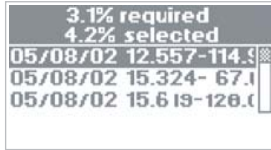


Figure 29: Deleting runs to free memory

The top line (“**required**”) indicates how much room you need to free up before saving the run. In this example, the G-tech is indicating that you need to free up **3.1%** more memory.

The line below it (“**selected**”) indicates how much room will be freed if you delete the run that is currently selected. In this example, the G-tech is indicating that if you delete the current run (which is named “**05/08/02 12.557-114.9**”), it will free up **4.2%** of the memory.

Since **4.2%** is larger than the required **3.1%**, deleting this run will allow you to save the new run.

Use the arrow keys to move to between different runs.

If you press **DEL**, the selected run will be deleted, and the numbers will be updated accordingly.

Once you have deleted enough runs to make room for the new run, the new run will automatically be saved.

Analyzing Runs

This section will show you how to use the G-tech to review and analyze the details of your runs.

Loading a Stored Run

Use the following procedure to recall/load a stored run.

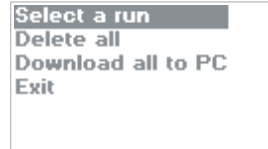
- 1 Start in **Drag Strip Mode**.



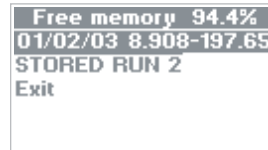
- 2 Press **MR** to bring up the Drag Strip Main Menu, then press **OK** to select "Stored Runs."




- 3 Press **OK** to choose "Select a run."



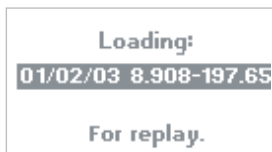
- 4 Use **◀**, **▶**, **▲**, and **▼** to select a run, and then press **OK** to load it.



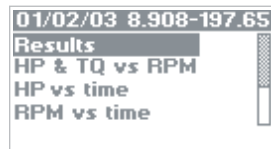
- 5 A menu such as this will appear. The name of the run you selected is on the top line. Since “View this run” is selected, press .



- 6 While the run is being loaded, the G-tech displays a screen such as this.



- 7 Once the run has been loaded, the G-tech displays the Run Viewing Menu as shown below. Notice that the name of the run you selected is on the top line.



Overview — Run Viewing Menu

The Run Viewing Menu (Figure 30) provides you with many options for analyzing your runs.

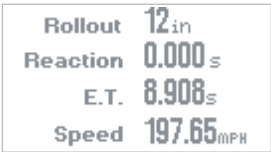
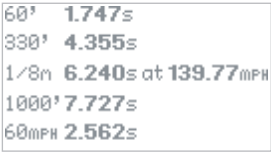
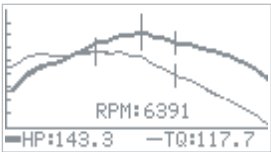


Figure 30: Run Viewing Menu

You can choose to view your run immediately after completing it, and you can also recall it later.

Figure 31 on page 71 provides an overview of each option in the Run Viewing Menu. Use it to become familiar with what each option does and then choose the options that interest you.

Run Viewing Menu

| Menu Item | Graph | Provides | Useful For... | Go to... |
|----------------|--|---|---|----------|
| Results |  <p>Rollout 12.1_{in} Reaction 0.000_s E.T. 8.908_s Speed 197.65_{MPH}</p>  <p>60' 1.747_s 330' 4.355_s 1/8m 6.240_s at 139.77_{MPH} 1000' 7.727_s 60_{MPH} 2.562_s</p> | 60 ft. time, 330 ft. time, 0-60 MPH time, 1/8 mile E.T. and trap speed, 1000 ft. time, 1/4 mile E.T. and trap speed | <ul style="list-style-type: none"> Measuring vehicle's straight line performance | p. 72 |
| HP & TQ vs RPM |  <p>RPM: 6391 HP: 143.3 TQ: 117.7</p> | Graph of Horsepower & Torque curves for a particular gear and RPM range | <ul style="list-style-type: none"> Getting a "dyno plot" of your vehicle Determining the best shift point | p. 72 |

| Menu Item | Graph | Provides | Useful For... | Go to... |
|---------------|-------|---|--|----------|
| HP vs time | | Graph of Horsepower output throughout the run | <ul style="list-style-type: none"> • Estimating effects of wind drag on your vehicle • Looking at horsepower throughout the run | p. 74 |
| RPM vs time | | Graph of Vehicle RPMs throughout the run | <ul style="list-style-type: none"> • Seeing where you shifted into each gear • Measuring time between gear shifts • Detecting wheelspin | p. 75 |
| Speed vs time | | Graph of Vehicle speed throughout the run | <ul style="list-style-type: none"> • Measuring time to get from one speed to another speed (e.g. 0-100 MPH, 50-70 MPH, 0-100-0 MPH, etc.) | p. 78 |

| Menu Item | Graph | Provides | Useful For... | Go to... |
|------------------|-------|--|--|----------|
| Gs vs time | | Graph of Forward acceleration throughout the run | <ul style="list-style-type: none"> • See how strong your car was pulling (accelerating) throughout the run • See how many negative Gs your car pulls while braking hard • Detecting wheelspin | p. 86 |
| Braking Distance | | Graph of Speed vs. Distance | <ul style="list-style-type: none"> • Measuring how many feet it takes your vehicle to stop from a given speed | p. 88 |

Figure 31: G-tech Run Viewing Menu Capabilities

Results

The “Results” menu entry provides you with all the information you’d get from a dragstrip timeslip, including milestones such as 60 ft. time, 1/8 mile time and speed, etc. For runs performed with a reaction time start mode (p. 129), your reaction time is given as well.

For more information on the “Results” menu entry, please refer to “Viewing Run Results” on page 55.

HP & Torque vs RPMs

One of the most exciting features of the G-tech is its ability to measure and graph your vehicle’s horsepower and torque against an RPM range.

The G-tech’s “HP & TQ vs RPM” menu entry provides you with a graph of horsepower and torque in an RPM range. This is the “dyno plot” that everyone is accustomed to seeing.

After you perform a run, the G-tech analyzes the data and then creates a graph based on the gear in which maximum horsepower was attained.

Note: *In order for you to get consistent HP & TQ graphs, there is an optimal driving technique to use. This technique is different than the driving technique you would use for a quick 1/4 mile!*

Please refer to “Horsepower, Torque & G-tech” on page 157 for more information on optimal technique for performing horsepower runs.

To view the horsepower (HP) and torque (TQ) graph for a run, select the menu choice titled “HP & TQ vs RPM” and press **OK**:



You will see a screen (Figure 32) that gives you a summary of the horsepower and torque measurements for the run.

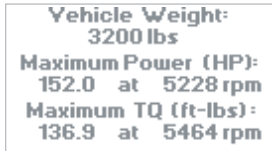


Figure 32: Horsepower / Torque summary

The G-tech calculates horsepower and torque throughout the RPM range measured during the run and finds the peak value for each. It displays the values, along with the vehicle weight, on the summary screen.

Note: Vehicle weight is displayed because the G-tech uses vehicle weight in the horsepower calculation. If you accidentally entered the wrong weight, the calculated horsepower will be off.

Refer to “Horsepower, Torque & G-tech” on page 157 for more information on vehicle weight and horsepower/torque calculations.

To proceed to the HP & TQ vs RPM graph, press **OK** again.

You will see a graph such the one shown in Figure 33. Of course the shape of the curve, as well as the numbers and ranges, will be different for your vehicle.

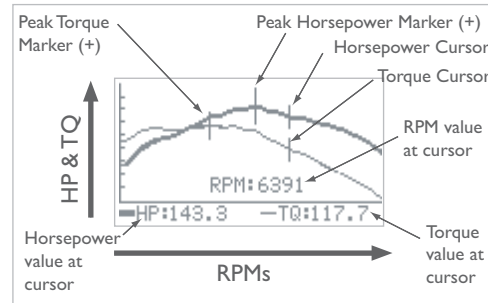


Figure 33: Graph of Horsepower & Torque vs RPMs

You will notice a few things about the graph screen:

- The horsepower curve is drawn with a **thick line**; the torque curve is drawn with a thin line.
- The peak horsepower and torque values are marked on the graph with vertical bars.
- The peak horsepower and torque markers correspond to the values seen on the Horsepower/Torque summary screen (Figure 32).
- The graph has moveable cursors for HP and TQ. The cursors move left and right using ◀ and ▶.
- The HP cursor rides along the HP curve, and the TQ cursor rides along the TQ curve.
- As the cursor moves, the “RPM,” “HP,” and “TQ” values are updated to reflect the current cursor position.

HP vs time

The “HP vs time” menu entry provides you with a graph of horsepower throughout the run.

This is not the optimal graph for analyzing horsepower. It will show artifacts around shiftpoints that are due to factors other than engine horsepower. The graph will also show the increasing effect of aerodynamic drag on the vehicle and the corresponding lower “net horsepower” as the speed increases.

To view the horsepower (HP) vs. time graph for a run, select the menu choice titled “HP vs time” and press **OK**:



You will see a graph such the one shown in Figure 34. Of course the shape of the curve, as well as the numbers and ranges, will be different for your vehicle.

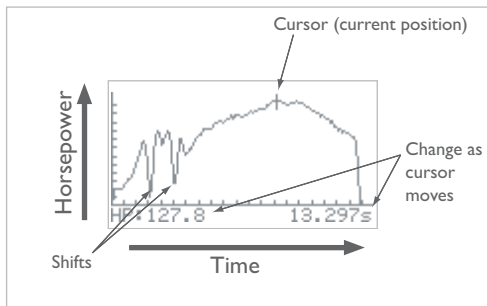


Figure 34: Graph of horsepower vs time

- As you move the cursor with ◀ and ▶, the horsepower and time values are adjusted to match the cursor.
- Note the “dips” in measured horsepower on the 1-2 shift and the 2-3 shift
- This was a “3rd gear horsepower run” because the user spent the most time in 3rd gear
- Each tic mark on the horizontal axis represents 1 second
- Each tic mark on the vertical axis represents 10 HP


RPM vs time

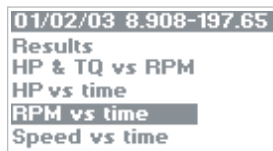
The “RPM vs time” menu entry provides you with a graph of vehicle RPMs throughout the run.

This is one of the most-used G-tech graphs.


By looking at the data in this graph, you can find out:

- how much time you spent in each gear
- what time each shift occurred
- how long each shift lasted
- the RPM range in each gear
- the RPMs (and implied gear) for each milestone
- whether you experienced wheelspin (look for a sudden sharp rise in RPMs)
- whether you should stay in a particular gear longer for better results (for example, maybe you’re shifting into 4th gear just before the 1/4 mile mark and would actually benefit from remaining in 3rd gear through the finish line)

To view the RPM vs. time graph for a run, select the menu choice titled "RPM vs time" and press :



In order to give you the feel and excitement of the run, the RPMs are replayed in real-time, just as they were happening during the run. This means that if you did a 15-second run, it will take 15 seconds to draw the RPM plot. During RPM replay, the G-tech illuminates an LED at any point where the shiftlights were on during the run.

Note: To finish the replay quickly, rather than in real-time, simply press the  button while it is being drawn.

Once the graph is fully drawn, you will see a graph such as the one shown in Figure 35.

Note: Your graph will look different due to your driving style and vehicle.

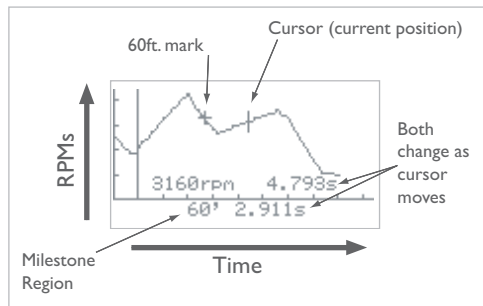


Figure 35: Graph of RPMs vs Time

On this graph,  and  move the cursor along the RPM curve.

As the cursor moves, the RPM value and timestamp value adjust to reflect the values at the cursor position.

Each tic mark on the horizontal axis represents 1 second.

Each tic mark on the vertical axis represents 1000 RPM.

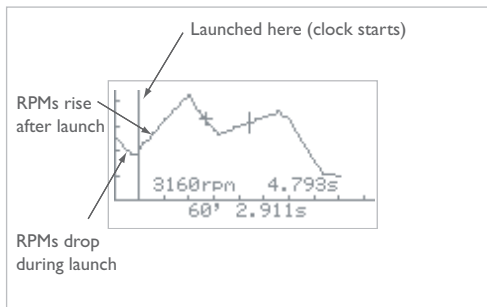


Figure 36: RPMs vs Time — launch

You will see a tall vertical bar on the graph that marks the launch where the G-tech began timing.

Thus you can see what your RPMs were at launch, and even for a brief period before launch.

Generally you will see a dip in RPMs at the launch, as the clutch engages and loads the engine.

Note: *The launch is perhaps the most crucial part of a run. By using the G-tech to analyze graphs of your RPMs (p. 75) and your forward acceleration (p. 86), you can perfect your launch technique and improve your times!*

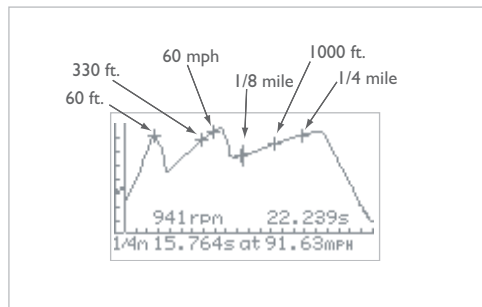


Figure 37: RPMs vs Time — milestones

You will see a plus sign (+) on the graph at each place where a milestone occurred (Figure 37). When you move the cursor over a milestone marker, the milestone region will be updated with the name of the milestone and its timestamp.

Note: *You must move the cursor over a milestone (from either direction) to update the milestone region. If you move the cursor near another milestone, but not over it, the milestone region will not be updated.*

Assuming that you let off the throttle during a shift, note that by placing the cursor at each peak in the graph, you can determine the time and RPM value where you shifted into each gear.

