



SPECIFICATION FOR AUTOMOBILE ENGINES - WORKING MODELS

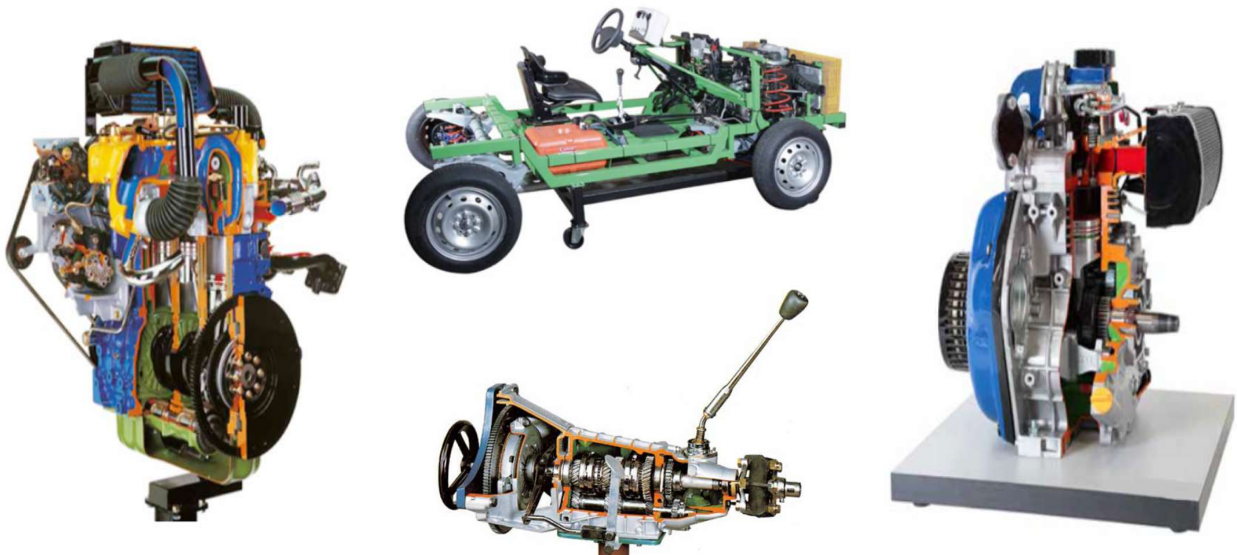




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1 Diesel Engine - 6 Cylinder - Running Condition

1.1 Basic Indicative Diagram



- 1.2 Diesel Engine with all required accessories like Starting system, Fuel feed system, Cooling System with reserve tank, charging system, Lubrication system, Exhaust System with Catalytic converter including exhaust brake and Air intake system
- 1.3 Should consists of Battery, Starter motor, Alternator, Fuel injection Pump (inline type), injector, fuel tank, water, separator, fuel filter, radiator, cooling fan, oil filter, oil pump etc. in working condition.
- 1.4 Engine should be mounted on M.S. Sturdy frame having four caster wheels for easy shifting and a panel board fitted on a frame having Fuel meter, Temp. Meter, Oil Pressure, Amp meter & RPM Meter (Digital) fitted in a panel board.
- 1.5 Acrylic Sheet should be provided at the back side of the panel board for easy view of wiring.
- 1.6 Engine should be start from panel board by ignition switch and it should be in a running condition with speed controlled from panel board with Engine full specification board with engine torque, including clearance.
- 1.7 Engine Specifications:
 - 1.7.1 Type: 4 Stroke cycle, turbo charged inter cooler, water cooled
 - 1.7.2 Piston Displacement: 4500 CC to 6000 CC
 - 1.7.3 No. of Cylinder: 6
 - 1.7.4 Max. Output (BHP): 100 to 150 KW at 2000 to 3000 RPM
 - 1.7.5 Torque: 450 to 600 NM at 1200 to 2000 RPM
 - 1.7.6 Fuel Tank Capacity: 30 Lit to 40 Lit
 - 1.7.7 Battery: 12 Volts.

