

ISUZU E-Learning System

Module 1: General Information



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HISTORY OF ISUZU



History

Isuzu Motors Limited



- 1916- Tokyo Ishikawajima Ship-Building and Engineering Co., Ltd. and Tokyo Gas and Electric Industrial Co. initiated plans to build automobiles

- 1918- Tokyo Ishikawajima Ship-Building and Engineering concluded a technical tie-up agreement with Wolseley Motors of England



History



- 1922- Tokyo Ishikawajima Ship-Building and Engineering completed its first domestically produced Wolseley, the model A-9

- 1934- a Ministry of Trade and Industry standard model car was launched and named the "Isuzu" after the ISUZU River in the ISE Shrine area, which means “50 Waves”.



History



- 1971- A partnership between General Motors and Isuzu was signed, GM acquired 34% of Isuzu



- 1999- GM raised its equity share in Isuzu to 49% through a third party allocation; but in 2003, GM decreased its equity share in Isuzu to 12%



History



- 2006- Isuzu announced that they re-purchased the 12% from GM and dissolved their equity tie-up. But said that they will continue their “current relationship”.
- 2006- Toyota purchased 5.9% shares from Isuzu, wherein both companies agreed on a business collaboration for the development of small diesel engines.





EVOLUTION OF ISUZU PHILIPPINES

History

History of Isuzu Philippines Corporation



1950's

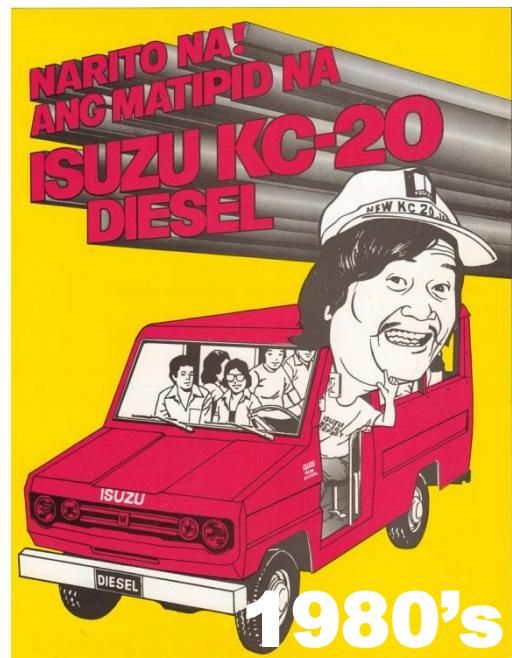
- 1950- Isuzu Philippines debut through its line of trucks

- 1972- GM and Isuzu had a joint agreement to create GM Philippines Inc. (GMPI)



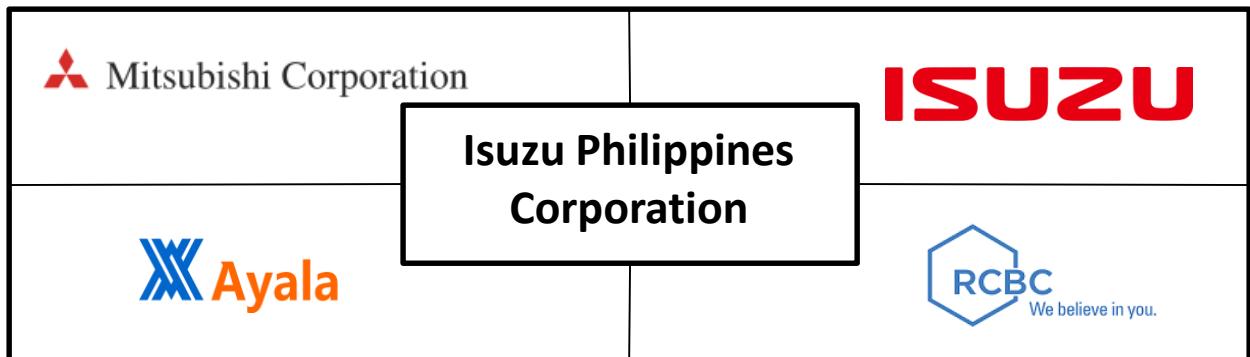
History

- 1980- Isuzu Pilipinas Engine Corp. was established
- 1989- Isuzu Motors Pilipinas Inc. (IMPI) was established, now that it was fully-owned by Isuzu Motors Ltd. Of Japan



History

- 1995- Isuzu Philippines Corporation was formed, through an agreement between Isuzu Motors Ltd., Mitsubishi Corporation, Ayala Corporation and RCBC.



- 1996- Isuzu Philippines Corporation began its production in the Philippines.



Isuzu Hilander



Isuzu Fuego



Isuzu N-Series



Isuzu F-Series

ISUZU

C-SERIES
E-SERIES
F-SERIES
N-SERIES
mu-X
D-Max



VEHICLE LINE-UP

Vehicle Line-Up



**3.0L LS 4x4 AT
3.0L LS 4x4 MT
3.0L LS 4x2 AT
3.0L LS 4x2 MT**



**1.9L RZ4E LS 4x2 AT
1.9L RZ4E LS 4x2 MT**



**LS 4x2 AT X-Series Freestyle White
LS 4x2 MT X-Series Black Hawk**

Vehicle Line-Up



LT 4x2 MT
LT 4x4 MT



Single Cab and Chassis Blue Power

Vehicle Line-Up



Isuzu D-max	Specs	
Engine	3.0L 4JJ1-TCX, Euro 4 Common-Rail Direct Injection Engine Max Output: 177 PS @ 3,550-3,650 RPM Max Torque: 380 N-m @ 1,800-2,800 RPM	1.9L RZ4E-TC, Euro 4 Common Rail Direct Injection Engine Max Output: 150 PS @ 3,600 RPM Max Torque: 350 N-m @ 1,800 – 2,600 RPM
Chassis	Steering: Rack and Pinion with Power Assist Suspension: Front Independent Double Wishbone with coil spring and stabilizer, Rear Semi-elliptical soft ride leaf spring. Wheels and Tires: 255/60 R18 Alloy Wheel*, 245/70 R16 Aluminum Alloy Transmission: TB50LS 5-Speed AT; MUA-5H 5-Speed MT (X-Series) AWR6B45-II 6 Speed AT, MVL6N**/6Y 6 Speed MT	
Brake	Front: Ventilated Disc Rear: Leading and Trailing Drum Brakes	
Safety	Dual SRS Airbag, Front ELR Seatbelt w/ Pre-Tensioner and Load Limiter, Rear ELR Seat Belts Anti-lock Braking System w/ Electronic Brake Force Distribution and Brake Assist, Brake Override System, Electronic Stability Control, Traction Control, Hill Start Assist and Hill Descent Control	

Note: * for Isuzu D-Max 3.0L LS Models

** for Isuzu D-Max RZ4E LS Models

Vehicle Line-Up



**3.0 LS-A 4x4 AT
3.0 LS-A 4x2 AT
3.0 LS-A 4x2 AT Luxe
1.9L RZ4E LS-A 4x2 AT
1.9L RZ4E LS-A 4x2 AT**



**1.9L RZ4E LS 4x2 AT
1.9L RZ4E LS 4x2 MT**

Vehicle Line-Up



Isuzu mu-X	Specs	
Engine	3.0L 4JJ1-TCX, Euro 4 Common-Rail Direct Injection Engine Max Output: 177 PS @ 3,550-3,650 RPM Max Torque: 380 N·m @ 1,800-2,800 RPM	1.9L RZ4E-TC, Euro 4 Common Rail Direct Injection Engine Max Output: 150 PS @ 3,600 RPM Max Torque: 350 N·m @ 1,800 – 2,600 RPM
Chassis	Steering: Rack and Pinion with Power Assist Suspension: Front Independent Double Wishbone with coil spring and stabilizer, Rear 5-Link Coil Spring and stabilizer bar. Wheels and Tires: 255/60 R18 Alloy Wheel*, 245/70 R16 Aluminum Alloy Transmission: AWR6B45-II 6-Speed AT, MVL 6Y 6 Speed MT	
Brake	Front: Ventilated Disc Rear: Ventilated Disc* / Leading and Trailing Drum Brakes	
Safety	Dual SRS Airbag, Front ELR Seatbelt w/ Pre-Tensioner and Load Limiter, Rear ELR Seat Belts Anti-lock Braking System w/ Electronic Brake Force Distribution and Brake Assist*, Brake Override System*, Electronic Stability Control**, Traction Control**, Hill Start Assist and Hill Descent Control**	

