Vehicle Body Repairing and Painting Level-II

Learning Guide-#7

Unit of Competence: Use Garage Information System

Module Title: Using Garage Information System

LG Code: EIS VRP2 M03 LO1-LG-07

Code: EIS VRP2 M03 TTLM 0919v1

LO 1: Identify characteristic of surface of System

Instruction Sheet	Learning Guide #7

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- identifying range of capacity
- Identifying a certain model and type of vehicle
- Selecting a certain model and type

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, **upon completion of this Learning Guide, you will be able to**:

- identify the range of capacity
- recognize Different possibilities to identify a certain model and type
- Select A certain model and type

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4”.
4. Accomplish the “Self-check 1, Self-check 2 and Self-check 3” **in page -6, 19 and 25** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1” **in page -27.**
6. Do the “LAP test” **in page – 28** (if you are ready).

Information Sheet-1	Identifying range of capacity

1. Introduction

Garage means a building, shed, or enclosure, or any part of a building, shed, or enclosure, that can accommodate, store, or keep five or more motor vehicles for a fee or other consideration.

The garage capacity can change during the day or from one day to the next, based on how many cars can be fit into the garage at any given time. Determining accurate capacity numbers was essential to showing accurate garage availability in the real-time availability feed, which is, in turn, essential for customers using the data feed to find available parking spaces in real time.

A garage management system also helps a garage or vehicle workshop to stay in constant contact with all its branches across the city. The software that holds together all the information within an actionable and responsive interface provides real-time information on vehicles and their respective service points

1.1.1. Vehicle information

One of the important tools as a technician must have is the correct, up-to-date service information for the car you are working on. A technician must learn to read and understand service information. This module will present the different types of service information used by the technician.

- Perhaps the most important tools you will use are service manuals.
- There is no way a technician can remember all of the procedures and specifications needed to repair an automobile correctly.
- Thus, a good technician relies on service manuals and other sources for this information.
- Good information plus knowledge allows a technician to fix a problem with the least amount of frustration and at the lowest cost to the customer

1.1.2. Diagnosis, trouble shooting circuit Diagrams

- **Wiring identification**

Wires in the electrical system should be identified by a number, color, or code to facilitate tracing circuits during assembly, troubleshooting, or rewiring operations.

This identification should appear on wiring schematics and diagrams and whenever practical on the individual wire.

Wiring color codes are used by manufacturers to assist the mechanics in identifying the wires used in many circuits and making repairs in a minimum of time. No color code is common to all manufacturers. For this reason, the manufacturer's service manual is a must for speedy troubleshooting and repairs.

Vehicle fault diagnosis

Vehicle fault diagnosis is the technology of examining operation states, detecting fault symptoms, analyzing fault reasons and fore casting their development trends. Vehicle fault are abnormal phenomena which can be felt and perceived. It is necessary to analyze the vehicle fault symptoms, which can be divided into functional failure, warning failure and hidden failure according t o their characteristics.

Diagnosis: - is a method of finding out the troubles within an engine by visual examination, by the sound produced, by the smoke of the exhaust and/or with the help of instruments.

Using Wiring Diagrams:-

- One of the most important resources.
- Shows relationships of circuits.
- They illustrate:
  - Wires by number or color coding
  - Wire cross-section size
  - Ground connections
  - Wire connection points

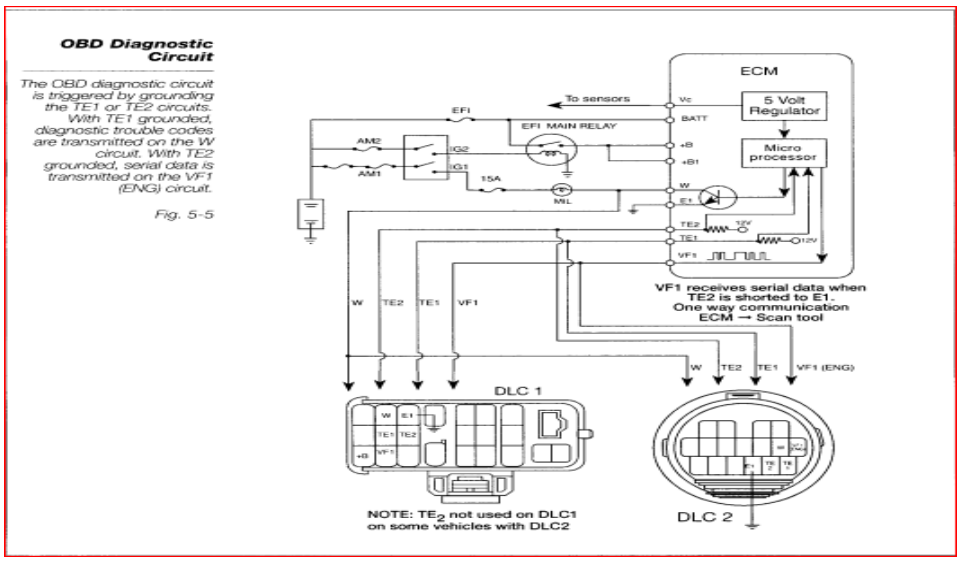


Figure: - 1 On board Diagnosis circuit diagram

This unidirectional data stream typically consists of 14 to 20 data words representing primarily sensor inputs and three outputs; injection pulse width, spark advance angle, and idle speed control command. Data is transmitted at a rate of 100 baud, updating on the Diagnostic Tester display approximately once every 1.25 seconds. Depending on application, the data is accessed from either DLC 1 or DLC 2. Data is triggered by grounding the TE2 circuit and reading the VF1 circuit.

Diagnostic Trouble Codes can be displayed using the Diagnostic Tester or by grounding the TE1circuit and counting the Malfunction Indicator Lamp (MIL) flashes. The scan tool reads Codes by counting the low voltage pulses on the W terminal of the Diagnostic Link Connector (DLC). Therefore, code retrieval is a relatively slow process, especially when multiple codes are Store

Self-Check -1	Written Test

i. **Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define the following term (4 points)

A. Garage

B. Diagnosis

ii. Multiple Choice: Select the best answer: (6 points)

1. Which one of the following method is used to identifying wire in electric circuit

A). color B). Code C). Number d. all of the above

2. Technician A says that diagnosis information can be found in the service manuals. Technician B says that diagnosis information can be found only in literature obtained from the manufacturer. Who is right?

a. A only

b. B only

c. Both A and B

d. Neither A or B

Note: **Satisfactory rating – 6 and 10 points** **Unsatisfactory - below 6and 10 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

i. Short Answer Questions

1._____

2._____

ii. Choose the best answer

1._____

2._____

Information Sheet-2	Identifying a certain model and type of vehicle

Classification of vehicles

Automobiles are the different types of vehicles used for transportation of passengers, goods, etc. Basically all the types of vehicles works on the principle of internal combustion processes or sometimes the engines are called as internal combustion engines. Different types of fuels are burnt inside the cylinder at higher temperature to get the transmission motion in the vehicles. Most of the automobiles are internal combustion engines vehicles only.

1. **Running gear**
   a. Single-Track Motor vehicles
      - Motor vehicles with 2 wheels

   b. Multi-Track Motor vehicles
      - Motor vehicles with three or more wheels.

   c. Motor vehicle with Caterpillar
      - Tractor fitted with the endless belt passing round the wheels enabling it to travel over rough ground.

2. **On the Basis of Load :**
   A. Heavy transport vehicle (HTV) or heavy motor vehicle (HMV),
      E.g. trucks, buses, etc.
   B. Light transport vehicle (LTV)
      E.g. Pickup, station wagon, etc.
   C. Light motor vehicle (LMV),
      E.g. cars, jeeps, etc.

3. **On the Basis of Wheels :**
   i. Two wheeler vehicle,
      For example: Scooter, motorcycle, scooty, etc.
   ii. Three wheeler vehicle,
      For example: Auto rickshaw, three wheeler scooter and tempo, etc.
   iii. Four wheeler vehicle,
      For example: Car, jeep, trucks, buses, etc.
   iv. Six wheeler vehicle,
      for example : Big trucks with two gear axles each having four wheels.

4. **On the Basis of Fuel Used**

(a) Petrol vehicle,

E.g. motorcycle, scooter, cars, etc.

(b) Diesel vehicle,

E.g. trucks, buses, etc.

(c) Electric vehicle,

E.g. battery drive

(d) Steam vehicle,

E.g. an engine which uses steam.

(e) Gas vehicle,

E.g. LPG and CNG vehicles, where LPG is liquefied petroleum gas and CNG is compressed natural gas.

5. **On the Basis of Body**

On the basis of body, the vehicles are classified as :

a. Sedan with two doors
b. Sedan with four doors
c. Station wagon
d. Convertible, e.g. jeep, etc.
e. Van
f. Special purpose vehicle,
g. e.g. ambulance, milk van, etc.

1. **Single-Track motor vehicles**

- Motorcycle - Any two-wheeled vehicle equipped with a propelling engine.
- Moped - Motor cycle with pedals and a petrol engine of low power
- Scooter - Light motor cycle, usually with small wheels, a low seat and metal shield protecting the driver's legs.

2. **Multi-Track motor vehicles**

- Saloon-car (sedan) - where the area for the driver and passengers is closed off from the luggage and engine areas.
- Hatchback - car with a large sloping back, hinged at the top, that opens like a door.
- Pick - up (also Pick-up truck) - small van or truck, open and with low sides, used by builders, farmers, etc.
- Van - covered vehicle, with no side windows, for transporting goods or people.

- Lorry (US Truck) - large strong motor vehicle for transporting goods, soldiers, et

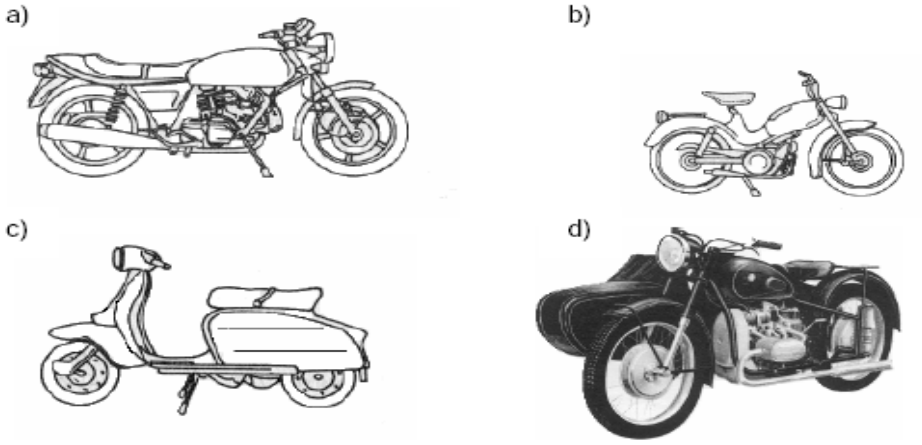
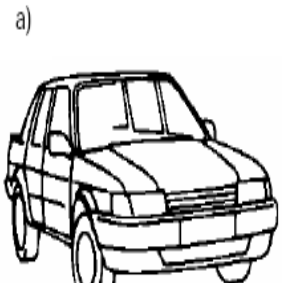
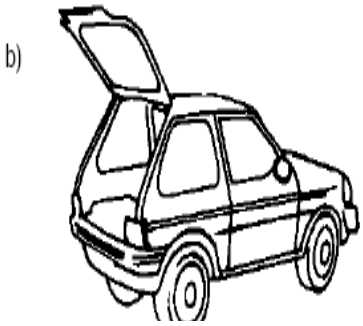


Fig. 1-1. Single track motor vehicles

3 wheels motorcycle



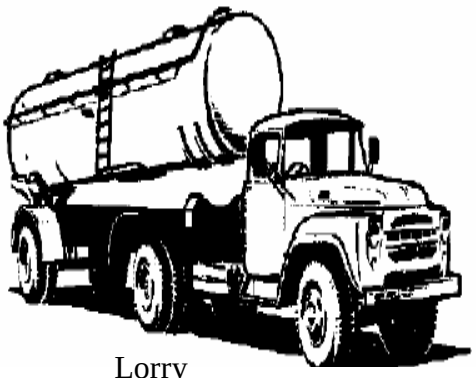
Salon-car (sedan)



Hatchback

Pick-up

Van

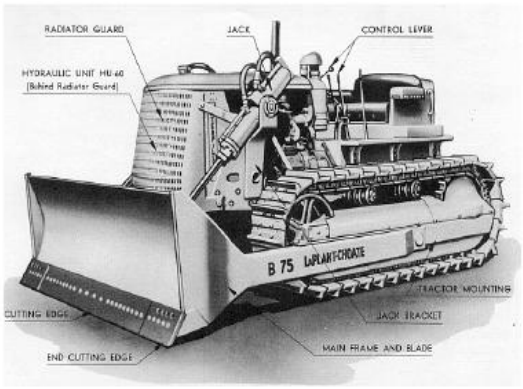


Lorry

Fig:-Multi-Track motor vehicles

Caterpillar tractor (off road vehicles)

Tractor fitted with the endless belt passing round the wheels of a tractor enabling it to travel over rough ground.

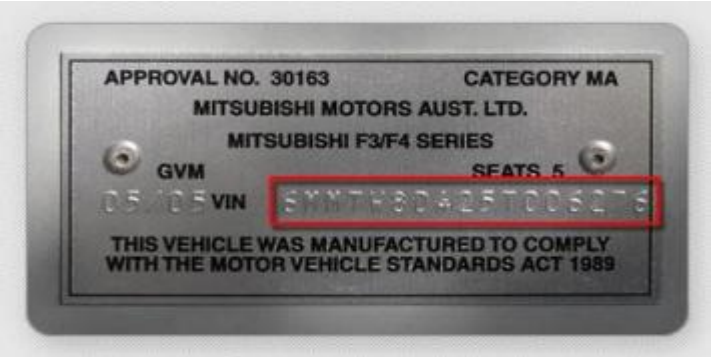


1.2.1 VIN- Identification

Before any service perform in a vehicle, it is important for you to know exactly what type of vehicle you are working on. The best way to do this is to refer to the vehicle's identification number (VIN). The VIN is located on a plate behind the lower corner of the driver's side of the windshield as well as other locations on the vehicle. The VIN is made-up of seventeen characters and contains all pertinent information about the vehicle. The use of the seventeen numbers and letter code became mandatory beginning with 1981 vehicles. It is use by all manufacturers of vehicles both domestic and foreign. Most new vehicles have a scan code below the VIN.

Honda Vehicle Identification Plate, a vehicle made a vehicle made from USA (left)

Honda Vehicle Identification Plate, from and Japan (right).



VIN Mitsubishi Motors from Australia, March 2005

Each character of a VIN has a particular purpose.

- The first character identifies the country where the vehicle manufactured.
- The second character identifies the manufacturer; for example:

■ A – Audi
■ B – BMW
■ C – Chrysler
■ D – Mercedes Benz
■ F – Ford
■ G – General Motors
■ H – Honda
■ N – Nissan
■ T – Toyota

- The third character identifies the vehicle type or manufacturing division (passenger car, truck, bus, and so on).
- The fourth through eighth characters identify the features of the vehicle, such as the body style, vehicle model, and engine type. Some manufacturer are using the values assigned to characters of VIN, see table below:

49 CFR 565.15(c)(1) Table III – Values Assigned to Characters of VIN

A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V	W	X	Y	Z
1	2	3	4	5	6	7	8	1	2	3	4	5	7	9	2	3	4	5	6	7	8	9

- The ninth character is use to identify the accuracy of the VIN and is a check digit.
- The tenth character identifies the model year; for example:

VIN NUMBER ORIGIN AND YEAR

1ST CHARACTER - COUNTRY OF ORIGIN

1 U.S.A.	L China or Taiwan	Y Sweden or Finland
2 Canada	M Thailand	Z Italy
3 Mexico	S Great Britain	
4 U.S.A.	V France or Yugoslavia	
5 U.S.A.	W Germany	
J Japan		
K Korea		

10TH CHARACTER - YEAR

A 1980	K 1989	W 1998	7 2007
B 1981	L 1990	X 1999	8 2008
C 1982	M 1991	Y 2000	9 2009
D 1983	N 1992	1 2001	A 2010
E 1984	P 1993	2 2002	B 2011
F 1985	R 1994	3 2003	C 2012
G 1986	S 1995	4 2004	D 2013
H 1987	T 1996	5 2005	E 2014
J 1988	V 1997	6 2006	

- The eleventh character identifies the plant where the vehicle was assembled, and
- The twelfth to seventeenth characters identify the production sequence of the vehicle as it rolled off the manufacturer's assembly line.

Toyota Vehicle Identification Numbers (VIN codes)

VIN format prior to 1996 For vehicles older than 1996 (Model Year 1980-1995):			VIN format after 1996 Toyota used the following VIN format and Codes in the USA after 1996.		
Position	Sample	Description	Position	Sample	Description
1	**J**	Country of Origin	1	**J**	Country of Origin
2	**T**	Manufacturer	2	**T**	Manufacturer
3	**2**	Vehicle Category	3	**4**	Vehicle Type
4	**S**	Engine Type	4	**N**	Body Type
5	**T**	Model/Platform	5	**R**	Engine
6	**8**	Series	6	**6**	Series
7	**8**	Model Grade	7	**7**	Restraint
8	**P**	Body/Chassis Configuration	8	**G**	Model
9	**X**	Check digit	9	**3**	Check digit
10	**P**	Model year	10	**Y**	Model Year
11	**0**	Plant	11	**0**	Plant
12	**1**	Sequential number	12	**0**	Sequential number
13	**0**		13	**0**	
14	**8**		14	**0**	
15	**3**		15	**4**	
16	**8**		16	**9**	
17	**5**		17	**1**	

1.2.2. country specific identification code,

The first character of a VIN will tell you the Country of origin where the vehicle was made.

