

User's Manual

Manual Revision 0

Software Release Level 1.4

RACINGDYNO V1.4.0

DYNO46
racing performance

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The User's manual

This user' guide introduces you to the basics of using of RacingDyno Software. Every chapter starts with its short description and the chapter contents.

Online Help

RacingDyno online Help contains basic and advanced information on features, settings and dialogs.

Technical Support

If you have any questions on how to use RacingDyno, please consult all the documentation you have (the User's Guide and the Help File) before contacting our technical support service. You may also browse the technical support section on our website www.dyno46.com. You may find the answer to your question there. In case you didn't manage to find the answer, e-mail us at info@dyno46.com. Our technical support service experts will need the following information to answer your question competently:

- Your first and last name
- Your organization name
- Your telephone number (or fax, or e-mail)
- The Hardware Control Number (HCN) of your IDERC unit
- General description of your problem and the full error message text (if there was one)
- Your computer and processor type
- The version of your Windows operating system

You may supply us with any other information you consider important. You can get some information automatically by clicking the System Information in the Display.

Installing RacingDyno Software

If there is only a CD-ROM in the distribution package, do the following:

1. Insert the CD-ROM into the CD-ROM drive.
2. Click the Start button on the Taskbar and select the Settings/Control Panel item.
3. Double-click the Add/Remove Programs icon.
4. Select the Install/Uninstall tab and click the Install button.
5. Follow the installation instructions.

Note: Steps 2-4 have the same effect as running the Setup.exe setup program from the CD-ROM.

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RACINGDYNO SOFTWARE FOR IDERC

1.0 OVERVIEW

The Racing Dyno software is used to read the preprocessed data from the IDERC units. The data will then be crunched and then will be displayed (no need of third party programs as "Microsoft Excel ®", read more). It will display TRUE engine torque and HP. After several years of updates based on user feedback, it has more "user friendly" functions available (will be described below).

The software is basically an updated version of the Racing Dyno DOS program. The latest Racing Dyno software is Window based. It is very easy to use and very powerful.

Below are some of the advantages of the Racing Dyno Software:

- Calculate Engine Torque (not just roller torque, read more)
- Watch "real time" gauges as you run the engine.
- Support of other channels with display gauges.
- Support of the 5 world major correction factors SAE EEC DIN JIS ISO STP.
- Import or save your files and share them with others. (unlimited number of runs for future retrieval).
- Export test readings into ASCII.
- Possibility of working simultaneously with several curves
- Enable or disable tests to be drawn on the screen.
- Tests also can be printed on paper.
- And lots more.

Future Updates

- Export test readings into ASCII. (Steps in time or distance).
- Display and export Time based and Distance Based graphs.
- Rotational Inertia Calculator

You may download to try it out and discover more advantages. For suggestions or comments, feel free to contact us at info@dyno46.com

Racing Dyno V1.4 is ready for distribution. It will be made better periodically. Updates will be available for FREE to owners of the IDERC kit

2.0 SYSTEM REQUIREMENTS

You will need the following to run RacingDyno software:

- IDERC Unit
- PC with a Intel® Pentium® 400 MHz processor or higher
- Microsoft® Windows® 2000, NT, 95, 98, Me, XP.
- 64 Mb of RAM or higher
- 15 Mb of free hard-disk space for minimal program installation
- 30 Mb of free hard-disk space for the program operation
- CD ROM (optional)

3.0 COMMAND MENUS

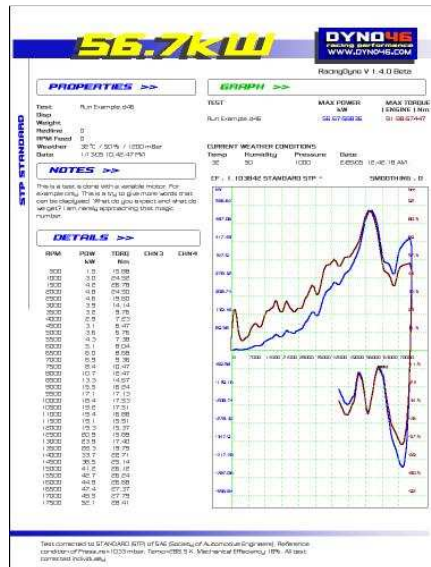
FILE MENU



NOTE:

There are several functions available in the menus. Most of these functions are also available via the right-click menu on the graph.

Open	Open allows you to browse to any directory containing a saved "Power Run". Open a saved "Power Run". The default extension for the file is *.d46 Up to eight files may be viewed at a time.
Export ASCII Data	Saves an opened d46 file into an ASCII file that can be opened in a third party spreadsheet program as "Notepad®" and "Microsoft Excel®". Data contained will include changes in the value of Channel parameters in steps of Time, RPM or Speed.
Print Options	Select the options for printing. The options to be selected are the same as ASCII Export, except the print preview will display graphs and complete details of the test.
Print Preview	Displays a print preview of the printed test.