Figure 38 shows how to use this graph to analyze the time spent in each gear and how long each shift took.

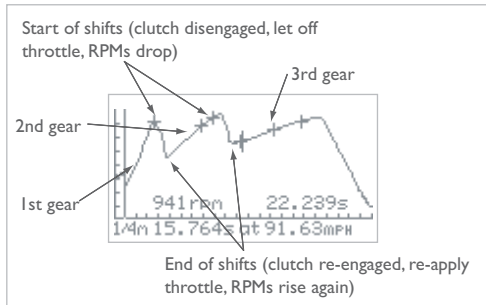


Figure 38: RPMs vs time — shifts and gears

You can determine how long a gear shift took by doing the following:

- place the cursor at a peak RPM value for one gear and make note of the time
- move the cursor to the right just until the RPMs begin rising again and make note of the time


The difference between these times is the shift time. Your vehicle actually slows a bit during shifts, so keep this time to a minimum!

Speed vs time

The “Speed vs time” menu entry provides you with a graph of speed throughout the run.

You can use this graph to measure things such as:

- time to get from one speed to another speed (e.g., 0-50 MPH, 40-60 MPH, etc.)
- time to accelerate from 0 to a certain speed, and brake to 0 again (e.g., 0-100-0 test)
- time to brake to a halt from a particular speed (e.g., 60-0 braking time)

To view the speed vs. time graph for a run, select the menu choice titled “Speed vs time” and press :



You will see a graph such as the one shown in Figure 39. Of course the shape of the curve, as well as the numbers and milestones, will be different for your vehicle.

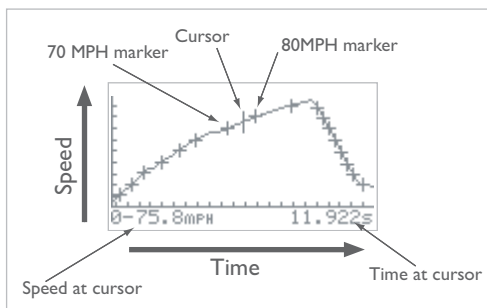


Figure 39: Graph of Speed vs time

You can use ◀ and ▶ to move the cursor on the graph.

As you move the cursor, the current speed and elapsed time indicators are updated to match the cursor position.

Each tic mark on the horizontal axis marks a 1-second difference.

Each tic mark on the vertical axis marks a 10 MPH difference.

A plus sign (+) marks where each 10 MPH increment occurred on your run. Whenever you move the cursor past a plus sign, the numbers on the bottom of the graph are updated to reflect the time to get to that speed from 0 MPH.

For example, when you move the cursor over the 7th plus sign, the numbers reflect the 0-70 MPH time.

Note: The speed milestone indicator will not change until the cursor rolls over a different 10 MPH marker.

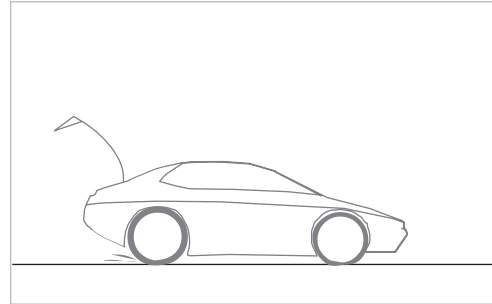
Measuring 0-40 MPH, etc.

Suppose you want to measure the time it takes you to reach a certain speed (say, 40 MPH) from a standstill. This section will show you how to do it.

Note: *In this example, we measure 0-40 MPH time, but you can use the same procedure to measure the time it takes to reach any speed you wish.*

Perform an acceleration run, **making sure you hit the speeds you want to measure.**

In this example, we are measuring 0-40 MPH, so we made sure the driver reached 40 MPH during the acceleration run.



- 2 To view the Speed vs. Time graph, select the menu choice titled “Speed vs time” and press **END**:

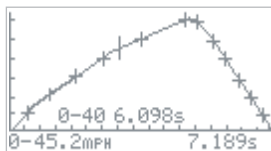
```

01/02/03 8.908-197.65
Results
HP & TQ vs RPM
HP vs time
RPM vs time
Speed vs time
  
```

- 3 On this graph, notice how the speed (vertical axis) rises for a while, and then falls again. This is because the vehicle braked to a complete stop at the end of the run.

For now (0-40 MPH), we only care about the rising part of the graph, during acceleration from 0 to 40 MPH.

Use the **◀ ▶** keys to move the cursor over the 40 MPH milestone *on the rising part of the graph*. The 0-40 MPH time is displayed.



Measuring 50-70 MPH, etc.

Suppose you want to measure a vehicle’s acceleration at highway speeds (sometimes referred to as a “passing test”). This test is often done in the vehicle’s top gear (5th or 6th gear in most vehicles) to measure how well the vehicle can accelerate on the highway without downshifting.

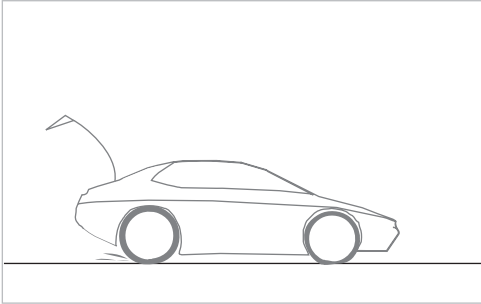
You may also wish to use this feature to measure the same interval (e.g. 50-70 MPH) in several different gears. For example, many vehicles can cover 50-70 MPH in 2nd gear, 3rd gear, 4th gear, and 5th gear. This measurement will tell you which single gear is the best choice for this speed range.

Let’s suppose you want to measure your 50-70 MPH time. This example will show you how to use the G-tech to do it.


Note: You can measure any interval you wish using the procedure described below – we have just chosen 40-60 MPH for this particular example.

Perform an acceleration run, **making sure you hit the speeds you want to measure.**

In this example, we are measuring 40-60 MPH, so we made sure the driver reached 60 MPH during the acceleration run.



2



To view the Speed vs. Time graph, select the menu choice titled “Speed vs time” and press :




3

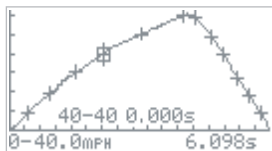
On this graph, notice how the speed (vertical axis) rises for a while, and then falls again. This is because the vehicle braked to a complete stop at the end of the run.

For measuring the 40-60 MPH acceleration time, we only care about the *rising* part of the graph, during acceleration from 40 to 60 MPH.


Use the   keys to move the cursor over the 40 MPH milestone *on the rising part of the graph*.

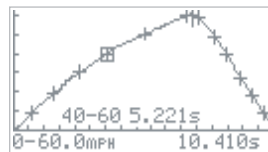
Press  and a box will be drawn around the 40 MPH milestone.

Since the cursor is still on 40 MPH, a 40-40 MPH time of 0.000 is displayed.



4

Now use the  key to move the cursor over the 60 MPH milestone *on the rising part of the graph*. Since the cursor is now on 60 MPH, the 40-60 MPH time is displayed.



Measuring 0-100-0, etc.

Suppose you want to perform the classic 0-100-0 MPH timed measurement... how quickly can your vehicle reach 100 MPH, and how quickly can it bring the vehicle back to a stop?

The G-tech provides you with all the tools you need to perform this test!

This section will show you how to perform this measurement.

Note: *In this example, we demonstrate measuring 0 - 60MPH - 0 MPH. You can measure “0 - <any speed> - 0” you wish using the procedure described below – we have just chosen 0 - 60MPH - 0 MPH for this particular example.*

When doing a test like this, we recommend:

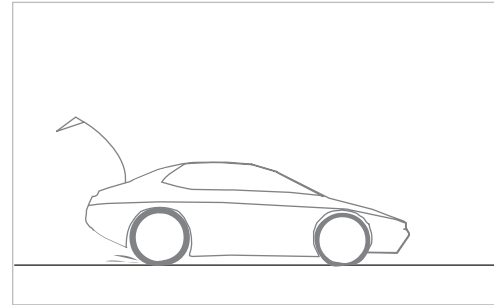
- disabling all distance marks (page 106)
- disabling your shiftlights (page 110)

Next, set the speed mark to the desired speed (in this case, 60 MPH - see page 105 for details on setting the speed mark).

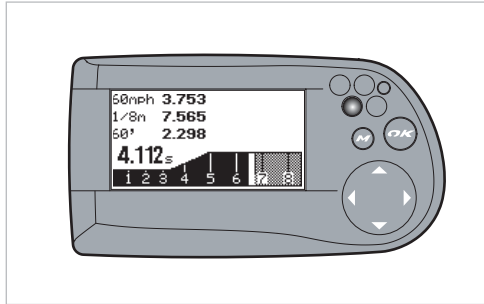
This ensures the only light that will come on during your run is the 60 MPH speedmark light.

To do the 0-60-0 test:

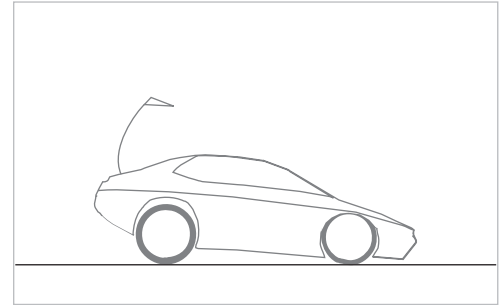
Launch your vehicle and start an acceleration run (page 52).



- 2 Keep accelerating until the speedmark light comes on.



- 3 Immediately brake hard, all the way to a stop.




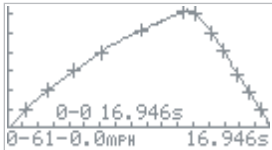
- 4 Keep the vehicle at a stop until the E.T. clock stops counting (about one second once you have completely stopped).

- 5 Bring up the "Speed vs time" graph for this run.



6

Notice the “upside down V” shape to the curve. Use the  key to move the cursor all the way to the right hand side of the screen. In this case, the driver actually went up to 61 MPH, so we get the 0-61-0 time, which is displayed on the bottom line.




Gs (Acceleration) vs time

Gs (pronounced like “Geez”) are a measure of acceleration.

The “Gs vs time” menu entry provides a graph of forward acceleration (“Gs”) vs time. Larger G values indicate stronger acceleration.

This graph is useful for seeing how hard your vehicle was pulling when it was accelerating (positive Gs) and how hard it was decelerating while braking (negative Gs.)

To view the Gs vs. time graph for a run select the menu choice titled “Gs vs time” and press :



You will see a graph such the one shown in Figure 40.

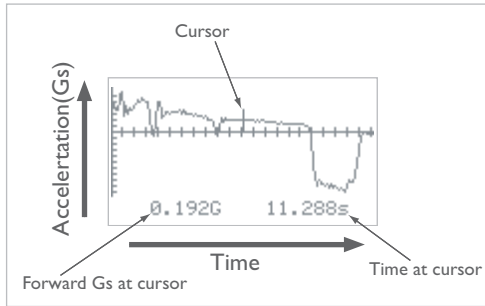


Figure 40: Graph of Gs vs time

Some things to note about this graph:

- As with other graphs, you can use ◀ and ▶ to move the cursor. The G-reading and timestamp always reflect their respective readings at the current cursor position.
- Each tic mark on the horizontal axis marks 1 second
- Each tic mark on the vertical axis marks 0.1G of acceleration

Figure 41 highlights some other useful information on the graph.

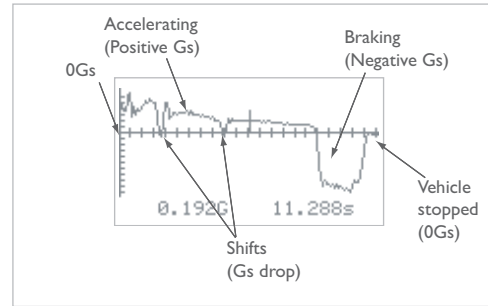


Figure 41: Braking and accelerating

- When the G plot is above the horizontal axis, it means the vehicle is accelerating.
- When the G plot is below the horizontal axis, it means the vehicle is decelerating (e.g. coasting, braking).
- The brief dips you see in the graph are shift points. When you shift, you temporarily remove power, and this causes the vehicle to decelerate briefly, until you re-gear the next gear.
- In a very powerful vehicle, or a traction-limited vehicle, you may also spot dips in acceleration that are not due to shifts.

These are due to more power being applied to the wheels than can be handled. The net result is that the wheels spin and the vehicle does not accelerate.

- The large dip you see at the end of the graph is hard braking at the end of the run.
- Notice at the end of the graph, Gs are zero. This is because the vehicle came to a stop. Hence there is no acceleration or deceleration.

Braking Distance

The “Braking Distance” graph is useful for seeing how many feet it took your vehicle to stop from a specific speed.

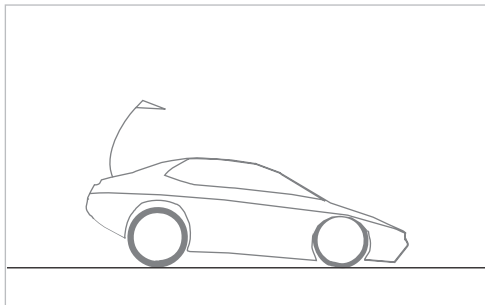
For example, you can use this graph to determine 60-0 MPH braking distance. This is a common measurement in automobile reviews.


As another example, when upgrading the brakes or tires on your car, you might be interested in a “before” and “after” comparison of your braking distance.

This graph also allows you to view intermediate braking results, such as 100MPH - 40MPH, or any other endpoints you choose.

Note: *If you do not brake to a complete stop at the end of your run, and let the E.T. clock stop, the data on this graph will not be very useful to you.*

Perform an acceleration run, **ending the run by braking hard to a complete stop**. Make sure that the E.T. clock continues to run until the vehicle is completely stopped. If the E.T. clock stops before the vehicle has come to a stop, your results will not be meaningful.