Car VIN# 1HGCG1659WA029633

Look at the first digit in the VIN 1 = United States

VIN positions

Position 1 (Country of Origin)		Position 2 (Manufacturer)		Position 3 (Vehicle Type)	
Code	**Description**	**Code**	**Description**	**Code**	**Description**
1	USA	**N**	NUMMI	**D,G,K,X,1,2,7,N**	Passenger Car
2	Canada	**T**	Toyota	**A,B,F,M,4**	Truck
3	Mexico			**E,L,3**	Multipurpose Passenger Vehicle (SUV)
4	USA			**5**	Typically a convertible
5	USA				
6	Australia				
8	Argentina				
9	Brazil				
J	Japan				
S	England				
M	Thailand				
K	Korea				
V	France				

Position 4 (Body – 1996 to present)		Position 5 (Engine – 1996 to present)	
Code	**Description**	**Code**	**Description**
A	2DR Sedan 2WD	**4**	7A-FE Lean Burn
B	4DR Sedan 2WD 4DR Truck 4WD	**A**	3MZ-FE
C	2DR Coupe 2WD	**B**	1NZ-FXE or Toyota AZ engine#2AZ-FXE|2AZ-FXE
D	4DR Truck 4WD	**D**	2ZZ-GE
E	4DR Truck 2WD	**E**	2AZ-FE
G	4DR Wagon 2WD	**F**	1MZ-FE or 2AR-FE
H	4DR Wagon 4WD	**G**	5S-FE
J	5DR Van AWD	**H**	1AZ-FE
K	4DR Wagon 2WD	**J**	1FZ-FE
L	5DR Wagon 4WD or 4 Door truck 4WD	**K**	2GR-FE
M	5DR Door Van 2WD	**L**	2RZ-FE
N	2DR Regular cab pickup 2WD	**M**	3RZ-FE
P	2DR Regular Cab Pickup 4WD	**N**	5VZ-FE, 2ZR-FXE
S	3DR Liftback 4WD	**P**	3S-FE
T	2DR Extended Cab Pickup 2WD	**R**	1ZZ-FE
X	5DR Sport Utility Wagon	**S**	1BM or Electric -- RAV4 EV only
W	2DR Extended Cab Pickup 4WD?	**T**	3S-GTE
Y	Sport Van	**U**	1GR-FE or 2ZR-FE (Corolla Conquest 2010)
Z	5DR Wagon 2WD	**V**	1NR-FE
		Y	3UR-FE

Position 6 (Series)	Position 7 (Restraint)	
* Based on the Chassis code given for the car.	**Code**	**Description**
	0	Manual Belts w/2 Airbags and Curtain Airbags
	1	Manual Belt / 1 STD
	2	Manual Belts w/ Driver's Side Airbag
	3	Manual Belts w/2 Airbags
	6	Manual Belts w/2 Airbags, Side Airbags, Curtain Shield Airbags, and Knee Airbag (Driver Seat)
	7	Manual Belts w/2 Airbags and Knee Airbag (Driver Seat)
	8	Manual Belts w/2 Airbags and Side Airbags
	D	Manual Belts w/2 Airbags, Side Airbags, Three-Row Curtain Shield Airbags, and Knee Airbag
	F	Manual Belts w/2 Airbags, Side Airbags, and Knee Airbag

Position 8 (Model / Platform – 1996 to present)		Position 10 (Year Model)		Position 11 (Assembly Plant)	
Code	**Description**	**Code**	**Year**	**Code**	**Description**
0	MR2 Spyder	**V**	1997	**0-9 (All numeric)**	Japan
1	Tundra	**W**	1998	**A**	Onnaing-Valenciennes, France (TMMF)
3	Echo and Yaris	**X**	1999	**C**	Cambridge, ON, CA (TMMC)
4	xB and Scion xD	**Y**	2000	**E**	United Kingdom
7	Scion tC	**1**	2001	**K**	Japan
A	Highlander/Sequoia/Celica RWD/Supra	**2**	2002	**M**	Baja CA, Mexico (TMMBC)
B	Avalon	**3**	2003	**N**	Kolin, Czech Republic (TPCA)
C	Sienna and Previa	**4**	2004	**R**	Lafayette, IN, US (Subaru of Indiana Automotive)
D	T100	**5**	2005	**S**	Princeton, IN, US
E	Corolla/Matrix	**6**	2006	**U**	Georgetown, KY, US
F	FJ Cruiser	**7**	2007	**W**	Woodstock, ON, CA (TMMC)
G	Hilux	**8**	2008	**X**	San Antonio, TX, US
H	Highlander	**9**	2009	**Z**	Fremont, CA, US (NUMMI)
J	Land Cruiser	**A**	2010		
K	Camry	**B**	2011		
L	Tercel and Paseo	**C**	2012		
M	Previa	**D**	2013		
N	Tacoma and older trucks as well	**E**	2014		
P	Camry Solara	**F**	2015		
R	4Runner & Corolla				
T	Celica FWD				
U	Prius				
V	RAV4				
W	MR2 (non-spyder models)				
X	Cressida				

1.2.3 Last number of vehicles

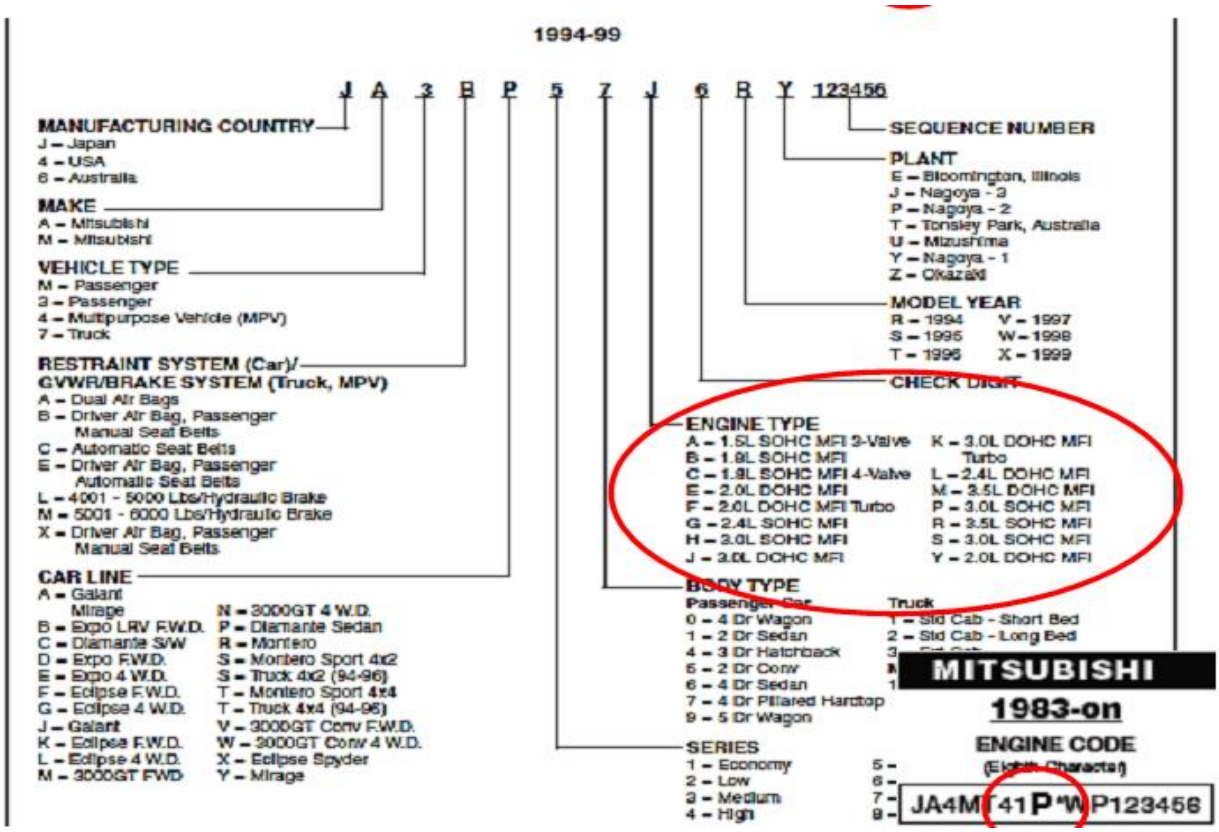
The last six digits in a Vehicle Identification Number are the actual serial numbers of that specific vehicle.

Car VIN# 1HGCG1659WA029633

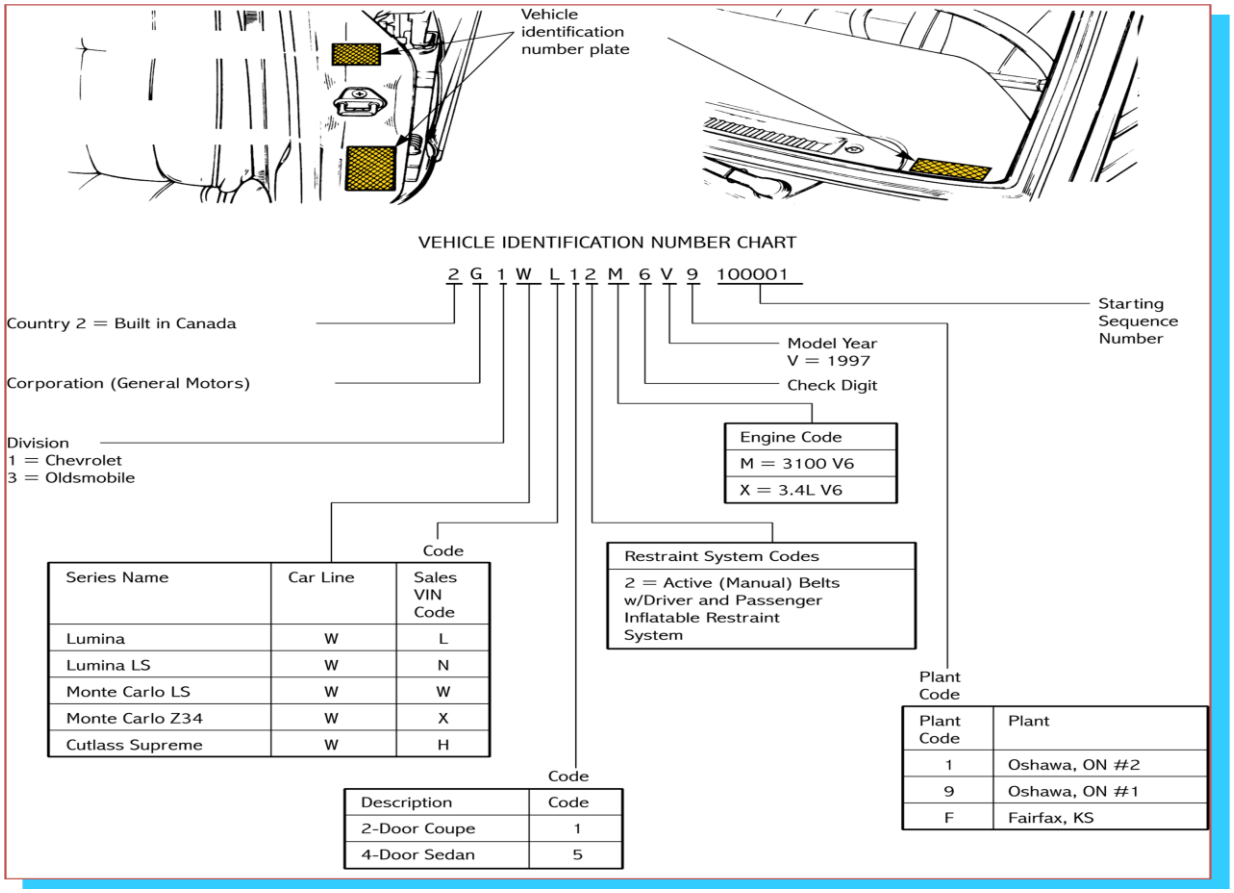
Look at the last six characters of the VIN 029633 che= Serial Number

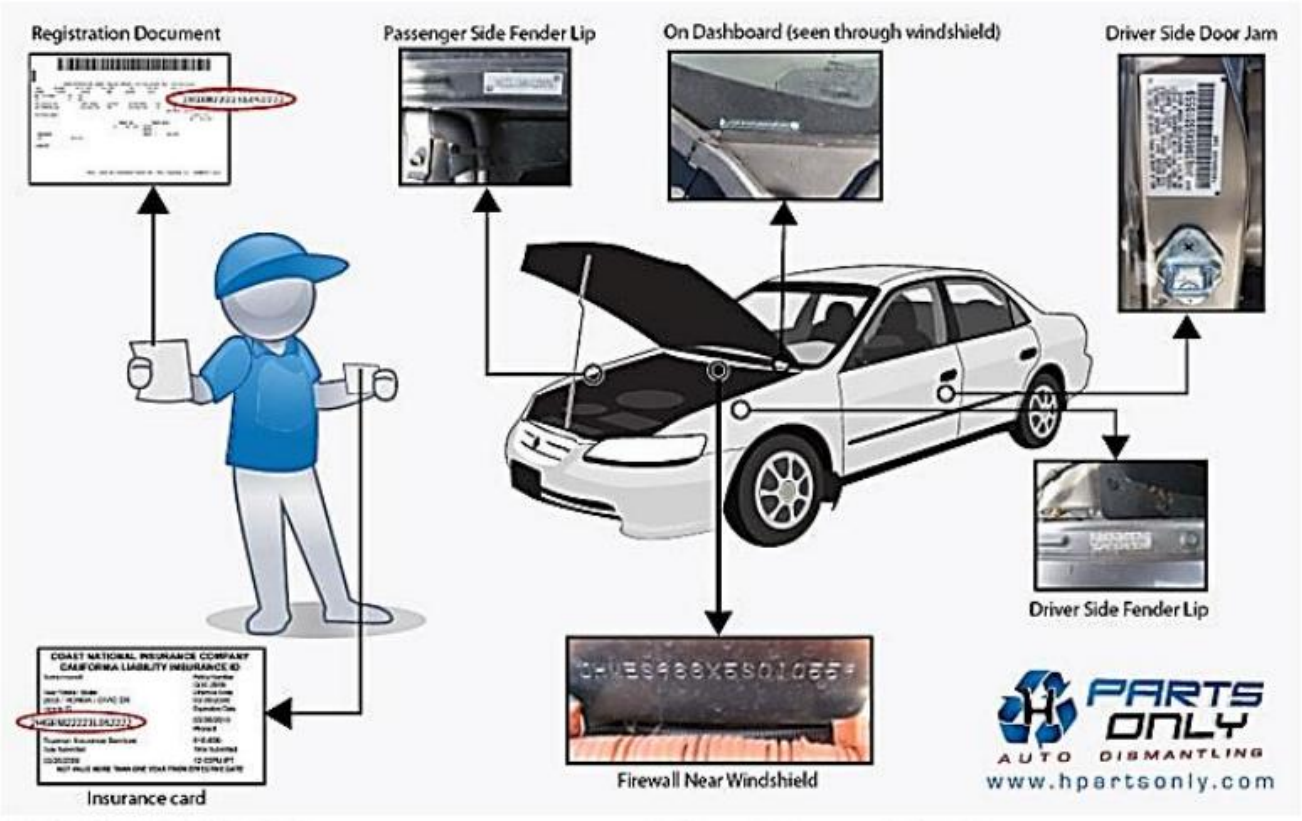
- The last six numbers of a Vehicle Identification Number are always the vehicle's serial number and also vehicle specific.
- The first ten characters may be the same, however the last six digits will be different on every vehicle.
- The ninth digit or Check Digit may also be different on the vehicle.

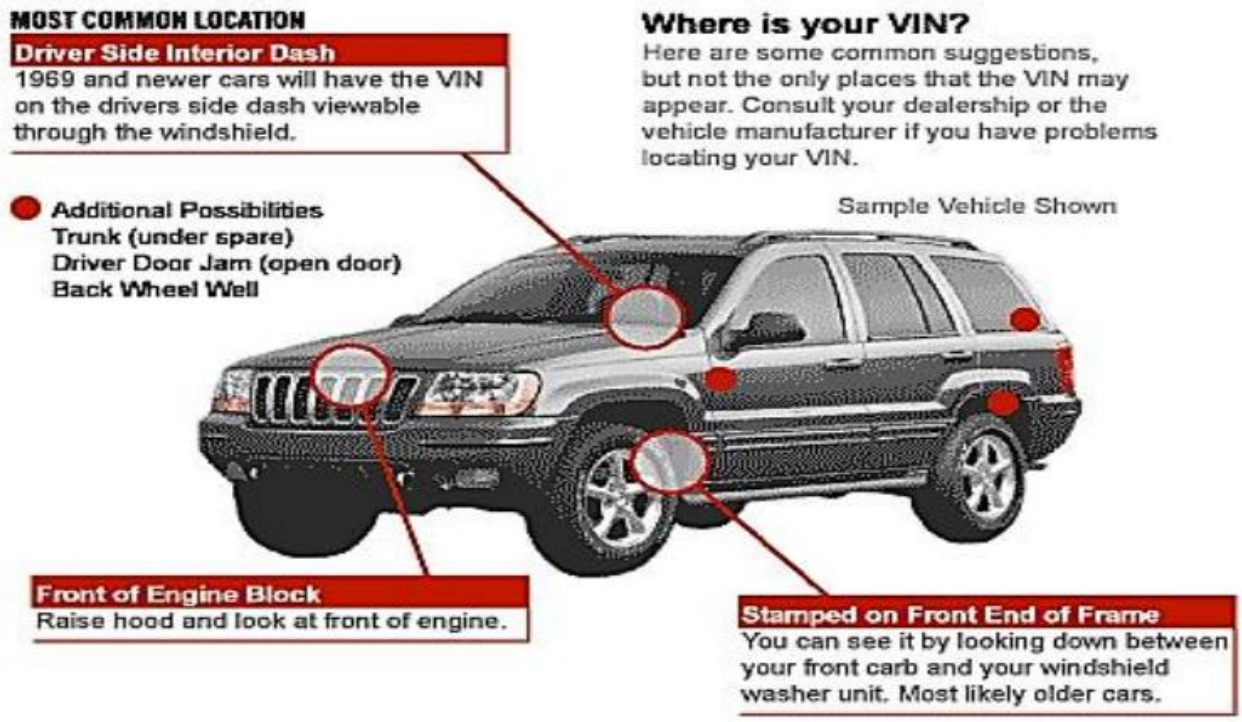
Sample of Vehicle Identification found in a vehicle service manual.



