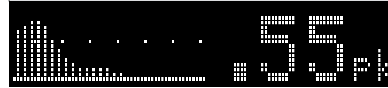


OWNER'S MANUAL SUPPLEMENT
for Performance Computer with VFD display

New Features



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Metric Operation



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New G-Meter Displays

We've added four new ways for the Performance Computer to display G-Forces.

G-METER OPTION 9: SKIDPAD

Press and release the G-METER button as necessary to select "G-METER OPTION 9."

Car testers use a large circular track ("skidpad") to measure maximum cornering capabilities of vehicles. This display shows only the cornering G-Force.

The small number on this display is a continuously computed two-second average reading for the cornering G-Force. This averaging eliminates false readings caused by momentary spikes.

(You can change the averaging time from 1 second to 16 seconds in the user setup mode. For reference, at .8 G, it will take about 15 seconds to travel a full lap of a 300 foot diameter skidpad.)

The large number on this display holds the peak reading (of the averaged number) for seven seconds. This allows you to evaluate the vehicle at its maximum cornering capability, then slow down a bit and still have time to view the highest reading achieved.



In this example, the small number shows that the current cornering G-Force is .79 G, and the large number shows that the peak skidpad reading in the last seven seconds was .95 G.

ENGINE DAMAGE WARNING

Some street vehicles are not designed for long-term continuous turning in one direction, and it may be possible to cause extensive engine damage when the oil in the engine's oil pan is held to one side by sustained cornering forces. Make sure your vehicle's oil is at the proper level, and immediately stop the skidpad test if your vehicle's oil pressure drops.

Comparing your results to published tests

Professional testers typically use new vehicles (with full-tread tires) on large asphalt skidpads, usually 200 or 300 feet in diameter.

Smaller diameter circles (such as you might perform in a parking lot) will produce higher G-Forces. Abrasive surfaces (such as concrete) will also produce higher G-Forces. Finally, worn tires (with little tread remaining) will produce higher G-Forces (on dry surfaces).

G-METER OPTION 10: G-FORCE GRAPH

Press and release the G-METER button as necessary to select "G-METER OPTION 10."

Note: This "moving chart" display will be easier to understand after you try it in your vehicle.

The graph shows a moving chart that shows how the G-Force has changed over the past seven seconds.

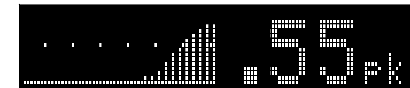
The large number on this display shows the peak of your combined vector G-Forces (see explanation in the owner's manual in G-METER option 2: Friction Circle) over the past seven seconds.

This seven second peak hold allows you to complete a maneuver (such as a turn), then after completing the maneuver, still have time to glance at the display to see what G-Force you attained.

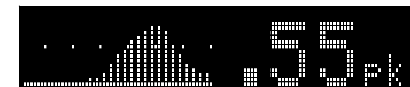
This display is very useful for evaluating driver smoothness. For example, by having a passenger monitor the G-Force as a driver brakes for a corner, turns into the corner, and then accelerates out of the corner. Ideally the G-Force graph will show a continuous high g-force with smooth transitions as the car goes from braking to cornering to acceleration.



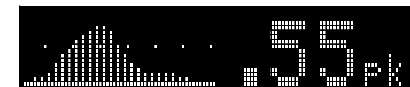
The car has begun to brake, and is decelerating at .10 G.



2 seconds later, the car is braking harder, now decelerating at .55 G.



2 seconds later, braking has been reduced to .10 G. (The peak G-Force over the past 7 seconds is .55 G.)



2 seconds later, the car is no longer braking. (The peak G-Force over the past 7 seconds is .55 G.)



2 seconds later, the car is no longer braking. (The peak G-Force over the past 7 seconds is .55 G.)

G-METER OPTION 11: 2-AXIS GRAPHS

Press and release the G-METER button as necessary to select "G-METER OPTION 11."

Note: This "moving chart" display will be easier to understand after you try it in your vehicle.

The left-hand graph shows acceleration and braking. Acceleration is displayed as a line above the center. Braking is displayed as a line below the center.

The right-hand graph shows cornering. Cornering to the right is displayed as a line to the right. Cornering to the left is displayed as a line to the left.

The number shows the peak of the combined G-Force over the past four seconds.



The car is decelerating at .50 G.



2 seconds later, the car has braked harder, then reduced braking. The car is beginning a right turn. The peak G-Force over the past 4 seconds is .60 G.



2 seconds later, the car is no longer braking, but it is cornering to the right at .75 G. (The peak G-Force over the past 4 seconds is .75 G.)



2 seconds later, the car is still cornering to the right, and is beginning to accelerate. (The peak G-Force over the past 4 seconds is .80 G.)



2 seconds later, the car continues to accelerate. (The peak G-Force over the past 4 seconds is .80 G.)

G-METER OPTION 12: 2-AXIS W/ PEAKS

Press and release the G-METER button as necessary to select "G-METER OPTION 12."