2 Diesel Engine - CRDI - 4 stroke for Dismantling and Assembling with Swiveling Stand

2.1 Basic Indicative Diagram



- 2.2 The model should be made with two stand setup wherein one stand should be mounted with which can be rotated 360 degrees on the stand, so that slowly rotating the handle provided the engine can be rotated and lock and any position and angle to enable the students to assemble or dismantle the engine.
- 2.3 A large oil drip pan should be provided at the bottom to collect the small screws, parts and oil dripping.
- 2.4 The rotating stand is made from steel tube with gears for slow speed operation along with self-retention wheels.
- 2.5 The Paint finished rotating stand should be provided with heavy duty caster wheels with brakes.
- 2.6 The other stand should be fitted with cooling system, exhaust system with Catalytic converter, Fuel system and engine starting system.
- 2.7 By connecting the two stands together with all necessary connection such as radiator connection, fuel line, electrical connections etc. the engine can be started and made to work.
- 2.8 So that the students should understand the fitting and connections involved in the engine starting, also they can check and confirm the reassembling of the engine assembly.
- 2.9 By disconnecting the stands, the engine can be dismantled for practice.
- 2.10 First trolley should contain – Radiator assembly with contain Battery & Dash board fuel tank with wiring harness
- 2.11 Second trolley should contain – Engine with Swiveling stand.
- 2.12 Diesel Engine CRDI: 4 Cylinder, turbocharged diesel.
 - 2.12.1 Aluminium engine head and cast iron block,
 - 2.12.2 Bore: 70 - 90 mm
 - 2.12.3 Stroke: 80 - 110 mm
 - 2.12.4 Displacement: 1186 - 1493 CC
 - 2.12.5 Compression Ratio: (16-22: 1)
 - 2.12.6 Maximum Power: 70 - 110 HP at 2200- 4000 RPM
 - 2.12.7 Valve Gear: 4 per Cylinder
 - 2.12.8 DOHC, Ignition & Fuel System: Common Rail Direct Injection
 - 2.12.9 Cooling System: Water Cooling
 - 2.12.10 Fuel Tank: 10 Liter including fuel gauge



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- 2.12.11 Including engine assembly torque chart and suitable wiring diagram with colour code on Vinyl Board
- 2.13 On another stand the ECM (Electronic Control Module), Accelerator Pedal, Ignition Key, along with wiring connections are mounted.
- 2.14 The engine should be equipped with the electronically operated Exhaust gas recirculation system.
- 2.15 By assembling both the stands together the engine can be made functional.
- 2.16 The trainees should be able to dismantle the engine and reassemble by inter connecting the two stands.
- 2.17 The trainees should be able to learn the necessary connection for the engine starting and also test for the correctness of the engine after reassembling.

3 Petrol Engine - 4 Cylinder, MPFI, Working Condition with Fault Simulation Board

3.1 Basic Indicative Diagram



- 3.2 The device should be designed based on latest technology with Multi Point Fuel Injection System. The trainer should be able to simulate engine start up, speedup, slowdown and other actions so as to illustrate the structure and working principle of MPFI engines.
- 3.3 Engine Type: 4 Cylinder, naturally aspirated petrol.
- | | |
|--------------------------------|---------------------------------|
| 3.3.1 Bore: | 70 - 95 mm, |
| 3.3.2 Stoke: | 72 - 110 mm |
| 3.3.3 Displacement: | 1000 - 1200 CC |
| 3.3.4 Compression Ratio: | (8-16: 1) |
| 3.3.5 Maximum Power: | 50-80 HP at 3200-6000 RPM. |
| 3.3.6 Valve Gear: | 4 Per Cylinder. |
| 3.3.7 Fuel Supply System: | MPFI |
| 3.3.8 Ignition system: | Spark Ignition |
| 3.3.9 Cooling System: | Water Cooling with Reserve tank |
| 3.3.10 Fuel Tank: | 10 Liter including fuel gauge |
- 3.4 Real and operating MPFI petrol engine, illustrating the structure and working process.
- 3.5 Engine management circuit diagram with wiring colour code and internal diagram of the ECU with part listing and naming should be printed on to Colour printed board base.
- 3.6 Test points should be provided on the printed base so that different voltages/current, resistance values etc. can tested/understood using a multi meter.
- 3.7 Automobile meters should be fitted on to the training module along with the printed circuit diagram, to demonstrate engine speed, temperature, fuel pressure, charging light etc.,
- 3.8 The training module should be fitted with diagnostic socket (DLC) for universal automobile decoder (Scan tool) to read fault codes, clear fault codes and read data stream.
- 3.9 Fault setting switch bank should be provided to induce faults in the training module to Set, demonstrate and diagnosis the line break, grounding short circuit, improper contact or open circuit faults can be induced, user can adjust the number and type of faults.
- 3.10 User can adjust the number and type of faults- Set the line break, grounding short circuit, improper contact or open circuit faults can be induced,.



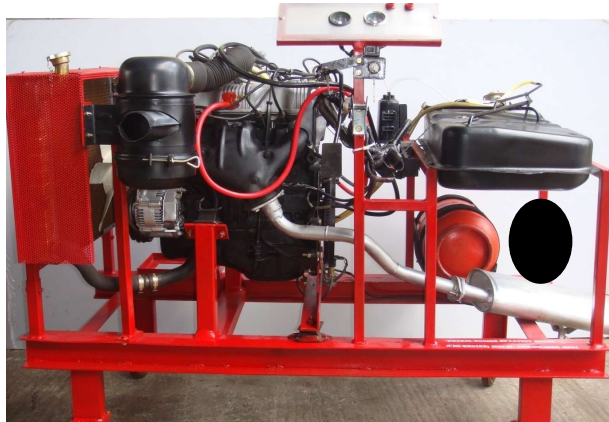
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- 3.11 Diagnostic reader should be attached to the model to display the error codes.
- 3.12 Good working condition engine should be provided with fuel tank and battery.
- 3.13 Throttle control should be provided on the module to accelerate.
- 3.14 The training module should be fabricated using steel pipe frame with spray painted.
- 3.15 The entire setup is should be provided with caster wheels with brakes for easy movement of the same.
- 3.16 The model should be equipped with colour circuit diagram of engine management system and its external connection and parts, so that the trainees can easily identify the wiring connections to different sensors and actuators.
- 3.17 Fault setting switch bank should be provided along with the engine so that the trainees can create troubles and check the reaction of the engine and diagnosis the problem and rectify.