NOTE:
 Be sure to set the paper orientation to "Portrait" in the printer setup.

Print

Prints the details all the selected tests. However the complete details will only be available for 1 test. Other test that will be printed along will only include the graph and max values. First there will be a window to configure the printer.

Exit

Exit from the program.

TEST MENU



NOTE:
 A "Power Run" or sampling is basically the recording of the current data, streaming to the software from the IDERC unit.

Power Run

This option opens a window as above to start a new test. Fill in the appropriate details in the window prior doing a test. You can start the test by clicking over the 'start' button in the window or the start button at the IDERC unit.

Details that are entered could be modified afterwards with the "FILE OPEN" command.

When all details are accepted, the software will bring up the "Run Screen" and proceed with an option to do a "Power Run". This is done by clicking on the "START" button on the "Run Screen".



NOTE:

Use the same gear used during the ratio test to obtain the **“RPM/KMH Ratio”** for doing the “Power Run”. E.g. If the third gear is used to obtain the **“RPM/KMH Ratio”**, use the third gear also during the “Power Run”.

Ratio Test

This option opens a window that is useful to calculate the **“RPM/KMH Ratio”** when the engine RPM channel is not available in the program. Either no RPM reading is available or when using the IDERC1 unit. It is done with a comparison of an external tachometer.

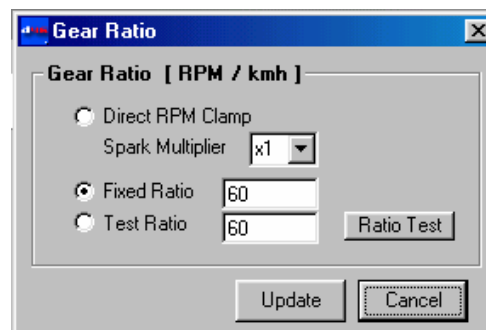
When the ratio value is unknown for a vehicle, and ignition channel is difficult to record (for example diesel engines) or it is noisy and inaccurate, it is better to approximate ratio value with this method.

With the last gear, accelerate the engine to a certain fixed RPM. At this moment, the roller will run at a certain speed. When the “Capture” button is clicked, the ratio value will be used after this process on the next power run.



Gear Ratio

This window shows the gear ratio source used for the setup. It is via direct RPM clamp, or “**RPM/KMH Ratio**” obtained via calculation or the “Ratio Test” above.



Remove All Runs

Remove all runs opened from the program. This is done to clear out the program when many runs are opened simultaneously. However the “Power Run”s will not be deleted from the hard drive. The files are still available for the future.

Recalculate RPM

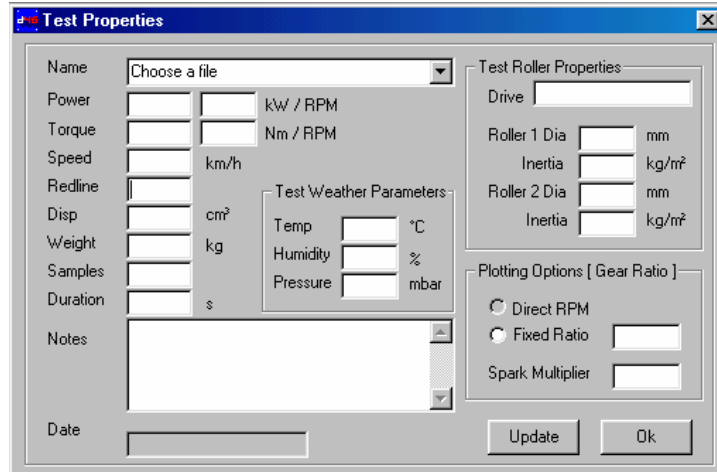
This option recalculates all the RPM channel of a saved file by overwriting the previous values with new calculated ones. This option is needed when the “**RPM/KMH Ratio**” is incorrect.

The RPM value is a result of multiplication of the speed and “**RPM/KMH Ratio**”, thus if ratio value is wrong, resulting RPM will be

wrong. Also affecting the Torque and HP values.

Properties

Shows all details from and opened test in a new window. The details could then be modified or repaired.

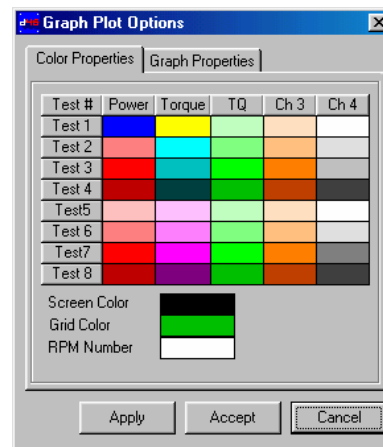


OPTION MENU

Graph Options

The graph option contains to tabs the “Color Properties” and “Graph Properties”.

