

Comprehensive Gasoline Test and Diagnostic Bench for Combustion Engines with Fault Simulation

TBM/G

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↳ PRODUCTS

↳ 9. - THERMODYNAMICS
& THERMOTECNICS



INTRODUCTION

Testing and diagnosing internal combustion engines are essential to ensuring the efficiency and reliability of these systems. An internal combustion engine converts the chemical energy of fuel into mechanical energy through combustion. These engines stand out for their autonomy, wide range of power, and design flexibility, making them vital in multiple industrial and automotive applications.

There are two main types of engines based on the ignition method:

- **Otto Cycle:** Spark ignition.
- **Diesel Cycle:** Compression ignition.

The Comprehensive Gasoline Test and Diagnostic Bench for Combustion Engines with Fault Simulation, "TBM/G", designed by EDIBON, allows for the testing of gasoline engines to evaluate their performance. Once operational, it measures critical and determinant characteristics of these engines to improve their performance. Following specific standards, these tests help identify the engine's characteristic curves, optimize fuel consumption, and minimize emissions. This process is crucial for detecting and correcting faults or inefficiencies, enhancing safety, and extending the engine's lifespan, ensuring optimal operation under various conditions.



Certificate of Approval of the
Quality Management System



European Union Certificate
(total safety)



UL and CSA Regulations
(All our products are manufactured according
to current UL and CSA regulations)



Certificate of Approval of the
Environmental Management System



Worlddidac Association
Certificate of Membership

GENERAL DESCRIPTION

The Comprehensive Gasoline Test and Diagnostic Bench for Combustion Engines with Fault Simulation, "TBM/G", is an advanced unit designed by EDIBON to conduct exhaustive tests and precise diagnostics on gasoline engines. Ideal for engineers and technicians, this unit allows for performance analysis, fault identification, and optimization of engine operation, ensuring efficiency and reliability in the maintenance and development of automotive systems.

The internal combustion engine is the central component of this test bench and its primary subject of study. Its function is to convert the chemical energy of fuel into mechanical energy through combustion in the cylinders. This unit enables the analysis of this conversion and the evaluation of combustion efficiency, exhaust emissions, and overall engine performance, key aspects for optimizing gasoline engines.

- The **air intake system** ensures that the engine receives the oxygen necessary for combustion, allowing for monitoring and analysis of air quantity and quality, vital factors for efficient combustion that directly impact power and fuel consumption.
- The **exhaust system** expels combustion by-products and reduces generated noise. The unit's exhaust system, designed to replicate that of a real vehicle, allows for the analysis of its behavior and operation. Additionally, it is possible to observe engine efficiency and analyze the composition of exhaust gases to assess regulatory compliance and environmental impact.
- The **fuel supply system** controls the exact amount of fuel injected into the cylinders, influencing combustion efficiency and engine performance. Through the diagnostic unit, various parameters of the fuel injection system can be evaluated. The bench allows adjustments and observations of how different fuel quantities affect the engine, optimizing consumption.
- The **cooling system** dissipates heat generated during combustion to prevent overheating and maintain the engine within a safe temperature range. This system can be monitored to evaluate its efficiency and impact on engine durability.
- The **starting system** includes an electric motor that initiates the first combustion, allowing the study of the startup process. This facilitates the analysis of engine behavior under cold start conditions, crucial for assessing reliability in different environments.

The Comprehensive Gasoline Test and Diagnostic Bench for Combustion Engines with Fault Simulation, "TBM/G", includes a **fault generation module** that allows for the simulation and study of the main problems that can occur in a gasoline engine, both in actuators and sensors. This enables students to identify and diagnose common faults, improving diagnostic and repair skills in a controlled environment. Additionally, Bluetooth connectivity is available for classroom monitoring and student assessment during practice sessions.

The unit's instrumentation includes various sensors that provide real-time data on critical engine variables such as pressure, temperature, speed, and fuel and air quantities. This data is essential for a thorough analysis of engine performance and allows for precise adjustments to optimize its operation.

Additionally, the unit includes an **electronic terminal block** that provides access to the main signals of the ignition and injection systems, facilitating a detailed analysis of their operation and behavior under different operating conditions.

This unit not only allows for the individual study of each engine system but also offers the ability to conduct comprehensive tests that simulate real operating conditions. These tests are essential for evaluating engine behavior under different scenarios, such as overloads and extreme temperatures.

Precise diagnostics are key to the proper functioning of a vehicle. Thanks to the Comprehensive Gasoline Test and Diagnostic Bench for Combustion Engines with Fault Simulation, "TBM/G", critical faults or inefficiencies for preventive maintenance can be identified. This allows intervention before serious breakdowns occur and facilitates real-time adjustments and repairs, improving engine reliability. With the diagnostic unit, it is possible to evaluate engine behavior in various situations and correct errors throughout its lifespan.