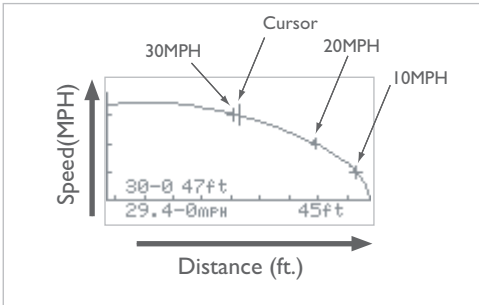
**2**

To view the braking distance graph, select the menu choice titled “Braking distance” and press :

```
01/02/03 8.908-197.65
HP vs time
RPM vs time
Speed vs time
Braking distance
Gs vs time
```

3

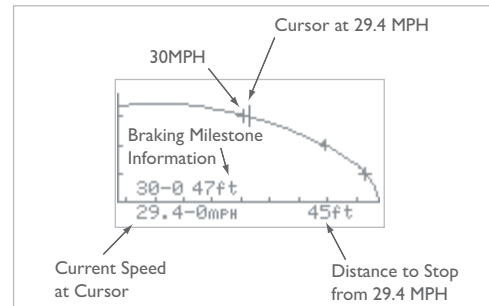
You will see a graph such the one shown below. On the vertical axis, the tic marks identify 10 MPH increments. Each plus sign (+) identifies a 10 MPH milestone during vehicle braking. The cursor is "live" and can be moved along the plot with ◀ and ▶.






4

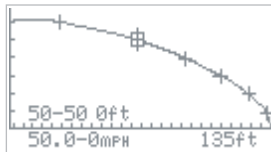
As the cursor is moved, the "current speed" and "distance to stop" fields are updated. Each time the cursor is rolled over a plus sign on the graph, the braking milestone information is updated for that milestone. In the following graph:

- At the cursor, "current speed" is 29.4 MPH, and "distance to stop" is 45ft. Thus, it took 45 ft. to stop from 29.4 MPH.
- The braking milestone information indicates that it took 47 feet to brake from 30 MPH. Moving the cursor further to the right would give braking distance from 20 MPH, 10 MPH, etc.



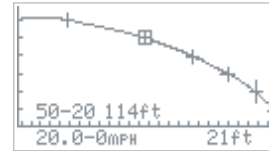
For intermediate braking results (e.g. 50-20 MPH), use the  button while on a milestone, as shown in the following example.

1 Move the cursor to the upper milestone, and press . In this example we will measure 50-20 MPH braking distance, so we put the cursor on the 50 MPH milestone and press . A box appears around the milestone, indicating that braking distance will be measured relative to 50 MPH.



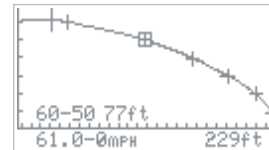
2

Move the cursor to the right until it reaches the 20 MPH milestone. The G-tech displays the braking distance from 50-20 MPH.



3

Move the cursor to the left until it reaches the 60 MPH milestone. The G-tech displays the braking distance from 60-50 MPH. Notice that in all cases, the bottom line of information always reflects the braking distance from the current cursor position to 0 MPH.



Stored Runs

This section will show you how to rename, delete, and download your stored runs to a PC.

Refer to “Saving a run / default name” on page 58 for more information on storing runs in your G-tech.

Recalling a Stored Run

Once you have stored a run in the G-tech, you can recall it at any time and examine its details.


Please refer back to “Loading a Stored Run” on page 66 for details on loading (recalling) a stored run.

Once the run has been loaded, you can do any of the following:

- **View the run results (milestones, E.T., graphs, etc.)**
See “*Reviewing Stored Run*” on page 94.
- **Rename the run**
See “*Renaming A Stored Run*” on page 95.
- **Delete the run from the G-tech’s internal memory**
See “*Deleting a Stored Run*” on page 96.
- **Download the run to the PC**
See “*Downloading A Stored Run*” on page 97.

Reviewing Stored Run

Once you have recalled a run from the G-tech (page 66), you can review the run as follows:

1 Select “View this run” and press .



2 While the run is being loaded, you will see a screen similar to the following:



3

At this point, the Run Viewing Menu will appear as shown.

For details on using the Run Viewing menu, please refer to “Overview — Run Viewing Menu” on page 68.



Renaming A Stored Run

Once you have recalled a stored run from the G-tech (page 66), you can rename it as follows:

- 1 Select “Rename this run” and press **OK**.



- 2 At this point, the procedure is the same as renaming a new run. Please refer to “Renaming and saving a run” on page 60.

Deleting a Stored Run

Once you have recalled a stored run from the G-tech (page 66), you can choose to delete it from the G-tech's internal memory. This will free up memory so that you can store other runs.

The procedure to delete a recalled run is as follows:

1 Select "Delete this run" and press **OK**.



2

The following screen will appear. Press **DOWN** if you want to delete the run, or **NO** if not.



Downloading A Stored Run

Once you have recalled a stored run from the G-tech (page 66), you can transfer it from the G-tech to a computer.

Note: Transferring a run to the computer does not delete it from the G-tech.

Note: Before transferring a run to the computer, you should connect the serial cable between the G-tech and the computer. Refer to “G-tech-Computer Connection” on page 157 for more information on connecting the G-tech to a computer. You should also ensure that the G-tech Performance Analysis System Software (PASS) is ready to receive data from the G-tech. Further instructions are provided with the PC software.

Use the following procedure to send the current run to a computer:

- 1 Select “Download to PC” and press **M**.



- 2 You will see a screen such as this. The computer and the G-tech will “see” each other and begin communicating back and forth. You can press **M** at any time to abort the process, even if the G-tech has not begun the transfer.



Deleting ALL Stored Runs

At some point, you may wish to delete all of the stored runs in your G-tech.

Note: *This is a drastic step that will cause you to lose all information about the runs in your G-tech. Be sure this is what you want to do before proceeding!*

Use the following procedure to delete all the stored runs on your G-tech.

Start in **Drag Strip Mode**.



2

Press **DR** to bring up the Drag Strip Main Menu, then press **OK** to select "Stored Runs".




3

Choose "Delete all" and press **OK**.



4



You will see this screen.

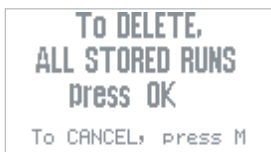
To proceed with the delete, press .

To cancel this and keep all your runs intact, press



5

To finish the process, press . To cancel this and keep all your runs intact, press .



Downloading All Stored Runs

At some point, you may wish to download all of the stored runs in your G-tech.

Perhaps you want to analyze all your runs in more detail on a computer, or perhaps you just want to transfer all your runs to a computer so you can delete them on the G-tech.

Note: Before transferring a run to the computer, you should connect the serial cable between the G-tech and the computer. Refer to “G-tech-Computer Connection” on page 157 for more information on connecting the G-tech to a computer. You should also ensure that the G-tech PASS PC software is ready to receive data from the G-tech. Further instructions are provided with the PC software.

Note: Transferring runs to the PC does not remove them from the G-tech.

Use the following procedure to transfer all the stored runs on your G-tech:

1 Start in **Drag Strip Mode**.



2 Press **↵** to bring up the Drag Strip Main Menu, then press **↵** to select "Stored Runs".



3 Choose "Download all to PC" and press **↵**.



4 The following screen will appear. You can cancel the transfer at any time by pressing **↵**.



Advanced Features

This section will show you how to use some of the more advanced features of the G-tech.

Setting U.S. or Metric Mode

The G-tech can display units in U.S. mode (feet, pounds, miles per hour, etc.) or Metric mode (meters, kilograms, kilometers per hour, etc.).

Set the G-tech to operate in whichever mode you prefer to view data.

Note: When you switch between metric and U.S. modes, it affects only how the data are displayed, not how the data are saved inside the G-tech.

In other words, you can switch between metric and U.S. modes at any time, without losing any configuration information or vehicle measurements.

The following table lists the units for each configuration item in the G-tech, both in U.S. mode and Metric mode:

| Item | U.S. unit | Metric unit |
|---------------|----------------|---------------------|
| Weight | lbs | kilograms |
| Speed | miles per hour | kilometers per hour |

| Item | U.S. unit | Metric unit |
|-----------------|--------------|---------------|
| Distance | inches, feet | cm, meters |
| Power | horsepower | kilowatts |
| Torque | ft-lbs | newton-meters |

When performing and viewing runs, there are also corresponding measurements in both modes:

| U.S. Mode Measurement | Metric Mode Measurement |
|-------------------------|-------------------------|
| 60 ft time | 20m time |
| 330 ft time | 100m time |
| 1/8 mile time and speed | 200m time and speed |
| 1 000 ft time | 300m time |
| 1/4 mile time and speed | 400m time and speed |
| 0-60 MPH time | 0-100 km/h time |

The G-tech measures and stores both full sets of measurements on every run, regardless of which mode you are in. In other words, even if you perform a run in U.S. mode, the G-tech is also monitoring and storing all the metric milestones as well, and vice versa.

This means that now enthusiasts all over the globe can compare results with each other, just by switching modes after a run is completed!

For example, let's suppose an enthusiast named Joe is in U.S. Mode when he does all of his acceleration runs, and an enthusiast named Simon is in Metric Mode for his runs.

All Joe and Simon have to do to compare their runs against each other ("apples to apples") is put their G-techs into the same mode (U.S. or Metric) before they review their runs.

When Joe compares his 100M time against Simon's 100M time, they are comparing exactly when each of them crossed the 100M point.

Joe and Simon can also compare U.S. mode milestones simply by putting their G-techs in U.S. mode.

Use the following procedure to switch between U.S. mode and Metric mode in the G-tech.

- 1 Start in **Configuration Mode**.



- 2 Select "Gtech Setup" and press .



3

Scroll down and select “US or Metric” and press



4

Choose U.S. Mode or Metric Mode.

The asterisk (*) indicates the active choice.

▲ / ▼ moves cursor.

OK makes selection.

When done, select “Exit” and press OK.

Note: In this example, Metric Mode is the current/active mode, as indicated by the * next to it. U.S. mode will be activated only if the user highlights “US Mode” and then presses OK.



Setting the Speed Mark

Have you ever wondered at what point you reach a certain speed during an acceleration run?

With the G-tech's Speed Mark feature, now you will know.

Simply set the Speed Mark value to whatever speed you want, and then during an acceleration run, the lower left LED will illuminate for 1 second when your vehicle reaches that speed.

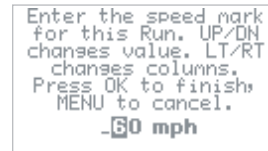
Start in **Configuration Mode** and Select "Run Parameters".



2 Select "Speed Mark".



3 Enter your desired speed mark by using the arrow keys. Press **OK** when done, or press **ABT** to abort.



Note: The speed mark can be set to any value in the range 20-150 MPH. It cannot be turned off completely. However, setting it to 150 MPH will effectively turn it off in a vehicle that doesn't reach 150 MPH.

Setting the Distance Marks

Have you ever wondered at what point you reach a certain distance during an acceleration run?

With the G-tech's Distance Marks feature, now you will know.

There are three distance marks:

- 60 ft. mark
- 1/8 mile mark
- 1/4 mile mark

Each of these marks can be individually enabled or disabled.

When you have a distance mark enabled, and the vehicle has reached that distance, the G-tech illuminates the upper right LED for one second.

For example, if you have all three distance marks enabled, and you do a full 1/4 mile acceleration run, the upper right LED turns on three times during the run.

1 Start in **Configuration Mode** and select "Run Parameters".



2 Select "Distance Marks".



3

Use **▲** and **▼** to move the cursor to the desired speed mark. Pressing **OK** toggles the speed mark on and off. An asterisk (*) next to a mark means it is on.

When done, select "Exit" and press **OK**.



Shiftlights Overview

In **Drag Strip Mode**, the G-tech is always monitoring vehicle RPMs, and can be programmed to turn on LEDs (shiftlights) when an RPM level called the "shiftpoint" has been reached.

This is an individual preference and depends on your driving style and your goals.

You determine the RPM level where the shiftlights come on, and you can also enable/disable the shiftlights at will.

As you analyze your runs with the G-tech and measure your horsepower and torque vs. RPMs (p. 72), you may determine that the best shiftpoint is not at vehicle redline, but at a different value.

The shiftlights feature can help with this by turning on at an RPM value you've set, so that you shift for optimal power delivery.

Since no one can shift instantaneously, the G-tech gradually prepares you for the shift by illuminating the shiftlights in three sequential stages as you approach the shiftpoint. This

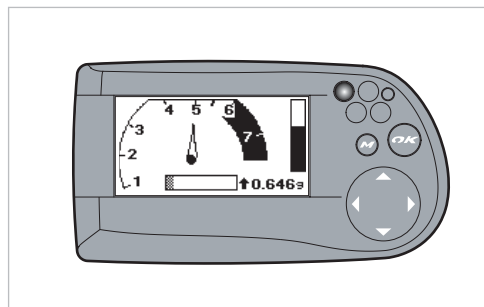
sequential activation allows you to anticipate when to shift. Our research indicates that this improves consistency.

The following example illustrates how the shiftlights work.

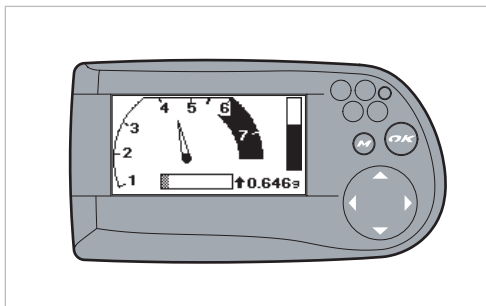
Note: In this example, the shiftpoint is set to **5500 RPM**.

Note: This example shows the shiftpoints operating while on the G-Window. The shiftlights also operate while you are performing a timed acceleration run as well. Many users will find the shiftlights extremely valuable during a run.

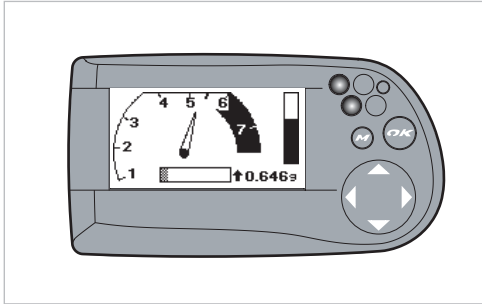
2 5000 RPM: Shiftlights first turn on.