➢ VIN location on vehicle






MOST COMMON LOCATION
Driver Side Interior Dash
1969 and newer cars will have the VIN on the drivers side dash viewable through the windshield.
Where is your VIN?
Here are some common suggestions, but not the only places that the VIN may appear. Consult your dealership or the vehicle manufacturer if you have problems locating your VIN.
Additional Possibilities
Trunk (under spare)
Driver Door Jam (open door)
Back Wheel Well
Sample Vehicle Shown
Front of Engine Block
Raise hood and look at front of engine.
Stamped on Front End of Frame
You can see it by looking down between your front carb and your windshield washer unit. Most likely older cars.

Self-Check -2	Written Test

i. Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define the VIN- Identification.(5 points)
2. List out the different types of vehicles based on. (3 points)
   A. Running gear
   B. On the Basis of Load
   C. Body type

ii. Choose the best answer(2points)

1. Technician A says that the VIN does not include any information about the engine in the vehicle. Technician B says that the VIN does not include the vehicle serial number. Who is right?
   A. only
   B. only
   C. Both A and B
   D. Neither A or B

2. When looking for the VIN on the vehicle, technician A says it ca is found on the dashboard on the driver's side. Technician B says it can be found in the owner's manual. Who is right?
   A. A only
   B. B only
   C. Both A and B
   D. Neither A or B

Note: **Satisfactory rating – 6 and 10 points** **Unsatisfactory - below 6 and 10 points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____

_____

1. choose answer question

A. Running gear

a. _____

b. _____

c. _____

B. On the Basis of Load :

1._____

2. _____

3. _____

C. On the Basis of Body

A._____

B._____

C._____

1._____

2. _____

Information Sheet-3	Selecting a certain model and type

A car's make refers to the car's manufacturer or companies who produced the car. Famous car makes include: Toyota, Volkswagen, Ford, Honda, Peugeot, Hyundai-Kia, Nissan, Renault, Ferrari, Chevrolet, and Daimler Chrysler.

Car make are often large, multinational companies. In some instances, they are distinguished by their association with a particular nationality or country of origin. Foreign car manufacturers often have their headquarters in their home country with satellite branches across the world. For example, Toyota and Nissan are associated with their origins and headquarters in Japan. The same goes for German, French, American, and other car manufacturers.

Car models are the specific products. The car model is often the specific name, number, or initial to indicate the difference between two models. Car manufacturers use a lot of car models (or names) for their car line or series.

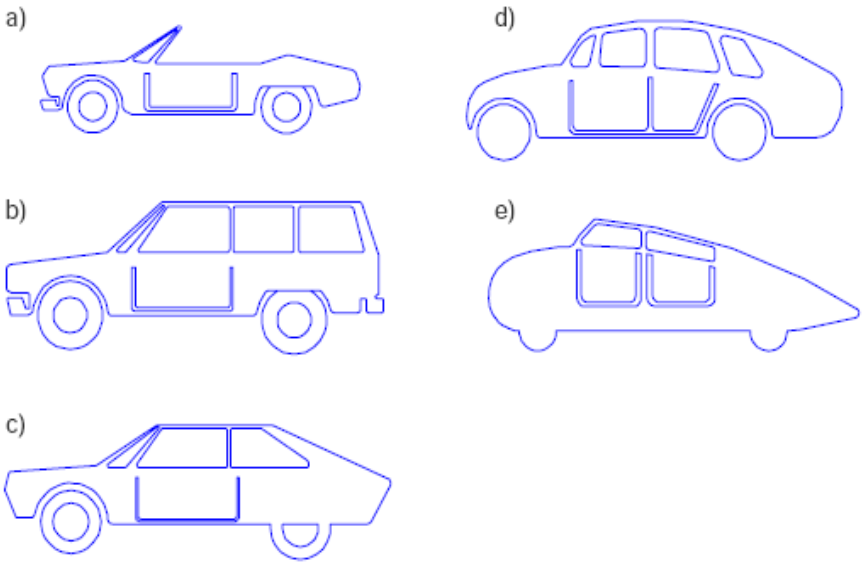
Some famous car model names are: Mustang, Pontiac, Prius, Focus, and Beetle.. The car name is chosen by the car manufacturer for its own line of products. This is especially useful when two rival car manufacturers release cars with an almost identical or very similar design.

1. A car's make and model usually make up its identification and name. The car make refers to the manufacturer or company that produced the car, while the car model refers to the car product itself and its registered identification name. Car models are identifiable and comprised of names, initials, or numbers.
2. A car's complete identification is made by the year the car was released, the car make, and the car model.
3. Car makes are often distinguishable by their country of origin. Many car manufacturers are international companies that have an international market. Car models, in contrast, are determined by the car manufacturer and the year of their release. This is especially true in a car series where cars share a name but are released in different years. Another purpose of the name is to distinguish a car from rival cars manufactured by companies with similar designs.
4. Car models are determined from different aspects. These aspects include the car's

model year, the designated car name, the car chassis, and the trim level. The alphanumeric (combination of letters and numbers) names are only available for the luxury version of the car.

3.1 Passenger car

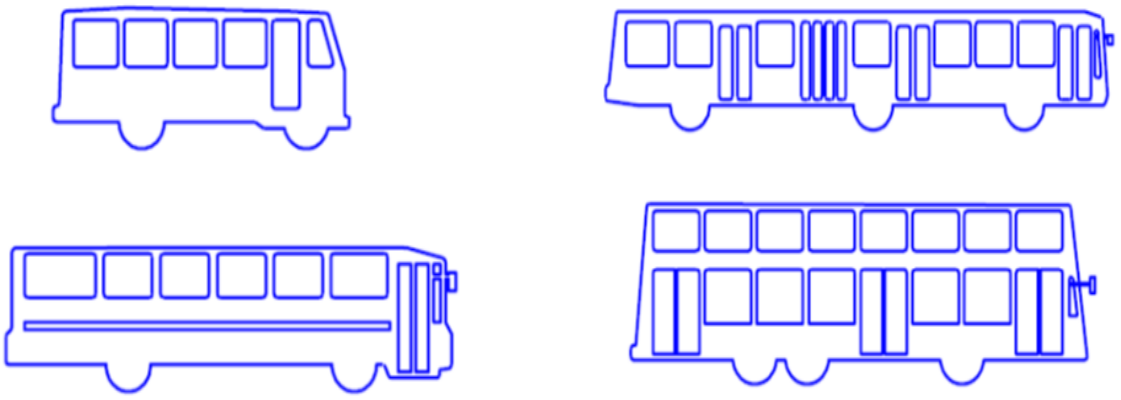
- Motor vehicle intended for carrying max 9 passengers with luggage.



a) Open convertible, b) Pontoon body, c) Headlights, rear wheels, spare wheel in body ; no bumpers, d) Van body K-shape (developed by Prof. Kamm), e) Headlights and all wheels in body ; clad floor

3. Buses

- 4 categories, depending upon the intended use.

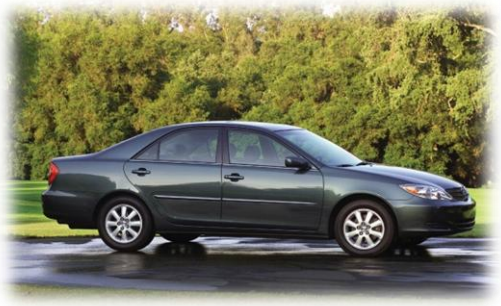


Microbus and microbus	Articulated bus and double decker public

4. Body Types

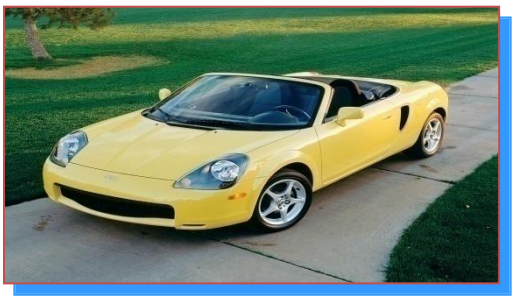
Automobiles are available in several body types, including

Sedan



Sedan Uses center body pillars, or “B” pillars, between the front and rear doors. A hardtop does not use “B” pillars

Convertible



Convertible Uses a vinyl or cloth top that can be raised and lowered

Hatchback

Hatchback The large rear door allows easy access when hauling items

Station Wagon

Station Wagon Provides a large rear interior compartment

Minivan

Minivan Has a higher roofline for more headroom and cargo space

Sport-Utility Vehicle

Sport-Utility Vehicle Provides the comfort of a passenger car, the interior space of a station wagon, and the

1.3.1 Identifying maintenance plan according the schedule

The maintenance plan is a “living document” including schedules and reports which will be updated periodically to reflect changes in maintenance policies, equipment, and program improvements.

The function of the maintenance plan is to provide a consistent systematic program that will enable RTS to properly inspect, maintain and service vehicles while following the manufacturer’s recommended maintenance schedule(s).

The mission of the Regional Transit System (RTS) is to provide safe, reliable, clean, and Well-maintained vehicles throughout the useful life of the asset.

The goals of the maintenance plan include:

- An effective preventive maintenance program;
- Defect Reporting;
- The proper management of parts, equipment, a
- A warranty recovery program;
- Quality assurance

Maintenance means keeping all the systems and features functioning as possible to the manufacturer’s original design intent tons.

Types of Maintenance

- Preventive maintenance or scheduled maintenance
- Predictive maintenance
- Breakdown maintenance or unscheduled maintenance

Preventive Maintenance

- ❖ It is a schedule of planned maintenance actions aimed at the prevention of breakdowns and failure.
- ❖ Primary goal is to prevent the failure of equipment before it actually occurs
- ❖ Preserve and enhance the equipment or vehicle reliability by replacing worn components before they actually fail

2. Types of preventive (scheduled) maintenance
    - Daily Maintenance
    - Weekly Maintenance
    - Monthly Maintenance
    - Quarterly Maintenance
    - Half yearly maintenance or fitness certificate work

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List out the goals of the maintenance plan at least five points.(5 points)
2. List Types of Maintenances .(3 points)
3. _____ keeping all the systems and features functioning as possible to the manufacturer's original design intent tons. .(1 points)
4. _____ a "living document" including schedules and reports which will be updated periodically to reflect changes in maintenance policies, equipment, and program improvements. .(1 points)

Note: **Satisfactory rating – 6 and10 Unsatisfactory - below 6 and 10 points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1..

a. _____

b. _____

c._____

d._____

e._____

2..

a. _____

b. _____

c. _____

3. _____

4. _____

Operation Sheet 1	Techniques of Recognizing different possibilities to identify a certain model and type

Techniques for recognizing different possibilities to identify a certain model and type

Steps 1- Identify the type, model and year.

Step 2- Locate the VIN on the vehicle for reference.

Step 3- Select the appropriate year of the service manual

Step 4- Refer to the first table of contents in the manual on the inside cover and page number that covers the type of vehicle.

Step 5- Turn to that page and read the index of service operation

Step 6- Look for the engine rebuilding specifications page number and turn to that page

Step 7- Engine rebuilding specifications are shown in various tables

Step 7- Often these specifications will be listed according to the size and configuration of the engine. If you are unsure of this information, use the VIN to identify the size and configuration. VIN information can be found by referring to the first table of contents.

LAP Test 1	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary vehicle, service manual, tools and materials you are required to perform the following tasks within 1 hour.

Task 1: Recognize different possibilities to identify a certain model and type

List of Reference Materials

1. Basic Automotive Service and Maintenance by Don Knowels
2. Motor Automotive Technology by Anthony Schwaller
3. Today Technician Classroom Manuals for Basic Automotive Service and System by Jay Wesbster
4. Today Technician Shop Manuals for Automotive Suspension and Steering System by Don Knowels
5. *https://mitchell1.com › shopconnection › 6-reasons-use-auto-shop-manag*
6. *https://www.usbr.gov › power › data › fist*
7. *https://www.mantenimientopetroquimica.com › typesofmaintenance*

Vehicle Body Repairing and Painting Level-II

Learning Guide-#8

Unit of Competence: Use Garage Information System

Module Title: Using Garage Information System

LG Code: EIS VRP2 M03 LO2-LG-08

Code: EIS VRP2 M03 TTLM 0919v1

LO 2: Identify operation of system

Instruction Sheet	Learning Guide #8

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- identify Components of system to be researched
- research Information to ensure sufficient understanding of system to assist

This guide will also assist you to attain the learning outcome stated in the cover page.
Specifically, **upon completion of this Learning Guide, you will be able to:**

- Identify Components of system to be researched
- Research Information to ensure sufficient understanding of system to assist

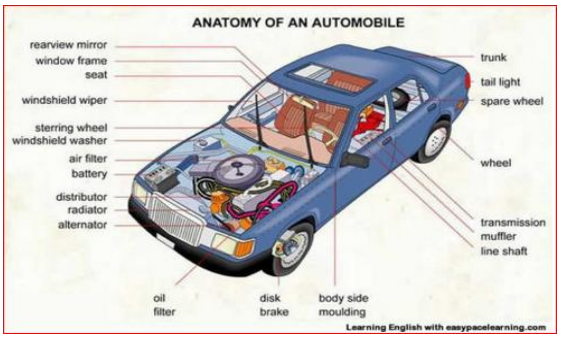
Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 4.

3. Read the information written in the information “Sheet 1, Sheet 2”.
4. Accomplish the “Self-check 1and Self-check 2” **in page -40 and 50** respectively.

Information Sheet- 1	identifying Components of system

At present time, everyone uses car for transportation in daily life. But no one tries to understand the basics of cars. What does car mean for common people? It is just made of four wheels holding a metal body. It does not sound so simple. It is made of several components that are essential for everyone to understand which can help them in unwanted situation.



Engine

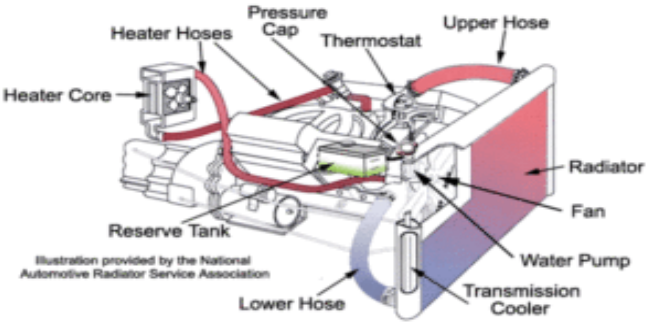
Engine (a type of large metal box) is designated as heart of the car. Like human body cannot work without heart, a car can't run without engine. It is made of blocks, head, pistons and valves. Fuel entered into the engine where it is caused to burn in presence of air, results in inflation of gases that creates movement in car.

Alternator

Main function of alternator is to generate power for electrical components of car. It charges the battery of car which in turn provides electricity to run headlights, brake lights, and internal electrical work.

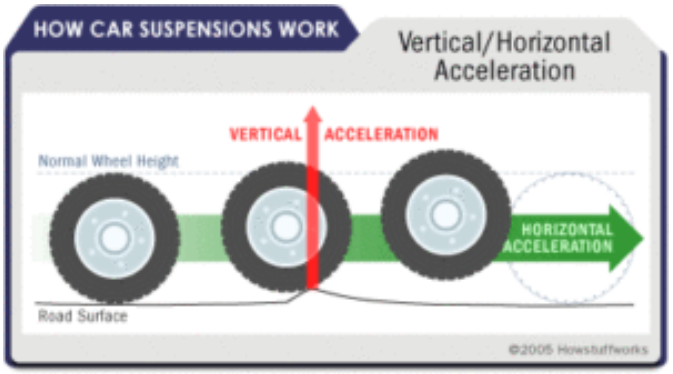
Radiator

The continuous movement of car's components of car can make the engine hot. Radiator works to keep engine and other cars components cool. It is located in front section of car from where it pumped the air into the car which absorbs excess heat from coolant. The other component that works with radiator to keep car cool are Thermostat, Water Pump, Heater & Hoses.



Suspension system

Suspension increases the friction between the tyre and the road which provides stability to steering and allows the car to run in comfort condition.



Ignition system

It is made of Spark Plugs, Distributor, Ignition Wires & Coil. It causes combustion in fuel in presence of air which makes the car to run.

Chassis

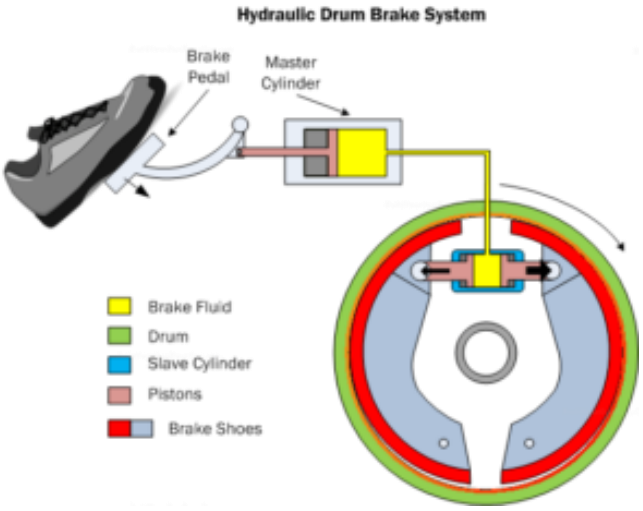
It is the part of car which provides the basic frame where all the car parts are screwed and protected

Muffler

It helps to run the car in silent mode i.e. it reduces the noise produced by car's engine. It is made of series of chamber enclosed in a container made of metal.