Note: * for Isuzu mu-X 3.0L LS-A & RZ4E LS-A Models

** for Isuzu 3.0L LS-A

Vehicle Line-Up



N-SERIES



NLR77
NLR85
NMR85
NPR85
NQR75

MODEL	NLR77	NLR85	NMR85	NPR85	NQR75
GVW	4,200 kgs	4,490 kgs	4,490 kgs	6,500 kgs	8,500 kgs
ENGINE	4JH1-TC	4JJ1-TCC	4JJ1-TCC	4JJ1-TCC	4HK1-TCN
POWER	106 PS	124 PS	124 PS	124 PS	155 PS
TORQUE	230 N·m	354 N·m	354 N·m	354 N·m	419 N·m
PAYLOAD	2,500 kgs	2,635 kgs	2,400 kgs	4,140 kgs	5,790 kgs
TRANSMISSION	MSB5S		MY5M		MY6S
BRAKE					
SERVICE			Drum Type/Vacuum		
AUXILIARY	Optional		Exhaust Brake		
PARKING			Center Brake		
SUSPENSION			Multi-Leaf Spring		

Vehicle Line-Up



F-SERIES



FRR90
FSR34
FVR34
FVM34T
FVM34W

MODEL	FRR90	FSR34	FVR34	FVM34 T	FVM34 W
GVW	10,600 kgs	11,000 kgs	16,000 kgs	26,000 kgs	26,000 kgs
ENGINE	4HK1 - TCC		6HK1 - TCN		6HK1-TCS
POWER	190 PS		240 PS	280 PS	280 PS
TORQUE	510 N-m		706 N-m	882 N-m	882 N-m
PAYOUT	7,365 kgs	7,100 kgs	10,965 kgs	19,155 kgs	18,995 kgs
TRANSMISSION	MZZ6W		MZW6P		EATON ES11109DD
BRAKE					
SERVICE	Drum Type, Air Over Hydraulic			Drum Type, Full Air	
AUXILIARY			Exhaust Brake		
PARKING	Center Brake		Wheel Park		
SUSPENSION			Multi-Leaf		

Vehicle Line-Up

C&E-SERIES



**CYZ52
CYH52
EXR52
EXZ52**

MODEL	CYZ52	CYH52	EXR52	EXZ52
GROSS VEHICLE WEIGHT	33,000 kgs	41,000 kgs	20,000 kgs	33,000 kgs
GROSS COMBINATION MASS	N/A	N/A	45,000 kgs	60,000 kgs
ENGINE	6WG1-TCR			
POWER	400 PS			
TORQUE	1863 N·m			
TRANSMISSION	MJT7S	MJX16P	MJT7S	MJX16P
BRAKE				
SERVICE	Full Air, Auto Adjust			
AUXILIARY	Exhaust Brake with Service Brake		Trailer Hand Brake	
PARKING	Wheel Park			
SUSPENSION	FR	Multi Leaf Spring	Taper Leaf Spring	Taper Leaf Spring
	RR	Multi Leaf Spring	Taper Leaf Spring	Multi Leaf Spring

Vehicle Line-Up

E-SERIES

BLUEPOWER
EUROV



EXRQL418W1
EXZQL425W1

MODEL	EXRQL418W1	EXZQL425W1
GROSS VEHICLE WEIGHT	18,000 Kg	24,900 Kg
GROSS COMBINATION MASS	45,000 Kg	60,000 Kg
ENGINE	6WG1-TCG52	
POWER	420 PS (309 Kw) @ 1,800 RPM	
TORQUE	2,060 N·m (210 Kg-m) @ 830-1,400 RPM	
TRANSMISSION	ZF16S2230TO	
BRAKE		
SERVICE	Full Air, Auto Adjust (S-Cam Type)	
AUXILIARY	Exhaust Brake / Trailer Hand Brake	
PARKING	Wheel Park	
SUSPENSION	Taper Leaf Spring	

General Tools & 5S Policy

General Tools

Hand Tools

For servicing of vehicles, different kinds of tools are needed in order to do the job safely, fast and efficient. These tools facilitate different servicing techniques including striking, turning, gripping and cutting in which it uses the energy from the technician in order to use them. Other tools may use an external source for energy such hydraulic and pneumatic tools which provide a higher amount of effort to accomplish the task such as lifting, tightening etc.

Management of Hand Tools

Since tools are a necessity for all service technicians , it is necessary for everyone to manage them by cleaning and keeping them in their proper storage. This allows everyone to be able to access these tools quickly and readily available whenever needed. At the same time, this enables everyone to know the condition of each tools so that damaged or worn and missing tools can be replaced.

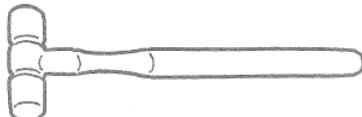


General Tools

General Tool Types

Striking Tools

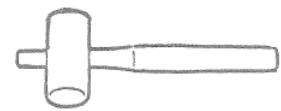
Hammers – is used to apply impact or shock by striking the object in order to fit or drive parts in place, break apart or disassemble components or detect loose bolts or nuts and other inspections.



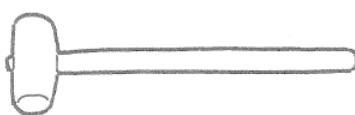
Plastic tip hammer



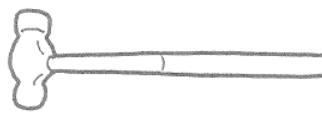
Brass hammer



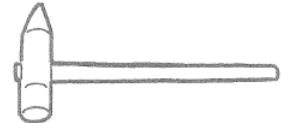
Wooden hammer



Rubber hammer



Ball peen hammer



Test hammer

Note:

Make sure that the head of the hammer is securely fixed to the handle as they may fly away when the head is loose during usage.

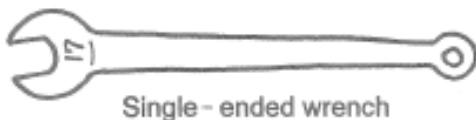
General Tools

General Tool Types

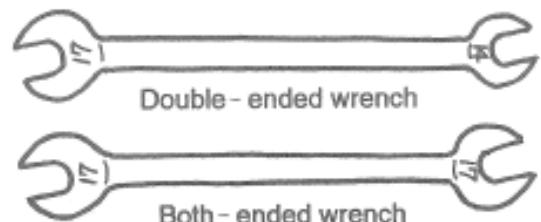
Turning Tools

Open End Wrench – used to tighten or loosen a bolt or a nut.

Different types of wrenches are widely used in the service shop which includes:



Single - ended wrench



Double - ended wrench

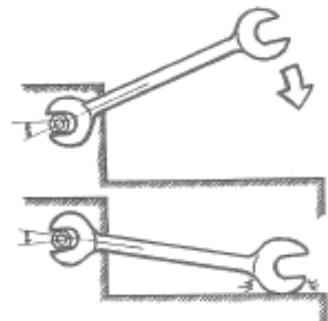
Both - ended wrench

- a 15° incline with respect to the handle of the wrench is provided so that it will be easier to turn nuts and bolts in tight spaces.