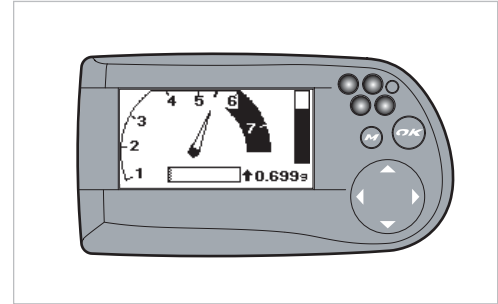
4500 RPM: Shiftlights are off.



3 5250 RPM: Shiftlights are more intense.



4 5500 RPM: Shiftlights fully on and blinking rapidly.



Enabling / Disabling Shiftlights

Use the following procedure for enabling/disabling the Shiftlight LEDs. (Refer to page 21 for information on setting the RPM shiftlight shiftpoint.)

- 1 Start in **Configuration Mode**.



Run Parameters
Vehicle Data
Calibration
Gtech Setup
Drag Strip Mode

- 2 Select "Vehicle Data".







Run Parameters
Vehicle Data
Calibration
Gtech Setup
Drag Strip Mode

- 3 Select "Shiftlights".



MUSTANG 66
Vehicle Weight
Engine Redline
Shiftlights
Cornering Lights

- 4 Select On or Off by using  and , then press  to make your selection. An asterisk (*) indicates your current choice. Select "Exit" and press  when done.



On
*Off
Set Limits
Exit

Cornering Lights Overview

In **Drag Strip Mode**, the G-tech is always monitoring lateral acceleration, also referred to as “cornering Gs.”

The G-tech can be programmed to turn on “Cornering Lights” when a lateral G-force threshold called the “Lower G Limit” has been reached.

The cornering lights allow you to anticipate when you are getting close to the limits of your car.

When the cornering Gs first reach the Lower G Limit, the Cornering Lights begin to blink slowly.

There is also a value called the “Upper G Limit” that marks the point where the cornering lights are blinking very rapidly.

As the cornering Gs approach the Upper G Limit, the Cornering Lights blink more quickly. The quicker the blinking, the more Gs you are pulling.

Figure 42 shows how the Cornering Lights react to different levels of cornering G forces.

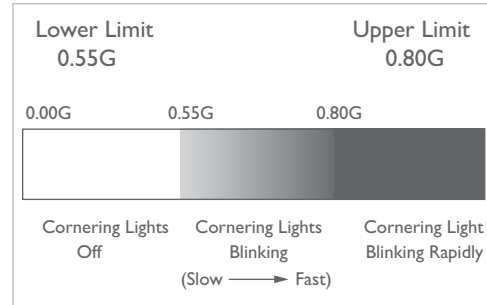


Figure 42: Cornering Lights Behavior

You can set the Upper and Lower G Limits to whatever value makes sense for you and your vehicle. You also have the ability to enable/disable the Cornering Lights completely.

WARNING: Adverse weather conditions can severely impair a vehicle’s cornering capabilities. Please use caution when setting Cornering Light limits.

WARNING: Do not rely on the Cornering Lights for indications of tire adhesion/safety. Many factors can affect the G limit of your vehicle, such as tire pressure and wear, temperature, aerodynamic drag, bank of road/track, road condition, and others. The G-tech should not be used as the only basis for driving decisions.

WARNING: There is a slight lag between when the G-tech senses lateral Gs and when the cornering lights are activated. This is intentional and is done to increase immunity to transient lateral acceleration surges that are unrelated to the steady-state driving conditions. Acquaint yourself with the G-tech's cornering lights behavior on a familiar track and in a familiar vehicle.

WARNING: The cornering lights rely on accurate measurements of lateral (cornering) acceleration. It is important that when your vehicle is at rest on the G-Window, both acceleration bars should indicate little or no acceleration. If this is not the case, please refer to "Self-leveling the G-tech" on page 49.

Note: *The cornering lights will not be accurate on banked turns.*

Setting the Cornering Lights

This section describes how to set the Upper and Lower G Limits for the Cornering Lights.

1 Start in **Configuration Mode**.



Run Parameters
Vehicle Data
Calibration
Gtech Setup
Drag Strip Mode

2 Select "Vehicle Data".

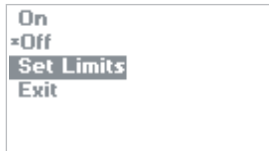


Run Parameters
Vehicle Data
Calibration
Gtech Setup
Drag Strip Mode

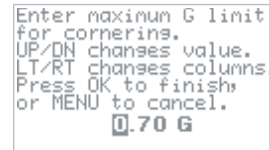
- 3 Select "Cornering Lights".








- 4 Select "Set Limits".



- 5 You will see the following screen. This screen is where you set the Upper G Limit for the Cornering Lights. Use ◀ ▶ ▲ ▼ to change the value. The value can range from 0.05G to 9.99G. Press **OK** when done.




6

You will see the following screen.
This screen is where you set the Lower G Limit for the Cornering Lights.
Use     to change the value.
The value can range from 0.01G to just a little below the Upper Limit you set in the previous step.
Press  when done.

```
Enter G limit where
cornering lights first
start blinking.
UP/DN changes value.
LT/RT changes columns.
To finish, press OK
  0.40 G
```




7

You will see the following warning screen.
Read the text, and then press  when done.

```
WARNING:
On wet roads, lower
your cornering G limit
significantly!
To continue, press OK
```

Please use the following procedure for enabling / disabling the Cornering Lights.

I

Select On or Off by using   and press  to make your selection.

An asterisk (*) indicates the current choice.

Select "Exit" and press  when done.

```
On
*Off
Set Limits
Exit
```

Displaying Firmware Version

The firmware version in the G-tech indicates how recently your G-tech has been updated with new code.

You can check the Tesla Electronics website at:

<http://www.gtechpro.com>

to see if newer G-tech firmware (code) is available.

Also, if you ever call Tech Support, you will most likely be asked what version of firmware is on your G-tech. This information assists in the troubleshooting process.

Start in **Configuration Mode**.




2 Select "Gtech Setup" and press .



3 Select "Firmware Version" and press .



4

A screen such as this will appear and provide information on the G-tech firmware version. **Your screen may differ, depending on which version of firmware you are running.** Press  to exit.



Resetting to Factory Defaults

In some cases you may want to restore the G-tech to the condition it was in when it was shipped from the factory.

This will clear out all the configuration information and stored runs.

Note: *Resetting the G-tech to Factory Defaults is a drastic step that causes you to lose all the information that is stored on the G-tech. Perform this step only if you are sure that you want to delete all configuration information and stored runs!*

Start in **Configuration Mode**.



- 2 Select "Gtech Setup" and press **OK**.



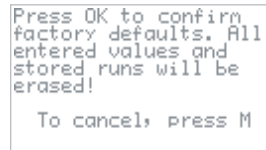
- 3 Select "Reset To Defaults" and press **OK**.



- 4 Because this is such a drastic step, a screen such as this will appear. Press **▼** to continue the process, or **M** to cancel.



- 5 One final level of confirmation is needed before the reset. Press **OK** to completely reset the G-tech, or **M** to cancel.



Note: After you have performed this step, you will need to perform the steps in the Quick Setup section again (page 66) before using your G-tech!

Serial Port Baud Rate

The G-tech uses a serial port to communicate with external devices such as your PC.

The “baud rate” determines how fast the G-tech communicates with the computer. The higher the baud rate, the faster the G-tech sends and receives data.

Some PCs cannot keep up with the G-tech at high baud rates, however. Therefore, the G-tech allows you adjust the baud rate so that you can match it to a baud rate on the computer that works reliably.

When using the serial port, start by using the fastest baud rate (115,200) on both the computer and the G-tech. If you

have problems getting the two devices to communicate, lower the baud rate on both and try again.

1 Start in **Configuration Mode**.



2 Select “Gtech Setup” and press .



3

Select "Serial Port Settings" and press **OK**.



4

Use **▲** **▼** to select the desired baud rate and press **OK**. The current baud rate is indicated with an asterisk (*). Select "Exit" and press **OK** when finished.



Adjusting the LCD Contrast

The G-tech uses a Liquid Crystal Display (LCD) to display information.

You may want to adjust the contrast on the LCD due to personal preferences, environmental conditions, etc.

Use the following procedure to adjust your LCD's contrast.

Start in **Configuration Mode**.




2 Select "Gtech Setup" and press .



3 Select "LCD Contrast" and press .



4 You will see a screen similar to the screen shown here.

Use   to adjust the contrast on the LCD.

When done, press  to save changes and exit.



Multiple Vehicles

This section will show you how to use the G-tech with up to 4 different vehicles.

Multiple Vehicle Usage

Many G-tech enthusiasts will want to use the G-tech in multiple vehicles.

Perhaps you have several vehicles that you want to compare against each other... or maybe you have a friend with a vehicle that you want to benchmark.

With the G-tech's ability to support up to four vehicles, you just tell the G-tech about the information that is specific to each vehicle.

When you move the G-tech to another vehicle, just select that vehicle in the G-tech. The G-tech adjusts everything based on the vehicle you have selected.

Vehicle-Specific Data

The first time you select a vehicle in the G-tech (page 123), you must enter in the information specific to that vehicle before using it.

This is a list of the information that you must enter for each vehicle that you use with the G-tech:

- Vehicle name (page 124)
- Vehicle weight (page 23)
- RPM calibration (page 25)
- Engine Redline (page 20)
- Shiftlights Shiftpoint RPM value (page 21)
- Shiftlights On/Off setting (page 110)
- Cornering Lights G Limits (page 112)
- Cornering Lights On/Off setting (page 112)

Selecting a Vehicle

As mentioned earlier, the G-tech stores information specific to as many as four different vehicles.

Use the procedure below to select a different vehicle.

- 1 Start in **Configuration Mode**.






- 2 Select "Vehicle Data" and press .



- 3 Scroll down and select "Choose Vehicle" and press .



- 4 You will see a screen similar to the following. An asterisk (*) identifies the active vehicle. To select a different vehicle, move the highlight bar to the desired vehicle and press . The G-tech will immediately re-configure itself to use the information for the new vehicle and display the **Configuration Mode** main menu. To exit without selecting a different vehicle, either press the  button, or go down to "Exit," and press .



Renaming a Vehicle

In the Quick Setup Procedure earlier in the manual, you may remember setting parameters such as vehicle weight and redline. In fact, you were setting information for the first vehicle.

To rename a vehicle, first select the vehicle (page 123) to make it the active vehicle.

Let's go ahead and rename the vehicle to something meaningful for your vehicle.

Start in **Configuration Mode**.



2

Select "Vehicle Data" and press .



3

You will see a screen similar to this one. In this example, the user has changed the name to "MUSTANG 66".



- 4 Scroll down to “Change Vehicle Name” and press .



- 5 The G-tech keyboard screen (page 60) will appear.
- Enter the new name for the vehicle using the keyboard.
 - Vehicle names can be up to 15 characters long

Showing the Active Vehicle

Use the procedure below to determine which vehicle is currently active in your G-tech.

- 1 Start in **Configuration Mode**.

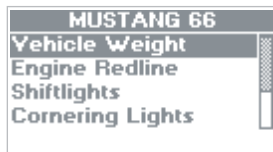


- 2 Select “Vehicle Data” and press .



3

The active/current vehicle is indicated by name across the top of the display.



Pro Features

This section will show you how to use the most advanced features of the G-tech.

Reaction Time / Start Mode

If you have been to a drag strip before, you are probably familiar with the “Timing Tree” (a.k.a. “Christmas Tree”) at the starting line.

(For more information, refer to “Drag Strip Concepts” on page 147.)

If you want to practice your launch technique or improve your reaction time when you are not at the track, the G-tech’s Reaction Time modes can help you perfect your technique.

You can choose from a **Full Tree** (also known as the “**Sportsman’s Tree**”) or **Pro Tree**, with 0.5 second or 0.4 second timing.

With a **Full Tree**, the three amber lights turn on sequentially, and with a **Pro Tree**, all three amber lights turn on simultaneously.

Generally when you are at the drag strip with a real Timing Tree setup, you do not want the G-tech displaying a reaction time light tree.

Instead, you want to launch based on the Christmas Tree at the track. In these cases, you would configure the G-tech for “No Tree” mode launches.

The following steps describe how to configure the G-tech for a specific Reaction Time mode.

Start in **Configuration Mode** and select “Run Parameters”.



- 2 Select “Reaction time.”

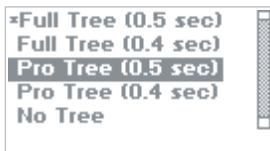


- 3 Select the mode you want. The line with the asterisk (*) next to it is the active choice.

To change the mode, move the highlighted selection bar to the choice you want, and press **OK**. The asterisk will then move to the choice you have just made, indicating that it is now active.

In this example, a Full Tree with 0.5 second timing is the current choice as indicated by the asterisk (*) next to it.

If you were to press **OK**, the mode would switch to a Pro Tree with 0.5 second timing.



Using the Timing Tree Modes

The following information describes the entire start procedure if you use any of the four Timing Tree modes. *This example assumes the user has set the mode to “Full Tree (0.5 second).”*

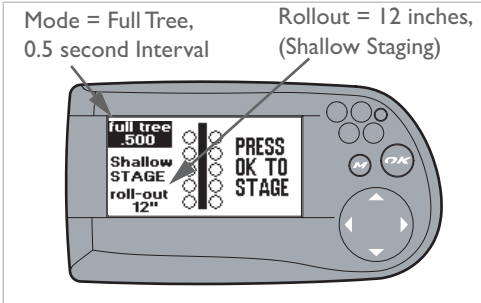
Note: The colors “amber” and “green” refer to the actual track light colors.

Start in **Drag Strip Mode**.



2

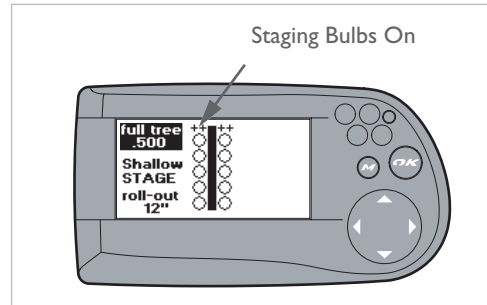
Press **OK** to stage the G-tech. You will see a screen such as this. Your current settings for reaction tree mode and rollout are displayed.