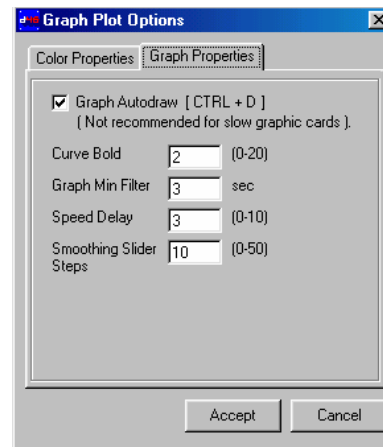
Click on the color boxes on the “Color Properties” tab to choose another color. Over 32-bit of colors are available. That is around 4'294'967'296 colors to choose from.



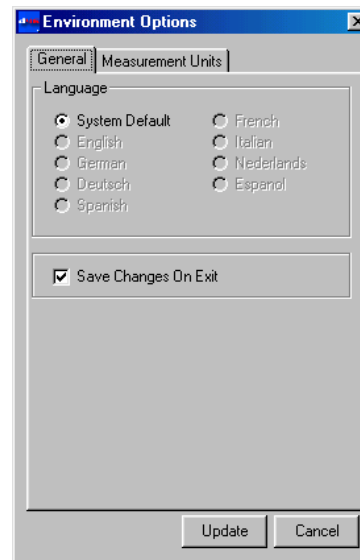
The “Graph Plot Options” tab contains graph-plotting options.



NOTE:
Enabling or setting values high for several options may require faster PC graphics processor. However recent PC setup are already able to work fine with these settings.

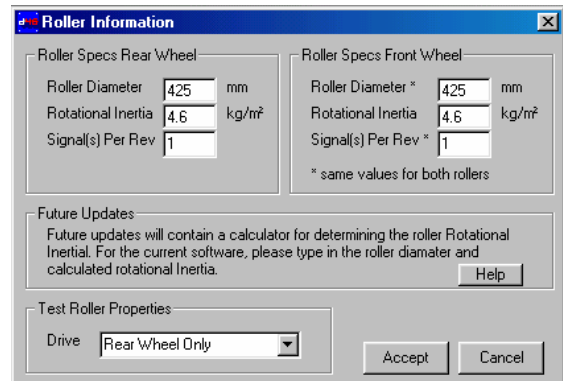


Environment Option This window provides language selection and an option to save all the program settings on exit automatically. However for the moment language database for other languages are still under development.

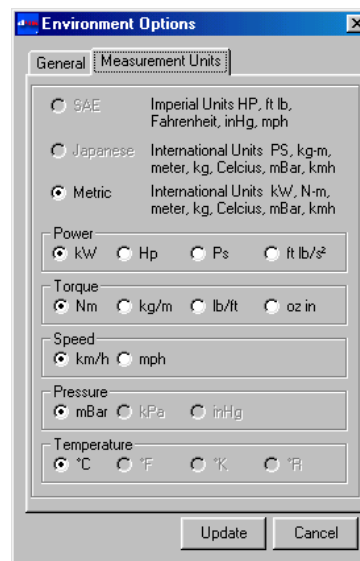


NOTE:
The roller properties will directly affect the speed and horsepower measurements. If the values are entered incorrectly the whole operation of the dynamometer will be incorrect. Please make sure values are correct. If possible in all conditions, with the accuracy of at least in 1mm.

Roller Properties This is the most important window. It contains the vital details to calculate the HP and Torque of a test vehicle.



Measurement Properties This window shows the measurement units available for use with the software.



CONNECT MENU



NOTE:

Please make sure the data cable for the IDERC unit is connected to both PC and the IDERC unit first to avoid the system to crash.

When connected data will already be streaming to the software. Any signals would be picked up by the IDERC unit even when not doing a "Power Run".

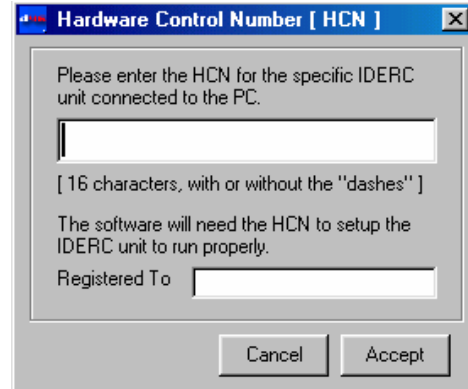
Connect to IDERC Now This option connects the software with the IDERC unit.