Size

Illustration for the reversed use of a wrench



General Tools

General Tool Types

Proper Usage of Open End Wrenches:

- Select the wrench the fits the bolt or nut size. If the bolt or nut.



Wrong



Wrong



Correct

- Always pull the wrench towards use. Pushing it may cause you to slip or stumble and get injured. If not avoidable, push it with an open palm to lessen



Wrong



Correct

- Never use tubes to extend the length of the wrench as it may break by increasing the force applied to it.



General Tools

General Tool Types

Turning Tools

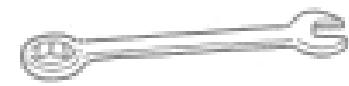
Box-End Wrench – used to tighten bolts and nuts more securely as it holds their heads all around and a larger torque can be applied to it than open end wrenches.



Offset wrench



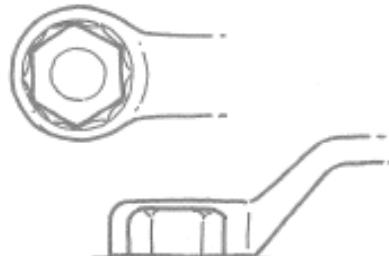
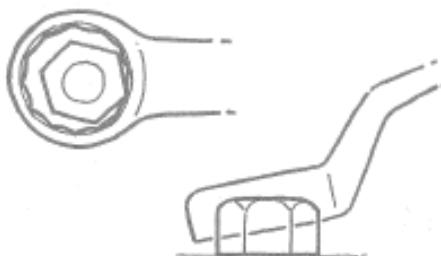
Flare - nut wrench



Combination box
– and open – ends wrench

Proper Usage:

- Select the proper size of box-end wrench and use it when tightening or loosening of bolts and nuts.
- Fit the wrench properly to the head of bolt or nut and pull the handle.
- Do not hit the wrench with hammer or use tubes to extend its length as it may break the wrench.

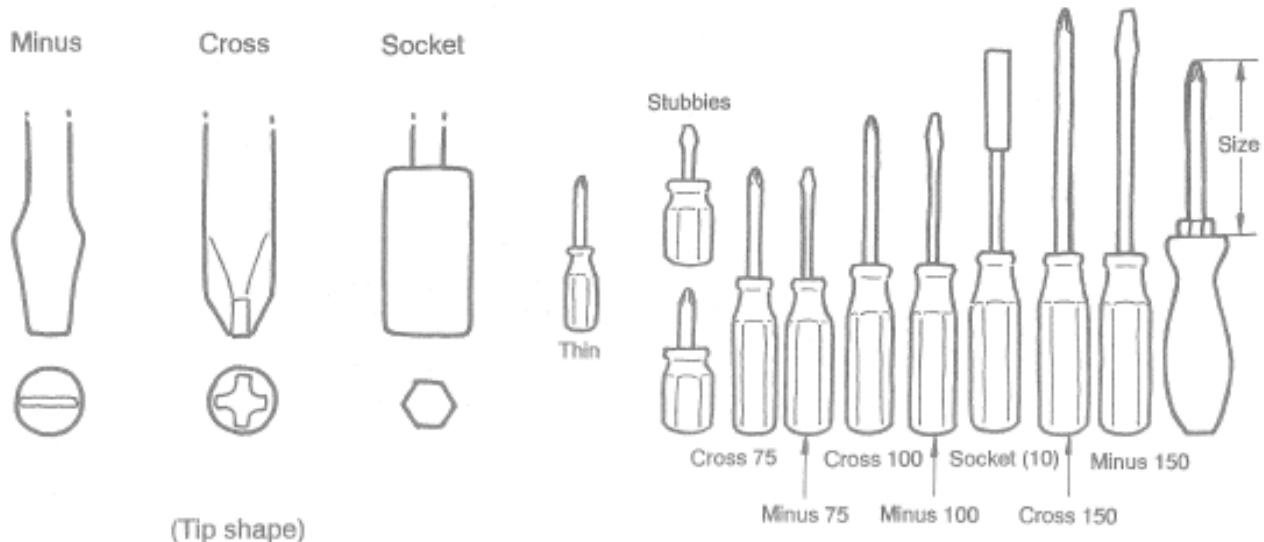


General Tools

General Tool Types

Turning Tools

Screwdriver – used to tighten or loosens screws. It has various tips available fir different kinds of screw heads.



Proper Usage:

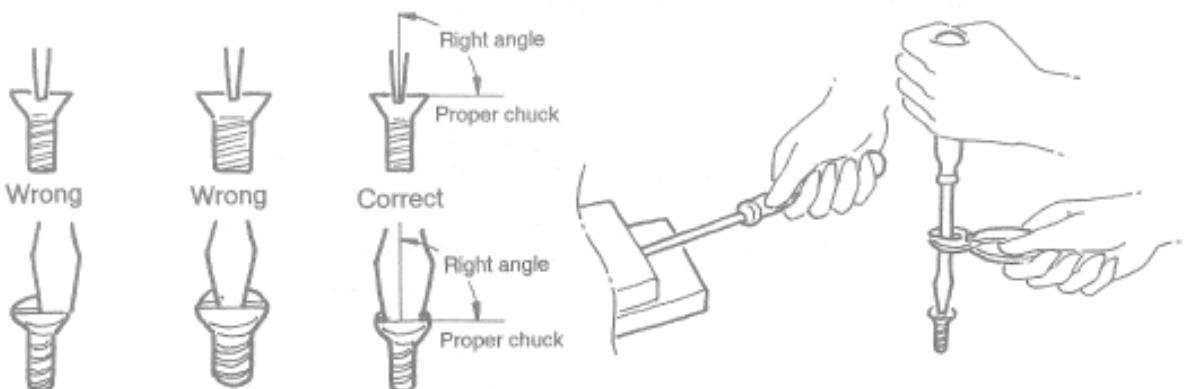
- Match the screwdriver tip with the groove of the screw head and it must engage it securely.

General Tools

General Tool Types

Turning Tools

- Use the appropriate size of screwdriver to avoid damaging the screw groove.
- Do not use the screwdriver as lever or force to turn it by using pliers as it may damage the screwdriver.

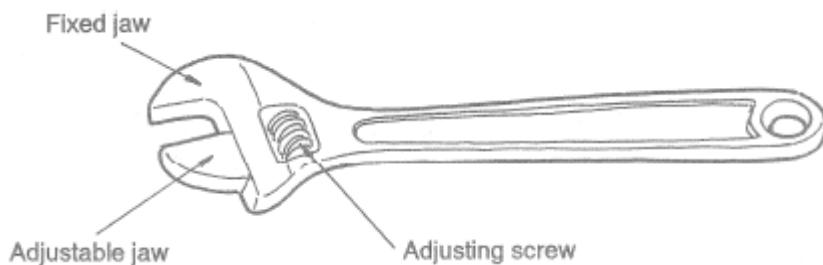


General Tools

General Tool Types

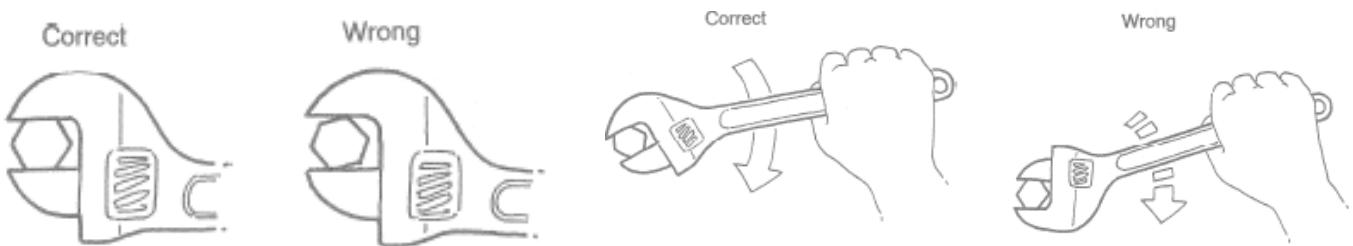
Turning Tools

Adjustable Wrench – Opening of the jaw can be adjusted according to the size of the bolt by turning the adjusting screw to move the adjustable jaw.