3

Press **OK** to activate the tree. After a brief period, the simulated staging bulbs will come on. (On a real track, these lights would come on when your vehicle is properly positioned).

Note: If the staging bulbs never appear, the accelerometers need to be re-calibrated. Press **OK** to go back to the G-Window screen with the tachometer, and refer to "Calibrating Accelerometers" on page 28 for details on this procedure.

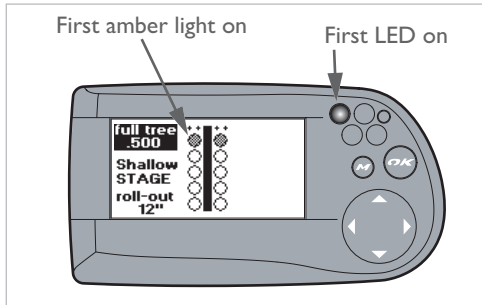


4

After a small, random amount of time, the tree countdown will begin — just like at the track. Since this is a **0.5 second Full Tree**, the three amber lights will come on in succession, 0.5 seconds apart.

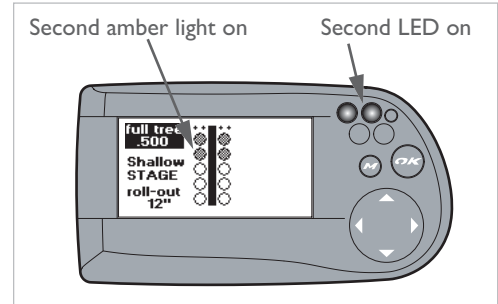
The green light will come on 0.5 seconds after the third and final amber light.

The G-tech's LEDs will illuminate at the same time as do the tree lights on the LCD screen. This way, you can use the bright LEDs to judge when to start, (i.e., you do not have to look at the LCD).



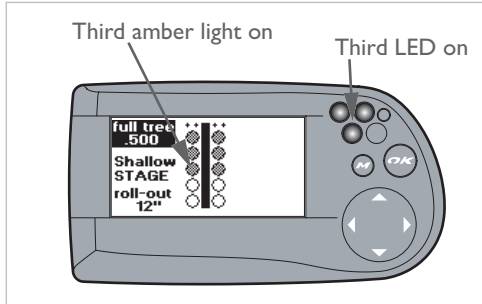
5

0.5 seconds later, the second amber will light come on.



6

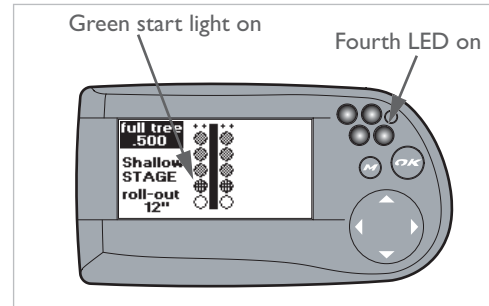
0.5 seconds later, the third and final amber light will come on. At this point, the reaction time clock starts.



7

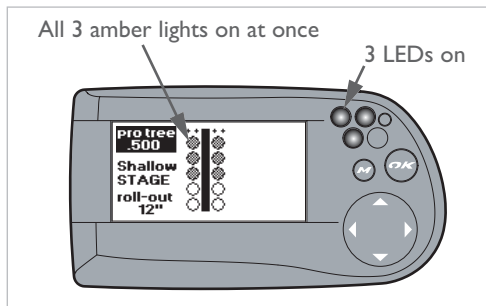
0.5 seconds later, the green start light will come on. In a perfect launch, your vehicle would already be moving at this time, and would have traveled exactly the rollout distance.

The reaction time clock stops timing once your vehicle has moved the rollout distance.



8

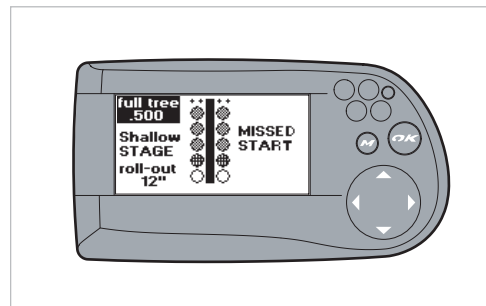
If you had used a “Pro Tree” instead of a “Full Tree” the only difference would be that all three amber lights, and the three corresponding LEDs, would come on simultaneously, instead of one-at-a-time. This is just like a Pro Tree at the track.



9

If you do not launch your vehicle within a few seconds of the reaction time clock starting (i.e., when the third amber light comes on), the G-tech assumes you do not want to perform an acceleration run.

In this case you will see the following screen. “Missed Start” indicates the tree counted down, but the G-tech never saw the vehicle launch. After a few seconds you will be returned to the G-Window.



Setting the Rollout Distance

The rollout distance is the distance that the vehicle moves before the E.T. clock starts timing. This is exactly what happens at a dragstrip.

By configuring the G-tech with a rollout distance that is identical to the rollout distance you use at the track, your times will be very close to those measured with the track's equipment.

Note: *You should use the same rollout value when doing several runs that you will compare against one another.*

For more information, refer to "Drag Strip Concepts" on page 147.

Use the following procedure to set the rollout for a run.

Start in **Configuration Mode** and select "Run Parameters".



Run Parameters
Vehicle Data
Calibration
Gtech Setup
Drag Strip Mode

2

Select "Staging/Rollout".



Reaction time
Staging/Rollout
Speed Mark
Distance Marks
Exit

3

- Enter your desired rollout distance.
Valid values are in the range 0-16 inches.
- Press **OK** to save changes.
- Press **ABT** to abort and discard changes.



Additional Info

This section is a collection of tips, technical information, and reference information for your use.

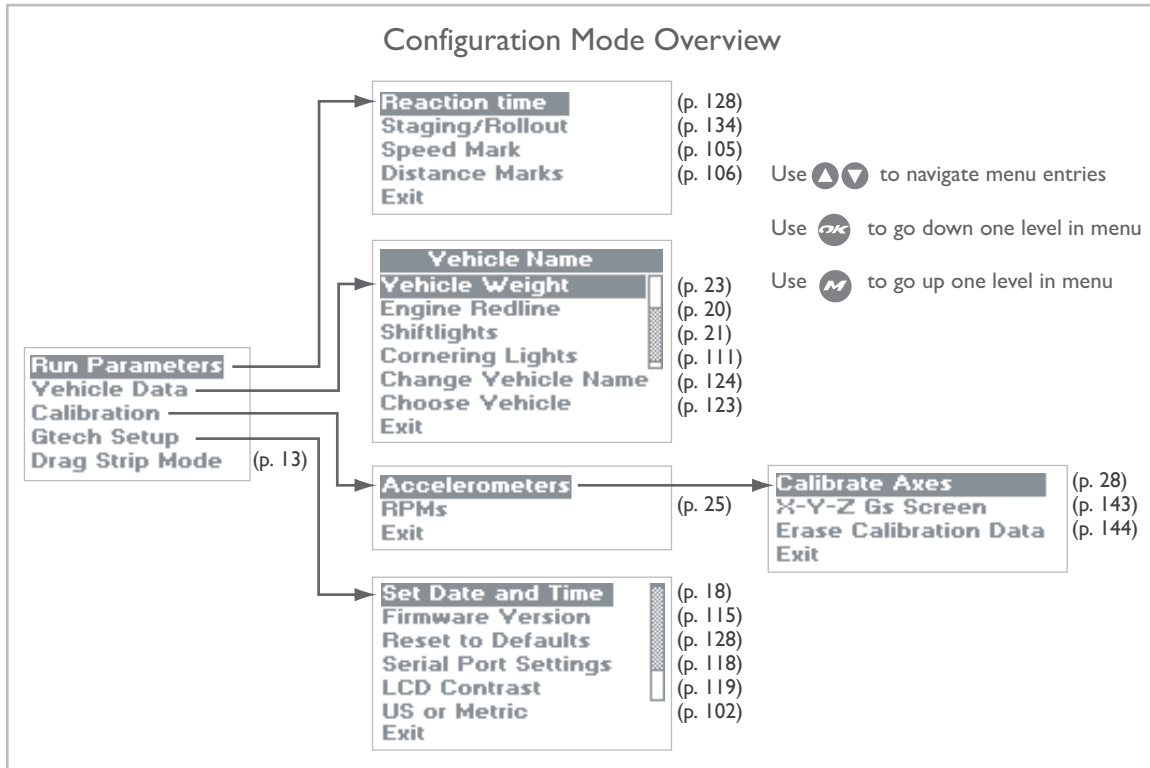


Figure 43: Configuration Mode Menu Summary

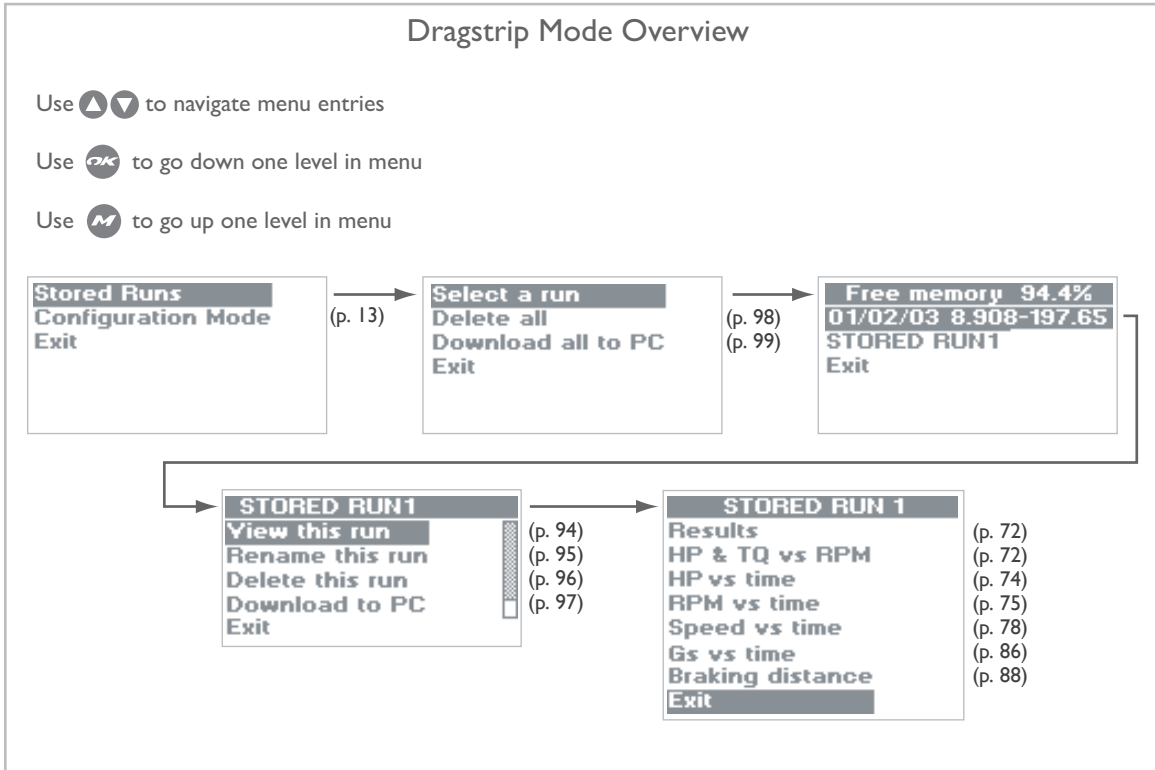
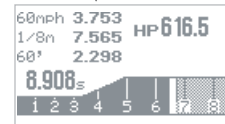
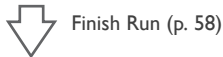
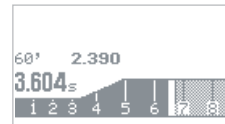
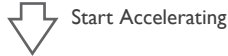
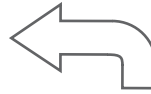


Figure 44: Drag Strip Mode Menu Summary

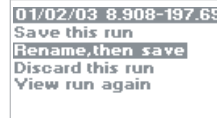
Performing an Acceleration Run



Analyze Run
(p. 68)



Return to Drag
Strip Mode
G-Window



Save (p. 58)
Rename (p. 60)
Discard (p. 57)

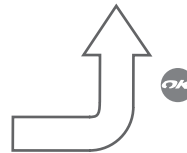
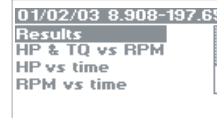


Figure 45: Performing an Acceleration Run

Tips for Improving Accuracy

- Make sure that your accelerometers are calibrated properly. Be sure to read “Accelerometer Tips” on page 142 when you have a chance. It provides a lot of useful information on how you can optimize your calibration
- Do your acceleration runs on a very flat / level track. Even a very gentle slope may cause your readings to be off.
- Try to avoid taking measurements on windy days. A tail wind will artificially lower your time and increase your measured horsepower. A head wind will artificially increase your time and lower your measured horsepower.
- Do several runs in both directions to average out the effects of slope and wind.
- Ensure that the G-tech is not loose in its mounting bracket and also make sure the mounting bracket is firmly installed.
- A smooth, strong launch will typically yield the most repeatable measurements. A jerky or violent launch might cause the G-tech to trigger before or after you intend.
- Rollout distance affects results (both E.T. and trap speed). If you program the G-tech with a large rollout, your E.T. will be faster and your trap speed will be higher. Always use the same rollout setting for runs that you will compare against one another. For more information, see “Rollout” in the Glossary (p. 162).
- When doing a braking test, bring the vehicle all the way to a complete stop *and wait for the E.T. clock to stop counting*. If you begin moving again before the E.T. clock stops, you may not be able to view braking distance results.
- When trying to measure horsepower and torque, please follow the procedure in the manual very closely (p. 157)

Accelerometer Tips

Hold the G-tech as still as possible during the accelerometer calibration procedure. You may find that it helps to rest the G-tech against something like a table or a wall during the procedure.

If you hold the G-tech in an incorrect orientation at any point during the accelerometer calibration procedure, the G-tech will notify you with a message on the screen.