NOTE:

Each HCN is unique. Every IDERC unit has it's own HCN number.

Hardware Control Number Window to enter the HCN [Hardware Control Number] to setup the software to use with the specific IDERC unit. The HCN will include information about the type and channel settings the of IDERC unit connected.



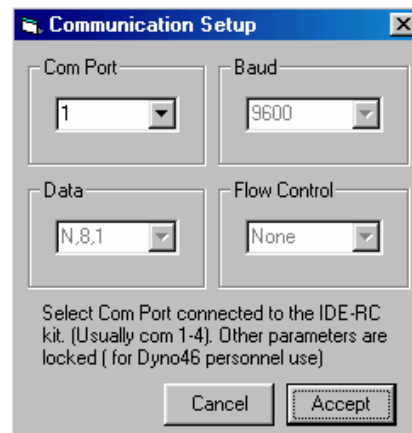
NOTE:

For PC without serial com port usually latest laptops, a USB-RS232 adapter is available.

COM Port Setup

Windows to setup the serial COM port number connected to the IDERC unit, usually COM port 1. The serial COM port is a 9-pin connector behind your PC, usually male.

Some win XP users will have problems connecting to the IDERC unit. This is due to tight security restrictions of win XP to opened ports.



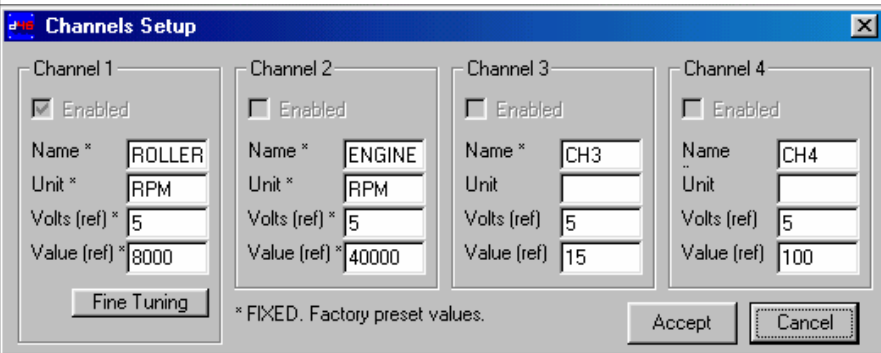
View Channels

This window shows the channel properties for the software. No modification will be need for CHN1 and CHN2 as the settings are embedded in the HCN. However the channels setting must be done to use CHN3 and CHN4.



NOTE:

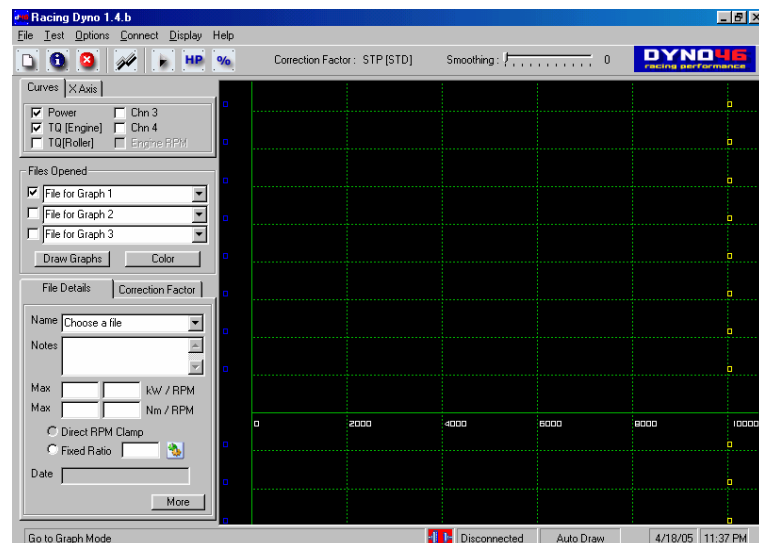
Use the "Fine Tuning" option for CHN1 [Roller]. Due to external factors the roller speed detected may differ from the actual. This process is done with a comparison of an external speedometer.



