VISIT OUR WEB SITE http://www.gtechpro.com/

1749 14th Street
Santa Monica, CA 90404
Tel: 310-452-0030

GTECH performance meter/PRO

USER'S MANUAL

metric version

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: Weather conditions severely impair controllability of a vehicle especially at high speed. Use this device with caution and emphasis on safety.

WARNING: Don't take your eyes of the road. G-TECH/Pro will record your results for viewing after the run.

This device is designed as a test tool to measure performance and safety characteristics of a given vehicle. Use it for that purpose only.

Please wear your seat belt at all times.

Thank you for purchasing G-TECH/Pro.

Your choice to acquire G-TECH/Pro is a sign that you are serious about performance. Since performance is important to you it's important to us. That's why G-TECH/Pro is such an incredible technological breakthrough.

RISC Microprocessor, GOLD plated circuitry, Precision Accelerometer, "Intuitive user interface" and highly sophisticated Digital Signal Processing algorithms are only some of the features designed to insure impeccable accuracy for your performance measurements.

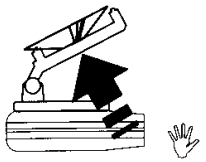
To truly benefit from your new G-TECH/Pro it's best to learn about its operation. We have tried to make this booklet as simple and concise as possible.

Please drive safely.

Jovo Majstorovic
President,

TESLA™
electronics

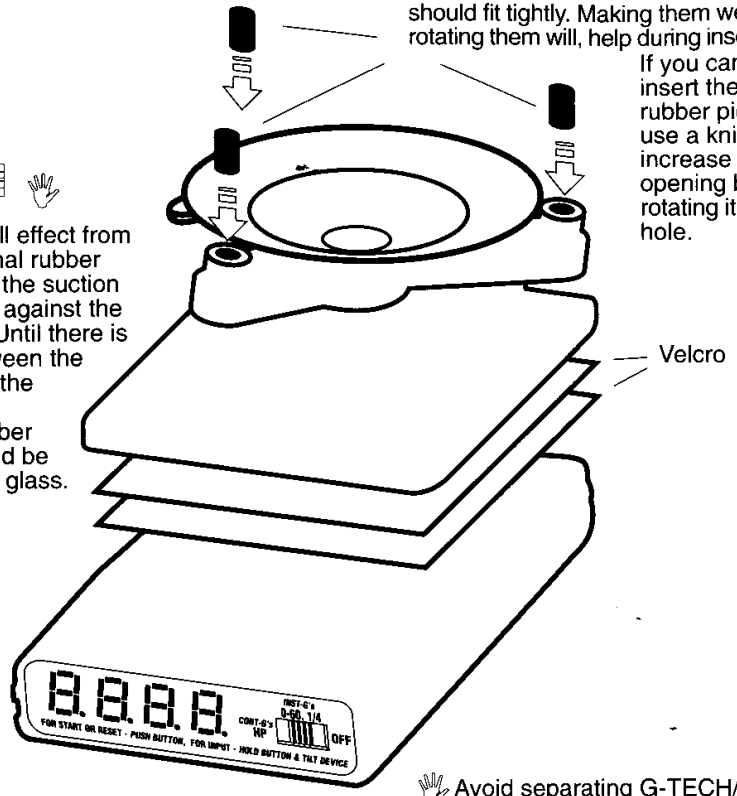
INSTALLATION



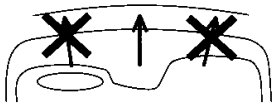
To get the full effect from anti-vibrational rubber pieces push the suction cup strongly against the windshield. Until there is no play between the bracket and the windshield.
All three rubber pieces should be touching the glass.

Place anti-vibrational rubber pieces in the holes on the bracket. They should fit tightly. Making them wet and rotating them will, help during insertion.

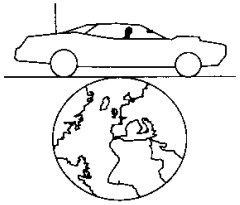
If you can't insert the rubber pieces use a knife to increase the opening by rotating it in the hole.



Avoid separating G-TECH/Pro from the bracket while hot because adhesive temporarily looses its strength during this time.



Windshield curvature will introduce vector offset and upset the measurements. So, make sure you position G-TECH/Pro right in the middle, underneath the rear view mirror.