Note: This "moving chart" display will be easier to understand after you try it in your vehicle.

The graphs are identical to option 11.

The upper number on the left shows the peak acceleration or braking force over the past four seconds. The lower number on the left shows the current acceleration or braking force over the past four seconds.

The upper number on the right shows the peak cornering force over the past four seconds. The lower number on the right shows the current cornering force over the past four seconds.

Peak acceleration or braking force over past 4 seconds ▼



▲ Current acceleration or braking force

▼ Peak cornering force over past 4 seconds

▲ Current cornering force



The car is decelerating at .50 G.



2 seconds later, the car is braking at .30 G. The peak braking G-Force over the past 4 seconds is .60 G. The car is beginning a right turn, cornering at .15 G.



2 seconds later, the car is not braking, but the peak braking G-Force over the past 4 seconds is .60 G. The car is cornering to the right at .75 G.



2 seconds later, the car is still cornering at .75 G, and is accelerating at .30 G. The peak accelerating/braking G-Force over the past 4 seconds is .50 G.



2 seconds later, the car continues to accelerate, and is now cornering at .15 G.

Other New Features

We've made refinements and improvements to several features of the Performance Computer.

EASIER-TO-READ DISPLAYS

We've improved some of the timed run screens.

New Horsepower readout:



Max Speed 109.3
324HP 60mph 296av

The display now shows the peak horsepower reading and speed first, the average horsepower second.

New Brake Test readout:



60-0 Brake Test
168 feet 3.09 sec

IMPROVED DEFAULT SETTINGS

Vehicle Weight:

The default vehicle weight (used for horsepower calculation) is now 3500 lb. (In metric mode, it is 1600kg.)

Brake Test:

The brake test feature is now normally ON. To perform a brake test, start a timed run as normal, accelerate to at least 63mph/105kph (but no higher than 80mph/130kph), then begin your brake test.

CHANGE IN DEMO MODE

If you put the Performance Computer in the "demo mode" (a special mode that continuously scrolls through the product's significant features), it will stay in that mode, even if unplugged and plugged back in.

To start or stop the demo mode:

1. Unplug the unit or disconnect power to it.
2. Press the UP button and the G-METER button.
3. Reconnect power while you hold the two buttons.

HORSEPOWER CALCULATION

We've improved the accuracy of the engine horsepower calculations of the Performance Computer.

We've added an additional correction factor, called "Mass Factor." Roller-type (chassis) dynamometers typically measure horsepower with the car in 4th gear. We believe most users of the Performance Computer will measure their horsepower at lower speeds. In lower gears, the effective mass of your car is increased, due to an increased effect of the rotating inertia of the drivetrain. Suggested settings for "Mass Factor" in the setup mode are 20% to measure horsepower in 1st gear, 7% to measure horsepower in 2nd gear, 3% to measure horsepower in 3rd gear, and 0% to measure horsepower in 4th gear (or higher gears). The default Mass Factor (adjustable in the Setup mode) is 7%, which assumes you will measure horsepower in 2nd gear (which covers speeds to approximately 60 mph in most cars).

For accurate horsepower measurements

For the most accurate horsepower measurements during a timed run, shift early and shift smoothly, letting your car accelerate at full throttle through the engine's entire RPM range. The unit measures horsepower from 30 mph through 60 mph (you can adjust this speed range in the setup mode). The peak horsepower is displayed along with your other run results after the run.

But remember, horsepower readings are affected by temperature, humidity, slope of the road, air density, and other factors. As such, the horsepower readings will not exactly match the results of an engine dynamometer, which is performed in a much more controlled (and therefore repeatable) environment.

CHANGE IN DATALOGGER MODE

We've improved the datalogger mode (see details on page 30 in the Owner's Manual). Now the Datalogger records acceleration, braking and cornering G-Forces 10 times per second, for a single run that can be as long as 22 minutes.

SETUP MODE ITEMS

"Mass Factor" (new item)

See horsepower calculation information on this page.

"Factory Default" is eliminated.

To restore factory defaults, instead use the procedure on page 33 of the Owner's Manual.

"Skidpad" (new item)

This lets you choose the time period for averaging the skidpad cornering force. It is adjustable from 1 to 16 seconds, the default is 2 seconds.

Setup for Metric use

You can now setup your Performance Computer for US or Metric units, and calculate engine power in HP, PS (metric horsepower) or KW (kilowatts).

IMPORTANT

NOTE: Changing any of these settings erases all saved run results and any personal settings the user has programmed, such as vehicle weight, etc., so this configuration is best done before first using the Performance Computer.

STEP 1: Enter the Metric Setup

- 1 Hold the G-METER button for 15 seconds.**
The display will change a few times while you hold the button. Do not release the button until the display reads "Metric/US config."
- 2 You will see these two alternating instructions:**

```
Metric/US confis
STARTforNextitem
```

This screen explains that you should press the START button if you want to go to the next item in the Metric Setup Mode.

```
Metric/US confis
GMETERExitSetup
```

This screen explains that you should press the G-METER button if you want to exit the Metric Setup Mode.