Proper Usage:

- Use the adjustable wrench after adjusting the jaw to fit the bolt or nut perfectly.
- Pull the adjustable wrench with fixed jaw at the upper side of the bolt as it is stronger than the moveable jaw.

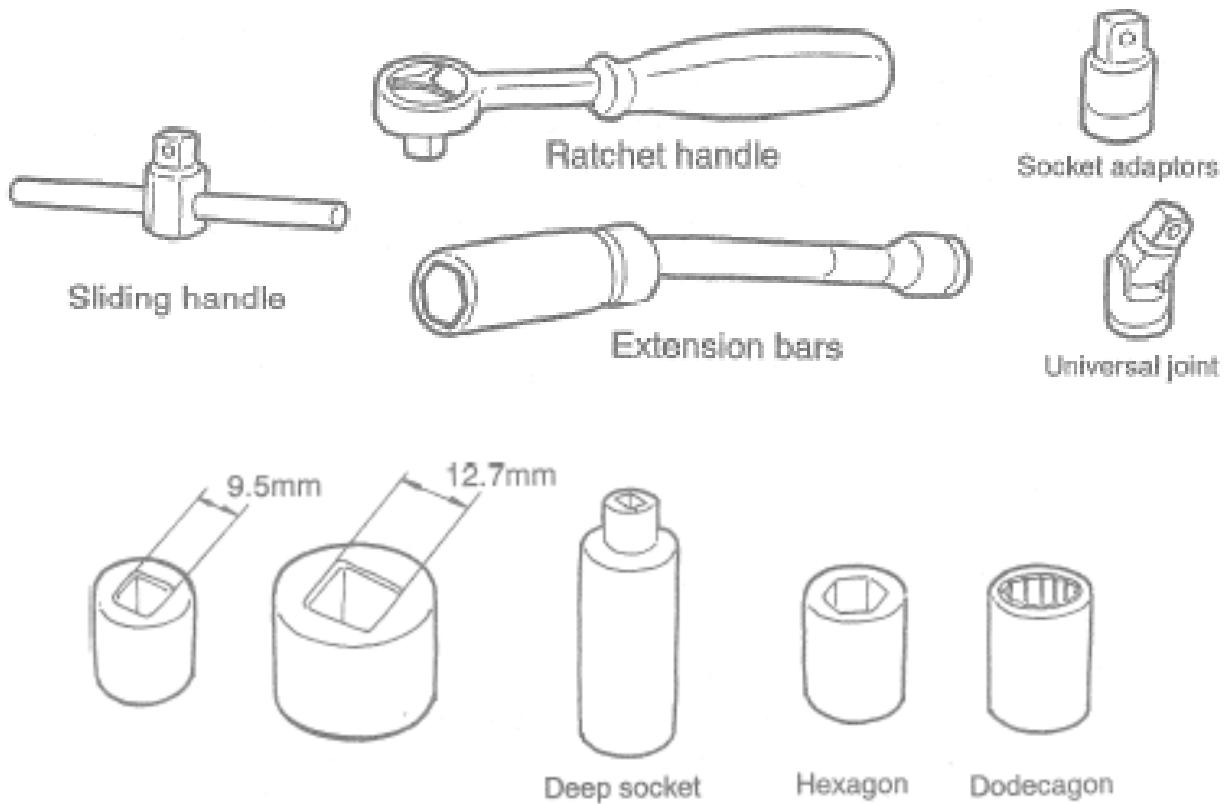


General Tools

General Tool Types

Turning Tools

Socket Wrench Set – it can be used for nuts of various sizes by combining this with various types of handles, extension bars and joints for hard to reach areas.



General Tools

General Tool Types

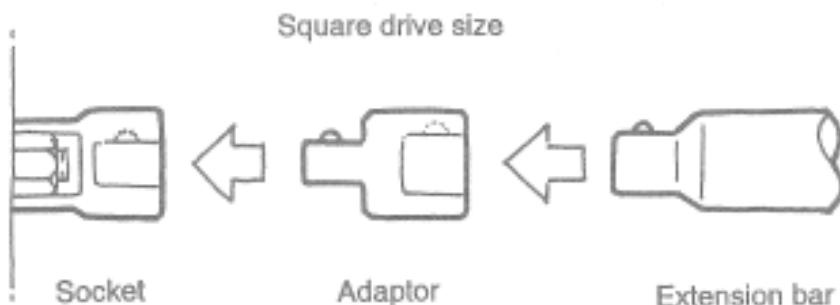
Turning Tools

Proper Usage:

- Use sockets of proper sizes that will fit securely to the nuts and bolts.



- Connect sockets securely, otherwise it may cause disengagement during turning and may result to injuries.
- Use sockets designed for impact wrenches as general purpose sockets may get damaged if used as substitute.

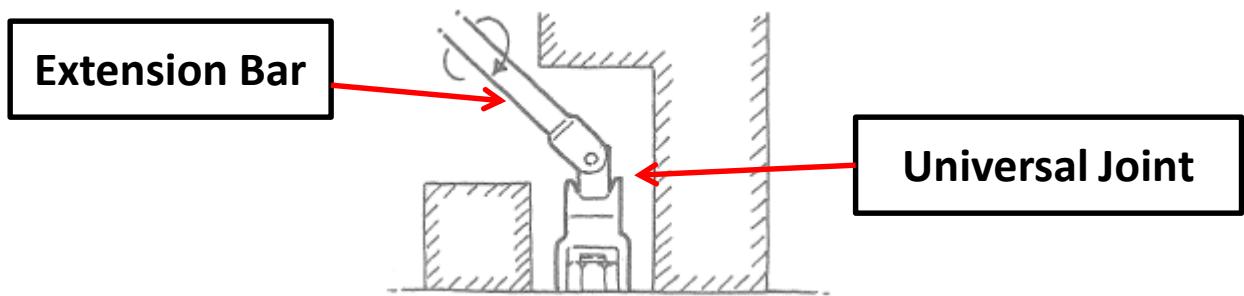


General Tools

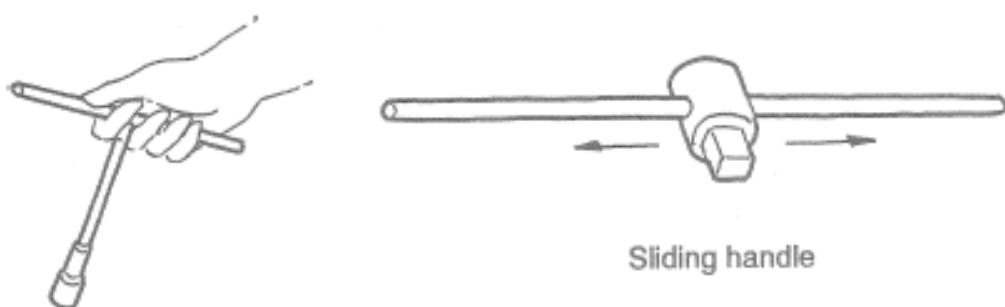
General Tool Types

Turning Tools

Extension Bar and Universal Joint – it is used if nuts or bolts are on hard to reach locations at tight spaces. Make sure that the socket is full engaged in the bolt or nut when using universal joints.



T-type Slide Handle – it is a combination of socket and cross bar used for fastening at a various torque by sliding the position of the handle and the socket.

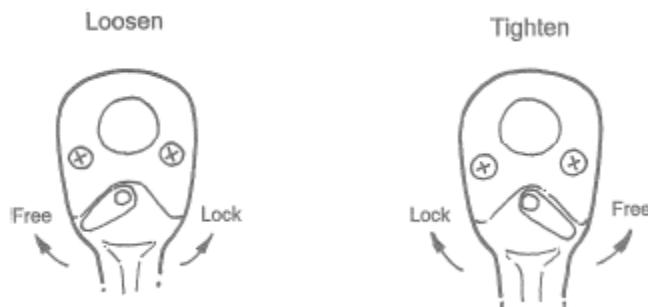


General Tools

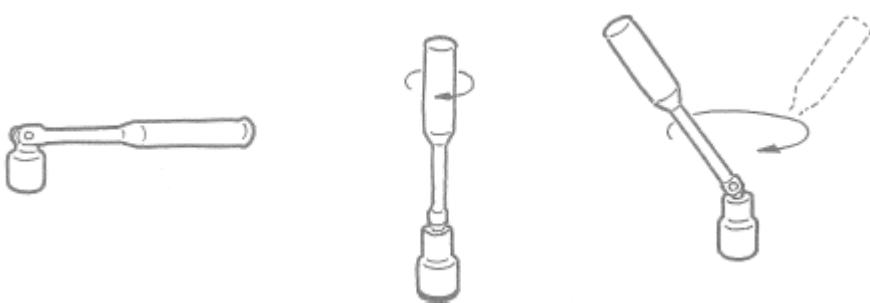
General Tool Types

Turning Tools

Ratchet Handle – it enables to turn bolts or nuts rapidly in one direction. Direction of rotation can be reversed using the ratchet lock lever. Do not use for initial loosening and final tightening of bolts as the ratchet will be damaged.



Spinner Handle (Hinged) – it is a bar with a universal joint in the end. It can bend at right angles for applying large torque to tighten or loosen bolts and nuts and can be straightened up to rotate them rapidly.

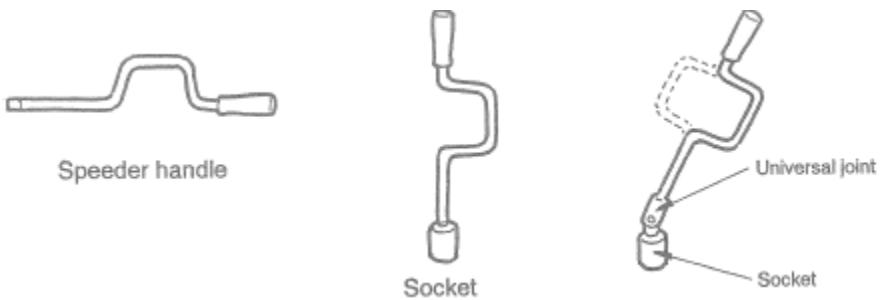


General Tools

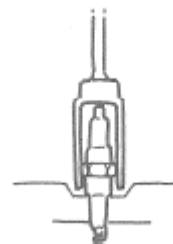
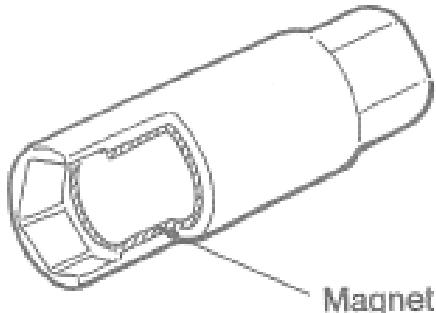
General Tool Types

Turning Tools

Speeder Handle – it enable loosening and tightening of bolts and nuts rapidly by holding the top end with one hand and rotating the U-shaped crank with the other hand.



Spark Plug Wrench – It is designed for installing and removing spark plugs. It has a mag net inside to hold spark plugs firmly.



OK



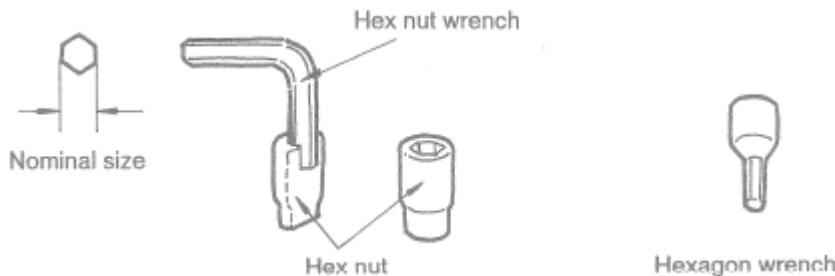
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General Tools

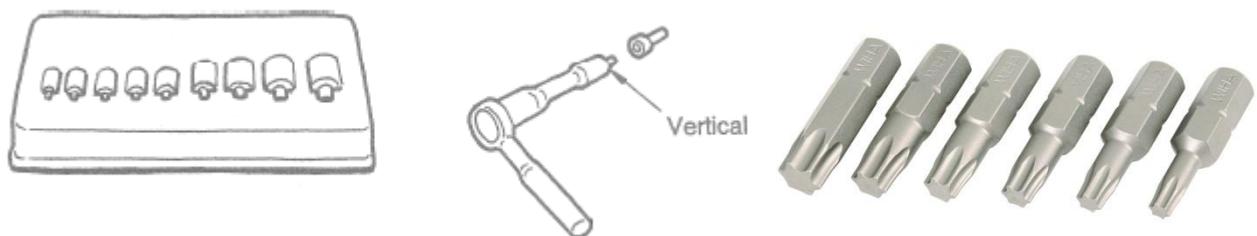
General Tool Types

Turning Tools

Hex Nut Wrench – L-Shaped, hexagonal-section bar used to turn hex nuts.



Torx Wrench – a type of wrench in which the contact face of the bolt and wrench is made vertical to the bolt head. This reduces the turning force and makes the life of the tool longer.



General Tools

General Tool Types

Gripping Tools

Pliers – used for holding, bending, twisting and cutting work pieces. Other types of pliers are used for installing and removing snap rings or piston rings.

Types of Pliers:

Combination Pliers – its jaws can be adjusted for small and large works.



Nose Pliers – the tips of the nose pliers are longer and narrower and is used in places that are tight for combination pliers.

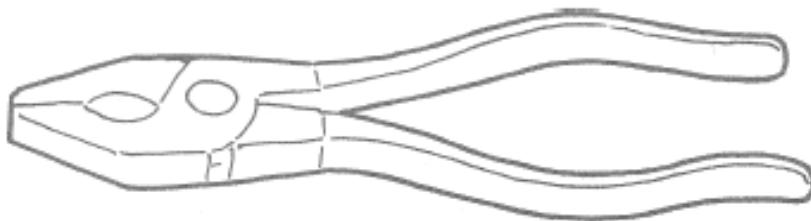


General Tools

General Tool Types

Gripping Tools

Cutting Pliers – It can be used for various purposes like cutting wires and holding and bending work pieces.



Vice Grip Pliers – used when a strong grip is needed and can be used for removal of damaged bolt or seized nut.

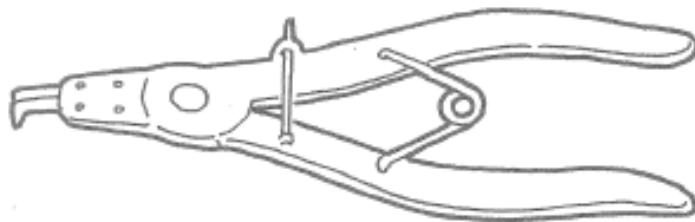


General Tools

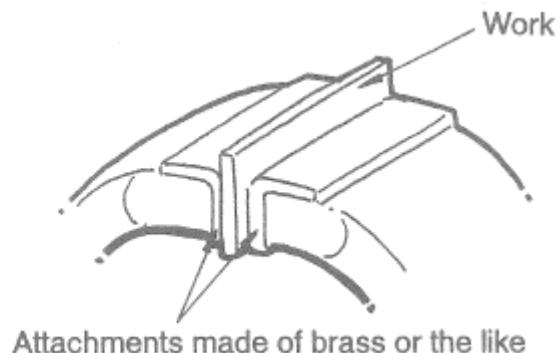
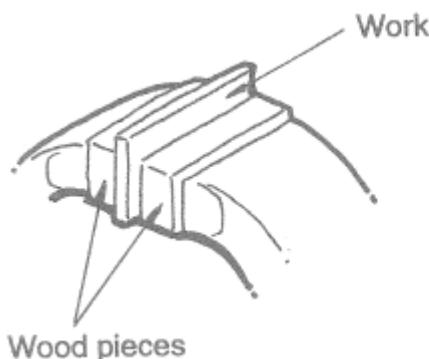
General Tool Types

Gripping Tools

Snap Ring Pliers – used to detach/attach a snap ring. It has two types: open and closed tips.



Vice – it used to hold a workpiece securely.

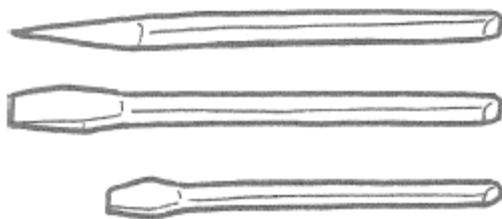


General Tools

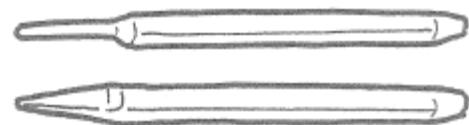
General Tool Types

Cutting Tools

Chisels – it is used for cutting and chipping metals, Flat and Crosscut chisels are used to chip flat surfaces or to cut rivets, bolts, thin steel sheets etc.



Flat chisel

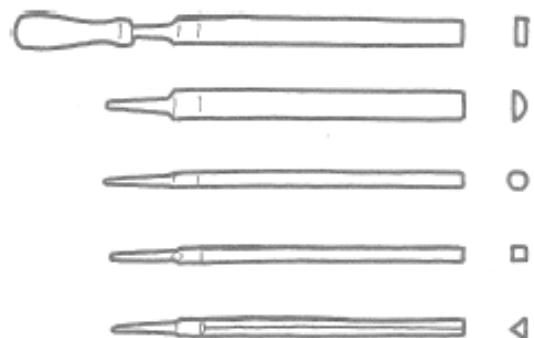


Crosscut chisel

File – it is used to finish or smoothen the surface of a workpiece.

Types of Files:

- Flat – used for flat face finishing.
- Half-round – for curved face finishing.
- Round – for finishing the inner surface of a round hole.
- Square and Triangle – for finishing holes or recessed corners



General Tools

General Tool Types

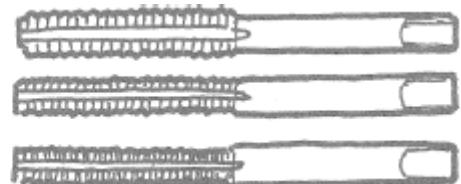
Cutting Tools

Taps – It is a tool used to cut a female screw in a hole of a work. It has the following types:

First hand tap for rough finishing

Second hand tap for semi finishing

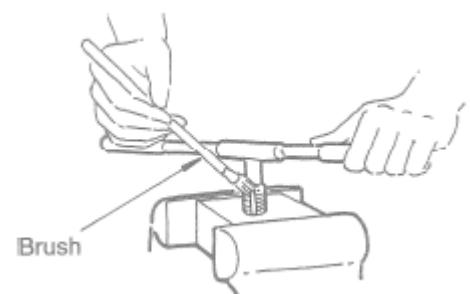
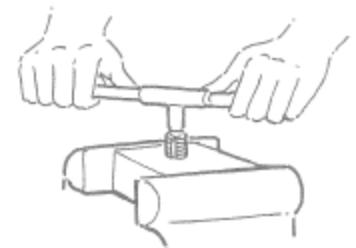
Third hand tap for final finishing



The screw is to be cut gradually by using first hand tap, the second hand tap and then the third hand tap.

Proper Usage:

- Always use a tapping wrench to make the tapping operation easier by applying a uniform force to the tap.
- The tap should be inserted straight in to a hole. Turn the tap for one turn to cut, then turn it half way in reverse to remove the chips.
- Use cutting oil to the tap during tapping as it will reduce heat generated by the work, protect the tap with lubrication and provide a clean finish of the screw.

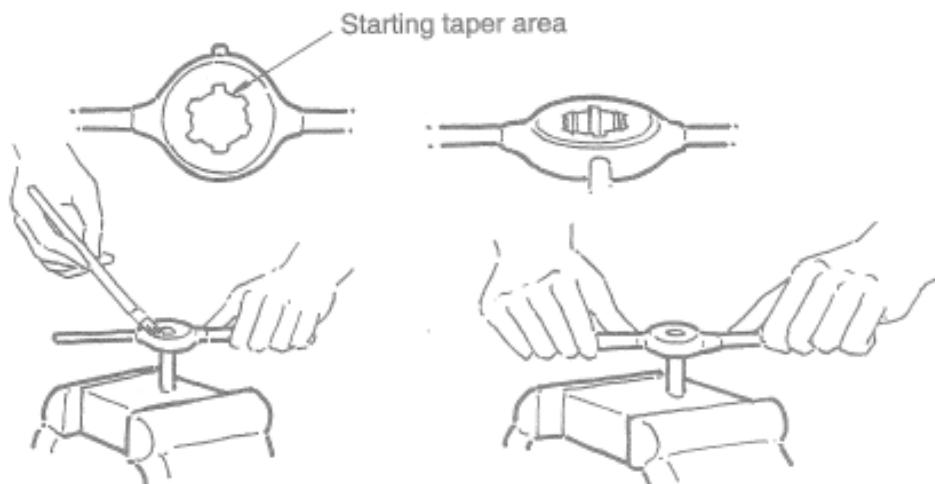


General Tools

General Tool Types

Cutting Tools

Dies – is a tool used to cut male screw around a round bar or a pipe. This can be applied for bolts that are hard to turn when being tightened by cutting the screw with the die again.



Proper Usage:

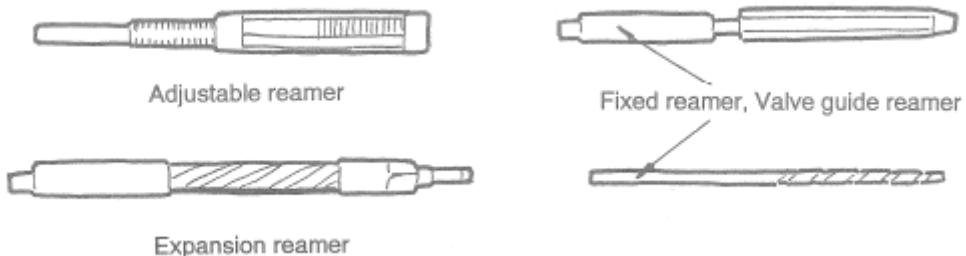
- Insert the die into a holder with the starting taper of the die facing downward.
- Apply uniform force to the right and left of the handle. The male screw should be cut carefully by advancing the die for one turn, then reversing by half a turn to release the chips without applying strong force.
- Apply cutting oil to protect the workpiece from heat and provide a clean finish.

General Tools

General Tool Types

Cutting Tools

Dies – it used to finish the drilled holes more precisely or to finish the inner surface of the bushes.



Proper Usage:

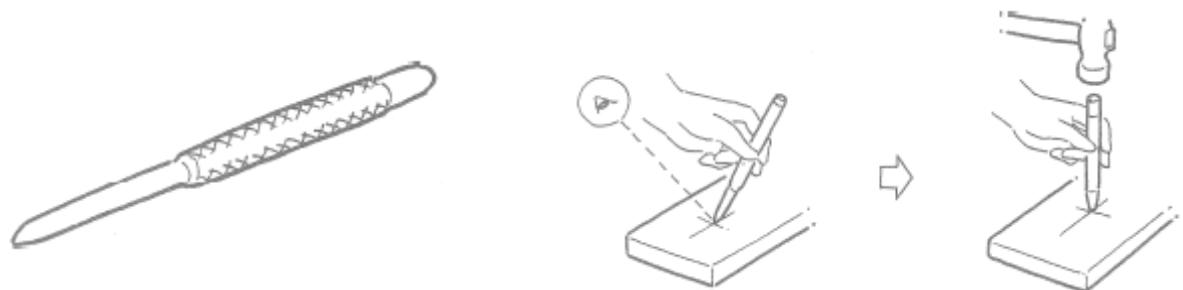
- Align the reamer with the center of a hole. Turn the reamer clockwise when inserting and removing the reamer.
- Do not rotate the reamer counterclockwise as it will damage its cutting edge or the finish of the workpiece.
- Apply cutting oil during finishing as it will wash away the chips to give a fine finish.

General Tools

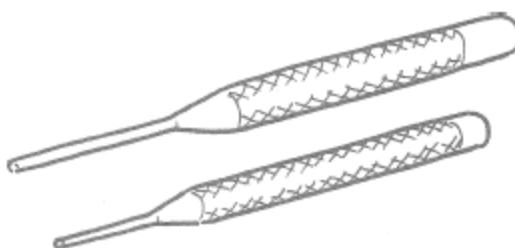
General Tool Types

Cutting Tools

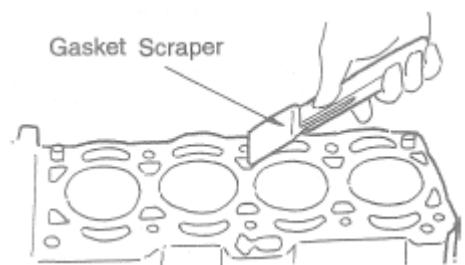
Center Punch – it is used to position the drill for drilling operation and marking match marks to show original positions of parts.



Pin Punch – used to remove rivets or pins by hitting.



Gasket Scraper – is used to remove old gaskets and clean the surface after removal.



General Tools

General Tool Types

Power Tools

Electric Drill – used to drill holes in a workpiece. The rotation of the drill motor is decelerated by the gear before being transmitted to the chuck at the tip.

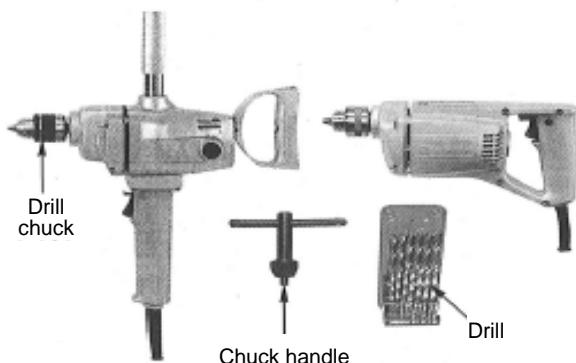


Figure-1

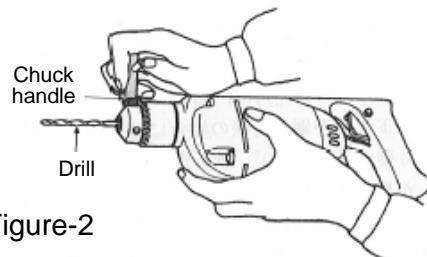


Figure-2

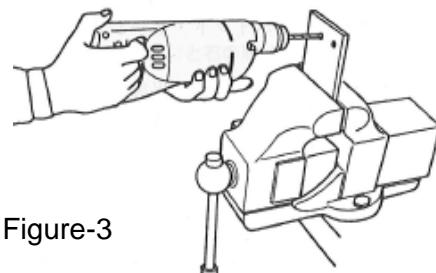


Figure-3

Proper Usage:

- Make sure the center of the drill is aligned with the center of the chuck and secure it using chuck handle.
- Mark the center of the workpiece with a center punch.
- Do not apply excessive force on the drill as it may slow the motor rotation speed resulting to inefficient drilling or breakage of drill bit.
- If the drill bit is stuck, hold the chuck and rotate the drill in the direction opposite to the direction of rotation of the drill.

General Tools

General Tool Types

Power Tools

Bench Drill – it is used to drill holes not greater than 13 mm in diameter. Power is transmitted from the motor to the spindle via v-belt and speed can be changed as the drill has several pulleys for speed adjustment.

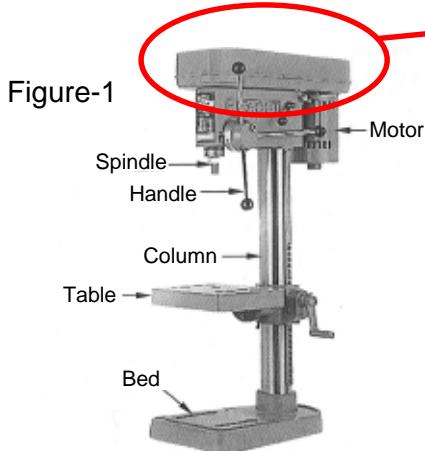


Figure-2

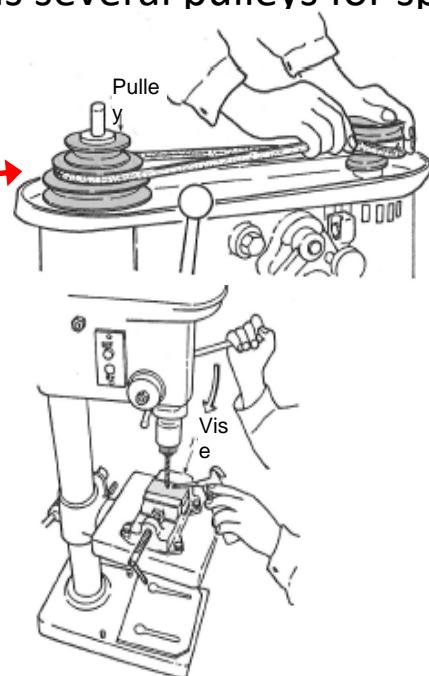


Figure-3

Proper Usage:

- Make sure the center of the drill bit is at the center of the chuck during installation.
- When drilling a hole in the workpiece, secure it with a vise or jig.
- Lower the drill speed if the workpiece is hard and apply cutting oil.

General Tools

General Tool Types

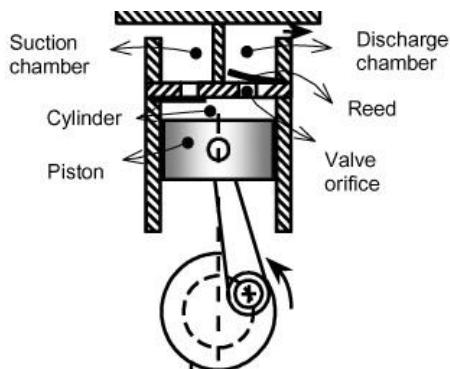
Power Tools

Air Compressor – It provides supply of compressed air to be used in other power tools which use air as their power source.