While operating make sure G-TECH/Pro is level and that display is showing .00 G's.

READ THIS FIRST

There are many variables involved in any car performance measurement including air temperature, altitude, oil viscosity, wind, fuel type, driver's timing, humidity and others.

Additionally, cars are not like computers, given the exact same parameters they will not come up with the exact same results. Even if it was possible to have all the elements the same in two separate measurements it's likely to have performance variations up to 10%.

Considering the amount of variables it's very important to average several different runs preferably in both directions of the wind.

Measuring speed of a moving vehicle is a very difficult task. Professional test track drivers encounter the same difficulties with variables as you do, after all they are dealing with same unpredictable elements you are.

We are proud to say that the accuracy of G-TECH/Pro is close to the equipment that costs $10,000 or more. However in order to achieve that accuracy you should do what professional drivers who use this equipment do and that is to average results.

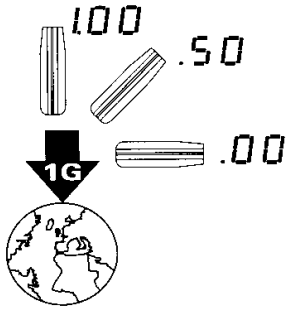
If you are making five runs, for example, you should average top three and ignore the worst two. Use the same principle, proportionately, regardless of how many runs you make.

Make sure that the track that you are doing the measurements on is as level as possible. Any incline or decline will upset the measurement. All standard tests are made on level ground.

Don't leave G-TECH/Pro on the windshield for a very long time. G-TECH/Pro is made of high quality plastic and the heat won't damage it but it will introduce temperature drift and upset the measurements. A good way to check if your G-TECH/Pro has been affected by the heat is to position it vertically and see if you are getting 1.00G's if not Your G-TECH/Pro should be brought to room temperature (just leave it in the glove box for 15 minutes).

HOW DOES IT WORK?

The heart of G-TECH/Pro is a precision accelerometer. An accelerometer is a sensor that measures acceleration also known as G-Force. G-Force is what's keeping you in your seat and if it wasn't for that seat you would be accelerating to the ground at 1G (9.81 meters per second squared).



Acceleration is measured in G's and that is what G-TECH/Pro is measuring and displaying most of the time. You can see this when you position G-TECH/Pro horizontally, it will show .00G's and if you position it vertically it will show 1.00G's. However, when you position it horizontally the gravitational force is ignored and G-TECH/Pro can concentrate solely on the acceleration of your car.

G-TECH/Pro measures your speed and distance traveled by integrating acceleration over time. Basically, if you know how fast you are accelerating for a certain time period you'll know how much your speed changed after that time period. So if you start of from zero speed then you'll know what your speed is after every time period. These time periods are very small (2.5 milliseconds) and that's how G-TECH/Pro maintains its accuracy. However, if you don't start from zero speed your measurement won't be correct because you won't have a good reference point. Consequently, it's very important to start all of your measurements from an absolute standstill.

Distance is measured in the same fashion, if you know how fast you are going for a certain time period you will know what is the distance traveled during that time period.

G-TECH/Pro also measures delivered Horsepower, sometimes also called Rear Wheel Horsepower. This horsepower includes the loss of power through the drivetrain which is usually 10-15%. Rear Wheel Horsepower is what most people are interested in because that is what they experience when driving. The use of Flywheel Horsepower measurement is fading out because an engine can't run without a car.

The horsepower that G-TECH/Pro measures also includes the aerodynamic drag. This means that if you tape over your headlights and grill, remove rear view mirrors and windshield wipers to improve your drag, you will measure a Horsepower increase even though you didn't make any changes to the engine. The only time this might affect you is if you take a headlight out to provide more air to the engine.

The formula for Horsepower is speed times acceleration (in any given moment during a run) times the weight of the vehicle.

WHAT CAN IT DO?

G-TECH/PRO can do following measurements:

1. 0-100 Kmh time
2. 100-0 Kmh braking distance
3. 400 meter E.T.
4. 400 meter trap speed
5. HORSEPOWER (DIN)
6. Instantaneous G's
7. Continuous G's

WHAT'S THE ACCURACY?