A blinking black rectangle on the display during calibration indicates that the G-tech is seeing shaking/movement. Try to hold the G-tech as still as possible. If you cannot get the rectangle to go away, please call Tesla Technical Support at (310) 452-0030.

Ensure that you calibrate the accelerometers at two different times, as far apart in operating temperature as possible (p. 35). Our recommended calibration procedure for accelerometers is:

1. Put the G-tech into **Configuration Mode** and then power it off.

2. Let the G-tech sit powered off for at least 12 hours at room temperature.
3. Power on the G-tech and immediately perform a calibration (p. 28). This would be the “cold” calibration.
4. Leave the G-tech powered on for at least 1 hour so that it reaches full operating temperature.
5. Perform a second accelerometer calibration. This would be the “warm” calibration.

After performing the “cold” and “warm” calibrations, go to the G-tech’s X-Y-Z Gs screen (p. 143). While holding the G-tech very still, ensure that the “Mag” value is always between 0.995G and 1.005G, at all temperatures and orientations.

Note: *The “Mag” value will always fluctuate a little due to vibrations, etc. As long as the displayed value is within this range, the calibration is fine.*

If the “Mag” value is not always between 0.995G and 1.005G:

- Erase the accelerometer calibration data (p. 144)
- Re-calibrate your accelerometers at 2 different temperatures (p. 28, p. 35)

Note: DO NOT CALIBRATE ACCELEROMETERS or ERASE ACCELEROMETER CALIBRATION on G-tech units which were shipped after August 2003. They have already been calibrated in the factory. Older G-techs will automatically request calibration. If you are unsure contact tech support.

X-Y-Z Gs Screen

If you suspect the G-tech is not measuring acceleration accurately, one useful thing to do is to view the "X-Y-Z Gs screen". This display shows you the current accelerometer readings measured by your G-tech.

- 1 Start in **Configuration Mode**.



- 2 Select "Calibration" and press **OK**.



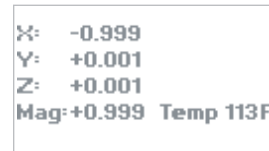
- 3 Select "Accelerometers" and press **OK**.



- 4 Select "X-Y-Z Gs Screen" and press **OK**.



- 5 The X-Y-Z Gs screen will appear:



Note: DO NOT CALIBRATE ACCELEROMETERS or ERASE ACCELEROMETER CALIBERATION on G-tech units which were shipped after August 2003. They have already been calibrated in the factory. Older G-techs will automatically request calibration. If you are unsure contact tech support.

Assuming you have performed two calibrations at two different temperatures, and the G-tech is held very still, the **Mag** reading should always be very close to +1.000. The closer the G-tech is to +1.000, the more accurate your measurements will be.

If the reading is greater than +1.005 or less than +0.995 you should erase the current calibration (p. 144) and then re-calibrate the accelerometers (p. 28).

The X, Y, and Z fields are provided for engineering support, and generally you will not need to look at them.

The current temperature inside the G-tech is also displayed, as this affects the accelerometers. It is provided primarily for engineering support.

Erasing Accel. Calibration

Use the following procedure to erase the G-tech's accelerometer calibration data.

1 Start in **Configuration Mode**.



```
Run Parameters
Vehicle Data
Calibration
Gtech Setup
Drag Strip Mode
```

2 Select "Calibration" and press .



```
Run Parameters
Vehicle Data
Calibration
Gtech Setup
Drag Strip Mode
```



Note: DO NOT CALIBRATE ACCELEROMETERS or ERASE ACCELEROMETER CALIBERATION on G-tech units which were shipped after August 2003. They have already been calibrated in the factory. Older G-techs will automatically request calibration. If you are unsure contact tech support.

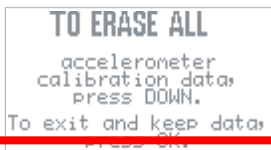
- 3 Select "Accelerometers" and press .



- 4 Select "Erase Calibration Data" and press .



- 5 Press  to erase the calibration.
Press  to keep the current calibration.





RPM Calibration Tips

The G-tech monitors vehicle RPMs constantly. In order to accurately convert your vehicle's electrical signature to RPMs, however, you must first perform an "RPM calibration" (page 25).

You can perform the RPM calibration while the vehicle is stationary or while it is moving (in gear).

The only thing that matters during RPM calibration is that the vehicle RPMs are stable (unchanging) and that they are at the value requested by the G-tech.

This means that if the G-tech instructs you to rev the engine to 4000 RPM and press , make sure the RPMs are steady right at 4000 RPM before pressing . The more careful you are during calibration, the better your RPM readings will be.

Some vehicles will allow you to rev the engine to redline while parked; others have a rev limiter that kicks in early (such as at 3000 RPM) when the vehicle is not moving.

Note: DO NOT CALIBRATE ACCELEROMETERS or ERASE ACCELEROMETER CALIBERATION on G-tech units which were shipped after August 2003. They have already been calibrated in the factory. Older G-techs will automatically request calibration. If you are unsure contact tech support.

If your vehicle rev limiter kicks in early while stopped, you will need to calibrate your RPMs while moving in gear. In this case, you should have assistance from a passenger.

Vehicles with automatic transmissions might need to be placed in first gear to keep the transmission from upshifting during the High RPM calibration.

Some vehicles have a very faint RPM signal. If you have performed an RPM calibration but the G-tech tachometer does not accurately represent your RPMs, your vehicle might fall into this category.

On these vehicles, you may have better results by turning on some of your electrical systems (such as the headlights, defroster, or fan) during the calibration process. If you do this, however, it often means you should keep these systems powered when using the G-tech as well.

Another point of note: with many vehicles, the RPM signal is very weak below 1000 RPMs (even 1500 RPM on some vehicles). This means that when your vehicle is at low RPMs, the G-tech may register the default value of 750. This is normal behavior.

During the RPM calibration process, the G-tech suggests two RPM values to use (e.g., 4000 RPM and 2000 RPM). These suggestions are based on what you input for your vehicle redline.

In all but a few cases, the suggested RPM values will provide a good RPM calibration. If you are not pleased with how well the G-tech is measuring RPMs after a calibration, the G-tech will allow you to change the two RPM calibration points.

For example, for a vehicle with a redline of 6500 RPM, the G-tech may suggest revving to 4000 RPM for the high value, but you are free to change this number to a larger number, like 6000 RPMs, during the calibration process.

For example, during RPM calibration, the first screen may come up as such:



```
Please Rev your engine
to: 4000 rpm
Use arrow keys to
adjust if necessary.
Press OK to continue
or MENU to cancel.
```

If you would like to calibrate at 6000 RPMs instead of 4000 RPMs, just press **▲** twice to change the “4000” to a “6000”, and then rev your engine to 6000 RPMs and press **OK**.

Drag Strip Concepts

Note: For a more information on drag race terminology and concepts, please visit our drag racing info page at:

<http://www.gtechpro.com/dragstrip.html>

This web page explains concepts such as “reaction time,” “roll-out,” “full tree,” and “pro tree.”

At a dragstrip, there is a small region which contains two beams that determine where your front tires are. The first beam your vehicle encounters is called the “Pre-Stage Beam”, and the second beam is called the “Stage Beam”.

When you first move your vehicle into the starting line region, the “Pre Stage” bulb on the track’s Christmas tree illuminates to tell you that your front tires have blocked the Pre-Stage Beam and are close to the Stage Beam.

When you roll forward a bit more (usually about 6-8 inches), a second bulb, called the “Staging Bulb”, comes on. This indicates your front tires have blocked the Stage Beam. At this point, your vehicle is “staged”, and ready for a legal start.

You can typically continue to inch your vehicle forward about one foot (depending on your tire diameter) and the Stage Bulb will remain on.

As you inch forward, eventually the Pre Stage Bulb will turn off. This is OK, since the Pre Stage Bulb has nothing to do with the starting line, and is simply provided as a courtesy.

If you roll your vehicle too far forward, the Staging Bulb will go out, indicating your front tires are no longer blocking the Stage Beam, and you must back up your vehicle and re-stage before the run can begin. The Christmas Tree will not begin the countdown until your vehicle (and the vehicle next to you) is staged.

As long as the Staging Bulb is illuminated, i.e., as long as any part of your front tire is blocking the Stage Beam, you are “staged” for a legal start.

If you stop inching your vehicle forward immediately after the Staging Bulb comes on, you have “shallow staged” (i.e., you have barely entered the staging area). This will generally give you a longer reaction time but a faster E.T. and trap speed, because the vehicle has more of a “running start” before the E.T. clock starts.

If you continue to inch your vehicle forward until you have almost left the staging area, you have “deep staged” (i.e., you are very close to the starting line). Deep stagers will often roll forward until the Pre Stage Bulb goes out... making sure not to turn off the Stage Bulb as well.

Deep staging will generally give you a shorter reaction time, but a slower E.T. and trap speed, because the vehicle has virtually no running start before the E.T. clock starts.

The E.T. clock begins running once the vehicle's front tires have rolled far enough forward so that they are no longer blocking the Stage Beam. This means if you sit at the starting line for a bit after you should have launched, it won't affect your E.T., since your vehicle will still be blocking the Stage Beam. The E.T. clock stops running once the driver passes the quarter-mile mark.

The reaction time clock begins timing as soon as the third amber light comes on. Even if your vehicle doesn't move, the reaction time clock is running! The reaction time clock stops running once the vehicle moves forward enough to unblock the Stage Beam (this is exactly when the E.T. clock begins timing.)

Rollout is defined as how far your vehicle moves from a stop (when it is staged) until the E.T. clock starts. The G-tech

allows you to set the rollout distance, i.e. how far the vehicle moves before the E.T. clock starts.

A large rollout distance (such as 16") gives the vehicle more of a “running start” before the E.T. clock starts. This can result in shaving several tenths of a second from the E.T. and adding several MPH to the trap speed.

As an example, say you set the rollout distance in the G-tech to 12 inches. When you launch your vehicle, the G-tech knows when your car has *barely* begun to move, i.e. a fraction of an inch. But it won't start the E.T. clock until it determines your vehicle has traveled 12 inches forward. At the track, this would mean your vehicle traveled 12 inches before the front tires rolled far enough to unblock the Stage Beam.

In any of the 4 Timing Tree modes, the G-tech will measure your reaction time. Also just like a track, it will begin measuring your 1/4 mile time when the vehicle has traveled the full rollout distance.

A poor reaction time will not hurt your 1/4 mile time. In other words, if you sit at the starting line for 2 seconds after you should have launched, you will have a terrible reaction time, but your 1/4 mile E.T. will still reflect the time it took your vehicle to move a 1/4 mile once it crossed the starting line.

If...

You typically stop your vehicle as soon as the Stage Bulb comes on at the track, this means you are a shallow stager. Set your rollout to a distance like 8, 10 or 12 inches.

If...

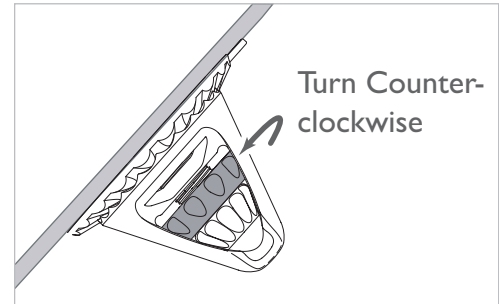
You typically roll your vehicle forward only a few inches after the Stage Bulb comes on, you are a deep stager. Your rollout will be smaller, maybe 2 or 4 inches.

Adjusting the bracket

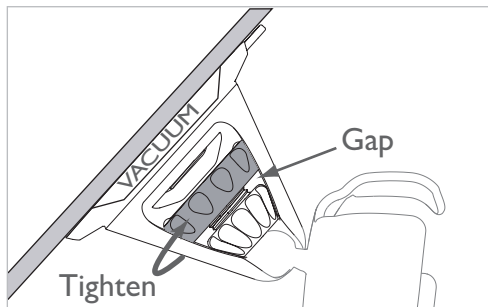
This section describes how to adjust the position of the mounting clip for better viewing.

It is very important that this technique be followed in order to avoid damage to your mounting system.

Turn the Large Vacuum Nut *counter-clockwise* until the mounting clip can rotate freely.



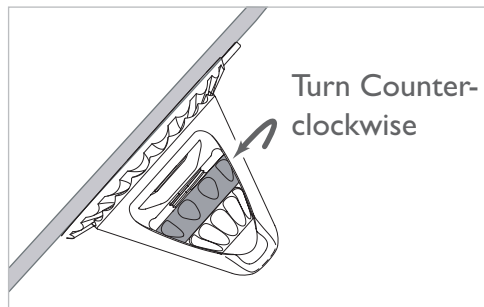
- 2 Adjust the position of the mounting clip gently. If the clip does not pivot easily, loosen the Large Vacuum Nut even more, otherwise you risk damaging the ball portion of the mounting clip.
- 3 Turn the Large Vacuum Nut *clockwise* until it is snug and the mounting clip is held firmly in place.



Removing the bracket

It is very important that this technique be followed in order to avoid damage to your mounting system.

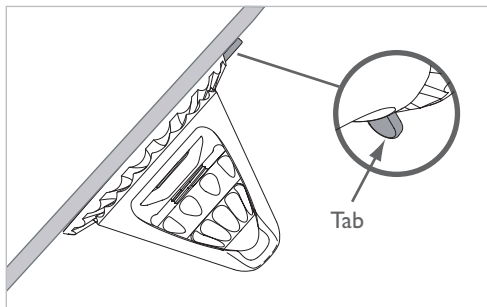
- 1 Turn the Large Vacuum Nut *counter-clockwise* until it is snug up against the Small Tensioning Nut.



2

Find the small rubber tab protruding from the side of the large rubber suction cup that is attached to the windshield.

Pull the rubber tab gently away from the windshield. This should break the vacuum seal and the entire mounting apparatus should come off easily.



Permanent Mounting

Your G-tech is supplied with a permanent mounting stem (Figure 46) which can be attached to a part of your vehicle other than the windshield.

Note: To use the permanent mounting system, holes must be drilled on a relatively flat surface within the vehicle.