SPECIFICATIONS

Anodized aluminum frame and panels made of painted steel.

The unit includes wheels to facilitate its mobility.

Main metallic elements made of stainless steel.

Bench composed of the following elements: safety mushroom button, key, USB connector for computer, hood opening, and plug.

Articulated and transparent hood with electric lock for full visualization of the complete system.

High-strength aluminum chassis coated with epoxy paint, supported on 160 mm diameter wheels.

Auxiliary panel composed of all the auxiliary elements found in a vehicle.

Emergency mushroom button, lateral emergency button for engine detection. A safety mushroom button is provided on each side of the unit.

Original vehicle fuel tank.

Electronic throttle with lock.

Liquid retention tank in case of leakage or improper handling.

Battery box, includes 12 V car battery, battery cut-off relay for unit safety, and battery charger.

Fuse and relay box, main engine fuses, and relays.

Battery cut-off relay for unit safety.

Gasoline engine block with all necessary elements involved in its proper operation: engine, injectors, coils, intake filter, intake manifold, ECU, etc.

Diagnostic system displaying CAN network information on a high-resolution screen.

Fault generation module with 14 faults.

Terminal block with 12 electrical signals.

Cables and accessories, for normal operation.

Manuals: This unit comes with the following manuals: Required services, Assembly and Installation, Commissioning, Safety, Maintenance, and Practices manual.



TBM/G detail

EXERCISES AND PRACTICAL POSSIBILITIES

- 1.- Identification of the combustion engine and each of its components.
- 2.- Startup of the unit and obtaining initial results during startup and operation.
- 3.- Procedure and analysis of cold start of an engine.
- 4.- Analysis of the main signals in the ignition and injection system of an engine.
- 5.- Study and analysis of common faults in a combustion engine.

REQUIRED SERVICES

- Electrical supply: single-phase 200 VAC – 240 VAC/50 Hz or 110 VAC – 127 VAC/60 Hz.

DIMENSIONS AND WEIGHTS

TBM/G:

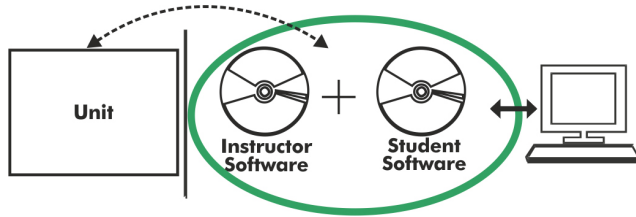
- Dimensions: 2000 x 1500 x 2400 mm approx.
(78,74 x 59,05 x 94,48 inches approx.).
- Weight: 200 Kg approx.
(440 pounds).

REQUIRED CONSUMABLES (Not included)

- Fuel suitable for the engine.
- Oil suitable for the engine.
- Coolant suitable for the engine.

ADDITIONAL RECOMMENDED ELEMENTS (Not included)

- Multimeter.
- Oscilloscope.

TBM/G/ICAI. Interactive Computer Aided Instruction Software:

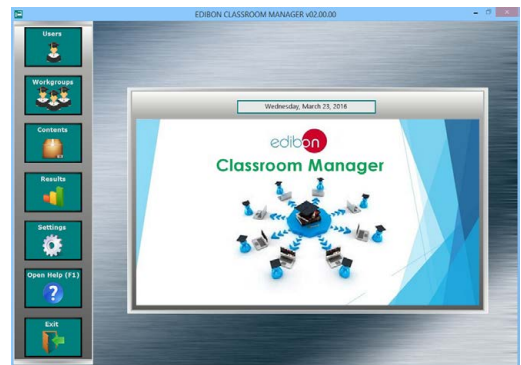
With no physical connection between unit and computer, this complete software package consists of an Instructor Software (EDIBON Classroom Manager -ECM-SOF) totally integrated with the Student Software (EDIBON Student Labsoft -ESL-SOF). Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the students.

Instructor Software**- ECM-SOF. EDIBON Classroom Manager (Instructor Software).**

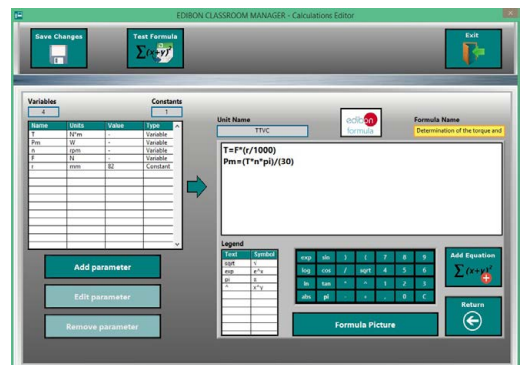
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual students, workgroups, units, etc... so the teacher can know in real time the level of understanding of any student in the classroom.