We look at accuracy in two different ways. First there is internal accuracy, which can be called resolution, and then there is Real Life Accuracy which is the worst case scenario to be expected in your measurements.

The difference between resolution and Real Life Accuracy is the result of noise, temperature dependency, vibration and other elements that influence the accelerometer and other internal electronic circuitry.

Since your measurements can be anywhere between the best (Internal) and worst (Real Life) accuracy the importance of averaging results becomes even more evident.

1. 0-100 Kmh	internal	1/100 sec.	Real Life	+/- 1/10 sec.
2. 100-0 braking	internal	1 foot	Real Life	+/- 2 feet
3. 400 meter E.T.	internal	1/100 sec.	Real Life	+/- 1/10 sec.
4. 400 meter Speed	internal	.1 mph	Real Life	+/- 1 mph
5. Horsepower	internal	1HP	Real Life	+/- 3 HP
6. Inst. G's	internal	1/100 G	Real Life	+/- 2/100 G
7. Cont. G's	internal	1/100 G	Real Life	+/- 2/100 G

G-TECH/Pro measures time performance differently than the racetrack, it measures elapsed time from the time that you start moving rather than from the time you cross the beam or the light turns green. This is better for tuning purposes because it eliminates driver variation in performance measurements and concentrates mainly on the car. Additionally, most race tracks average your speed at the last 20 meters of the 400 meter run while your G-TECH/Pro measures your speed at the exact 400 meter point. So, some discrepancy is to be expected, however, the consistency of the G-TECH/Pro is extremely good and is optimized for baseline testing in "before and after" situations.

TWO MODES OF OPERATION

G-TECH/Pro has two modes of operation. When first turned on G-TECH/Pro will sequentially display two abbreviations. **Accl** which stands for Acceleration mode and **GFrc** which stands for G-Force mode.

Acceleration mode OR **G-Force mode**

You can choose the mode you want by pushing the button when that mode is displayed. Then, G-TECH/Pro will start blinking the mode you chose for a couple of seconds (to toggle between modes push button again). After a couple of seconds, G-TECH/Pro will stop blinking and activate the mode you have chosen.

In order to perform a specific measurement you have to select the position of the switch.

far left position

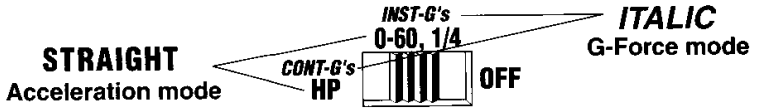
OR

middle position

In ACCELERATION mode the far left position of the switch is for Horsepower measurements and the middle position is for timing measurements.

In the G-FORCE mode, the far left position of the switch is for Continuous G's and the middle position of the switch is for Instantaneous G's.

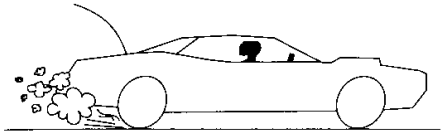
If you forget what position of the switch is for what measurement you can look at the indication symbols around the button. **STRAIGHT** letters are for Acceleration mode and ***ITALIC*** letters are for G-Force mode.



These two modes of operation are completely transparent so you won't know what mode you are in, because G-TECH/Pro shows G-Force on the display in both modes. However, you should know that you can't measure Horsepower in G-force mode or Instantaneous G's in Acceleration mode and so on.

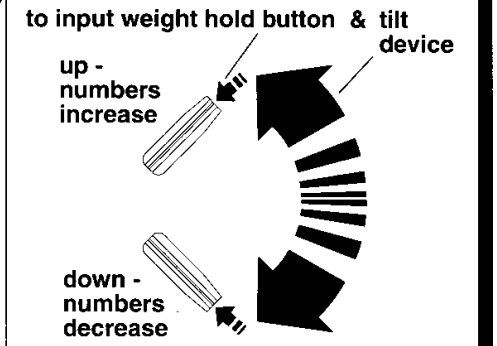
Remember, once you are in a certain mode you can't go back to the other mode unless you turn G-TECH/Pro off and then turn it on again.

