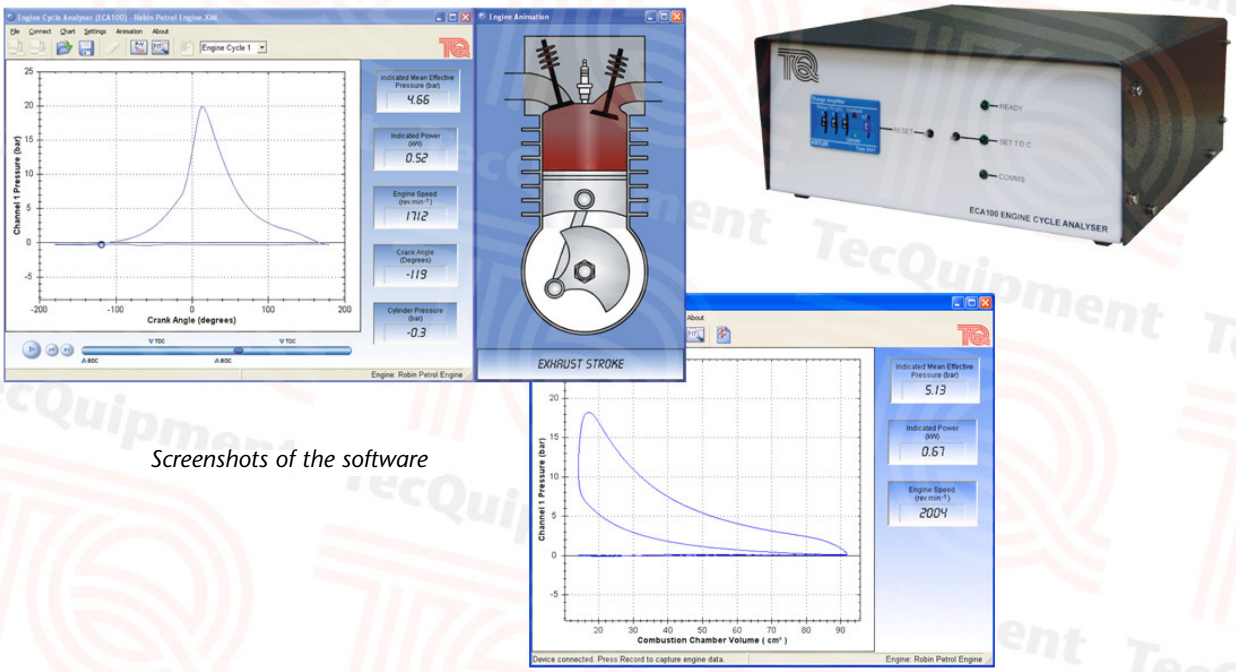
ECA100

Engine Cycle Analyser

Hardware and software to measure internal combustion engine cylinder pressure and crank angle



Screenshots of the software

- Significantly enhances practical investigations, demonstrations and studies of internal combustion engines
- For use with TecQuipment's Small Engine Test Set (TD200) and Regenerative Engine Test Set (TD300) and engines
- Can also be used with other engines fitted with suitable cylinder head transducers and crank angle encoders
- Includes powerful Windows®-based software specially designed for educational use
- Automatic calculation and real-time display of p-θ plots and p-V plots and other important parameters
- Useful snap-shot, replay and animation functions
- Accurate, clear animations of crank, piston, inlet and exhaust valve positions help students visualise the engine cycle
- Students can export data for further analysis

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TecQuipment

ECA100 Engine Cycle Analyser

Description

Ideal for student experiments, laboratory demonstrations or project work,TecQuipment's Engine Cycle Analyser enables students to investigate a variety of engine performance characteristics.

The versatile equipment consists of both hardware and software specially designed for educational use. It enables students to investigate the relationship between crank angle or volume and the cylinder pressure in an internal combustion engine. The equipment is primarily for use with TecQuipment engine test sets and engines (TD200 and TD300 series) but it can also be used with other engines fitted with compatible cylinder head transducers and crank angle encoders.

The equipment consists of a hardware unit with connectors and leads, plus Windows®-based data acquisition and analysis software. The hardware consists of a microprocessor-based signal conditioning unit with high-speed PC interface, housed in a rugged, protective enclosure. It accepts and conditions signals from the Cylinder Head Pressure Transducer (ECA101 available separately) and Crank Angle Encoder (ECA102 available separately). The cylinder pressure input includes a precision charge amplifier with a digital thumb-wheel for calibration. As well as crank angle position, the signal from the Crank Angle Encoder is also used to determine engine speed.

The output from the hardware unit connects to a computer (PC available separately) running the Engine Cycle Analyser software. The hardware unit includes LED indicators to show the processor readiness, encoder top dead-centre position and PC communication status.

The software provides real-time display of pressure versus crank angle (p-θ)and pressure versus volume (p-V) plots. It performs calculations on the data to accurately display indicated mean effective pressure (IMEP) and indicated power for comparison with brake mean effective pressure (BMEP), and brake power to determine the mechanical efficiency of the test engine.

The software has useful snap-shot, replay and animation functions to help students visualise and better understand the engine cycle. The snap-shot and replay allow students to capture several engine cycles and study them using an animation showing the relative position of the crank, piston, inlet and exhaust valves. The software also allows students to create and recall engine configuration files for convenient entry of test engine data needed for calculations such as crank radius and engine swept volume. Data can also be exported to other software for further analysis.

Standard Features

- Supplied with comprehensive user guide
- Two-year warranty
- Made in accordance with the latest European Union directives

Experiments

Investigations into a variety of internal combustion engine characteristics, including:

- The thermodynamic cycle of an internal combustion engine
- Calculation of indicated mean effective pressure and indicated power
- Comparison of indicated mean effective pressure and brake mean effective pressure
- Mechanical efficiency of the test engine
- Further work using exported data such as combustion analysis

Essential Ancillaries

- Cylinder Head Pressure Transducer (ECA101)
- Crank Angle Encoder (ECA102)

For engine test sets or engines other than TecQuipment's TD200 or TD300 series, please contact TecQuipment or your local TecQuipment Agent.

Recommended computer hardware:

- Intel® Pentium® 4 or equivalent processor operating at 2 GHz
- 512 MB of RAM
- SVGA monitor with 16-bit colour, 1024 x 768 resolution
- CD-Rom drive
- USB 1.1 or 2 port
- 500 MB of hard disc space
- Two-button mouse

Operating System:

- Microsoft® Windows 2000, ME, XP, Vista and Windows 7

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Essential Services

Electrical supply:

Single-phase a.c. 90 to 240 V, 50/60 Hz

Operating Conditions

Operating environment:
Well ventilated laboratory environment

Storage temperature range:
–25°C to +55°C (when packed for transport)

Operating temperature range:
+5°C to +40°C

Operating relative humidity range:
80% at temperatures < 31°C decreasing linearly to 50% at 40°C

Specification

Dimensions:
Nett: 250 mm x 250 mm x 110 mm
Packed: 0.03 m^3

Weight:
Nett: 4 kg
Packed: 6 kg

Crank angle input:
Shaft encoder with 360 pulses per revolution (such as encoder ECA102)

Resolution:
1 degree (via encoder ECA102)

Pressure signal conditioning:
Precision charge amplifier with digital thumb-wheel calibration

Maximum engine speed:
7000 $rev.min^{-1}$

PC connection:
Via USB type 1.1 or 2

Auxiliary input:
0 to 10 V via BNC connector

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