Brakes system

It is made of different components including Disk & Drum Brakes, Master Cylinder, Power Booster & Anti-lock Brakes. Their main function is to slow down the speed of wheel in wanted situation.

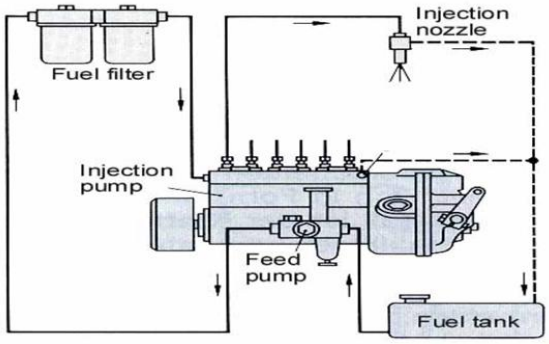


1.1 Vehicle Components and Systems

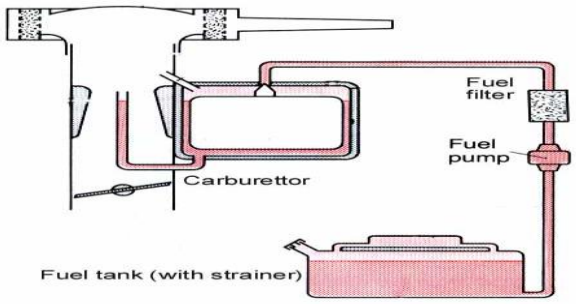
The automobile can be considered to consist of five basic components : (a) The Engine or Power Plant : It is source of power. (b) The Frame and Chasis : It supports the engine, wheels, body, braking system, steering, etc. (c) The transmission which transmits power from the engine to the car wheels.

Purpose: Become acquainted with a vehicle's main systems and components in terms of their purpose, safe and legal use, maintenance, and certain economic consideration

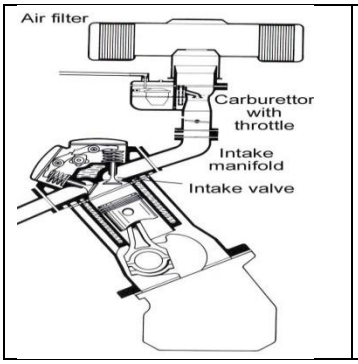
1. identifying Engine system components



Fuel system (diesel engine)

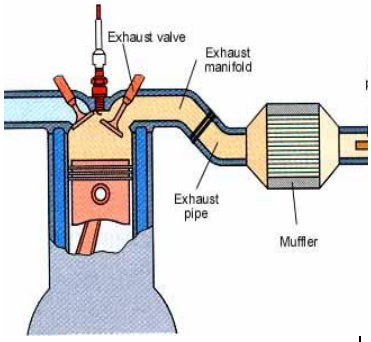


Fuel system (gasoline)

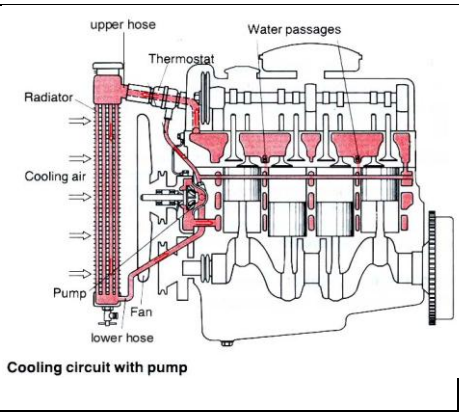


Intake system
Air cleaner (filter)
Carburetor (diesel: no carburetor!)
Intake manifold
Intake valve

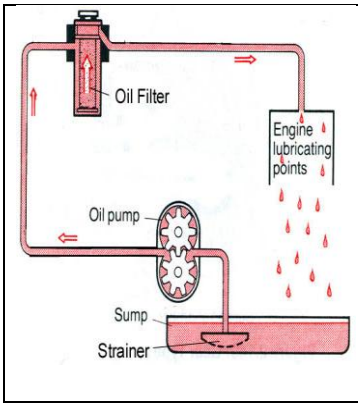
Exhaust system
Exhaust valve
Exhaust manifold
Exhaust pipe
Muffler
Tail pipe



COOLING SYSTE
Radiator
Lower hose
Water pump & Fan
Water jacket
Thermostat
Upper hose

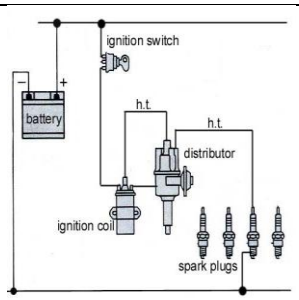
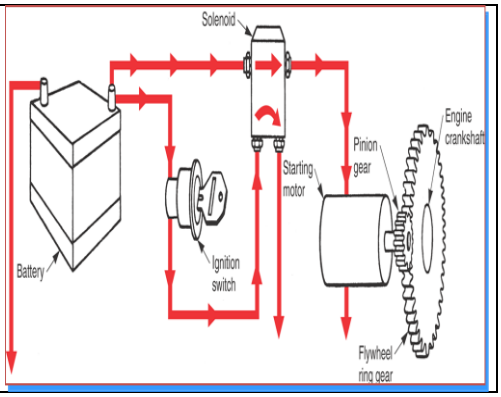


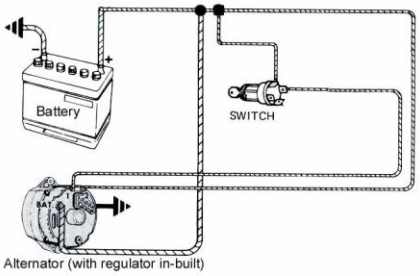
Cooling circuit with pump



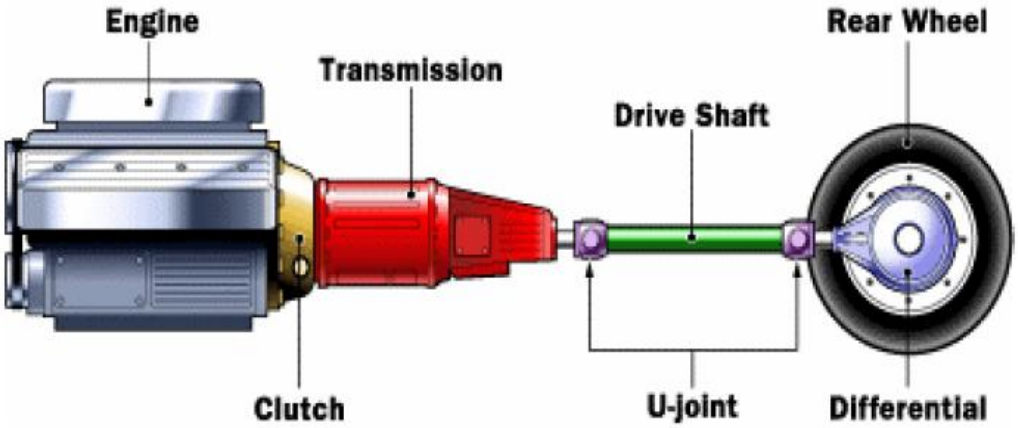
LUBRICATION SYSTEM
Oil sump
Strainer & Oil pump
Filter & lines (gallery)
Points of Lubrication

2. identifying Electric system components

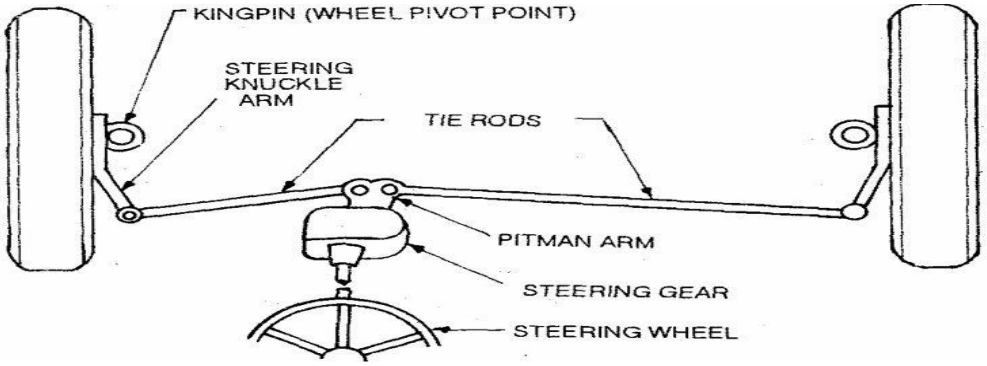
<u>Ignition system</u> (gasoline engines only!) Battery Switch Ignition coil Ht. Cable Distributor High tension cable & spark plug		<u>Starting system</u> Battery Switch Starter motor Ring gear at flywheel	

	<u>Charging system components</u> Battery Switch Alternator (Generator) Regulator

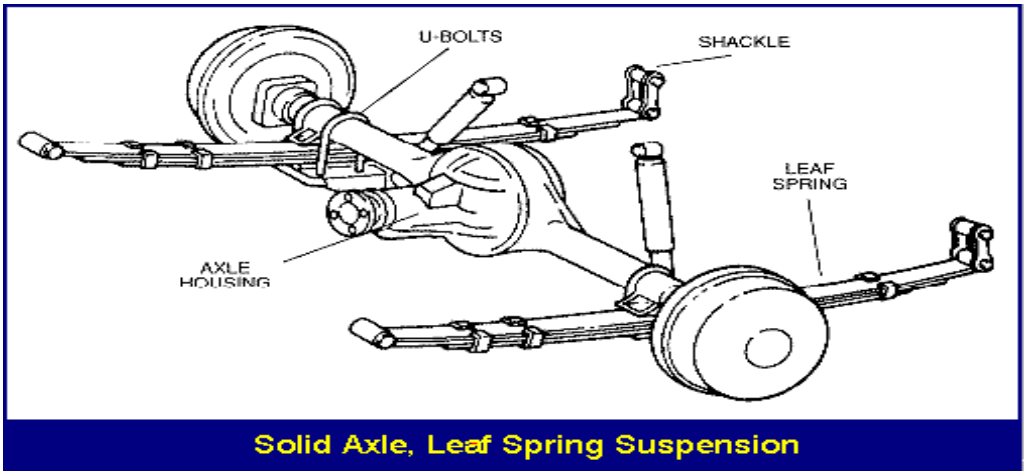
3. identifying Drive train system components



4. identifying Steering system components



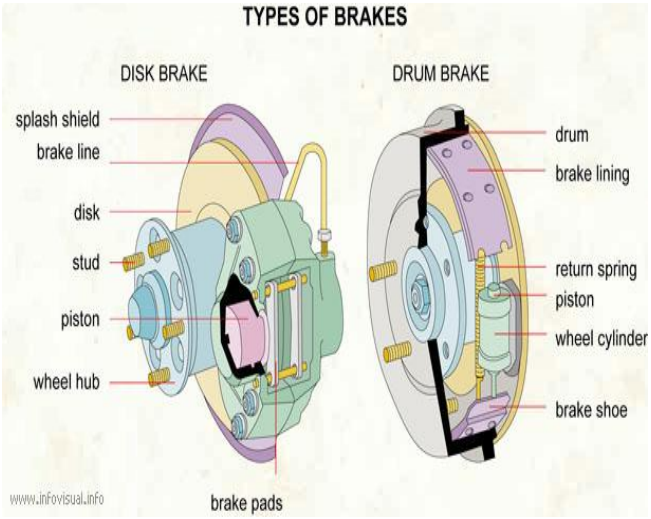
5. identifying Suspension system components

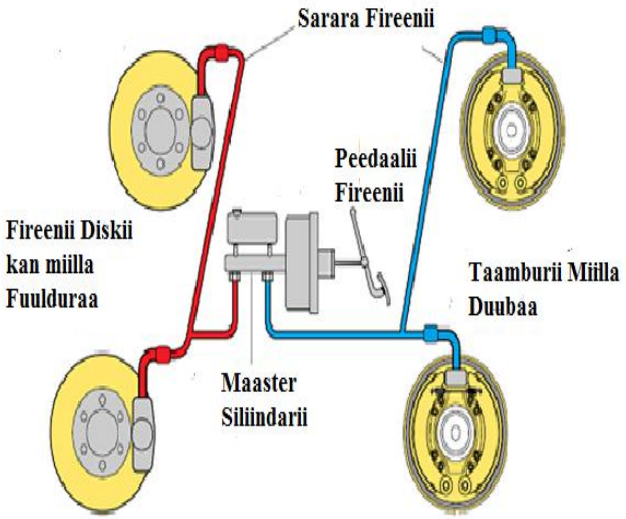


6. Body frame

Frame is an integral part of the body

7. Identifying Brake system components





2.1.1 systems of vehicle

The major systems of an automobile are the engine, fuel system, exhaust system, cooling system, lubrication system, electrical system, transmission, and the chassis. The chassis includes the wheels and tires, the brakes, the suspension system, and the body.

Vehicle Components and Systems Categories

Engine; the engine is the system that generates all of the power within the car.

Transmission; the transmission accepts the rotaional energy from the engine and converts it based on the vehicle's gearing.

Differential; The Differential accepts the rotational energy from the transmission and translates it out through the axles to the wheels.

Steering; This is the system that allows for the directional motion of the wheels transferred from the steering wheel.

Suspension; the suspension supports the car and provides for control of the handling and comfort of the ride.

Brakes; The brakes allow the vehicle to stop.

Fuel System; the fuel system is responsible for the storage and supply of fuel to the engine.

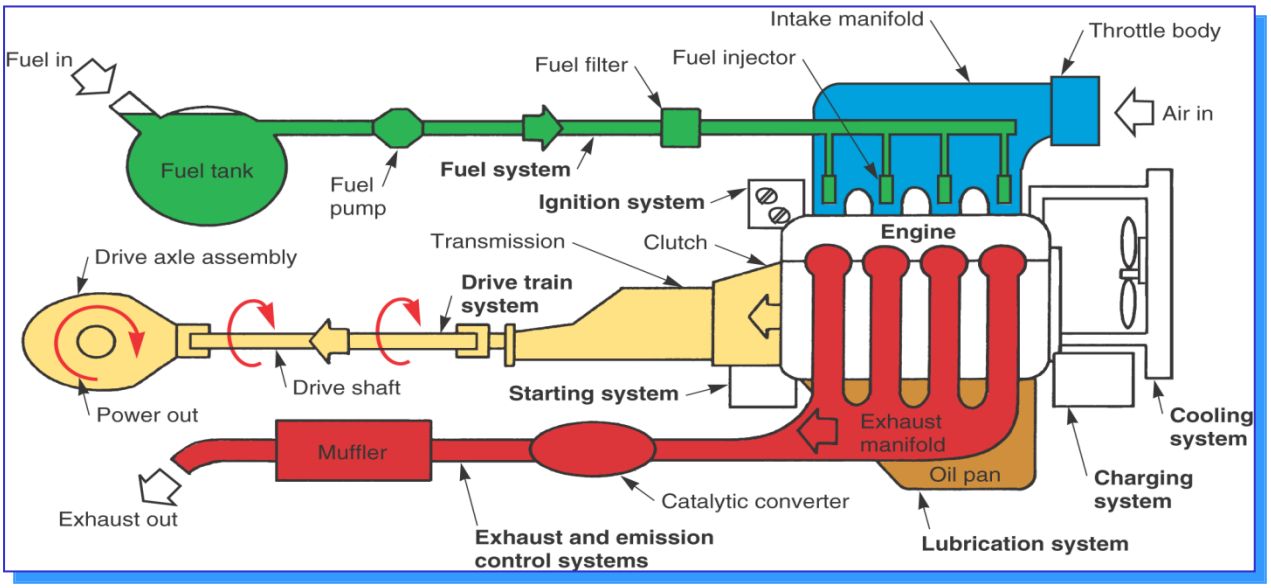
Emissions; The emissions system monitors and controls the output of noxious fumes (exhaust) from the vehicle.

Body; the body is the primary component to encapsulate the working parts of the vehicle and the passengers.

Interior; this describes the finishing effects on the interiour of the car for human use.

Heating / cooling; this system controls the climate within the vehicle.

Stereo; this system controls the ability to play radio, cd, etc. within the vehicle.



Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the space

1. _____that produces power to move the vehicle
2. _____to carry the power from the engine to the drive wheels.
3. _____to provide electricity for cranking the engine, charging the battery, and powering the light and other electrical equipment
4. _____that absorbs the shock of the tires and wheels meeting hole and bumps in the road.
5. _____the driver controls the direction of vehicle travel.

Note: **Satisfactory rating – 3 and 5 points** **Unsatisfactory –below 3 and5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____
2._____
3._____
4._____
5._____

Information Sheet- 2	Researching system information

As a new class of information systems (IS), vehicle information systems (Vehicle IS) is enabled through the data generated by a plethora of different sensors within modern vehicles, meshed up with data from a variety of different other sources.

To obtain the correct system specifications and other information, you must first identify the exact system you are working on. The best source for vehicle identification is the VIN. The code can be interpreted through information given in the service manual. The manual may also help you identify the system through identification of key components or other identification numbers and/or markings. To use a service manual:

A. Select the appropriate manual for the vehicle being serviced.
B. Use the table of contents to locate the section that applies to the work being done.
C. Use the index at the front of that section to locate the required information.
D. Carefully read the information and study the applicable illustrations and diagrams.
E. Follow all of the required steps and procedures given for that service operation.
F. Adhere to all of the given specifications and perform all measurement and adjustment procedures with accuracy and precision.

Owner's Manuals

An owner's manual comes with the vehicle when it is new. It contains operating instructions for the vehicle and its accessories. It also contains valuable information about checking and adding fluids, safety precautions, a complete list of capacities, and the specifications for the various fluids and lubricants for the vehicle.

Computer-Based Information

Compact Disk read-only memory (CD-ROMs), digital video disks (DVDs), and the Internet are computer-based information that eliminates the need for a huge library of printed manuals. Using electronics to find information is also easier and quicker. Internets are normally updated monthly and not only contain the most recent service bulletins but also engineering and field service. fixes

Hotline Services

Hotline services provide answers to service concerns by telephone. Manufacturers provide help by telephone for technicians in their dealerships. Some manufacturers also have a phone modem system that can transmit computer information from the car to another location.

The vehicle's diagnostic link is connected to the modem. The technician in the service bay runs a test sequence on the vehicle. The system downloads the latest updated repair information on that particular model of car. If that does not repair the problem, a technical specialist at the manufacturer's location will review the data and propose a repair.

iATN

The International Automotive Technician's Network (iATN) is comprised of a group of thousands of professional automotive technicians from around the world. The technicians in this group exchange technical knowledge and information with other members. The Web address for this group is http://www.iatn.net.

2.2.1 Manufacturer's specification manual

Specifications

Specifications are included as part of the service manual. Specifications are technical data, numbers, clearances and measurements used to diagnose and adjust automobile components. Specifications can be referred to as specs. They are usually considered precise measurements under standard conditions. Examples of specifications include valve

clearances, spark plug gaps, tire pressure, number of quarts of oil, ignition timing and size of engine.

Types of specifications

General Engine Specification – This specification identify the size and style of the engine. They include cubic inch displacement, engine codes, fuel system settings, bore and stroke, horsepower, torque, compression ratio, and normal oil pressure.

Tune-Up specifications – This specification helps identify adjustments necessary for tune-up on the vehicle. This includes spark plug gap, firing order, degrees of ignition timings, fuel system settings and fuel pump pressure.

Capacity Specifications –This specification include to identify the capacity of different fluids on the vehicle. This includes cooling capacity, number of quarts of oil, fuel tank size, transmission transaxle capacity, and rear axle capacity

Overhaul and Maintenance Specifications – This specification used to aid technician in servicing the vehicle. This include distributor advance at different speeds, valve seat angles, valve stem clearance, piston measurements, ring end gaps, bearing clearances, shaft end play and many more. This specification help the technician determine how much wear has occurred. The mechanic is then able to decide whether or not to replace the component in question. Usually maximum or minimum clearances are given for this purpose.

Operational Specification – This specification tell how the vehicle is to operate, what type of oil to use, and so on. Some of them are found in the owner's manual. Other specification includes tire inflation, type of gasoline to use, tire size and general information for the operator of the vehicle.

Torque Specification – It is important to torque each bolt or nut correctly when replacing or installing a component on the automobile. Torque specifications are used for this purpose. This torque specification should be used in place of any standard bolt and nut torque specification

General Engine specifications

Gives information about the engine type to help technician identify the exact type of engine in a vehicle.

SPECIFICATIONS

ENGINE SPECIFICATIONS

Application			E32 Engine
Engine Model			M162.990
Displacement (CC)			3199
Cylinder (Bore x Stroke) (mm)			89.9 x 84.0
Fuel Injection / Ignition System			MSE 3.62S
Compression Ratio			10 : 1
Number of Cylinders			6
Camshaft Valve Arrangement			DOHC
Camshaft Drive Type			Chain-Driven
Max. Output (ps/rpm)			222 / 5500
Max. Torque (kg•m/rpm)			31.6 / 3750
Firing Order			1-5-3-6-2-4
Ignition Type			Distributorless Double Ignition
Ignition Timing			BTDC 8° ± 2°
Valve Timing	Intake	Open/Close	ATDC 11° / ABDC 34°
	Exhaust	Open/Close	BBDC 31° / BTDC 14°
Valve Clearance Adjustment			Automatic Control
Idle Speed (rpm)			700 ± 50
Fuel Injection Pressure (kg/cm2)			3 - 4
Oil Capacity (liter)			8.2
Lubrication Type			Forced by Gear Pump
Oil Filter Type			Full Flow with Paper Filter
Fuel			Unleaded Gasoline

MSE 3.62S/3.53S (Motorsteuer Elektronik : German)
MSE : Engine Control Electronic
3.62S : 6 Cylinder Version
3.53S : 4 Cylinder Version

Tune up specification

Year & Engine/ VIN Code	Spark Plug Gap	Ignition Timing		Mark Fig	Curb Idle Speed ④	Fast Idle Speed ⑤	Fuel Pump Pressure Psi
		Firing Order ②	Degrees BT DC ③				
1989 ①							
4.3L/V8-262/Z	.035	E	TDC ⑤	B	⑥	⑥	9⑦8
5.0L/V8-305/E	.035	A	6 ⑤	B	⑥	⑥	9⑦8
5.0L/V8-307/Y	.060	C	20 ⑫	D	⑥	5⑨0	⑪
5.7L/V8-350/7	.035	A	6 ⑤	B	⑥	⑥	9⑦8

Cooling system & capacity data

Engine & VIN Code	Cooling Capacity, Qts	Radiator Cap Relief pressure, Psi.	Thermo. Opening Temp.	Fuel Tank Qts.	Engine Refill Qts.	Transmission Oil		
						Man. Trans. Pts	Auto. Trans. Qts. ①	Rear Axle Oil Pts.
1989-90								
3.8L/V6-232 (4)	11.6	16	197	18.8	4 ②	-	12.3 ③	④
3.8L/V6-232 SC (C, R)	12	16	197	18.8	4 ②	6.3 ③	12.3 ③	⑤
5.0L/V8-302 (F)	14.1	16	197	18	4 ② ⑥	-	12.3 ③	⑦

Operational Specification

This specification tell how the vehicle is to operate,.

BREAK – IN SPEED LIMIT MPH (KM/H)						
Manual Transaxle		1s	2nd	3rd	4th	5th
	4- Speed	0 to 22(0 to 35)	12 t o 37 (20 to 60)	20 to 55 (30 to 90)	25 to 75 (40 to 120)	
	5- Spee	0 to 22 (0 to 35)	10 to 37 (25 to 85)	15 to 53 (25 to 85)	22 to 68 (36 to 110	28 to 80 (45 to 130)
Automatic Transaxle		"1" Low		"2" Low		"D" Drive
		0 to 30 (0 to 50)		0 to 53 (0 to 85)		0 to 75 (0 to 120)

Engine Tightening Specifications

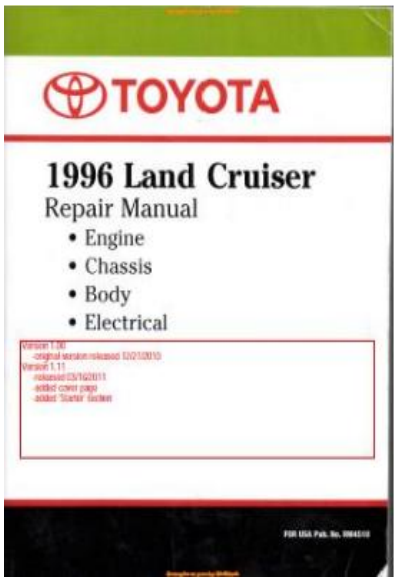
Torque specifications are for clean & lightly lubricated threads only. Dry or dirty threads increase friction which prevents accurate measurement of tightness.

Engine MODEL/ V.I.N.	Spark Plugs Ft. Lbs.	Cylinder Head Bolts Ft. Lbs.	Intake Manifold Ft. Lbs	Exhaust Manifold Ft. Lbs.	Rocker Arm Shaft Bracket Ft. Lbs.	Rocker Arm Cover Ft. Lbs.	Connecting Rod Cap Bolts Ft. Lbs.	Main Bearing Cap Bolts Ft. Lbs.	Flywheel To Crankshaft Ft. Lbs.	Vibration Damper Or Pulley Ft. Lbs.
4-150/U	27	85 ②	23	23	19 ③	28 ①	33	80	⑤	90 ④
4-151/B	11	92	37	37	20 ③	7	30	65	66	160
4-151/B	11	92	26	37	20 ③	7	30	65	66	162
6-258/C	11	85	23	23	19 ③	28 ①	33	65	105	80 ④
6-258/C	11	85 ②	23	23	19 ③	28 ①	33	80	105	80

Manufacture's service manual

Manufacturer's service manual or sometimes its called a shop manuals, are written by the automotive manufacturer for the technicians in their dealership. A shop manual covers one model and one year of a vehicle in great detail, sometimes it is printed in a number of volumes. Shop manuals are the best source of detailed service information for specific car

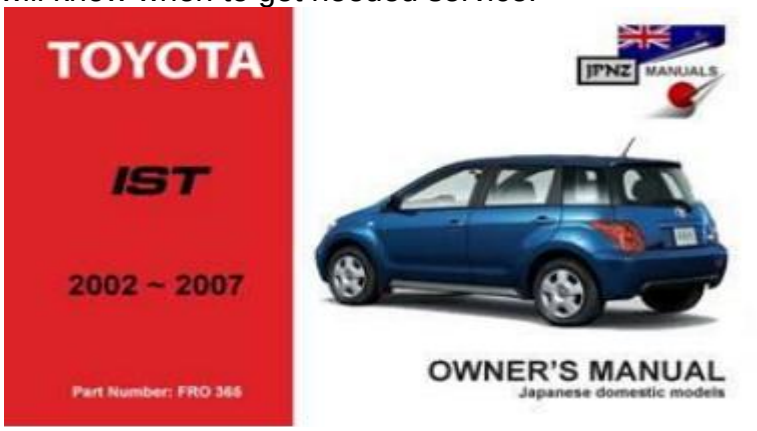
The shop manuals contain three basic types of information. First, there is diagnostic or troubleshooting information. Second, they contain a step-by-step repair procedure. Third, there a specification charts.



Owner's manual

An owner's manual or an operator's manual is a booklet that comes with a new car. This manual usually explains how to operate the automobile's control and accessories. In addition the owner's manual provides a great deal of technical information that can be useful to the technician.

In an owner's manual a vehicle maintenance procedure is provided so that the owner will know when to get needed service.



A vehicle dimension manual

Gives the body and frame measurements of undamaged vehicles. Dimensions are given for every make and model car, van, truck, and SUV. These known good dimensions can be compared with actual measurements taken of a wrecked car or truck to find out how badly the vehicle is damaged and what must be done to straighten it (Figure below).

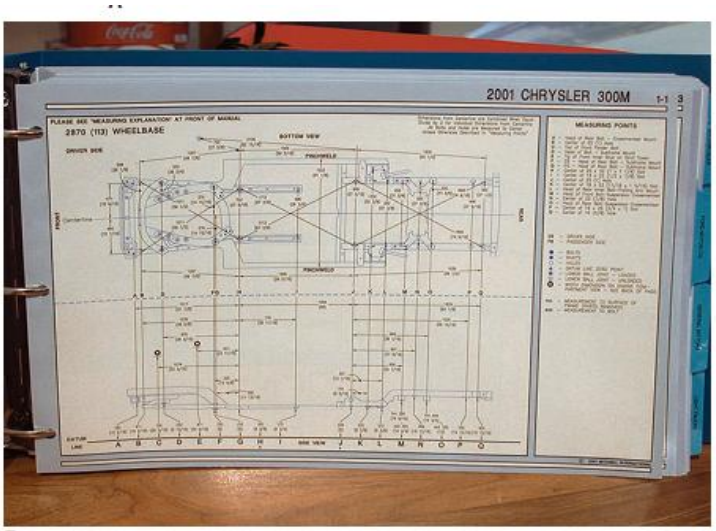
A vehicle dimension manual or software will usually contain the following repair information:

- Complete upper body measurements
- Wheel alignment specifications
- Engine compartment measurements
- Inside passenger compartment measurements
- Front windshield measurements
- Door opening measurements
- Deck lid opening measurements
- Torque values for suspension and steering
- Front suspension measurements
- Rear suspension measurements

Vehicle dimension manuals give the measurement values across specific points on a damaged car, truck, van, or SUV. You can measure damage and compare to published values to find the direction and extent of major damage

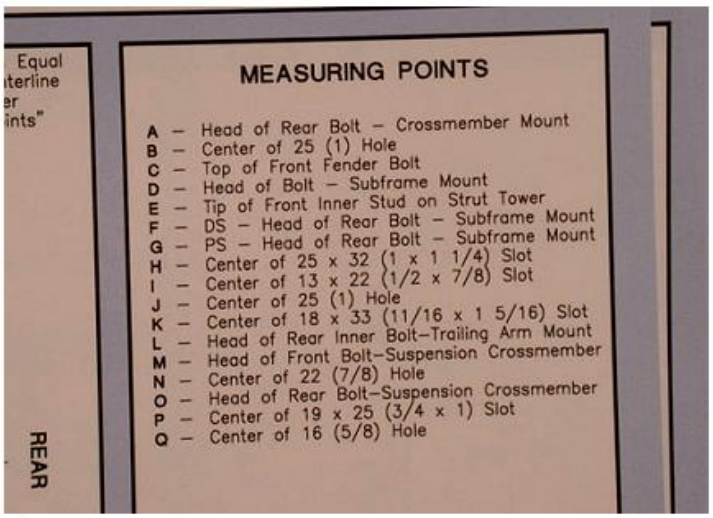
A

Figure; (A) Both domestic and import dimension manuals are available.



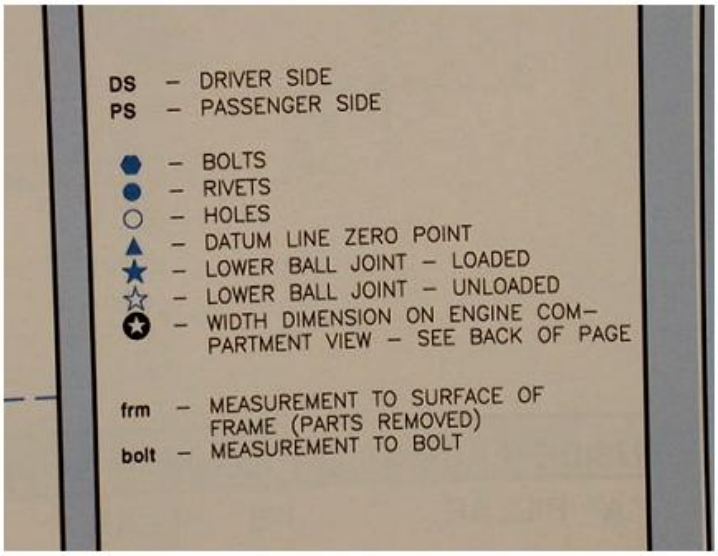
B

FIGURE ; (B) A page from a dimension manual shows measurement points and specifications for one make and model vehicle.



C

Figure (C) Measurement points are given as letters on the dimension page.



D

Figure ; (D) Symbols on the dimension page tell you exactly what must be measured to see whether the vehicle has major structural damage.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. **List Types of specifications(5point)**
2. _____are technical data, numbers, clearances and measurements used to diagnose and adjust automobile components.(1 point)
3. _____This specification helps identify adjustments necessary for tune-up on the vehicle.

Note: **Satisfactory rating – 5 and 7 points Unsatisfactory – 5 and 7 below points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. Types of specifications
   a. _____
   b. _____
   c. _____
   d. _____
   e. _____
   f. _____
2. _____
3. _____

List of Reference Materials

1. Basic Automotive Service and Maintenance by Don Knowels
2. Motor Automotive Technology by Anthony Schwaller
3. Today Technician Classroom Manuals for Basic Automotive Service and System by Jay Wesbster
4. Today Technician Shop Manuals for Automotive Suspension and Steering System by Don Knowels
5. *www.nuceng.ca › bill › volvo › Voluparts_engines*

7. https://www.kaiserwillys.com › tech-guide › 4-134-l-engine-tune-up-specif...

8. www.servotechnica.spb.ru › BOOKS › CAR › SsangYong › Korando

9. *https://www.w3.org › auto › wiki › Vehicle_Information_Service_Specific.*

Vehicle Body Repairing and Painting Level-II

Learning Guide-#9

Unit of Competence: Use Garage Information System

Module Title: Using Garage Information System

LG Code: EIS VRP2 M03 LO3-LG-09

Code: EIS VRP2 M03 TTLM 0919v1

LO 3: Apply for Information

Instruction Sheet	Learning Guide #9

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Sourcing components of information system
- using Capacity of information system to carrying out a periodic service
- Diagnosis with tester
- Erasing maintenance indicator signal

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to:

- Source Suitable components of information systems to assist with task
- Use Capacity of information system to carry out a periodic service
- Erase Maintenance indicator signal by diagnosis tool

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4”.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 and Self-check 4” **in page -60, 70, 88 and 95** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1and Operation Sheet 2 ” **in page -97,98.**
6. Do the “LAP test” **in page – 99** (if you are ready).

Information Sheet-1	Sourcing components of information system

A good technician must have a complete understanding of commonly used terms that identify parts and assemblies of a vehicle. The technician who is not familiar with this language will have difficulty ordering parts and reading repair orders.

Measurements are number values that help control repair processes in collision repair. For example, measurements are needed to measure structural damage, straighten

frame damage, mix paint, adjust spray gun pressure, do a wheel alignment, torque a bolt, and numerous other repair tasks.

Vehicle manufacturers give specifications (measurements) for numerous repair procedures: body straightening dimensions, bolt or nut torque values, material thicknesses, electrical values, and other critical information. When working, you will have to refer to factory specifications to ensure competent repairs.

SERVICE INFORMATION

Service information includes written instructions and technical illustrations to help you properly repair a damaged vehicle. Service information is published by vehicle manufacturers (Jaguar, Chrysler, General Motors, Toyota, and soon) and aftermarket publishers (Mitchell Manuals, Motor Manuals, and Chilton Manuals, for example).

PRINTED SERVICE INFORMATION

Printed service information places service instructions, vehicle dimensions, estimating data, and technical illustrations on paper in bound books. Books and professional magazines are another excellent way to retrieve service Instructions and to improve repair knowledge and skills.

COMPUTER-BASED SERVICEINFORMATION

Computer-based service information places service manuals, dimension manuals, estimating manuals, re finish material guides, mechanical repair procedures, and other data on compact discs (CDs). This allows using a personal computer (PC) to quickly look up and print the desired service repair information. Most PCs used in the collision repair industry are Windows-based.

Figure : using both printed and computerized service information. With modern vehicle repair methods, accessing accurate service information is more important than ever. (Courtesy of Automotive Service Excellence)

There are various kinds of software or computer pro-grams used in the collision repair industry. As a technician, or perhaps someday a shop owner, you should understand the purpose of these useful shop tools.

Most high-volume shops now access their service manuals with a PC. A huge volume of service data can be kept on CDs or retrieved online over the Internet. A PC allows more efficient handling of all shop operations. Estimating, parts ordering, bookkeeping, finding vehicle septic service instructions, and the whole shop business operation can be more closely monitored and controlled by computer using both printed and computerized service information. With modern vehicle repair methods, accessing accurate service information is more important than ever. (Courtesy of Automotive Service Excellence)

A PC can quickly access thousands of illustrations for ast and easy identification. By ordering new CDs every year, the computer-based information you have can be kept current, which means you'll never be at a loss for the most up-to-date parts and service information.

Electronic media or computer-based service information provides potential advantages over print media by enabling the technician to:

- More quickly look up parts and labor information
- More efficiently cross-reference and validate parts and prices
- More easily create, store, and e-mail parts and labor worksheets and part orders
- Print customized parts, assemblies, and repair illustrations for shop use

Shop publications

There are several publications, both printed and computer based, that all body shop personnel should become familiar with.

All automobile companies publish yearly service manuals that describe the construction and repair of their vehicles. These manuals give important details on repair procedures and part construction-assembly. Also called shop manuals, they give instructions, specifications, and illustrations for their specific cars, trucks, vans, and SUVs.

Service manuals have both mechanical and body repair information.

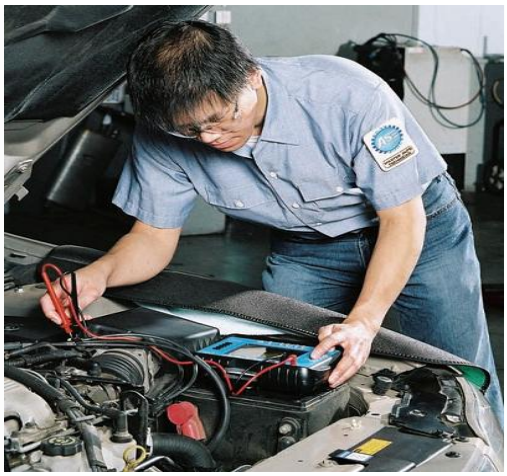


FIGURE : Part or panel removal and installation instructions can be found in factory and aftermarket reference materials (for example, service manuals or computer-based information).

The contents page of a service manual lists the broad categories in the manual and gives page numbers. Each service manual section concentrates on describing one area of repair: body parts, interior parts, suspension system, brakes, and so on

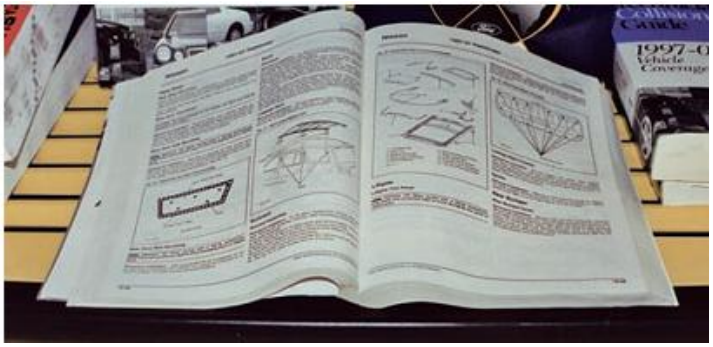


FIGURE: A typical page from a shop manual gives written instructions and illustrations to clarify how repairs should be done.

Service information categories

There are several types or categories of service manuals or computer-based service data used in collision repair. You should be familiar with each type.

Shop management software is designed to help enhance the collision repair facility's Productivity, portability, and customer service by coordinating all aspects of collision repair. It converts electronic estimates into repair orders, making it easy to track and order parts, generate work orders and productivity reports, and deliver the final bill.

Parts ordering software enables you to generate a new parts order and fax it to a vendor. The returned vendor in formation can then be entered and used to maintain the parts status on vehicles. After entering the part information received from the vendor, the software will instantly generate a status report showing which parts have been re ceived, back-ordered, or returned.

Collision repair guides give instructions, safety warnings, and technical illustrations for septic makes and models of vehicles. They are available in both printed and computerized formats. Collision repair guides will summarize procedures for removing parts, cutting and welding structural body panels, and similar types of repair operations. Some shops have a personal computer in the repair area .

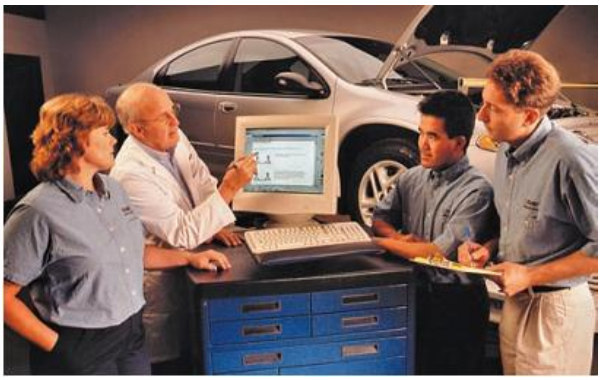


Figure :A shop manager and technicians discuss the use of new computerized measuring systems for checking the amount and direction of vehicle damage.

Collision estimating guides provide information for calculating the cost of collision repairs. They give part numbers, part prices, labor charges per repair task, and other data to help the estimator calculate the cost of repairs.

Re finishing guides explain paint codes, types of paints, and how to apply and buff paints, and also describe other paint-related information. Re finishing guide scan be printed or in electronic form.

Refinishing software typically allows you to calculate painting costs for approximately 5,000 paint codes from several paint manufacturers, including four types of paint.

Re finishing software will help you develop summary reports and detailed breakdowns of materials costs.

A computer compact disc containing re finishing materials information is shown in Figure 3–6. One compact disccan hold the information of several thick, printed service manuals.

Re finishing guides and software will typically include information on:

- Paint code locations
- Paint code explanations
- Bodywork materials
- Plastic and fiber glass materials
- Sanding and buffing materials
- Blending paints
- Low volatile organic compound (VOC) information

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the space

I. Explain the following terms

1. Printed service information(2 point)
2. shop manuals (2 point)
3. Service information (2 point)

Note: **Satisfactory rating – 4 and 6 points** **Unsatisfactory - below 4 and 6 points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____
_____

2.
_____
_____

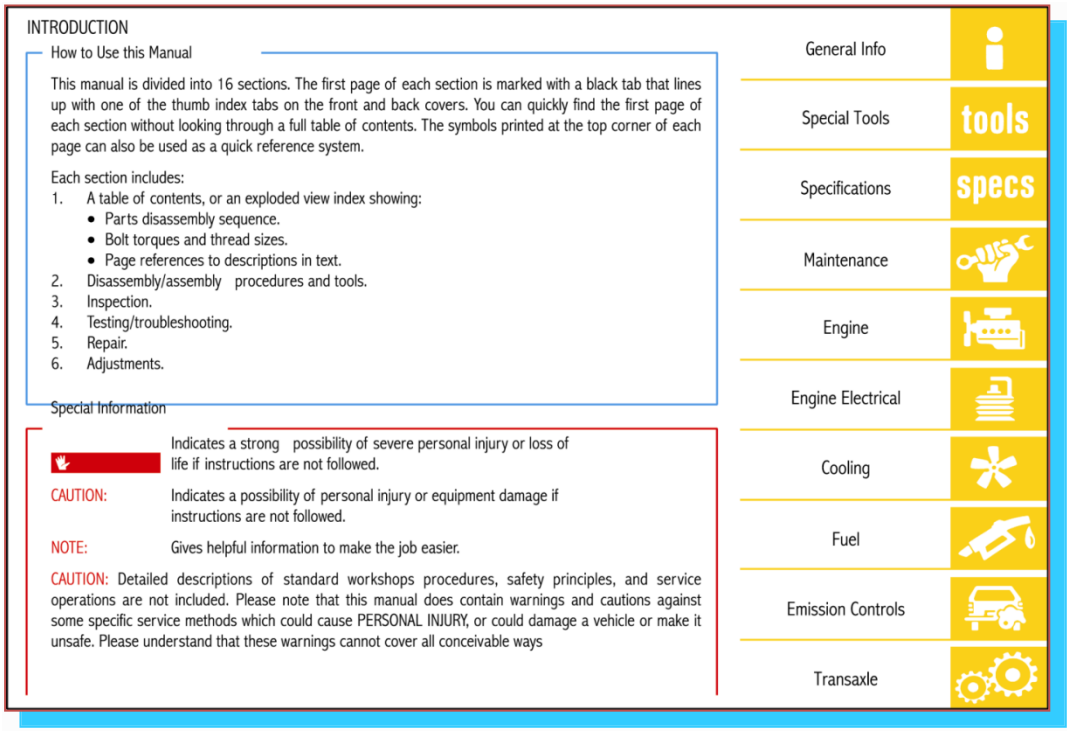
3._____
_____

Information Sheet-2	using Capacity of information system to carrying out a periodic service

General Information

- ❑ Helps the technician with a vehicle's identification, basic maintenance, lubrication, and other subjects

  Service Manual Sections



Repair Sections

- ➢ Explain how to recognize and diagnose problems and inspect, test, and repair each system
- ➢ Specifications such as bolt tightening limits, capacities, clearances, and operating temperatures are given in the repair sections
  - o Illustrations
- ➢ Used to supplement the written information in a service manual
- ➢ Various illustrations may show:
  - ✓ exploded or disassembled views of parts
  - ✓ how a part works
  - ✓ where leaks might occur
  - ✓ how to measure part wear

- ✓ how to install a part

A general service for your car is carried out at regular intervals, either every 10,000 / 15,000 kms or every year, whichever comes first. The service interval also depends on the grade of oil that you choose for your car's engine. Generally, vehicles that use Synthetic Engine Oil have a longer service interval than those that use Mineral or Semi-Synthetic Engine Oil.

Vehicle check up

General service usually starts with a complete vehicle check up including a test drive along with the customer to check for engine, electrical, braking, suspension, clutch, wheels and tyres. Every service provider has a standard checklist of items to inspect in the car prior to start of service.

Engine – oil change

Servicing your car at regular intervals is vital to the health of the car's engine. The main components that need to be replaced in a periodic service are

- Engine oil
- Oil filter

The primary purpose of engine oil is to provide lubrication between the various moving parts of the car's engine and also to act as a cooling medium to carry heat away from the engine parts.

After every 10-15k kms, the car's engine oil tends to deteriorate (mainly lose viscosity). If the engine continues to run with poor quality oil, it can cause increased friction between the various moving parts thus damaging the internal components of the engine which will lead to engine seizure and an expensive repair bill.

The oil filter is another component that has to be replaced periodically. As the name suggests it filters the oil that flows into the engine block to minimize friction that may be caused due to particulate matter in the oil.

Following are the steps involved in replacing the engine oil and the oil filter.

Step 1 : The oil filter is first unscrewed from its place near the engine block.

Step 2 : After removing the oil filter, the oil drain nut is removed from underneath the oil sump and the oil is drained out of the car.

Step 3: Once the oil is completely drained out and collected, the drain nut is fixed back in place and fresh oil is poured into the engine. After the oil is poured, the new oil filter is fitted in place

Step 4 : The engine is cranked and left to idle for a few minutes so that the oil circulates inside the engine.

Braking system – cleaning / overhaul

The braking system of your car is critical and needs periodic maintenance too. For most mass market vehicles, the front wheel hubs are equipped with brake disc and calipers that contain brake pads and the rear wheels hubs are equipped with brake drums that contain brake shoes.

The friction causing element of brake pads and shoes are made up of abrasives which wear out during braking. This creates fine brake dust that gets trapped between disc and pad as well as between shoes and drums along with dirt and mud from the road.

Hence brakes need to be checked periodically

- To ensure that surfaces of the brake pads and the brake shoes are clean from dust (Brakes cleaning)
- To ensure they are replaced if worn out (Brake pad / disc overhaul)

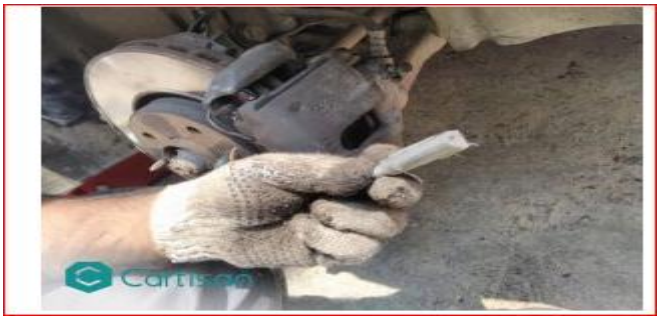
Why is it required?

- Presence of brake dust will reduce braking effectiveness
- Worn out pads and shoes will reduce braking effectiveness
- Screeching sound on pressing the brake pedal

Following are the steps involved in Brakes cleaning.

Step 1 : While the engine is idling, the technician gets to work, removing the wheels from each wheel hub, dismantling the brake calipers for the front wheels and the brake drums of the rear wheels. In the front, brake pads are removed and checked. If found to be worn out they are replaced, else, they are cleaned and placed back inside the caliper and refitted to the brake disc.

Step 2: The caliper pins are greased before reinserting them into the calipers.



Step 3: For the rear wheels, the brake shoes are inspected. If found to be worn out they are replaced as well, otherwise they are cleaned.

Step 4: In some cases, the drums can develop rust, hence anti rust / lubrication spray is sprayed onto the drum to prevent corrosion.

Airflow – air filter replacement

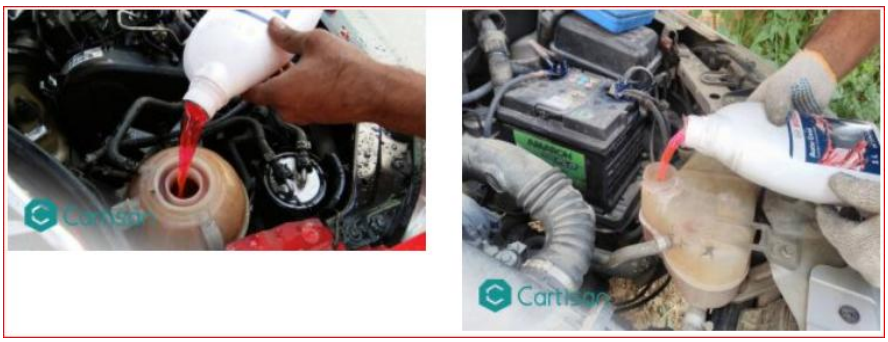
The air inducted into the engine is filtered by a component called the air filter. It is important that the air is filtered properly so that particulate matter which would hamper the process of combustion thereby leading to inefficiency and engine damage are filtered out. It is recommended to change the filter at least once every 20,000 kms (or more frequently depending on the environment conditions where you drive the car and as per recommendations of your car manufacturer). The filter is removed and inspected. If it is not completely covered by dust, it can be cleaned and placed back inside the filter housing. In cases where it is thick with dirt, it will need to be replaced. Below is the step involved in air filter inspection, cleaning and replacement.

Cooling system

The engine coolant is a water based chemical that is circulated inside the engine block with the primary purposes of extracting heat from the engine. The coolant flows through the engine block where it absorbs heat and then into the radiator where the heat is transferred to the atmosphere by convection with the help of the radiator fan.

It is important that coolant levels are checked every service interval. Low coolant levels can cause overheating of the engine therefore reducing its efficiency and potential engine seizure.

Coolant levels are checked and topped up into the coolant reservoir with an appropriate mix of water. In some cases the entire coolant tank is flushed clean and filled with fresh coolant + water mix.



Battery

You car battery is needed to provide the starter motor with sufficient energy to crank the engine. Also, it provides power to all the electronic systems in the car, like accessories, AC System etc. The most basic test of battery strength can be done with the help of a millimeter. A millimeter is connected to the two terminals of the battery and the voltage of the battery is checked. If the voltage is lesser than 12V at any point of time, it means that the battery is weak and will need to be recharged or potentially replaced.

The battery terminals are cleaned and sprayed with a terminal spray which prevents accumulation of deposits on the terminals. Distilled water is topped up in the battery as required.

Others

Usually anti-rust / lubrication spray is sprayed onto the door hinges, bonnet and boot locks of the car to prevent accumulation of rust in these areas.

Water is poured into the wiper wash reservoir and then topped up with 250ml of soap solution.

Fuel Filters, Cabin filters are be inspected and replaced if necessary or as per the manufacturer recommended schedule.

Wheel alignment and balancing are carried out based on requirement.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the space

Explain the following terms

1. What is engine coolant (2 point)
2. Discuss how to clean battery terminals (2 point)

Note: **Satisfactory rating – 3 and4 points** **Unsatisfactory - below 3 and 4 points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____
_____

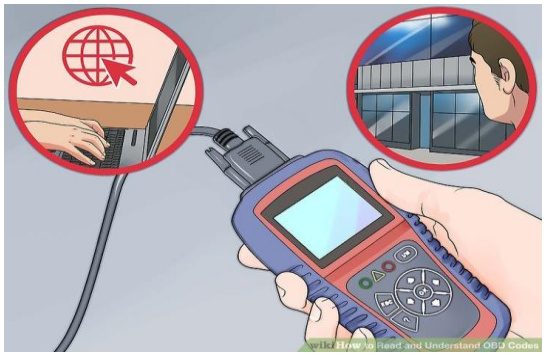
2.
_____
_____

Information Sheet-3	Diagnosis with tester

The diagnostic test relies on a computer system that links to the vehicle's computer processor, sensors, and microchips, logging any problems or issues present. It can reveal existing flaws including problems with the exhaust, transmission, oil tank and other systems.

- Most scan tools will give prompts in their display windows
- Answer the questions or select the choices as they appear

II. Getting the Codes 1



Obtain an OBD-II scan tool. You can find OBD-II scan readers at many online and auto-parts stores. If you have a Bluetooth-enabled smart phone, you can download an app to interpret the data and purchase an OBD reader that will display the codes and explanations directly on your device.

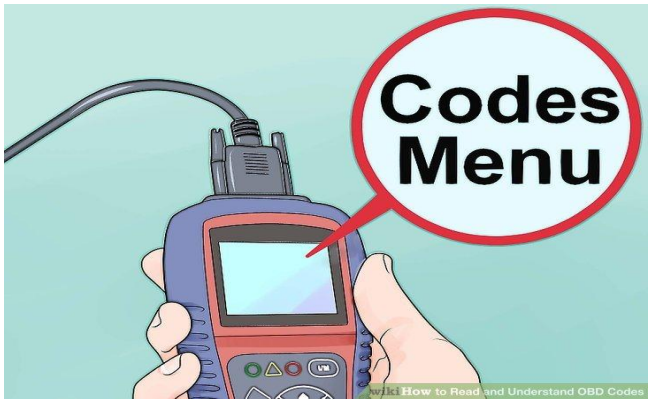
- If your car/light truck is older than 1996 you will need to purchase an OBD-I scanner which are more vehicle specific and do not use the universal OBD-II coding system. This article concentrates on the OBD-II system.
- OBD-II constantly monitors the performance of your engine and Emissions Control System. It will turn on your Check Engine Light whenever a malfunction occurs that causes the vehicle produced emissions to be greater than or equal to 150% of the Federal EPA mandated limits.

Locate the Diagnostic Link Connector (DLC) in your vehicle. This is a somewhat triangular shaped 16-pin connector that is commonly located underneath the left hand side of the dash near the steering column. If you have trouble locating the DLC, search for the location on the internet using your car's model and year, or refer to the owner's manual.

Insert the scan tool connector or code reader into the DLC. Turn your ignition on, but do *not* start your engine. You will see the scanner begin to communicate with the onboard computers in your vehicle. Messages like "searching for protocol" and "establishing data transmission link" may appear on the scanner's screen.

- If the screen stays blank and does not light up, jiggle the connector to achieve a better contact between the scanner and DLC connector pins. Older cars in particular may have poorer connections.
- If you still aren't having any luck, be sure that your cigar lighter works. This is because the OBD-II system uses the cigar lighter circuit to provide voltage to the DLC. If the cigar lighter does not work, locate and check the appropriate fuse.

Enter in your vehicle information. On some scanners, you will need to input your VIN as well as the make and model of the vehicle. You may also need to specify the engine type. This process will vary depending on the scanner.



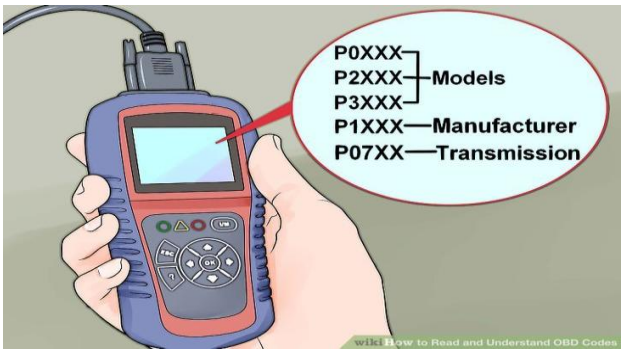
Find the menu. When the scanner finishes booting up, look for a menu. Select “Codes” or “Trouble Codes” to open the main Codes menu. Depending on your scanner and year of the vehicle you may be presented with a few systems such as Engine/Powertrain, Transmission, Airbag, Brakes etc. When you pick one, you will see two or more types of codes. The most common are Active codes and Pending codes.

- Active codes are live codes or malfunctions that are keeping your Check Engine Light on. Just because your Check Engine Light is off doesn't mean the code or malfunction disappeared, it just means that the code setting conditions haven't occurred for two or more operations of the vehicle.
- Pending codes mean that the OBD-II monitoring system has failed the operation of an emission control system at least once and if it fails again the Check Engine Light will be turned on and the malfunction becomes an Active code.

III. Understanding the codes

Learn what the letter means. Each code will start with a letter which designates what system the code is referring to. There are several letters that you may see, though you may have to move to different menus to see them:

- **P** - Powertrain. This covers the engine, transmission, fuel system, ignition, emissions, and more. This is the largest set of codes.
- **B** - Body. This covers airbags, seat belts, power seating, and more.
- **C** - Chassis. These codes cover ABS, brake fluid, axles, and more.
- **U** - Undefined. These codes cover other aspects of the car.



Learn what the numbers mean. P0xxx, P2xxx, and P3xxx are all generic codes that apply to all makes and models. P1xxx codes are manufacturer specific, such as Honda, Ford, Toyota, etc. The second number tells you what subsystem the code refers to. For example, P07xx codes refer to the transmission.

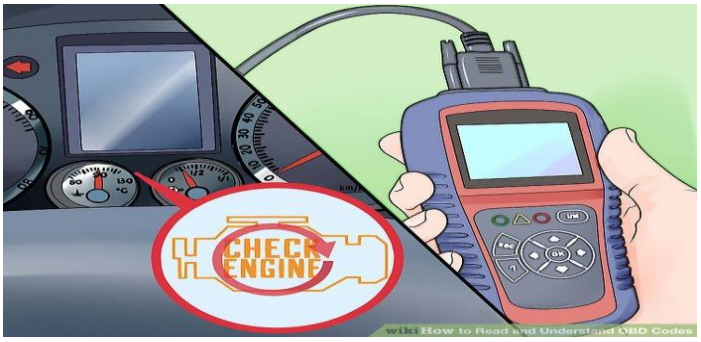
- The last two digits are the specific problem that the code refers to. Check a code chart online for details on each specific code.

Read an example code. P0301 indicates a misfire condition on cylinder #1. The P indicates it's a powertrain code, the 0 indicates that it is a generic or universal code. The 3 means the area or subsystem is an Ignition System code.[1]

- The 01 indicates it's a cylinder specific problem, in that there is a misfire condition in the number 1 cylinder. It could mean that the spark plug, plug wire or dedicated ignition coil are worn out or that there is a vacuum leak near the cylinder.
- A code does not tell you what component is defective; it only points to or indicates that a component, its circuit, or its wiring/vacuum control are malfunctioning. The code may be the symptom of a malfunction caused by a completely different system.

Diagnose your vehicle. The proper diagnosis of OBD-II codes takes years of training and practice. For example, a weak battery or worn out alternator can set five or more codes in systems that are perfectly normal. Before attempting repairs, understand that the codes alone will not tell you what parts need to be replaced or what repairs need to be made.

- If you are unsure of what you are doing, take your car to an ASE Certified Master Technician with the L1 Advanced Engine Performance Diagnostic certification, or you could end up wasting a lot of time and money.



Reset your Check Engine Light. If you've made your repairs, or simply don't want to see your Check Engine Light for a while, you can reset it using most OBD scanners. The light will turn off until the car has been driven a certain amount of time (this varies from manufacturer to manufacturer).

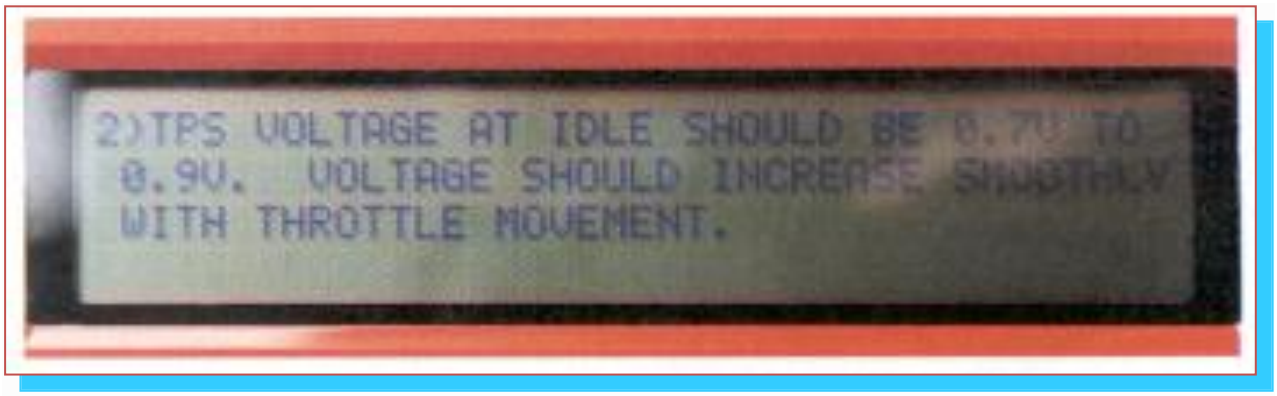
- You can reset the Check Engine Light from the main menu of most scanners. It is also referred to as a CEL.

Troubleshooting Tips

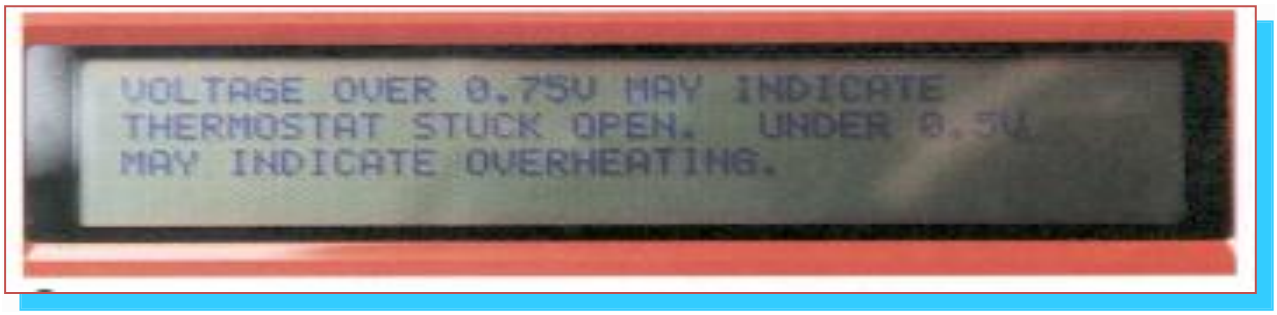
- VIN data lets the scan tool know which engine, transmission, and options are installed on the vehicle

- This scan tool is showing normal voltage range and which wire to probe for voltage

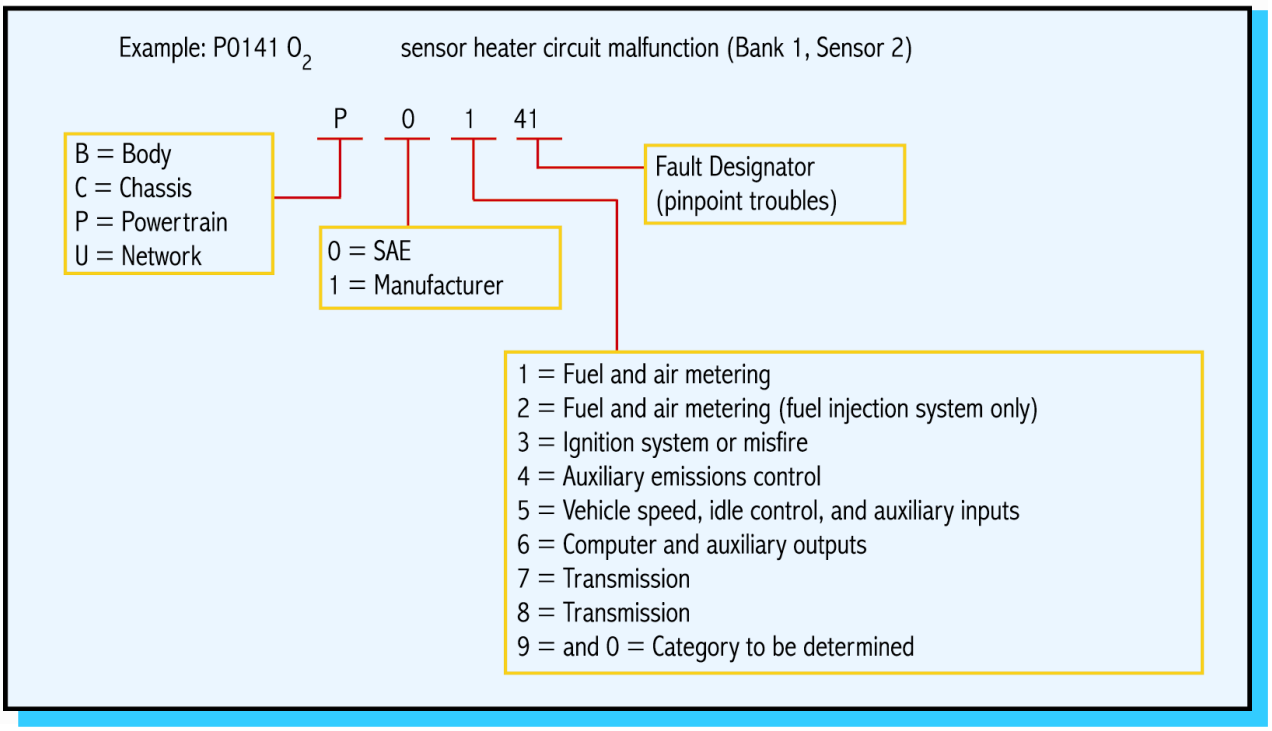
- This scan tool is giving information for testing the throttle position sensor



- This scan tool explains how engine operating temperature can fool the computer into signaling a problem with the engine coolant temperature sensor



OBD II Diagnostic Code



Failure Types

- Computer system failures can be grouped into two general types:
- Hard failure
  - problem that is always present
- Soft failure
  - problem only occurs when certain conditions are present (intermittent)
  - soft failure codes will be stored in memory for 30–50 ignition or warm-up cycles

Repairing the Problem

- Always correct the cause of the lowest number diagnostic trouble code first and then recheck for codes
  - fixing the cause of the lowest code may clear other codes
- Trouble codes do not always mean that a certain component is bad, only that the circuit parameters have been exceeded

Erasing the Diagnostic Trouble Codes allows the Scan Tool to delete not only the codes from the vehicle's on-board computer, but also "Freeze Frame" data and manufacturer specific enhanced data..Do not erase the codes before the system has been checked completely by a technician.

- Removes the stored codes from computer memory after system repairs have been made
- Codes should be erased after service to prevent misdiagnosis in the future
  - ✓ on OBD II vehicles, codes may need to be cleared to extinguish the MIL lamp
- There are various ways to erase trouble codes from the computer:
- Use a scan tool
  - ✓ this is the best way
- Disconnect the battery ground cable or unplug the fuse to the ECM
  - ✓ will erase radio, seat, clock, and ECM adaptive strategy memories

1. . If you decide to erase the DTCs, Select “2. ERASE” from the main menu by pressing the ENTER button

2. . A message of “ERASE? YES NO” comes up asking for your confirmation.

3. If you do not want to proceed with erasing the codes, press the SCROLL button to exit.
4. If you do wish to proceed to erase the codes, then press the ENTER button.
5. If the codes are cleared successfully, an “ERASE DONE!” message will show on the display. Press the ENTER button to Return to the main Menu list.

6. If the codes are not cleared, then an “ERASE FAIL!” message will appear. Press the ENTER button to Return to the main Menu list.
7. HOT KEY: Pressing and Holding the SCROLL button for about 3 seconds will allow you to erase the DTCs more quickly than through the main menu. With most scan tools, simply choose the menu selection to clear codes and then press YES

- ❑ After clearing codes, re-energize on-board diagnostics to verify that no codes are present
- ❑ This will help to verify your repair

3.1.1 Diagnosis socket

Diagnostic Link Connector (DLC)

The diagnostic link connector (DLC) on OBD II equipped vehicles is a standardized 16 pin diagnostic connector used to interface an OBD II compliant scan tool with the PCM allowing access to on-board diagnostics and live data streams.

The OBD II DLC is usually located under the instrument panel on the driver side, though there are several exceptions. The OBD-II connector is required to be within 2 feet of the steering wheel (unless an exemption is applied for by the manufacturer, in which case it is still somewhere within reach of the driver).

Most manufacturers have made the OBD-II Data Link Connector the only one in the vehicle through which all systems are diagnosed and programmed. A vehicle will fail the (NYVIP2) emissions inspection if the DLC is missing, has been tampered with or fails to provide any data.

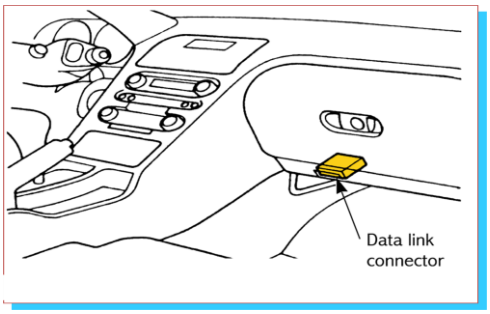
The EPA and vehicle manufacturers have developed a system to locate the DLC on all OBD II compliant vehicles. The location of the connector is based on the passenger compartment diagram, or Diagnostic Link Connector Diagram, which breaks the passenger compartment into 9 locations. Locations 1-3 are preferred connector locations. Locations 4-8 are allowable connector locations. And location 9 is for miscellaneous DLC connector locations.

When trying to locate the DLC connector keep in mind the connector may be hidden by a small cover, and center console located connectors may be hidden by ashtrays or cup holders. To find the location for a particular DLC connector you can use the location diagram and location charts, check the owner's manual or look up the information on line.

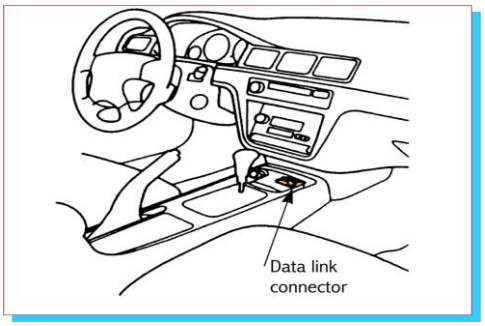
- ❑ Multi pin terminal used to link the scan tool to the computer
- ❑ OBD I connectors came in various shapes, sizes, and locations
- ❑ OBD II connectors are standardized 16-pin connectors located under the dash

Diagnostic Connector Location

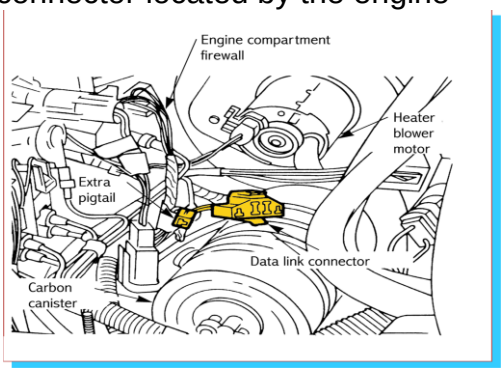
1. This OBD II connector is located below the dash



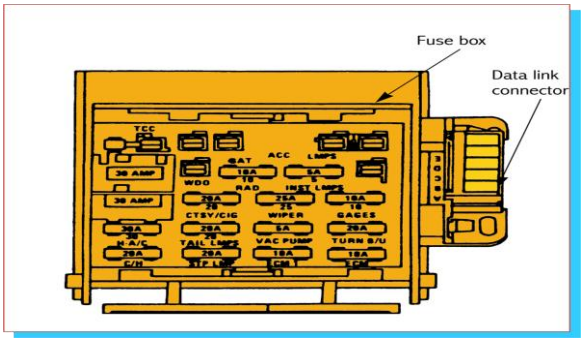
2. This OBD II connector is located in the center console



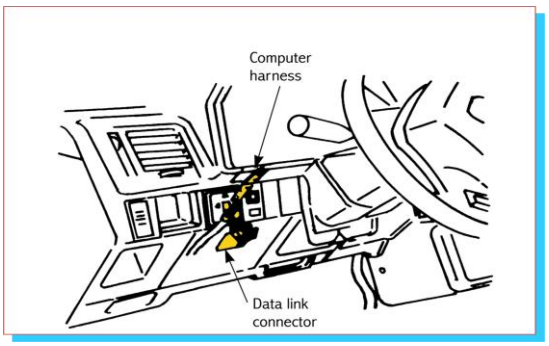
3. Early Ford diagnostic connector located by the engine



4. Early General Motors diagnostic connector located next to the fuse box



5. This connector is located behind the dash



Connecting the Scan Tool

- Adapters are sometimes needed between the scan tool connector and the data link connector on OBD I systems

- Connect the scan tool cable to the vehicle's data link connector

3.3.2. identification error memory

- OBD I and earlier codes were different for each manufacturer
- To simplify troubleshooting, OBD II requires all manufacturers to use a set of standardized alpha-numeric codes
- Each generic trouble code identifies the same problem in all vehicles

3.3.3. Erase error memory

- Press the ENTER button. A sequence of messages showing the OBD2 protocols will be observed on the display until the vehicle protocol is detected.
- They will stop appearing after the vehicle protocol is detected and a confirmation message of “XXX Protocol” is displayed.
- If a “LINK ERROR!” message shows up, turn the ignition off for about 10 seconds, check if the Scan Tool’s OBDII connector is securely connected to the vehicle’s DLC, and then turn the ignition back to on. Repeat the procedure from step 5. If the “LINK ERROR” message does not go away, then there may be problems for the Scan Tool to communicate with the vehicle.

3.3.4. Actuators

Actuators are an essential part of electronic control systems in passenger cars and commercial vehicles. It is their job to convert the electrical signals from the control unit into an action. Most actuators are electric motors...

- Actuator-specific data gathered within the device should include information on standard key components, such as the electric motor, mechanical gearing, position encoder, torque sensor, and motor controller/contactor. The actuator’s BIST feature analyzes component-related data in order to determine overall actuator health.
- By gathering the motor supply voltage, current, winding temperature, and runtime, you will be able to see the electric motor performance measures clearly. Individual user-configurable thresholds provide direction for generating motor warnings and alarms. For example, a high-motor-current condition can signal impending issues such as motor failure, loss of mechanical-gear efficiency, and low-line voltage.
- Encoders are typically used in electric actuators to enable precise valve positioning, so it is extremely important to integrate encoder diagnostics into the actuator. These components are either absolute or incremental rotary-style encoders using optical or mechanical sensing technologies. Optical encoders typically use LEDs beamed onto photodiodes through slits in a disc. Mechanical encoders typically employ strips of magnetized material placed on a rotating disc interacting with a Hall-effect sensor.

Actuator Diagnostic Test

MAXIMUM TEST

by Microtronics for Fortec Srls

Figure : Maximum Test

Maximum Test, produced by Microtronics to the specifications of Fortec Srls, is a multi-functional instrument for testing sensors and actuators in modern engines. Essential to check analogue signals and PWM of transducers and also to test activation of various types of electromechanical actuators.

With the innovative system of smart wiring, to add a new function to Maximum Test that wasn't there before, you simply need to update the instrument firmware and connect the new cable ! The development of new updates and applications is continuous, to keep up to speed with modern automotive technologies.

Some of the functions available to date:

Activation of electromechanical actuators: EGR valves, throttle bodies, pressure regulators, HPV valves, IMV valves, pneumatic actuators, etc. with selection of the duty-cycle and activation frequency.

Activation of injectors: petrol, LPG and CNG, diesel coil and piezoelectric ignition, with the option of modifying the frequency of activation and injection time.

Diesel spark plug testing: operation test on spark plugs of all nominal voltages, even without disassembly from the engine

Inductive pick-up sensor: test on activation of power components via electromagnetic sensor without electrical contact, with pulse readings in real time.

Multimeter for continuous voltage and pwm signals: measurement of maximum and minimum voltages, frequency and duty-cycle of input signal. This includes a function to read minimum voltage of the battery during start-up.

Engine mass test: measurement of engine mass potential with automatic display of test results.

Dc voltage generator: simulation of output of analogue signals with integrated electronics.

PWM signal generator: simulation of electronic sensors with modulated PWM output.

Variable resistance simulator: simulation of resistive sensor output.

From the long-standing experience of qualified technical engineers in the automotive sector, who know only too well the needs of modern car repair shops, comes , the new digital tester for operation tests on electromechanical parts of cars. Where auto-diagnostics ends, it is essential to get to the root of the problem causing the error code, and this is possible thanks to : the analysis of continuous and pulse signals (pwm) is

much simpler than with the traditional oscilloscope and control of the electromechanical components enables immediate checks on operation.

Maximum Test is a multifunctional device that is extremely simple to use, as it changes its function according to wiring attached.

Thanks to its versatility and complete expandability, it is like having a set of tools all in one.

With the innovative system of smart wiring, to add a new function to that **Maximum Test** wasn't there before, you simply need to update the instrument firmware and connect the new cable to it! The development of new updates and applications is continuous, to keep up to speed with modern automotive technologies.

Technical specifications of wiring and functions currently available:

- **DC and PWM multimeter: m**ax. and min. voltages from 0.0 to 100.0V; frequency from 0 to 20KHz; duty cycle from 1 to 99%.
- **DC Generator:** from 0.0 to 12.0Vdc; internal resistance=250ohm.
- **Variable resistance simulation:** 220ohm-25Kohm with steps of approx. 200ohm.
- **Spark plug test:** nominal voltage adjustable from 3.3 to 12V; max. current 20A; ignition time adjustable from 5 to 20sec.; display of current absorption and filament resistance in real time.
- **Pwm signal:** signal amplitude from 0 to 12V; frequency from 1Hz to 15KHz; duty cycle from 1 to 99%.
- **Pwm power with activation of negative pwm:** batt. voltage (12V nom.); frequency from 1Hz to 1000Hz; duty-cycle from 1 to 99%; max. current 10A.
- **Activation of electromechanical injectors:** with negative activation, frequency and injection time variable according to the type of fuel (petrol, diesel, gas).
- **Activation of piezoelectric injectors:** nominal voltage at 120V and variable frequency.
- **Electromagnetic sensor:** inductive detection of pulses/sec on power drives.
- **Engine mass test:** display of voltage readings and test results.
- Uses the scan tool to order the vehicle's computer to energize specific output devices
- Allows you to verify actuator operation
- Some of the actuator tests available:
    - firing or preventing the firing of the coil
    - opening and closing fuel injectors
    - cycling the idle speed motor or solenoid

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the space

1. Write the procedure to Erase error memory (5 point)
2. Diagnostic Connector Location(5 point)

Note: **Satisfactory rating – 6 and 10 points** **Unsatisfactory - below 6 and 10**
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Q-1

a._____

_____

b._____

_____

c._____

_____

Q-2

1._____

2._____

3._____

4._____

5._____

Information Sheet-4	Erasing maintenance indicator signal

An On Board Diagnostic lamp comes on to notify the driver that there is a problem in the vehicle.

However MIL will go off automatically after 3 sequential driving cycles without the same malfunction.

Immediately after the ignition switch is turned on (ON position), the malfunction indicator light is lit continuously to indicate that the malfunction indicator light operates normally.

Methods to Reset Check Engine Light

They are equipped with a lot of electronic systems, and one of these parts are the car's onboard diagnostic system, (OBD) system.

Some of the possible malfunctioning that can occur in your car can be detected either by some inappropriate sounds or by some physical signs. But some faults, that are not easily detectable but do occur in your vehicle, are represented by the check engine light in your car.

When the **ECU (Engine Control Unit)** detects a problem that it is unable to regulate, it then turns on the check engine light on your dashboard. This check light will either keep on glowing or will blink depending on the nature of the fault.

Let's say if Engine Check is on regularly then it means that there is a problem but not an emergency. But if it is blinking, then it means there is an emergency problem with your car.

For example, a faulty oxygen sensor, cannot be just detected until **check engine light** indicates that there is a problem in the engine's any of the parts and then using the compatible device to decode that problem.

But sometimes, engine check light is not always due to any major problem or malfunctioning. Just **resetting the engine check light** is what it all needs to be done.

How to Reset the Check Engine Light

The simplest way to reset the check engine light is with an OBD2 Scanner. But if you do not have one available, you can often do it without one either. It's still recommended to check the trouble codes first with an OBD2 scanner if the Check Engine light is ON.

Here are some different ways of how you can reset your check engine light.

1. **With an OBD2 Scanner**

- If you have an OBD2 scanner available you can reset your Check Engine Light within seconds. If you want to get one, you can check out our other article of the best OBD2 scanners to buy.
- When your check engine light is on, connect the scanner to the Ob Board Diagnostic Connector (OBD) that is situated under the steering portion in the most vehicles. Then switch on your car's ignition and turn all other devices connected into the car. After the connection is established between computer and car, the press read button scanner so it can check all activities going in an ECU.
- After the scan is complete note down all error codes that are diagnosed by the scanner, decode those problems using user manual of particular make and model. Once the code is decoded, the problem is detected. Solve that problem, if that part needs to change then change it or if it needs to calibrate it then do its calibration.

- Once done, erase error from the scanner by pressing “Erase/Clear” button. Once the problem is solved it is recommended to switch off the ignition, then switch it on again, see if engine check light is not on again and recheck from the scanner that is it giving the same fault again or not.

2. Battery Disconnection Technique

This is the first technique of how to reset your check engine light without a scanner. Battery disconnection technique is a conventional way of resetting your car’s check engine light in some cars.

First of all, remove your battery’s both positive and negative terminals. Then try to drain any available electricity present in car’s capacitor by pressing horn for around 20-30 seconds or turning on lights. After all, electricity is disconnected, then leave your car for 10-15mins. After this short span, reconnect all battery terminals, make sure they are well tightened to avoid any possible sparking, and then switch on your car.

If on restarting, your car is giving that same check engine light, then it means that there is some serious problem in our car. In such a case, it is highly recommended to make an appointment with a professional mechanic and get your problem solved to avoid further possible problems.

3. Turning On and Off Ignition

Switching on and off ignition is also one of the ways of hard reset without disconnecting batteries. Put keys your ignition and turn on and off your ignition in consecutively after a span of second in each step.

Once it is done, see if engine check light is still coming or not. If check light is off, then you are ready to go, but if it is still coming then get ready for an appointment from a professional mechanic as a problem could be of some serious nature.

4. Let it go off itself

One of the possible ways to reset check engine light is to wait and let it go by itself. It is really an easy way, what all you have to do is to just wait and continue driving your car

for around three days. Car's computers are designed in a way that works in a continuous cycle and refreshes their present state.

Remember that you have to make sure that the old problem is gone before doing this technique.

For example, if ECU detects some problem in oxygen sensor that could occur due to a minor glitch, then it might fix automatically as ECU will update sensor's status once glitch is removed, setting off check engine light. But if your check light is still on even after three days, then either apply above mentioned methods yourself or take your car to a mechanic.

If Engine Check Light Returns

Once you have to get your check light removed using any of the four above mentioned methods, then you are ready to go. But if after a few days, your check light glows again, it means there is some major problem in your car.

If you scan using a scanner and same problem code does not appear again, it means then some new fault has occurred in your car. But if the same code is still coming on the scanner, then, in this case, it is highly recommended to go get an appointment from some professional mechanic/technician and get a full diagnosis of your car with a good OBD2 scanner.

Pulling Off Fuse

One of the possible ways of getting your check light off is by pulling off engine control units fuse. Although this won't solve the problem in newer cars, because of which check light was glowing but it will simply disconnect engine check light's connection with Electronically Controlled Unit (ECU).

The best way is to use a good Scanner to reset your check engine light. If you do not own one, you can probably lend one from a friend or ask a mechanic workshop to reset it for you.

Remember that it may not be possible to reset the check engine light if a problem still occurs in your engine control unit.

The glowing of engine check light is a sign of some malfunctioning in your car. It indicates any possible fault in your car's engine. Sometimes they get solved themselves but sometimes they are an indicator of something really bad that is going your car and could further disturb your car's functioning. So don't ignore it, and get is solved using any of the above methods to avoid any major losses.

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the space provider

1. List out the different ways of how you can reset your check engine light (**4 points**)

Note: **Satisfactory rating – 3 and 4 points** **Unsatisfactory - below 3 and 4 points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Short answer question

1._____

2. _____

3._____

4._____

Operation Sheet 1	Techniques of Erasing Maintenance indicator signal by Battery Disconnection

1.1. The Techniques of Erasing trouble codes by Battery Disconnection are;

Step -1 Remove your battery's both positive and negative terminals

Step- 2. Then try to drain any available electricity present in car's capacitor by pressing horn for around 20-30 seconds or turning on lights.

Step- 3. After all, electricity is disconnected, then leave your car for 10-15mins

Step- 4. After this short span, reconnect all battery terminals, make sure they are well tightened to avoid any possible sparking, and then switch on your car.

Step -5. If on restarting, your car is giving that same check engine light get your problem solved to avoid further possible problems.

Operation Sheet 2	**Techniques of** Erasing Maintenance indicator signal by diagnosis tool

1.2. Techniques for Erasing trouble codes from the computer **are;**

Step-1 connects the scanner to the Ob Board Diagnostic Connector (OBD) that is situated under the steering portion in the most vehicles. . Make sure that your car is NOT running while you perform this step.

Step-2 Once you have the OBD2 scanner connected, turn the key to the “on” position, but don’t turn the engine on.

Step-3 Press the scan button on your OBD2 scanner and give it a few seconds or a couple minutes to search for codes. Once it finds the problem, it will either give you a single code or a list of codes

Sterp-4 Decode those problems using user manual of particular make and model

Step-5 Once the part is replaced, plug the OBD2 code reader back in and press and hold the “erase” button.

Step-6 Clearing fault codes to turn of the check engine light

LAP Test 2	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary service manual, vehicle, scan tools (**OBD II**) and materials you are required to perform the following tasks within 1:00 hours.

Task 1: Erasing Maintenance indicator signal by Battery Disconnection

Task 2: Erasing Maintenance indicator signal by scan tools

List of Reference Materials

1. Basic Automotive Service and Maintenance by Don Knowels
2. Motor Automotive Technology by Anthony Schwaller
3. Today Technician Classroom Manuals for Basic Automotive Service and System by Jay Wesbster
4. Today Technician Shop Manuals for Automotive Suspension and Steering System by Don Knowels
5. *cartisan.in › Advice*
6. http://www.obd-codes.com/trouble_codes/
7. http://www.popularmechanics.com/cars/how-to/maintenance/4267896
8. http://straighttalkautomotive.com/articles/scan_tools_pt_1.html
9. *https://www.microtronics.it › lang1 › maximumtest_diagnostic_sensors_act..*