HORSEPOWER MEASUREMENT



1. **Turn G-TECH/Pro on**
2. **Take it out of the bracket**
3. **Get into Acceleration mode**
4. **Turn the switch to left position**
5. **G-TECH/Pro blinks** U 0 ①
6. **Input vehicle weight in pounds** ②
7. **Put it back on the bracket**
8. **Position it horizontally**
9. **Get ready to start accelerating**
10. **Push the button**
11. **G-TECH/Pro zeroes-out**
12. **- Go - is displayed** ③
13. **Start accelerating**
14. **G-TECH/Pro starts displaying HP**
15. **Go trough gears (up to redline)** ④
16. **To end measurement slow down** ⑤
17. **G-TECH/Pro blinks Maximum HP** ⑥

To input the weight simply hold the button down and tilt the device. If you tilt it up (so that the display is pointed up) the numbers will increase. If you tilt it down the numbers will decrease. The more you tilt the device the faster the numbers change. When you let go of the button G-TECH/Pro will blink the weight for a couple of seconds. If you want to change the weight again push the button during this time, otherwise don't do anything and G-TECH/Pro will take in the weight and start displaying G's.



① If U 0 is blinking that means that you must input weight in order to measure Horsepower. U (for weight) will disappear when you go above 999 kilograms while inputting weight.

② Weight is usually displayed next to the Vehicle Identification Number on the plate by the door. It includes full passenger capacity. Subtract 85Kg for each missing passenger.

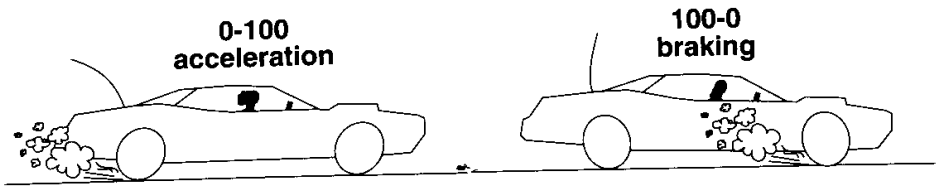
③ Sometimes Error will be displayed after zero-out. In this case try to position G-TECH/Pro more horizontally.

④ Most likely your maximum horsepower will be delivered in lower gears. Aerodynamic drag has a square effect (if you are going twice the speed drag is four times as much and so on). Drag will play considerable effect in higher gears. Additionally, peak horsepower resides close to redline, so make sure you get up there in RPM.

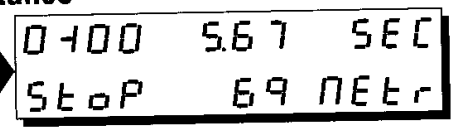
⑤ There are two ways to end a Horsepower measurement and have G-TECH/Pro display maximum HP. Either go above 200Kmh or slow down below 60Kmh.

⑥ G-TECH/Pro measures truly delivered horsepower which includes loss from drag so it will be few percent lower than on a dyno.

0-100 KMH AND BRAKING MEASUREMENTS



1. Turn G-TECH/Pro on
2. Choose Acceleration mode
3. Switch to middle position
4. Position device horizontally
5. Get ready to start accelerating
6. Push the button
7. G-TECH/Pro zeroes-out
8. - Go - is displayed①
9. Start Accelerating
10. G-TECH/Pro starts timing
11. Accelerate to 100Kmh or above
12. G-TECH/PRO blinks 100Kmh time
13. *USER CHOICE* - Start braking②
14. G-TECH/Pro continues timing③
15. At 100Kmh G-TECH/Pro stops timing
16. It starts displaying braking distance
17. Come to a complete stop
18. G-TECH/Pro displays results



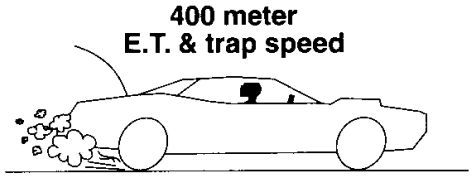
① Sometimes Error will be displayed after zero-out. In this case try to position G-TECH/Pro more horizontally.

② G-TECH/Pro has an intelligent feature of automatically determining if you are going for a 0-100Kmh or 400m run. After you have gone over 100Kmh you have a choice of continuing to accelerate or to slow down. If you continue to accelerate G-TECH/Pro will determine that you are going for a 400m and continue timing. However if you start slowing down after you accelerated above 100Kmh G-TECH/Pro will realize that you are interested in 0-100Kmh measurement and it will give you that result.

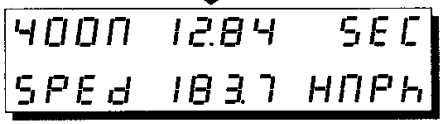
③ If you are only interested in 0-100Kmh time than you don't have to rapidly brake. You can slow down normally. Just make sure that you slow down below 100Kmh before you go 400m. If your braking distance is over 200m G-TECH/Pro will display 0 meters.
If you are interested in 100-0 braking distance only. Than you don't have to accelerate very rapidly to 100Kmh. (Don't take too much time either, because of drift).

YOU DON'T HAVE TO START BRAKING EXACTLY WHEN G-TECH/Pro BLINKS 0-100Kmh TIME! G-TECH/Pro knows your speed, so it doesn't matter at what speed above 100Kmh you started braking, G-TECH/Pro will only start measuring from 100Kmh to zero.

400 METER TIME AND SPEED MEASUREMENT



1. Turn G-TECH/Pro on
2. Choose Acceleration mode
3. Switch to middle position
4. Position device horizontally
5. Get ready to start accelerating
6. Push the button
7. G-TECH/Pro zeroes-out
8. - Go - is displayed①
9. Start Accelerating
10. G-TECH/Pro starts timing
11. Accelerate for 400 meters②
12. G-TECH/PRO blinks 100Kmh time③
13. *USER CHOICE* - Continue accelerating
14. G-TECH/Pro stops timing at 400m
15. G-TECH/Pro displays results



① Sometimes Error will be displayed after zero-out. In this case try to position G-TECH/Pro more horizontally.

② You don't have to know where the 400 meter mark is G-TECH/Pro does the measuring for you.

③ G-TECH/Pro will blink your 0-100 time for a second. However, it continues timing your 400m in the background and puts it up on the display after the second passes.

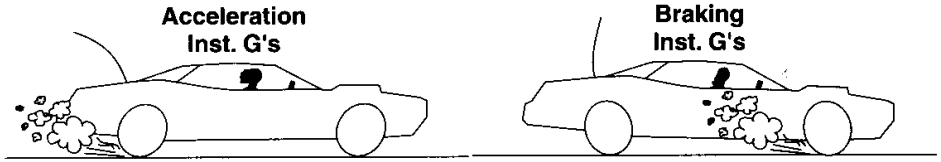
G-TECH/Pro will give you a result containing your 400m Elapsed Time and trap speed (speed at 400m point).
To reset G-TECH/Pro and get it ready for next measurement simply push the button. G-TECH/Pro goes back to showing G's.
Remember to write the results down since they are not kept in the memory.

INSTANTANEOUS G's

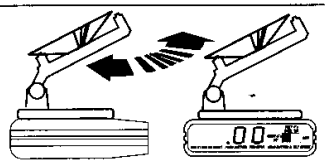
We have all heard people say that an Formula 1 car can pull above 3 G's. This is thanks to a large wing and other aerodynamics. This is a momentary peak G reading and is quite different from standard skidpad G readings. If you took a Formula 1 car and tested it on the skidpad with hardly any downforce it would pull around 1.4 G's.

The difference between Instantaneous G's and continuous G's is the duration of force. For example, even a little econo box can pull 3 G's for a moment. Will it stay on the road, well that's another matter.

In Instantaneous G measurement you can measure maximum acceleration G's or at what G level did the tires lose traction during braking or cornering. This can be used to test brakes, suspension and for determining the effects of weather conditions.



1. **Turn G-TECH/Pro on**
2. **Choose G-Force mode**
3. **Switch to middle position**
4. **Position device horizontally**
5. **Start your measurement**
6. **When done push button** ①
7. **G-TECH/Pro displays max. Inst. G's**
8. **Display blinks for 2 seconds**
9. **To reset push button while blinking** ②
10. **Back to displaying G's**



In order to measure lateral G's G-TECH/Pro has to be turned sideways (perpendicular to the direction of the vehicle). However, it should remain horizontal.