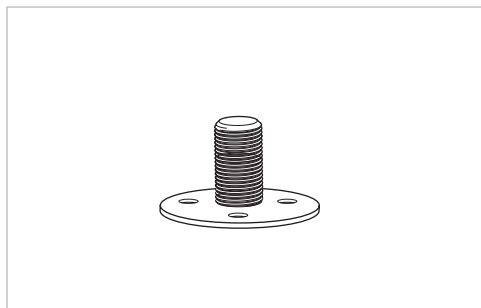


Figure 46: Permanent Mounting Stem

Use the provided screws to mount the permanent mounting stem in your vehicle. Re-assemble the mounting bracket as shown in page 37. Remember not to overtighten.

Firmware Upgrades

The programming inside your G-tech is referred to as “firmware.”

As part of our ongoing commitment to you, the enthusiast, we are constantly updating the firmware.

As a G-tech owner, you are entitled to free upgrades and improvements for the life of the product.

Upgrading the firmware is a straightforward process. You will need Internet access in order to download the new firmware from the Tesla Electronics Inc. website.

1. Determine the version of firmware you have installed on your G-tech (“Displaying Firmware Version” on page 115).
2. Check the Tesla Electronics Inc. website (<http://www.gtechpro.com>) for information on support and firmware downloads.
3. If the website has a newer version of firmware, download it from the website and follow the instructions included with it to re-program your G-tech with the new firmware.

Battery Replacement

The G-tech contains a small internal battery that powers its internal clock when no external power is applied.

The battery will last several years, but at some point the G-tech’s internal battery may need replacing.

If the G-tech loses the current date/time when you power it off and then on again, the battery needs replacing. You can determine whether the battery is dead by going into **Configuration Mode** and going into the “Set Date and Time” menu (p. 18). If the date is set to Jan. 1 2002, 1:00 am, it means the battery needs replacing.

If you encounter this situation, please contact Tesla Electronics Technical Support (p. 165).

Frequently Asked Questions

Note: Please visit the Tesla Electronics Inc. website at: <http://www.gtechpro.com/support.html> for the most up-to-date list of Frequently Asked Questions.

Q : Can I disable the speed mark?

A : No. But you can set it to 150MPH, which is essentially the same effect for most vehicles, since very few vehicles can reach 150MPH in the span of a 1/4 mile.

Q : The horsepower and torque numbers I see seem to be way off. What is going on here?

A : There is a specific driving style and procedure that we recommend when measuring horsepower and torque. The driving style is different than that for 1/4 mile runs. Please refer to "Horsepower, Torque & G-tech" on page 157.

Q : Can I use the G-tech with my motorcycle?

A : Yes, although the RPMs generally won't work with a motorcycle. Therefore, you can get 0-60 MPH, 1/4 mile, etc. and other straight-line measurements, but graphs such as RPM vs. time, and HP & TQ vs. RPM, will probably be meaningless.

The problem with RPMs on motorcycles is due to differences between motorcycle and automotive electrical systems.

Q : Can I "hardwire" my G-tech into my vehicle?

A : For this, we recommend that you buy a 12V extension power cable, such as Part Number 270-1592 — "10-Ft. Coiled 12VDC Car Power Adapter Extension Cord" — from Radio Shack, and then modify and route that cable to your preference.

Most importantly, please do not cut or modify the cable that came with your G-tech!!! Tesla Electronics Inc. cannot replace cables that have been modified or damaged.

Troubleshooting

Note: Please visit the Tesla Electronics Inc. website at: <http://www.gtechpro.com/support.html> for the most up-to-date troubleshooting information.

The tach needle moves when my vehicle's RPMs change, but it is not accurate.

This indicates that the RPMs need calibrating for this vehicle. Please refer to p. 25 for information on RPM calibration, and p. 145 for RPM calibration tips.

The tach needle does not move at all after I have performed an RPM calibration.

If the tach needle does not respond at all to changes in your vehicle's RPMs, this indicates that the G-tech may be having difficulty locking on to your vehicle's RPM signature. Please refer to p. 154 for troubleshooting.

The acceleration bars on my G-Window don't seem to work properly.

Make sure that the G-tech is calibrated properly and that you are on level ground. Also make sure the G-tech has not been

moved since your last acceleration run.

If you are stopped on level ground, your acceleration bars should register very close to 0.00. If not, please refer to "Self-leveling the G-tech" on page 49.

My Gtech keeps saying "Staging" forever when I press from the G-Window... in other words, I never get the "Launch when ready" message.

Your G-tech's accelerometers need to be calibrated. Please refer to "Calibrating Accelerometers" on page 28.

I have a message on my screen that says "DIAGS FAILED" with some other text.

Your G-tech's built-in diagnostics have detected a problem. Please call Tesla Technical Support to resolve this.

I have a message on my screen that says "Diagnostic" with a bunch of other numbers.

Your G-tech's built-in diagnostics have detected a problem. Please call Tesla Technical Support to resolve this.

I Want To...

If you know what you want to do, but just don't know where to find the answer, this is the section for you!

| I Want To... | Go To: |
|--|--|
| Set up my G-tech so I can start using it | "Quick Setup and Use" on page 18 |
| Measure my 1/4 mile performance | "Measuring Your Runs" on page 52 |
| Calibrate my accelerometers | "Calibrating Accelerometers" on page 28 and "Accelerometer Tips" on page 142 |
| Calibrate my rpms | "Calibrating RPMs" on page 25 and "RPM Calibration Tips" on page 145 |
| Measure my 0-60 mph time | "Measuring Your Runs" on page 52 and "Viewing Run Results" on page 55 |

| I Want To... | Go To: |
|---|--|
| Use the shiftlights to improve my track times | "Setting the Shiftlight Set-point" on page 21, "Enabling / Disabling Shiftlights" on page 110 |
| Measure horsepower and torque | "HP & Torque vs RPMs" on page 72 and "Horsepower, Torque & G-tech" on page 157 |
| Measure my braking distance | "Braking Distance" on page 88 |
| Do a 0-100-0 MPH run | "Speed vs time" on page 78 |
| Measure lateral (cornering) G's | "G-Window: Acceleration Bars" on page 47, "Self-leveling the G-tech" on page 49, and "Cornering Lights Overview" on page 111 |
| Use My G-tech in multiple vehicles | "Multiple Vehicle Usage" on page 122 |

| I Want To... | Go To: |
|--|--|
| Use my G-tech in metric mode | "Setting U.S. or Metric Mode" on page 102 |
| Improve my reaction time | "Reaction Time / Start Mode" on page 128 |
| Analyze my runs on a PC | "Downloading A Stored Run" on page 97 |
| See where I shifted at each point during the run | "RPM vs time" on page 75 |
| Mount my G-tech in my vehicle | "Mounting the G-tech" on page 36 |
| Know when I've reached a certain speed | "Setting the Speed Mark" on page 105 |
| Know when I've reached a certain distance | "Setting the Distance Marks" on page 106 |
| Use my Acceleration Bars on the G-Window (Tach Screen) | "G-Window: Acceleration Bars" on page 47 |
| View the results from a previous run | "Loading a Stored Run" on page 66 and "Viewing Run Results" on page 55 |

| I Want To... | Go To: |
|---|--|
| Customize the G-tech for my vehicle | "Multiple Vehicle Usage" on page 122 |
| Use Cornering Lights for lateral Gs | "Cornering Lights Overview" on page 111 |
| Increase the accuracy of my measurements | "Tips for Improving Accuracy" on page 141 "Accelerometer Tips" on page 142 "RPM Calibration Tips" on page 145 "Horsepower, Torque & G-tech" on page 157 |
| Understand why lights keep blinking on my G-tech when I'm driving | "Enabling / Disabling Shiftlights" on page 110, "Cornering Lights Overview" on page 111, "Setting the Speed Mark" on page 105, "Setting the Distance Marks" on page 106 |
| Use my G-tech on my motorcycle | "Frequently Asked Questions" on page 153 |

G-tech-Computer Connection

In order to upgrade the firmware in your G-tech or transfer data (such as stored runs) to your computer, you must ensure that the G-tech is powered on and connected to the computer via the supplied serial cable.

Generally you will be doing this indoors, so you can use the AC power adapter to power the G-tech.

The serial cable is designed so that only one end will plug into the G-tech. The other end plugs into an available serial port on your computer. It does not matter whether the G-tech is powered on or not when you connect the serial cable.

Note: *If your computer does not have a serial port, you will need to use a serial-to-USB converter device. Companies such as Belkin, Keyspan, D-Link, and Tripp Lite make these devices. Tesla Electronics Inc. cannot provide technical support for any of these devices however.*

Further instructions are provided with firmware upgrades and the PC Analysis Software. Please visit the Tesla Electronics website at <http://www.gtechpro.com> for updates to the G-tech firmware and the PC software.

Horsepower, Torque & G-tech

This section provides detailed information on the G-tech's horsepower & torque measurements and some guidelines and tips to help you get repeatable results.

The G-tech does not measure *engine horsepower at the crank*, which is what the automobile manufacturers and magazines typically report.

The G-tech does not measure *wheel horsepower* either (a dyno measures *wheel horsepower*). As you may know, *wheel horsepower* always measures lower than *engine horsepower*, since it includes drivetrain loss, the rolling resistance of the tires on the road, and other factors.

The G-tech measures *net horsepower*, which reads even lower than *wheel horsepower*. The G-tech's *net horsepower* value is a measurement of all the horsepower that is available to accelerate your vehicle after all power losses have been subtracted.

As one example, on a dyno, the vehicle is not experiencing any aerodynamic drag ("wind resistance") because it is not actually moving through the air — it is stationary on rollers.

However, in the “real world” (i.e., at the track), your vehicle has to contend with issues such as aero drag.


Suppose that two vehicles with identical engines, drivetrains, and tires go to the same dyno. One vehicle has been modified to minimize aerodynamic drag. They both go to the dyno in town and measure identically.

On the G-tech, the vehicle that is more aerodynamic will measure a higher *net horsepower*. This is because it loses less power due to aerodynamic drag on the track as it is slicing through the air.

The optimal driving technique for measuring horsepower and torque is nothing like the technique for obtaining the best 1/4 mile results.

We will describe the technique here and then provide some supporting information afterwards.

1. Stage the G-tech just as you would for a 1/4 mile run. Wait for the “Launch when Ready” message.
2. At a moderate RPM value, start your vehicle briskly off the line, enough to trigger the G-tech and start its clock. Don’t launch as hard as you would for a quarter mile. For example, if your vehicle redline is 6000 RPM, launch at 1500 to 2000 RPM, for example.

3. Shift out of 1st gear before you are halfway to your vehicle’s redline. So if your vehicle has a 6000 RPM redline, shift to 2nd before you reach 3000 RPM in first gear. Be sure to let off the throttle between shifts, i.e., while the clutch is not fully engaged.
4. As soon as 2nd gear is fully engaged (which should be at a low RPM, since you shifted out of 1st gear very early), floor the accelerator. Keep the “pedal to the metal” until your vehicle’s redline.
5. This allows you to cover a very wide RPM range in 2nd gear at full throttle. Don’t worry about the fact that you aren’t in the sweet spot of your power band when you first shift into 2nd gear. That’s the point: we’re measuring the power over the whole RPM range.
6. Once you reach your upper RPM value (e.g. redline) in 2nd gear, shift into 3rd gear and accelerate briefly (maybe one second or so.) This does not have to be full-throttle, since we are using 2nd gear for our horsepower measurement.
7. At this point, you can press  to stop the G-tech from measuring, or just coast (foot off accelerator). The G-tech will stop its clock.
8. Now you can view the “Horsepower and Torque vs RPMs” graph for your run (p. 72).

Some notes on horsepower runs

- There is significantly less wind drag in 2nd gear as opposed to 3rd gear; that is the reason we chose 2nd gear in this example.
 - No matter which gear you do your runs in, be sure to use the same gear for all runs you wish to compare. Suppose you do a 2000-7000 RPM run in 2nd gear and another run from 2000-7000 RPM in 4th gear. The run in 4th gear was at a much greater speed, and hence the aero drag was much greater. This will have the effect of lowering the *net horsepower* on the 4th gear run.
 - Vehicles with extraordinary power, or poor traction, may spin the wheels at full-throttle in 2nd (and even later) gears. The G-tech horsepower measurement relies on no wheelspin being present, just like a chassis dyno. If your vehicle experiences wheelspin in 2nd gear, please perform the run in 3rd (or 4th...) gear.
 - Be sure to do multiple runs and average the results for the most accurate and repeatable numbers. You can use the G-tech's PC Analysis Software to assist with this.
 - Remember that with the G-tech, repeatability and tuning is the goal here, not necessarily comparisons to magazines or dynos.
- Vehicle weight is factored into the horsepower calculation. This number should be as accurate as possible. Refer to “What does my vehicle weigh?” on page 160 for more information on vehicle weight.
 - External environmental conditions such as wind, air temperature, and humidity affect *net horsepower*. The same vehicle with the same driver will measure more *net horsepower* at 32 degrees Fahrenheit than it will at 100 degrees Fahrenheit. Cold air is more dense, and hence contains more combustible oxygen. That's why your vehicle feels so much stronger when it's cool outside!
 - Cars with Continuously Variable Transmissions (CVT) might be a problem, as the G-tech relies on gear shifts and broad RPM ranges when determining peak horsepower and torque. For these situations, you can use the G-tech's Horsepower vs. Time graph to find the peak horsepower value by hand.
 - Make sure that your RPMs are calibrated properly and working throughout the entire RPM range before doing a horsepower run. Otherwise your results will be skewed.

What does my vehicle weigh?

It is extremely important that the G-tech have an accurate value of your vehicle weight in order to calculate useful horsepower measurements.

In this manual, the term “vehicle weight” refers to all the weight that is supported by the vehicle’s tires (including the tires themselves). So this includes the driver’s body weight, fuel weight, tools, fast food wrappers, etc.

If you are fortunate enough to have access to an accurate vehicle scale, go ahead and weigh the vehicle as it would be equipped at the track (i.e., with you in it, the correct amount and type of fuel in the tank, etc.)

Some tracks even have scales available for weighing your vehicle. Also, some towns have dumps or refuse collection areas with large scales that you may be able to use. Moving companies may have vehicle scales as well.

