

# EMISSIONS STANDARDS

## 1988 Toyota Celica

### 1988 EMISSION & TUNE-UP STANDARDS

#### MANUFACTURING STANDARDS

Federal and state governments have established air quality standard during the past 20 years. Automobile manufacturers design their vehicles to conform to standards where the vehicle will be sold and operated. These standards cover carbon monoxide (CO), hydrocarbons (HC) and oxides of nitrogen (NOx).

Federal and California Standards which must be met by manufacturers are specified in units easily measured in a testing laboratory. Since 1970, these standards have been in "grams per mile". This means no vehicle, whether 2-cylinder or V8, may emit more than a set weight (in grams) of pollutants for each mile travelled. Since large engines burn more fuel per mile than do small engines, they must be "cleaner" per gallon burned if they are to meet these standards.

When manufacturers certify vehicle models prior to sale, the vehicles are placed on a dynamometer and the exhaust gases are collected in a bag. After the vehicle runs for a specified time, the gases are analyzed and weighed. Engines and emission systems are designed so the weight of emissions will be less than the specified grams per mile standard.

Infra-red exhaust analyzers are commonly used in vehicle test stations. The analyzer uses a test probe placed in the exhaust stream to sample the exhaust gases, and measure the percentage of CO and the parts per million of HC. These are not the same units used by the manufacturer when the vehicle is certified. The NOx emissions cannot be measured by an infra-red exhaust analyzer. Laboratory equipment must be used to determine NOx emissions.

#### TUNE-UP STANDARDS

The technician must use the proper specifications when adjusting the vehicle during a tune-up. The first few years of emission-regulated vehicles were adjusted using an exhaust gas analyzer which measured CO and HC.

In the past few years, manufacturers have produced much cleaner running vehicles. The CO (percentage) and HC (ppm) have become very low, especially when measured downstream of catalytic converter. It has become difficult to measure the effect of fuel and ignition adjustments.

One solution to this problem for vehicles using carburetors requires the use of artificially-enriched propane adjustments. The added propane increases or decreases engine RPM for evaluation of carburetor rich/lean setting. This allows the technician to check carburetor setting quickly and accurately.

As computer-controlled systems were developed, it became possible for the vehicles to adjust the air/fuel ratio, ignition timing and emission control device operation throughout the entire driving range. These computer control systems use a variety of sensors that provide the electronic control unit with information on vehicle speed, altitude of vehicle operation and transmission gear position, along with engine operating conditions.

Fuel delivery to achieve a lean air/fuel ratio is controlled by the computer. The computer controls the on/off (duty cycle) time of the fuel injector(s) or carburetor mixture control solenoid to achieve leanest possible air/fuel ratio while maintaining good driveability.

Although most repair shops have exhaust gas analyzers, computer-controlled vehicles normally do not have a CO and HC

specification for tuning. An abnormal exhaust gas reading on an exhaust analyzer may be helpful in diagnosing a problem, but should not be used as a basis for adjustments.

These procedures and specifications are supplied by the manufacturer and may not list CO or HC specifications.

## **STATE TEST STANDARDS**

Some states have established standards for allowable pollutants for used vehicles. These standards are normally given in CO (percentage) and HC (ppm). Vehicle tail-pipe emissions can be checked against the standard using an exhaust gas analyzer. Typical standards for newer vehicles would be 0.5 percent CO and 200 ppm HC. If vehicle emissions are below this standard, vehicle would pass emissions test. These standards are used to determine if the vehicle is running properly, not to be used for tuning or adjusting the engine. If the vehicle will not pass emission test or is running poorly, use the manufacturer's diagnostic procedures and specifications for repair.

Test standards may change each year and vary from state to state, and even by county within each state. It is not possible to provide an accurate and up-to-date list of emissions standards. Emission standards can be obtained for your area by contacting your local county or state office. Remember, the emission standards are only for test purposes. The manufacturer's adjustment procedures and specifications must be followed when repairing vehicles.