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STEP 2: Select English or Metric

- **Press the START button to go to Item 1: "Mode"**
- **Then press the UP and DOWN buttons to choose your preferred Mode.**

There are three options:

Mode: ENGLISH

This choice has speed in MPH, measurements in feet and inches, and weight in pounds.

Mode: MET+400M

This choice has speed in KPH, measurements in cm and meters, and weight in Kg.

This choice also replaces the conventional 1/4 mile timed run with a 400 meter timed run.

Mode: MET+1/4m

This choice has speed in KPH, measurements in cm and meters, and weight in Kg, but uses a U.S. "drag strip" 1/4 mile timed run (but with the speed displayed in kph).

STEP 3: Select Power Units

- **Press the START button to go to Item 2: "Power Units"**
- **Then press the UP and DOWN buttons to choose your preferred Units.**

There are three options:

Power Units : HP

Displays power as English Horsepower.

Power Units : PS

Displays power as Metric Horsepower.

Power Units : kW

Displays power as kilowatts.

STEP 4: Exit the Metric Setup

After you have chosen your preferred settings, press the G-METER button for normal operation.

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Differences in Metric

There are many detail differences between the US and Metric modes. We'll review the differences here.

- Speed is measured in kph.
- Vehicle weight is measured in kg, and the default weight is 1600 kg. You can adjust this in the setup mode. (See pages 24-30 in the Owner's Manual).
- The braking test is from 100kph to 0. To perform a braking test, start a timed run as usual, then accelerate to at least 105 kph (but no more than 130 kph), then immediately perform a braking test. The results will be included as additional items added to the standard acceleration run data.
- Rollout distances for the timed runs are measured in cm, and adjustable from 0 to 65cm using the setup mode. (See page 29 of the Owner's Manual for a definition and detailed discussion of rollout).
- Aerodynamic drag CDA is measured in square meters. You'll need to enter this value in the setup mode in order to calculate horsepower for your vehicle.

See the following section for details.

To determine the metric CDA of your car:

There are three ways to determine your car's CDA:

- Find specifications for your car's CDA
 - Estimate your car's CDA
 - Calculate your car's CDA using a coastdown test
- Details on each method follow.

1 Manufacturer's specifications or other research

Very rarely do manufacturers list the aerodynamic qualities of their cars, unless they are exceptional. Try searching the internet for the terms "drag coefficient" or "frontal area" and the make of your car.

Note: If you find specifications for US cars they list frontal area in square feet. Divide those figures by 10.76 to convert to square meters.

2 Estimate your vehicle's CDA

Use these examples to estimate your car's CDA.

Honda Insight	.25 CD x 1.90 M ²	= .48 CDA
Corvette C5	.29 CD x 1.98 M ²	= .57 CDA
Porsche 911	.32 CD x 1.80 M ²	= .58 CDA
Audi S4	.31 CD x 2.04 M ²	= .63 CDA
Honda Civic	.34 CD x 1.95 M ²	= .66 CDA
Minivan or SUV	.40 CD x 2.80 M ²	= 1.12 CDA
Pickup or van	.45 CD x 3.25 M ²	= 1.46 CDA

Modern passenger car CDs are usually .30 to .35.

Van, SUV and truck CDs are usually .35 to .45.

3 Calculate your vehicle's CDA

You can determine the correct CDA number by using a "coastdown" test.

- On a flat road, on a day with no wind, accelerate to slightly above 100 kph.
- Put your car in neutral (whether your car has an automatic or manual transmission, it is important to put the car in neutral).
- Measure the time it takes your car to decelerate from exactly 100 kph to exactly 80 kph.
- Perform this test at least three times in each direction, to make sure your results are relatively consistent.
- Average your times, then use the table to the right to determine the CDA factor.
- Multiply your car's weight times the CDA factor from the table to determine your car's CDA.

EXAMPLE: Find the CDA of a 1800 kg car that takes 20.5 seconds on average to coast from 100 to 80 mph.

Look at the table. For 20.5 seconds, the factor is .000382. Multiply that times 1800 kg to get the car's CDA.

$$1800 \times .000382 = .69$$

.69 is the car's approximate CDA.

The average time it takes your car to coast from 100 kph to 80 kph (in seconds)	Multiply your car's weight by this number to calculate your CDA.
13.0	.000798
13.5	.000756
14.0	.000717
14.5	.000681
15.0	.000647
15.5	.000615
16.0	.000585
16.5	.000557
17.0	.000531
17.5	.000506
18.0	.000482
18.5	.000460
19.0	.000439
19.5	.000419
20.0	.000400
20.5	.000382
21.0	.000365
21.5	.000348
22.0	.000333
22.5	.000318
23.0	.000303



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