If you cannot weigh your vehicle directly, you can estimate it. Use the manufacturer’s data to obtain vehicle weight (check the Owner’s Manual or perhaps the Internet). Then adjust the weight based on the difference between your car as it

was stock, and as it is now (Have you added a heavier stereo? Have you removed the spare tire?). Don’t forget to include your own body weight and the fuel as well.

You do NOT want to use the Gross Vehicle Weight Rating (**GVWR**) value that is provided in the vehicle door jamb as the actual vehicle weight.

GVWR is the fully-loaded vehicle weight with passengers.

GVWR is always higher than the actual (empty) vehicle weight.

If you enter **GVWR** instead of actual vehicle weight, your horsepower numbers will be artificially inflated.

There is a very rough rule of thumb that you can use to estimate your vehicle weight from the **GVWR**, but you should not rely on this being too accurate.

Again, this is a very **ROUGH** rule of thumb... each manufacturer calculates **GVWR** in its own way...

The rule of thumb is to take the passenger capacity of the vehicle (e.g., 5 for a mid-sized sedan) and subtract from the **GVWR** 180lbs for each missing person.

Example: Suppose **GVWR** = 4200 lbs, vehicle capacity is 5 people, but we have only a driver. Thus there are 4 missing passengers, which means we subtract 4×180 lbs. The value $4200 \text{ lbs} - 720 \text{ lbs} = 3480 \text{ lbs}$. Thus you would enter 3480 lbs into the G-tech for vehicle weight.

Glossary

Acceleration run: a procedure where the vehicle accelerates from a stop when the G-tech is staged and ready to begin timing. The staged G-tech starts timing the acceleration run automatically when the vehicle begins moving. For more information on acceleration runs, see “Measuring Your Runs” on page 52.

Accelerometer: a precision device which outputs an electrical signal that changes under acceleration.

Calibration: the process of teaching a device how to relate a measurement of a system into a useful, quantified value.

Configuration Mode: One of two operating modes in the G-tech. In this mode, all settings and configuration items are entered.

Cornering Gs: see [Lateral Acceleration](#).

Cornering Lights: LEDs on the G-tech that illuminate when lateral G forces of a specific value are exceeded.

Cornering Thresholds: In the G-tech, there are two cornering thresholds. The Low Limit is the smallest lateral G acceleration value that turns on the cornering lights. The High Limit is the lateral G acceleration value where the cornering lights are blinking rapidly.

Deep Staging: A fairly short rollout. On a track, to stage deep, you would keep the vehicle rolling forward to within a few inches of the stage beam. This gives the vehicle almost no distance to move forward and pick up speed prior to starting the clock.

Distance Mark: An LED that comes on when a specific distance milestone (60 ft, 1/8 mile or 1/4 mile) has been reached.

Drag Strip Mode: One of two operating modes in the G-tech. In this mode, the G-tech allows the user to measure, store and review performance-oriented data about a vehicle.

E.T.: Elapsed time.





Foul: Occurs when the user launches a vehicle too early, and it crosses the starting line before it should.

Full Tree: A Christmas light tree where the three amber bulbs are lit in succession, one after another, followed by the green starting light.

Lateral Acceleration: Sometimes referred to as “cornering Gs,” this is what is actually called “centripetal acceleration.” It is the reason that when you turn your vehicle sharply while accelerating, you feel like you are going to slide out of the seat.

Launch: The process of getting your vehicle moving from a standstill.

LEDs: Light Emitting Diodes, the red lights on the G-tech are LEDs.

Menu: A multi-line text display in the G-tech that allows a user to make a selection. Generally in a menu:  selects the currently-highlighted item;  goes up one level in the menu;  and  move the highlighted selection cursor to another item.

Pro Tree: A Christmas light tree where the three amber bulbs are lit together, followed by the green starting light.

Reaction Time: The elapsed time from the last amber bulb coming on until the vehicle crosses the starting line.

Rollout: The distance a vehicle can travel in the staging area during a drag race before the clock starts timing.

Shallow Staging: A fairly long rollout. On a track, you would stop the vehicle rolling forward as soon as the stage beam is broken. This would typically give the vehicle 12 inches to move forward and pick up speed prior to starting the clock. Shallow staging will yield a faster E.T. and trap speed than will deep staging, everything else being equal.

Shiftright: LEDs that come on when the vehicle RPMs approach the shiftpoint.

Shiftpoint: An RPM value programmed into the G-tech. At this value, the shiftright blink at full intensity.

Speed Mark: A speed that is programmed into the G-tech. When the vehicle reaches this speed, an LED is illuminated for one second.

Stored Runs: Acceleration runs that you have stored in the G-tech's internal memory. You can store up to 30 runs in the G-tech.

Trap Speed: The average speed of a vehicle during the last 66 feet of a quarter mile at a dragstrip. For the G-tech, "trap speed" is the speed of the vehicle when it crosses the quarter mile mark.

For more info

Tesla Electronics Main Company Website:

<http://www.gtechpro.com>

G-tech Technical Support:

<http://www.gtechpro.com/support.html>

support@gtechpro.com

G-tech Discussion Forums:

<http://www.gtechproforums.com>

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G-tech Results & the Race Ticket

Many people take the G-tech to the drag strip and compare the G-tech's results against the race ticket. However, due to the effects of rollout, it is unlikely that the numbers will line up perfectly.

Your staging technique at the track has a large effect on your race results. A long rollout (shallow staging) provides more of a "running start" for your vehicle before it crosses the starting line. (When we say "crosses the starting line", we mean "rolls far enough to unblock the stage beam.") This running start can shave several tenths of a second from a vehicle's E.T., and add a small amount to the trap speed as well.

The following chart demonstrates the effect of rollout on the 1/4-mile E.T. and trap speed. In this chart, the driver drives the EXACT SAME WAY, the only difference is how much rollout the driver uses, i.e., how deeply the driver stages. (In this example, for the sake of illustration, we are assuming the vehicle pulls about 0.35g of acceleration continuously throughout the run.)

| | | | | | |
|-------------------------------|--------|--------|--------|--------|--------|
| Rollout Distance | 0 in. | 4 in. | 8 in. | 12 in. | 16 in. |
| Rollout Time (s.) | 0.000 | 0.226 | 0.319 | 0.391 | 0.452 |
| Speed at end of rollout (MPH) | 0.00 | 2.01 | 2.85 | 3.49 | 4.02 |
| 1/4 mile E.T. (s) | 14.215 | 13.991 | 13.899 | 13.829 | 13.770 |
| 1/4 mile trap speed (MPH) | 126.63 | 126.64 | 126.66 | 126.67 | 126.69 |

Notice how significantly the E.T. is affected by rollout distance, whereas the effect on trap speed is minor.

This chart indicates that the E.T. for the exact same driver in the exact same car can vary by approximately 0.5 second just because of rollout!

In other words, significant time discrepancies can arise at the track due entirely to rollout. The time it takes to roll those first few inches has an enormous effect on the timed milestones (e.g., 60 ft. mark, 1/8 mile mark, 1/4 mile mark).

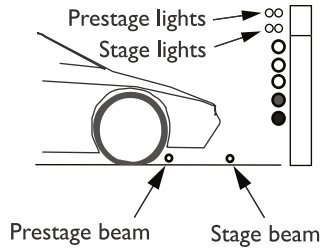
In all likelihood, when you're at the track, you will stage slightly differently each time. Maybe 6 inches one time, 8 inches the next pass, 5 inches the time after that....

The bottom line is this: for the G-tech results to match up nicely with the race ticket, the G-tech has to start timing at exactly the same time the track's E.T. clock starts timing. And the only way this can happen is if the rollout setting in the G-tech is set to exactly the same rollout distance you are about to use on this pass down the track.

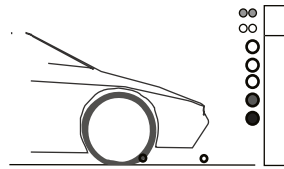
On the track, you have to concentrate on your opponent, the officials, spectators, the Christmas tree, your car, the launching revs and many other variables. We have found that concentrating on matching the actual track rollout to what is set in the G-tech is extremely difficult unless you have somebody to measure the exact rollout distance as you are staging.

In general, the small timing discrepancies between the G-tech and the track can be attributed to the difference between the G-tech's rollout setting and the actual rollout that took place on that particular run.

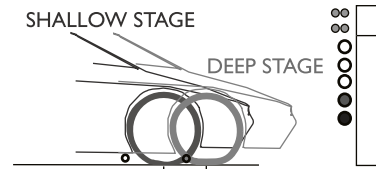
Step 1 Drive-up



Step 2 Prestage

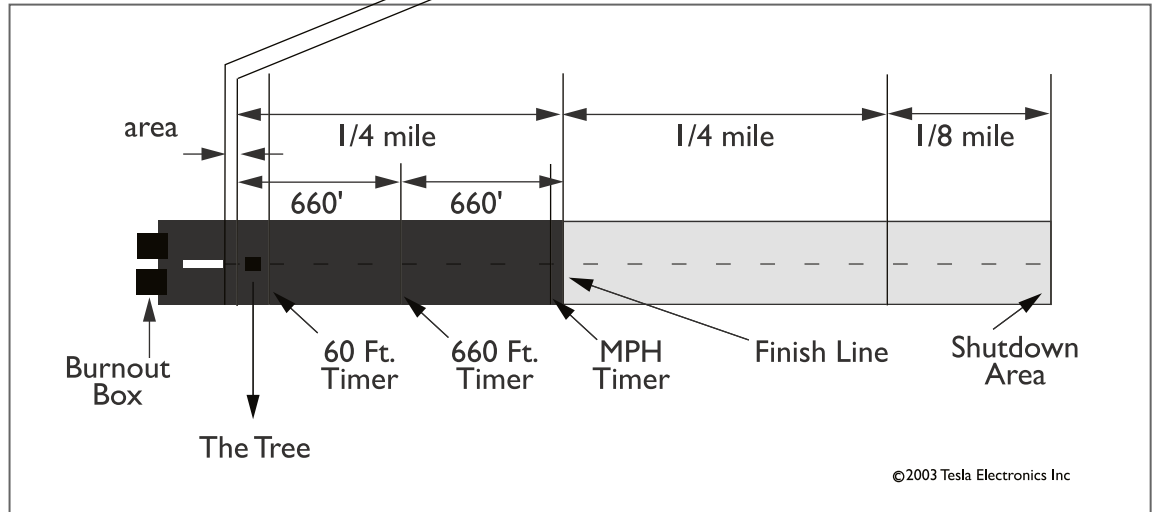


Step 3 Stage



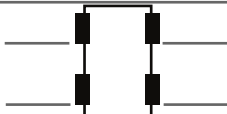
You are staged as soon as you block the Stage beam. E.T. timer starts when the stage beam is unblocked. Rollout can be up to 16" long (depending on your wheel and tire size).

Rollout distance is based on how far vehicle can travel and have the stage beam blocked by the wheel.



ATECH Run Log

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| | | | | | | |
|----------------|-----|---|-----|----------|-----|--|
| Date: | | Notes: | | | | |
| Track: | | 1/4 or 1/8 (circle one) | | | | |
| Time of Run: | | AM PM (circle one) | | | | |
| Lane: | | Right Left (circle one) | | | | |
| Humidity: | | % | | | | |
| Temp: | | | | | | |
| Altitude: | | | | | | |
| Tire Pressure: | |  | | | | |
| | | Launch RPM: | | | | |
| Roll Out: | | Shallow Deep (circle one) Approximate Rollout Distance (inches): | | | | |
| Shift Points: | 1st | 2nd | 3rd | 4th | 5th | |
| | RPM | RPM | RPM | RPM | RPM | |
| E.T.: | | 60Ft Time: | | 330Ft | | |
| Trap Speed: | | 1000Ft Time: | | 0-60mph: | | |

Make several photocopies of this page and fill them out after each run. Make sure to take notes regarding anything relevant that occurred during a particular run. We have found that having a record of this information is a tremendous help in tracking your performance improvements.

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 **TESLA**[™]
electronics inc.

1 Year Limited

WARRANTY

SEE REVERSE SIDE FOR COMPLETE DETAILS

Limited Warranty

Tesla Electronics Inc. ("Tesla") warrants this product and its accessories against defects in material or workmanship for a period of one (1) year from the date of purchase. Tesla will repair or replace this product with new or refurbished products or parts, at Tesla's option, free of charge in the USA.

This warranty extends only to the original purchaser. A purchase receipt or other proof of date of original purchase from an authorized dealer (including Tesla Electronics, Inc.) is required in order to perform warranty service.

G-techs bought from Tesla Electronics, Inc. can be returned directly to Tesla Electronics, Inc. If you bought your G-tech from any other authorized dealer, the G-tech must be returned to that dealer in order for warranty service to be provided.

Before you send back a G-tech for warranty service, you must obtain a Return Materials Authorization number ("RMA number") from Tesla Electronics. G-techs received without an RMA number will not be accepted. The RMA number should be marked conspicuously on the outside of the package.

This warranty covers failures due only to material or workmanship defects.

This warranty does not cover cosmetic damage or damage due to accident, misuse, abuse, negligence, commercial use, acts of God, or modifications of, or to any part of the Product, including accessories.

This warranty does not cover damage due to operation or maintenance, connection to improper voltage supply, or attempted repair by anyone other than a facility authorized by Tesla to perform service on this product.

This warranty does not cover consumables such as fuses. This warranty is only valid for the United States.

Tesla 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 warranty of merchantability, are limited to the applicable warranty period set forth above. Some states do not allow the exclusion or limitation of incidental or consequential damages, or limitations on how long an implied warranty lasts. Therefore, the above exclusions or limitations may not apply to you.

Tesla specifically disclaims any and all liability, whether directly or by way of indemnity, for special, incidental, consequential or other damages, whether based on breach of contract, tort, strict or products liability, or any other legal theory.



Registration

V3.1

First Name _____ Last Name _____ Today's Date _____

Address _____

City _____ State _____ Zip _____

E-mail: _____ Phone: _____

Vehicle Information: Make _____ Model/Year: _____

Vehicle Modifications: _____

Comments: _____

Use First
Class
Stamp

Tesla Electronics Inc.
G-TECH Registration
1749 14th St
Santa Monica, CA 90404-4300