Innovative features:

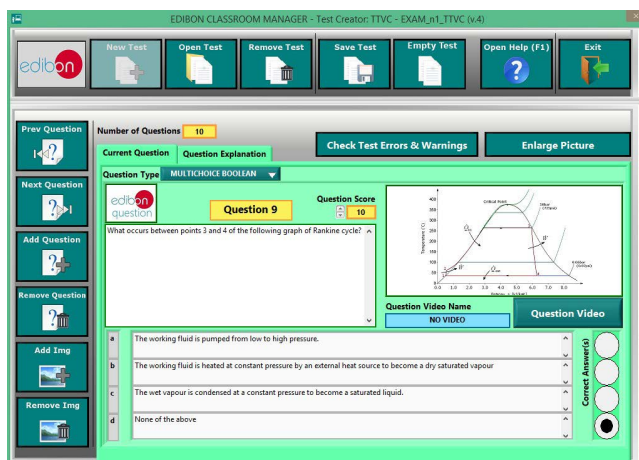
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.
- Updatable Contents.
- Report generation, User Progression Monitoring and Statistics.



ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



ECAL. EDIBON Calculations Program Package - Formula Editor Screen



ETTE. EDIBON Training Test & Exam Program Package - Main Screen with Numeric Result Question



ERS. EDIBON Results & Statistics Program Package - Student Scores Histogram

Optional
Student Software

- ESL-SOF. EDIBON Student Labsoft (Student Software).

ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are provided by EDIBON to allow the students start working from the first session. Reports and statistics are available to know their progression at any time, as well as explanations for every exercise to reinforce the theoretically acquired technical knowledge.

Innovative features:

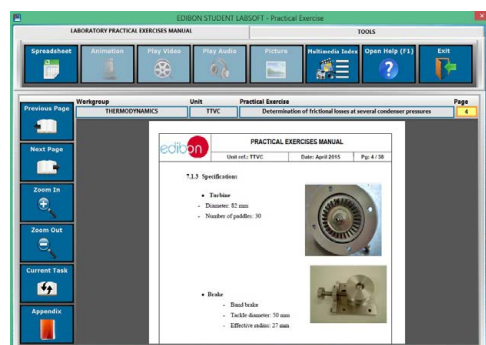
- Student Log-In & Self-Registration.
- Existing Tasks checking & Monitoring.
- Default contents & scheduled tasks available to be used from the first session.
- Practical Exercises accomplishment by following the Manual provided by EDIBON.
- Evaluation Methods to prove your knowledge and progression.
- Test self-correction.
- Calculations computing and plotting.
- Equation System Solver Engine.
- User Monitoring Learning & Printable Reports.
- Multimedia-Supported auxiliary resources.

For more information see ICAI catalogue. Click on the following link:

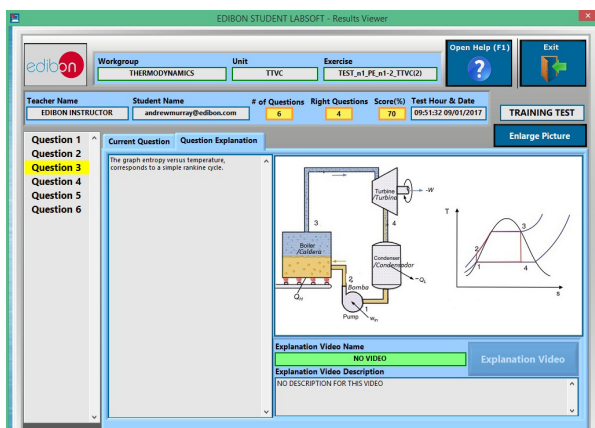
www.edibon.com/en/interactive-computer-aided-instruction-software



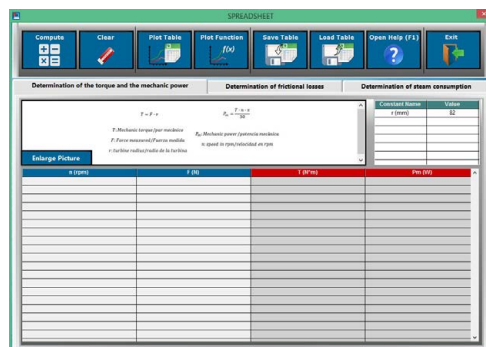
ESL-SOF. EDIBON Student LabSoft (Student Software)
Application Main Screen



EPE. EDIBON Practical Exercise Program Package Main Screen



ERS. EDIBON Results & Statistics Program Package - Question Explanation



ECAL. EDIBON Calculations Program Package Main Screen

* Specifications subject to change without previous notice, due to the convenience of improvement of the product.



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REPRESENTATIVE:

