AX22 Performance Computer

- Built in 5Hz GPS
- Digital accelerometers
- Compact flash memory
- Lap beacon input
- Serial input from ECU/OBDii

What is the AX22?

The AX22 is a new product for a new market sector – it is a comprehensive data logging system that can be installed in minutes. The AX22 can be used to either carry out measurements on the car (for example acceleration times or braking distances) and view the results on its screen, or log data to compact flash and carry out a more complete analysis on a computer.

Installing the AX22 couldn't be much simpler, it is normally mounted on the windscreen using the "Cullman" suction mount, and adjusted so it is approximately level. Power comes from either the cigar lighter or another 12v source. Finally, the magnetic mount GPS antenna should be mounted on the car's exterior – and you are ready to go testing!

Who is the AX22 designed for?
Because the AX22 is so quick and simple to install and use in different vehicles, the AX22 is ideal for car enthusiasts who want to know more about their cars and improve their driving, race driving instructors, car testing professionals, accident reconstruction engineers, magazines who road test cars and other driving professionals.

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What does it do?
You can use the AX22 in 3 different modes: You can do a simple "summary" run and look at the results on the screen of the AX22 (for example, time how long it takes to accelerate from 0-60mph or measure the braking distance from 100mph). Alternatively, you can view data on the screen but not log it (for example display your current cornering g force or the speed you are going), or you can log everything to memory for detailed analysis on your computer.

The AX22 calculates the vehicles speed, acceleration, RPM, power, torque, distance travelled and GPS position 100 times every second with very high accuracy - far more accurate than the instruments that use wheel speed sensors for example. While summary results can be viewed on the screen, the real power of the system is when you look at the logged data on the computer using our data analysis software. This allows you to check everything down to the last corner and gear change - even lap times and sector times can be calculated for circuit work.

Why use GPS?
One of the key features of the AX22 is its built in high accuracy GPS system - this gives the AX22 advantages over other data loggers in 2 key areas – greatly improved track maps and far more accurate speed data.

Track Mapping. Conventional data loggers require a "closed circuit" to enable them to calculate the track map; the shape of the track is estimated from a combination of the lateral acceleration and speed. This works adequately in some situations but it becomes increasingly inaccurate for long tracks and impossible for open circuits, motorbikes or boats. In contrast, the GPS will produce high accuracy track maps in almost any situation.

Speed Measurement. While speed is probably the most important parameter that anyone wants to measure using the data logging system, it is also the most inaccurate in a "conventional" system. The normal way to measure speed is to simply attach a pickup to a wheel to detect how fast it is rotating - but the rolling circumference of a tyre changes by 4% just with wear and temperature. Even worse, the error increases significantly under race conditions where the tyre is under loaded - typically the tyre slips by about 20% under hard braking going into a corner. Measuring speed using GPS is now common practice in high-end systems - under typical conditions speed error is well under 1%!

Features of the AX22
The AX22 is an all new, 2nd generation, data logging product from Race Technology. The AX22 combines some parts of our very popular performance meters and other parts from out new DL1 black box data logger.

The AX22 can be operated in 3 different modes:

• Summary timing modes. For quick, easy, accurate performance measurements. The modes include: timing between any 2 speeds, timing over a set distance and timing over a quarter mile. Timing between speeds mode can be used for acceleration and braking runs, e.g. 0-60mph, 30-50mph or 100mph-0. Quarter mile timing is a special mode for drag racers and displays the times for rollout, 60ft, 330ft, 660ft, 0-60mph, 0-100mph as well as the quarter mile statistics.

• Display mode. simply displays information on the screen such as acceleration or speed. This mode is useful for calibrating speedometers and testing tyres, or testing for a car's maximum speed where you want a single result immediately without having to load the data onto a computer.

• Continuous mode. Logs all the data (including speeds and accelerations) to the compact flash card for analysis on the PC using the comprehensive software provided. With all the data stored 100 times every second, you can see exactly what is going on in incredible detail.

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• Built in GPS. The new GPS unit is based on our own high accuracy GPS3 technology and calculates position and speed 5 times every second. This is easily the fastest, most accurate GPS system available for under $1500. The measurements from the GPS and accelerometers are combined to calculate very high accuracy positions and speeds at 100 times a second.

• Built in accelerometers. Built in 2-axis accelerometer with 2g full scale (optional 10g full scale).

• Logging to compact flash memory. Compact flash memory is robust, economical and ideal for use in data logging products. The advantages of using compact flash include incredibly fast download times (using a suitable card reader) and huge storage capacities.

• Built in display. The AX22 includes a large, very high quality, high contrast, 40 character, back lit LCD display. The LCD is a special design that works at both high and low temperatures.

• Simple. The AX22 is controlled using 3 buttons: up, down and select. The menu interface which is very similar to our established range of performance meters.

• Simple Mounting. The windscreen suction mount is made from billet aluminium in Germany by "Cullman" and provides an ultra stable mount - essential for accurate g force data. Alternatively the AX22 can be permanently mounted in the vehicle using aluminium brackets if required.

• RPM input. The AX22 has an RPM input designed for low level signals such as a feed from the ECU.

• Serial data (RS232) input. The serial port can be configured to accept data from an external source – possible examples are data from the engine management unit, OBDii or CAN data (with a suitable adapter)

• Lap beacon input. For some applications it is desirable to use a lap beacon, so we have included a dedicated input for it. It can also be used as a general-purpose digital input if required.

• Built quality. The AX22 is built into a 2mm thick aluminium enclosure for very high impact resistance, we even use stainless steel screws!

• Power supply requirements. The power supply to the AX22 data logger can be taken directly from the vehicles 12v supply, or it can be powered from it's own battery if required. The power supply is smoothed and regulated within the AX22 ensuring its performance it highly robust and stable.

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Frequently Asked Questions

What is the difference between the AX22 and the AC22/AP22 performance meters?
The AX22 is the big brother of the AC22/Ap22 performance meters, they all operate in a similar way and have a similar user interface. The big differences is that the AX22 has integrated GPS, compact flash for long data runs and lots of potential for further expansion, making it far more "future proof". There is no way to physically upgrade an AP22 to an AX22 as there are very few common components.

What is the maximum g-force/speed that can be measured?
The standard AX22 is configured for a maximum of 2g acceleration, 10g is a factory option. The maximum measurable speed is about 1000mph.

How often do you get GPS speed updates?
The GPS system calculates speed every 200ms (5 Hz), however this data is combined with the data from the accelerometers to calculate speed 100 times every second with very high accuracy.

How often do you get GPS position updates?
The GPS system calculates position every 200ms (5 Hz), however this data is combined with the data from the accelerometers to calculate position 100 times every second with very high accuracy.

How accurately is speed measured?
With average GPS reception, speed accuracy is about 0.1mph (or 0.1% if greater) when you are just driving along at fairly constant speed, and about 0.2mph (or 0.1% if greater) during fast accelerations or braking. The only exception is at very low speeds (under 10mph) where the error increases to about 1mph. Do not be fooled by exaggerated claims from other manufacturers… this is as good as it gets! In contrast, a standard wheel speed pickup is only accurate to about 4% at constant speeds, and under high accelerations or braking, the error increases up to about 20%.

How accurately is position measured?
With good GPS reception, positional accuracy is about 3m (CEP).

What happens to the data if you drive under a bridge/tunnel/trees etc?
Because speed and position are calculated from both the GPS data and accelerometers, even if the GPS data "disappears" for a number of seconds, you won't be able to tell from the data in the software. Only if GPS data disappears for an extended time (20+ seconds) will the data start to degrade noticeably.

Will it work with any Compact Flash card?
Whilst we cannot guarantee that the AX22 works with all compact flash cards, we have successfully tested many makes and sizes of compact flash card.

Is it easy to use?
The AX22 has a simple 3 button menu interface, similar to that found on a mobile phone. How difficult it is to use really depends on what you are trying to do – to do a quick 0-60mph timing can be done very quickly and easily, for a complete race analysis it will obviously take a bit longer.

What specification of computer is required?
As with most programs, the analysis software will run on just about any PC running windows 95 or later – however, the faster the PC, the faster the program will run. The main restriction is the memory required for long runs, typically we recommend that your PC has an absolute minimum of about 30MB of memory installed for each hour of data loaded. The PC also requires some means of downloading the data from the compact flash cards, there are many options available – normally a USB reader is most convenient.

Is the AX22 reliable and well made?
The AX22 is built from very high quality components, designed and built within the UK and individually tested and calibrated by us to exacting standards. This is a very high quality professional instrument, not a re-badged product that has been mass-produced in the Far East. The unit carries the normal 12 month guarantee against manufacturing defects and lifetime email support.

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Technical Specification

Display Type	Type 20 x 2 characters, STN type with LED backlight. Special wide temperature range display fluid.
Memory	Compact flash type I, using FAT16 file format. Minimum ard size 32MB, maximum 2GB
GPS	Update at 5Hz of position, speed, positional and speed `error estimate with no interpolation. Tracking loops optimised for autosport applications up to about 4g. Tracks all the satellites in view
GPS serial port	GPS data output can be configured by the PC, standard output is for the NMEA messages of RMC and GGA at 1Hz
AX22 serial port	Real time data output at 115kbaud, format available on request. Data can also be input for storage on the flash card and accessed from the software. More information is available on request.
Accelerometers	2 axis, precision digital output. A guaranteed 2g deflection in all directions with a resolution of better than 0.005g. Optional 10g sensor available as a factory fit option, with a resulting resolution of 0.02g.
Speed	Derived from a combination of GPS and longitudinal acceleration. Data is combined using a statistically based filter, self optimising at every time step.
Position	Post processed in the software using a combination of GPS data and accelerometers.
RPM	Buffered input for a 5v to 15v signal at a frequency up to 1kHz. Scaling from frequency to RPM can be set in the analysis software.
Lap Beacon	An external lap beacon input is included for optical triggering. This input is not currently used and is included for expansion
Internal Expansion	Internal expansion is provided by a high-speed serial bus.
Power Supply	12v nominal input, standard AX22 requires about 150mA. Input tolerance approximately 9v to 18v.
GPS RF Connection	SMA type connector, with 3.3V supply to the antenna