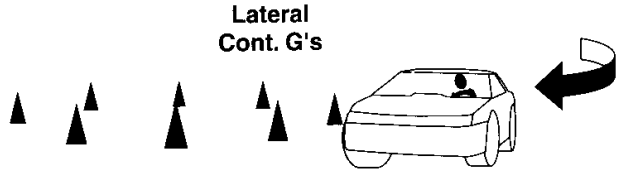
① When you want to find out what your maximum Instantaneous G's were up to that point simply push the button. Maximum value is displayed. I .97 The letter I on the left stands for Instantaneous G's.

② While G-TECH/Pro is displaying maximum value you can push the button again to reset it. If you don't reset it G-TECH/Pro goes back to showing G's. However the maximum value is still in the memory

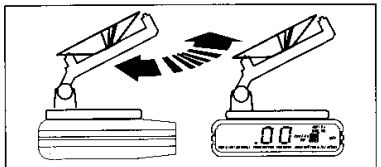
CONTINUOUS G's

In order for a G reading to be considered continuous it has to be valid for 3 seconds. Standard Lateral G-Force measurements are made on skidpads. Skidpad is nothing more than a flat surface large enough to accommodate a car going around in a circle. The diameter of the circle is not that critical. Usually test drivers put some cones on the circle to lead their way. They start out slow and build speed. Lateral G-Force increases with speed and at some point the car starts losing traction. The readings taken just before that point are considered maximum Continuous Lateral G-Force.

This test provides very valuable information about cars handling performance. The effects of suspension tuning and tire type become easily evident.



1. **Turn G-TECH/Pro on**
2. **Choose G-Force mode**
3. **Switch to far left position**
4. **Position device horizontally**
5. **Start your measurement**
6. **When done push button** ①
7. **G-TECH/Pro displays max. Cont. G's**
8. **Display blinks for 2 seconds**
9. **To reset push button while blinking** ②
10. **Back to displaying G's**



In order to measure lateral G's G-TECH/Pro has to be turned sideways (perpendicular to the direction of the vehicle). However, it should remain horizontal.

① When you want to find out what your maximum Continuous G's were up to that point simply push the button. Maximum value is displayed, C .69 letter C on the left stands for Continuous G's.

② While G-TECH/Pro is displaying maximum value you can push the button again to reset it. If you don't reset it G-TECH/Pro goes back to showing G's. However the maximum value is still in the memory

TROUBLESHOOTING

G-TECH/Pro DOESN'T LIGHT UP

There is a lot of electrical noise coming out from most cigarette lighter plugs. This noise is mainly caused by the ignition. There is a large capacitor inside G-TECH/Pro to filter out this noise. Sometimes, if you turn of the G-TECH/Pro and turn it on right away the capacitor will not have enough time to completely discharge which will cause an incomplete reset. When this happens it will seem like G-TECH/Pro is not working. But all you have to do is turn it off and wait a couple of seconds before turning it on again.

CABLE TENSION REPOSITIONING G-TECH/Pro

Some cars have cigarette lighter plugs further away from the windshield. In this case the tension from the cable may not allow proper positioning of the G-TECH/Pro. If the cable is too short you can buy an extension from your local Radio-Shack.

G-TECH/Pro CONTINUES TIMING EVEN IF YOU STOP

Sometimes G-TECH/Pro will continue timing even after you have come to a complete stop. This is probably caused by the compounded error throughout the entire measurement. G-TECH/Pro measures speed by integrating acceleration over time. Unlike mechanical speedometer G-TECH/Pro has only one point of reference, which is zero. Longer the timing measurement is higher the chances of compounded drift error. Best thing to do in this case is to repeat your measurement and make sure that you are on level ground.

NOT GETTING RESULTS YOU EXPECTED

Most critical point in your measurement is the staring point. It's very important that the G-TECH/Pro starts timing the exact same moment you start moving if this doesn't happen you will get the result that will be incorrect.

In horsepower measurement you will always get the lower number than expected because G-TECH/Pro measures horsepower including horsepower loss from aerodynamic drag. Dyno horsepower does not include the aerodynamic loss because the car is standing still when the measurement is being performed.

If you have a turbo car the difference from Dyno and G-TECH/Pro will be greater because turbo cars develop maximum horsepower in higher gears (more time to build up the boost) but in higher gears there is also more aerodynamic drag.

If you have Ram Air car the difference between Dyno and G-TECH/Pro will be smaller because in Dyno measurement you don't get the benefit of Ram Air since the car is standing still.