4 Petrol Engine - 4 Stroke Petrol Engine with CNG Setup

4.1 Basic Indicative Diagram



- 4.2 The Four stroke Petrol Engine with CNG setup
- 4.3 All the fittings of the engine along with radiator, silencer, air filter, starter, battery, alternator, indication meters, fuel tank, CNG setup with CNG tank, electrical wiring with ignition switch etc.,
- 4.4 CNG tank should be removable. Fully filled CNG tank should be supplied along with the setup.
- 4.5 All mounted on to a sturdy iron frame with caster wheels (mobile trolley)
- 4.6 Engine Type: 4 Cylinder, naturally aspirated petrol.
 - 4.6.1 Bore: 70 - 90 mm
 - 4.6.2 Stoke: 65 - 110 mm
 - 4.6.3 Displacement: 1000 - 1200 CC
 - 4.6.4 Compression Ratio: (8-15: 1)
 - 4.6.5 Maximum Power: 50-80 HP
 - 4.6.6 Valve Gear: 4 per Cylinder
 - 4.6.7 SOHC, Fuel supply system: MPFI
 - 4.6.8 Ignition system: Spark Ignition
 - 4.6.9 Cooling System: Water Cooling
 - 4.6.10 Fuel Tank: 10 Liter with fuel gauge
 - 4.6.11 CNG Cylinder: 8 Kg with gauge with suitable for refilling purpose
- 4.7 All the fittings such as meter, fuel tank, radiator etc., along with the engine should be arrange on to the paint finished trolley with its original fittings such as rubber dampers and clamps so as to contain the vibrations.
- 4.8 The wiring for the sensors, indication meters etc, should be done so that by cranking the ignition the engine should start working, the indications such as alternator charging, oil pressure, temperature etc., should be displayed on to the necessary indication meter attached. The engine assembly should be serviced, painted with a single colour paint.
- 4.9 MPFI engines should be fitted with all necessary sensors, injectors and other MPFI accessories, ECU etc., which should be duly connected by its original wiring harness and should be made to work along with necessary indications.



5 Working Model - CRDI, 4 Stroke Diesel Engine Assembly with Fault Simulation Board

5.1 Basic Indicative Diagram



- 5.2 The device should be designed based on latest technology diesel engines with Common rail direct fuel injection system.
- 5.3 The trainer should be able to simulate engine start up, speedup, slowdown and other actions so as to illustrate the structure and working principle of CRDI engines
- 5.4 The Engine should be 4 Cylinder, turbocharged with inter cooler diesel. Aluminium engine head and cast iron block.
 - 5.4.1 Displacement: 1500 - 2500 CC
 - 5.4.2 Maximum Power: 70 - 110 HP
 - 5.4.3 Ignition & Fuel System: Common Rail Direct Injection
 - 5.4.4 Cooling System: Water Cooling
 - 5.4.5 Fuel Tank: 10 Liter with fuel gauge
 - 5.4.6 Engine Specification board – suitable for engine
- 5.5 Real and operating CRDI Diesel engine, illustrating the structure and working process.
- 5.6 Engine management circuit diagram with wiring colour code and internal diagram of the ECU with part listing and naming should be printed on to Colour printed board base.
- 5.7 Test points should be provided on the printed base so that different voltages/current, resistance values etc. can tested/understood using a Multimeter.
- 5.8 Automobile meters should be fitted on to the training module along with the printed circuit diagram, to demonstrate engine speed, temperature, fuel pressure, charging light etc.,
- 5.9 The training module should be fitted with diagnostic socket (DLC) for universal automobile decoder (Scan tool) to read fault codes, clear fault codes and read data stream.
- 5.10 Fault setting switch bank should be provided to induce faults in the training module to Set, demonstrate and diagnosis the line break, grounding short circuit, improper contact or open circuit faults can be induced, user can adjust the number and type of faults.
- 5.11 Diagnostic reader should be attached to the model to display the error codes.
- 5.12 Good working condition engine should be provided with fuel tank and battery. Throttle control is provided on the module to accelerate.



- 5.13 The training module should be fabricated using steel pipe frame with spray painted for good looks and the entire setup is provided with caster wheels with brakes for easy movement of the same.
- 5.14 The model should be equipped with colour circuit diagram of engine management system and its external connection and parts, so that the trainees can easily identify the wiring connections to different sensors and actuators.
- 5.15 The model should be mounted on to sturdy iron frame with caster wheels with brake so that the model can be easy to carry from one place to another place
- 5.16 The CRDI engine should be equipped with DLC Socket, to connect the scan tool for diagnosis and fault codes, live data stream reading.
- 5.17 Fault setting switch bank is provided along with the engine so that the trainees can create troubles and check the reaction of the engine and diagnosis the problem and rectify.