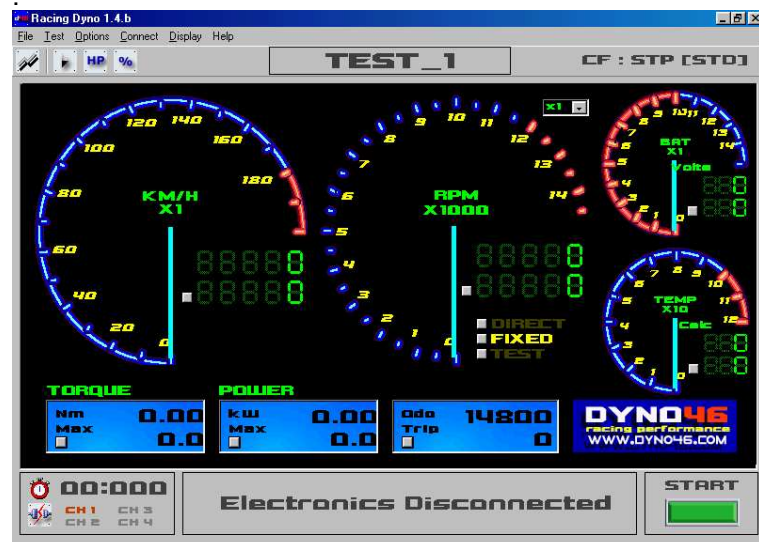
Disconnected IDERC This option disconnects the IDERC from the software.

DISPLAY MENU

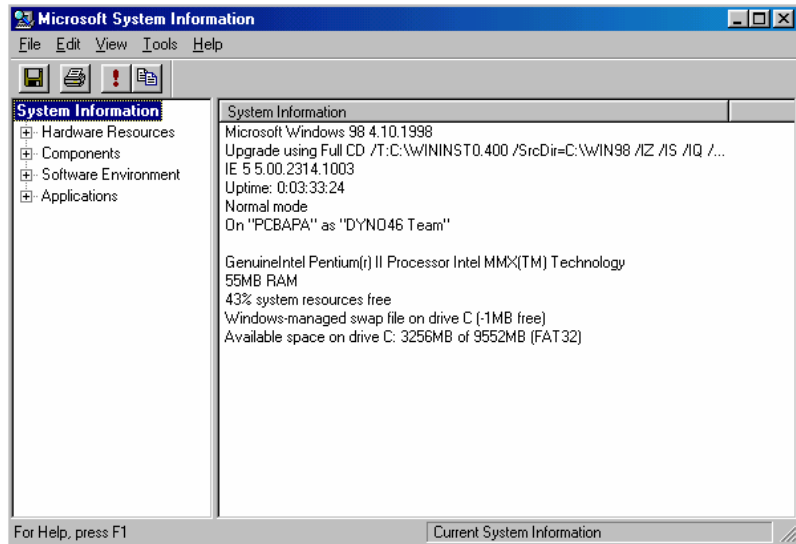
Graph Screen This option will bring up the “Graph Screen” as shown below.



Run Screen This option will bring up the “Run Screen” as shown below



System Information This option brings up the “System Information” windows. This window is very helpful to determine several important details as system as resource, processor speed and platform type.



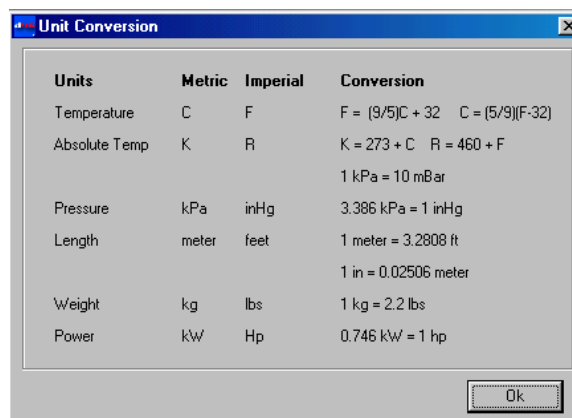
HELP MENU

Help

Brings up the “Help Window”.

Unit Conversion

Brings up a window that shows a table of some major measurement conversions usually used in calculations for the software.



Dyno46 Home Page The link to our homepage at <http://www.dyno46.com>

About Information about the HCN for the IDERC unit used with the software and several information about DYNO46.

GRAPH OPTIONS

OPTIONS FOR Y AXIS.

There are some channels at this box, if checked this channels will appear on graphs area (if they exists during the "Power Run"):

Power Displays horsepower channel
TQ (Engine) Displays torque channel
TQ (Roller) Displays engine RPM channel.
CHN3 Displays detected values for Channel 3.
CHN4 Displays detected values for Channel 3.

OPTIONS FOR X AXIS.

Options in this box are:

Engine RPM Display test curves as a function of engine RPM. The values of this channel is always calculated by using the ratio value (RPM/KMH) of "Power Run" either by 'ratio test' or "direct clamp".

FILE OPENED

This list contains tests loaded from the disk or tests have been done with the IDERC unit. Several details of the files opened then could be modified. The graph for the files will also be available.

FILE DETAILS

A simplified tab of the "Test Properties". First select the file to view the details from the dropdown menu. To view detailed or edit the values of the, click "More" button on the tab.

CORRECTION FACTOR

This tab shows and sets the correction factor used for the current "Power Run" only. To view the weather condition of a file when it was recorded, click "More" on the "Test Properties" tab.



NOTE:

All files that are saved are "UNCORRECTED" format. This means it hasn't been corrected to any major CF. However a correction to any CF is possible because the weather condition when the run was recorded is also saved along with the file. This is our advantage over many other types of software.

However the Correction Factor "TYPE" selected from the column will be the CF type to correct the current opened saved files and to correct the current "Power Run".

The CF "Value" calculated will be the value to correct the current "Power Run" ONLY.

Temperature and pressure affects the power and Torque produced by an engine. This windows allows you o enter necessary information to correct the program calculations due to atmospheric conditions at the time of the run. These figures must be checked before every run to ensure accuracy.

4.0 GETTING STARTED

4.1 SOFTWARE SETUP CHECKLIST

Number	Done	Action
1		Install the RacingDyno Software.
2		Connect the cables from the IDERC unit to the PC.
3		Run the software
4		Select the correct COM port for the IDERC unit.
5		Key in the HCN [Hardware Control Number]
6		Key in the mass Inertia of the roller
7		Key in the number of signals per roller revolution .
8		Connect the software to the IDERC unit .
9		Set the gauge readings to suit your application .
10		Do fine tuning for the roller speed-readings

4.2 DOING A POWER RUN



NOTE:

When the IDERC is connected, this “Run Screen” shows in real time the roller speed and the calculated/sensed engine RPM. In addition if other sensors are connected [IDERC4], the values of the other channels are also displayed real time.

1. Click On the “Power Run” menu or press CTRL+R. This will bring up the “New Run” window. Key in the appropriate information for the ‘Power Run’.

ALTERNATE WAY:

Pushing the “Start” button on the IDERC unit will also bring up the “New Run” window. Another click will start the Power Run. The file name will be automatically generated as the name specified on the “Name Format” box. This will help with one-man operation Power Runs.



NOTE:

The details of the “Power Run” could also be modified afterwards

Test Details

Details of the “Power Run”. Only the “Name” is required. The other details are optional.

Correction Factors

The CF used to display the “Power Run”. However the data saved will also be saved

UNCORRECTED. This is so the file can be opened gain and corrected in any other CF format in the future.

- Roller Properties** This is the number of rollers you have.
- Auto Start Settings** These settings will determine how the "Power Run" will start and stop.
- Gear Ratio** This will determine the gear ratio type used for the test. When using a RPM clamp, the signals are produced by the high voltage flow from spark cable. Every engine follows a different pattern. If your RPM reading is incorrect adjust the "Spark Multiplier" to justify.

2. Select the "Start Run" button to start the "Power Run".
3. Continue with the inertia dynamometer procedure below.

METHOD OF OPERATION

The Dyno46 Inertia Dynamometer testing procedure is easy as follows:

1. Start the engine/motor and warm it to the operating temperature.
2. Accelerate from near idle through the power band to max rpm.
3. Close the throttle and see results.

A proper test run duration is between 7 to 14 seconds to achieve a reliable result. That is why we have to settle down to the most suitable flywheel/roller based to our test vehicle.

3. Click on the "Stop" button and the Power Run is saved in a file with the extension of *d46.

ALTERNATE WAY:

Pushing the "Stop" button on the IDERC unit will also stop the current Power Run.

5.0 FAQ

Recent updates of the FAQ is available at our homepage at <http://www.dyno46.com>

ELECTRONICS

- Q: What is the difference between the IDERC1 and IDERC4?
- Q: My Personal Computer doesn't have a serial port?
- Q: Why do you ask for the expected max RPM of the Roller Channel?
- Q: Is power supply needed for the IDERC Kit?
- Q: What difference is your system with other "data logger" systems?
- Q: Why are the unused channels on IDERC4 produce unstable spikes?
- Q: How do I get more signals per Roller revolution to increase reading resolution?
- Q: What is the best distance for the inductive pickup with the teeth?
- Q: Why do you suggest the PC to have a 3 pin AC outlet?

SOFTWARE

- Q: Does your software need third party programs as "Microsoft Excel"?
- Q: Why do you have options for RPM Engine input?
- Q: Why is the max reading at the run screen and graphs screen differ?
- Q: Why is there a "fine tuning" option for Channel 1, the ROLLER Channel?
- Q: Why does the Racing Dyno software hang on Windows XP platforms?
- Q: Why do I get misaligned text ?

DIY

- Q: Can I upgrade my old "analogue scale " system dynamometer?
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GENERAL

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Q: Does your software need third party programs as "Microsoft Excel"?

A: Our software are stand alone, Windows based software. This means it doesn't need any other third party software. As an example one other source (and lots of others) have to rely on the PC to have installed "Microsoft Excel" to operate. What's happening is, their software is not showing real time data, as their usual operating procedure is, do a run, record, CONVERT TO CSV, see data. This is not real on the fly data.

Our operating method is, do run, record, see data. The Racing Dyno software itself is crunching data. Also you have all the basic and lots of additional controls to your data.

The best thing is it's FREE.

Q: Why do you have options for RPM Engine input?

A: This option is needed for the "true engine tuner" to get the torque produced BY THE ENGINE at RPM steps. We have found other sources and software with this huge flaw in their mathematical expression. They have declared that the torque produced at the roller is the torque produced by the engine. This is totally wrong!

TORQUE AT ROLLER IS NOT SAME AS TORQUE AT ENGINE!

However HP at the roller is same as the HP at the engine. This is the basic physical function of a chassis dynamometer. Therefore to get the engine torque, go backwards in to the formula

$$\text{Roller HP} = \text{Engine HP} = (\text{engine torque} \times \text{engine RPM}) / 5252$$

Because roller HP and engine HP are the same, by filling in the engine RPM, we could get the TRUE engine torque.

Q: Can I make my own Inertia Chassis Dynamometer?

A: Of course you can. You could use our IDERC1 or IDERC4 Inertia Dyno Electronics Kit. If you have a resource of precision machinery this is a good option, especially for the roller part. It must be properly balanced and machined from known mass density, to get accurate polar moment inertia. We could provide you with the guidelines to make the dynamometer.

Q: Can I make my own Engine Dynamometer?

A: Of course you can. You could use our IDERC1 or IDERC4 Inertia Dyno Electronics Kit. If you have a resource of precision machinery this is a good option, especially for the roller part. It must be properly balanced and machined from known mass density, to get accurate polar moment inertia. We could provide you with the guidelines to make the dynamometer.

Q: What is the difference between the IDERC1 and IDERC4?

A: The IDERC1 is a 1-channel data acquisition system. Suitable is only reading live 1 channel (the roller RPM). Then the Engine HP could be calculated. However the engine RPM could be obtained by entering the gear ratio to the program.

The IDERC4 is a 4-channel DAQ system. With extra 2 channels, other parameters could be monitored. Usually LIVE reading of engine RPM, Engine Temperature, Battery Volts etc.

Q: Is a computer required?

A: Yes, at least an IBM 400Mhz (obsolete) or better PC is needed.

Q: Is power supply needed for the IDE-SERIES Kit?

A: No external power supply will be needed for the IDERC kits. The unit will get its power from the PC serial COM port automatically. So less cables, less hazard around and lower power consumption.

(However in the case of using external sensors that derive high power from its source, external power is needed to cover up the power supplied by the PC com Port. If signs of insufficient power supply or unstable data reading is detected, we would suggest an external power supply).

Local power adapter with output of 9VDC 300mA, center post +ve, outer Gnd, could also be used. We can also provide suitable power adapters (Please specify local power supply either 120VAC or 240VAC).

No power supply will be needed for IDERC1, as it is only a single channel unit. Please determine the power dissipation of the external sensors used.

External power is not needed if no reading error is detected (most likely due to insufficient power supply by the PC serial com).

Q: Why do you use large diameter of rollers?

A: The diameter of the rollers affects the tire contact patch area, which in turn, affects traction and tire deformation. Rollers less than about 33% of tire diameter should be avoided, as they will damage the tire's carcass under sustained high speed/high HP running.

So we have chosen the largest diameter possible, considering several factors as material mass density, tire grip and availability. That's why we have chosen a large suitable engineering material for the suitable weight; tire grip, price and availability. We also had to consider to deliver a 7 to 14 seconds testing run duration.

Q: My Personal Computer doesn't have a serial port?

A: There are new laptops without serial port, but an RS232-USB adaptor can be used to connect the IDE-Series to PCs. This adaptor creates a virtual COM port that can be selected on the program to work with the unit as usual. Theoretically any RS232-USB adaptor will work with this device, requirements are 9600-baud transfer. We can supply a well-tested adaptor if you cannot find a suitable one.

Also if your PC doesn't have a DB9 serial port (serial port with 9 pins) but has a DB25 serial port, we also have the adapter for you.

Q: What difference is your system with other "data logger" systems?

A: This is the best part, our electronic kit is better than others usual "data logger" systems that does the reading in 1 session then the analyzing in another session That is doing reading and recording unknown state of data (low reading, corrupted signal, sensor failure, need to do retest), then transferring that data to the computer to be analyzed. While our systems does the data logging and analyzing simultaneously. You will see the results on the fly!

Q: Why do you ask for the expected max RPM of the Roller Channel?

A: Please indicate to us your expected max frequency for the roller channel (number of signals per second expected). This is so we could set up the channel for best performance. The idea is so we could use more than 80% of the full swing of the Roller Channel frequency.

The setup of the built in tachometer for the Roller Channel has to be done at the factory. The components that represents the max frequency has to be properly selected and soldered on.

Q: Why is the max reading at the RUN screen and Graph Screen differ?

A: Data averaging is very common for any type of dynamometer, even for the big boys. Data averaging is done to raw data to remove unsuspecting or non-logical values that may appear in the raw data. These values are as very high spikes (producing HP or TQ values impossible to achieve by the engine), sudden deceleration or acceleration, etc.

Data averaging effect is easily understood as data filtering or data smoothing.

However during the RUN, values are calculated with raw data. But at the Graph screen these raw data are averaged and could yield a better approximation of the HP and TQ value. Therefore HP and TQ displayed at the RUN screen are best taken as estimation. This is why the values differ from each screen.

Q: Why is there a "fine tuning" option for Channel 1, the ROLLER Channel?

A: Even though the built in speedometer inside the IDERC units are very accurate, other external factors may contribute to a slight shift in the IDERC speed input in terms of volt losses. These factors are as, different power supplies of different computer makes and different length of pickup cable. Although not very often, but the option is available for users to fine-tune their dynamometer against the actual speed via reference to an external speedometer.

The options are under the "Connect" > "View Channels" > "Fine Tuning" section.

Q: Why are the unused channels on IDERC4 produce unstable spikes?

A: The IDERC4 units have high input impedance. As any high input impedance electronic device, the IDERC4 has a very small leakage current (in the order of nano Amps) that can cause these open voltage readings if the input is left open. The unused inputs could be connected to ground or disabled by the software if it bothers.

To disable unused channels, go to "Connect" > "View Channels" > and choose the unused channel. Then restart the program. Unused channels are best to disable than to connect the inputs to ground to increase the IDERC4 processing speed.

Q: How do I get more signals per Roller revolution to increase reading resolution?

A: The Roller Channel max frequency is preset at the factory. The idea is so the roller channel operation will have a swing of 80% of the max frequency.

Therefore it will not be convenient to have more signals per rev afterwards due to components already setup at the factory. Unless your IDE unit has a higher max frequency, more signals per rev is possible. The math is simply,

Signals per rev possible = Max Roller Channel Frequency / Actual Roller Max Frequency.

After mechanically adding extra signals, setup the software at "Options" > "Roller Properties".

Q: Can I upgrade my old "analogue scale " system dynamometer?

A: As long as the analogue scale system has a roller, it is possible. The interface is easy, just align the inductive pickup with the roller to get frequency signals, setup at the software, you're done.

Dyno46 computerized systems are more superior to the analogue systems. It is more reliable, accurate and repetitive.

Q: What is the best distance for the inductive pickup with the teeth?

A: Often, the inductive pickup is placed too close to the target (teeth). When this happens, the pickup can trigger the IDERC units on scratches, nicks, or magnetic deformities in the flywheel or shaft. Usually, a gap of about 0.625mm (1/4 inch) is sufficient.

The target must be of a ferrous material. The target must produce the largest magnetic interference of any other scratch, hole, or deformity in the flywheel or shaft.

Q: Why do you suggest the PC to have a 3-pin AC outlet?

A: It is suggested to ensure proper grounding of the IDERC unit. Often, improper grounding will disturb the reading of high frequency ROLLER channel.

Q: Why does the Racing Dyno software hang on Windows XP platforms?

We have reports that some users have difficulties with Windows XP platforms during connection. This is because as stated in the official Microsoft homepage, Windows XP doesn't allow direct user access to the I/O ports for security reasons.

Please do the followings to allow the hardware to use the I/O ports.

- Log in to your XP PC as an administrator.
- Click on the "control panel" icon
- Click on the "security center" icon
- Click on the "Windows Firewall" icon
- Choose the "Exceptions" tab
- Click on the "Add Program" Button
- Scroll and choose the "Racing Dyno V1.4.b" program.
- If you the program cannot be seen in the list most likely the software still hasn't been installed or not detected by the system. In this case click "Browse" button and search for the "Racing Dyno V1.4.b" program.

Q: Why do I get misaligned text?

A: The software has been developed with custom-built fonts. However during installation, some PC's wont allow for automatic installation of the Racing Dyno fonts to the PC operating system.

If you experience in misaligned text, most likely the fonts are not installed. To fix this,

- Go to your windows system fonts folder. Usually at "c:\windows\fonts".
- Search for the fonts with the DYNO46 name.
- Click on the files to view it (this will automatically install it to the PC).
- Restart your PC.

The software will most likely look like the snapshots at the [software page](#).. This also includes the print preview.