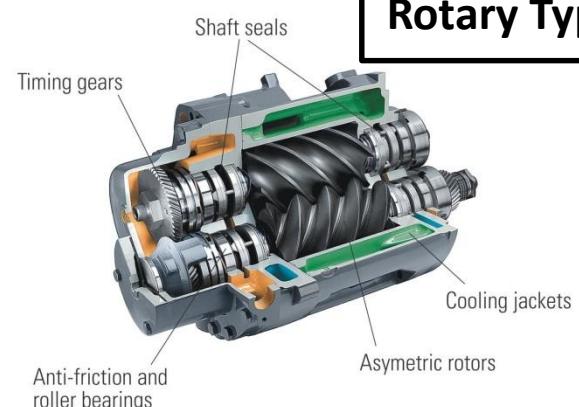
There are two types of air compressors:

- Rotary Type Air Compressor
- Piston Type Air Compressor

Piston Type



Rotary Type



General Tools

General Tool Types

Power Tools

Handling Air Compressors:

- Check oil level before operating air compressor and replace oil on a regular basis.
- Use the specified oil and fill the oil tank up to its specified level.
- Open the drain cock at the bottom of the air tank once a day to discharge water from the tank.
- Check the tension of the belt on a regular basis.

General Tools

General Tool Types

Power Tools

Press – it is used to install and remove bearings, bushings, etc. by applying force in the workpiece to be pressed.

Types of Press:

- Hand Press
- Hydraulic Press

Hydraulic Press



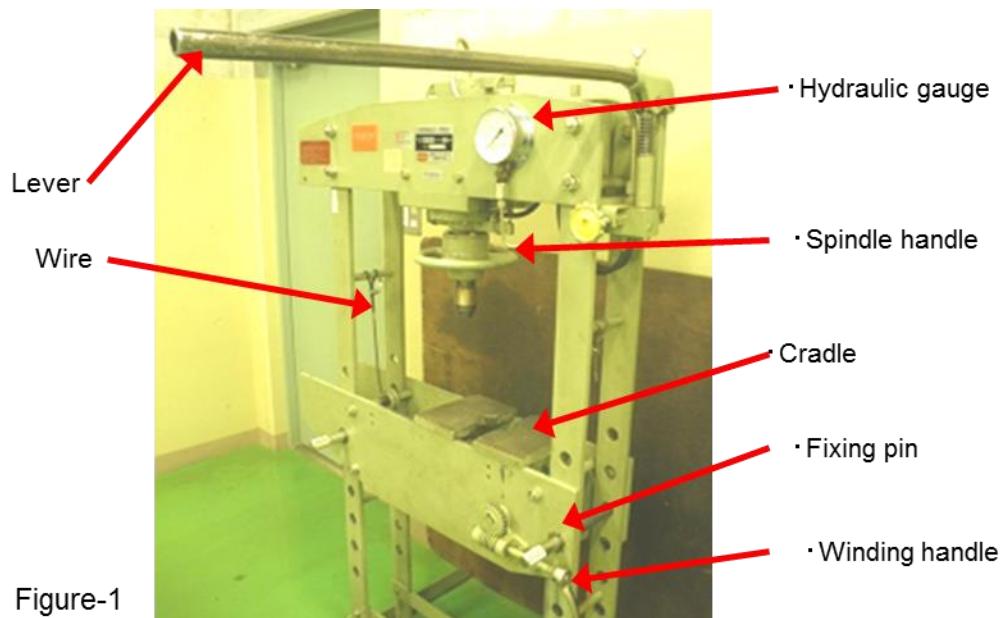
General Tools

General Tool Types

Power Tools

Proper Usage:

- Position the cradle by turning the winding handle that will move the cradle up or down depending on the workpiece to work on.
- Fix the position of the cradle by inserting fixing pins on the left and right sides of the cradle. If the cradle is not fixed, the wires may break during pressing.
- Turn the spindle handle to press the spindle against the center of the workpiece to be pressed.
- Apply hydraulic pressure by using the lever to press the workpiece. Keep in mind to monitor the pressure in the gauge when using the hydraulic press.

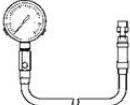
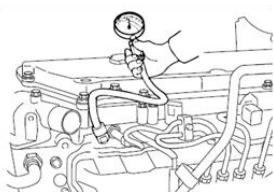
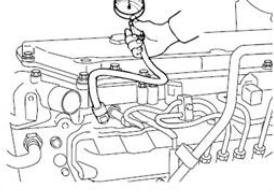
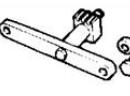
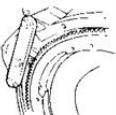
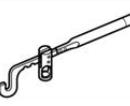
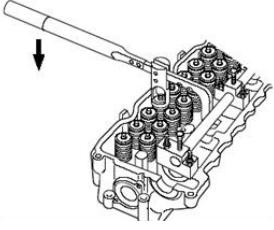
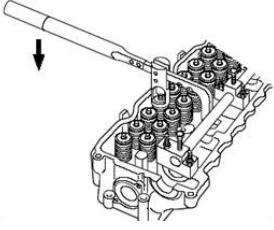
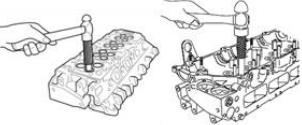
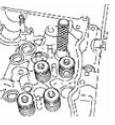


General Tools

General Tool Types

Special Service Tools (SST)

Special Service Tools (SST's) are tools designed for specific components of Isuzu Vehicles in order to remove and install them correctly during servicing.

SST illustration	SST usage	SST name	SST parts number
		Compression gauge	5-8840-2675-0
		Gauge adapter	5-8840-2815-0
		Crankshaft stopper	5-8840-2230-0
		Valve spring replacer	5-8840-2621-0
		Pivot	5-8840-2808-0
		Valve guide replacer	5-8840-2628-0
		Valve stem seal installer	9-8522-1289-0

General Tools

General Tool Types

Measuring Tools

Measurements are performed to our vehicles in order to know and ensure its full function and performance as well as to retain its durability.

Selection of Measuring Instrument

-It is important that you fully understand the performance of each instrument. Select the most appropriate tool for the required accuracy, shape and dimensions, then use it efficiently and properly.



General Tools

General Tool Types

Measuring Tools

Kinds of Measurement Error

- Inexperienced User
- Improper Handling
- Instrument Structural Problem
- Environment

Measuring Instrument's own Error

- Instrument error is inspected and determined under the standard conditions specified by JIS for length, temperature, humidity and atmospheric pressure.

Countermeasures on Instrument Error

- Know the instrument error and select suitable instruments for dimensional accuracy.
- Handle measuring instrument properly.
- Check that the original point of an instrument is correct before application.
- Inspect and calibrate instrument periodically
- If highly precise measurement is required, carry out measurement repeatedly, if the measured value shows variation take the average of maximum and minimum values.

General Tools

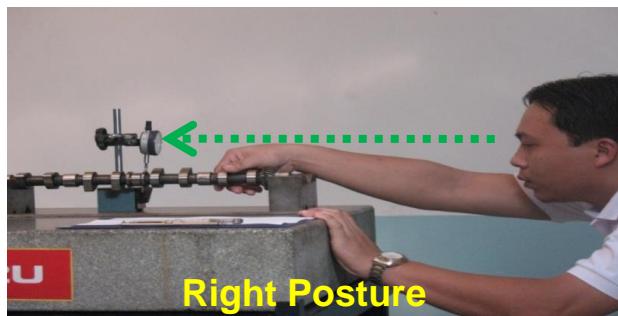
General Tool Types Measuring Tools

Common Measurement Error

- Parallax Error – Reading values may differ depending on the position of an observer although the instrument indicates dimensions accurately.

Countermeasure on Parallax Error

- Make it a practice to take a correct posture wherein the position of the eyes are always at the right angle to the scale board.



General Tools

General Tool Types

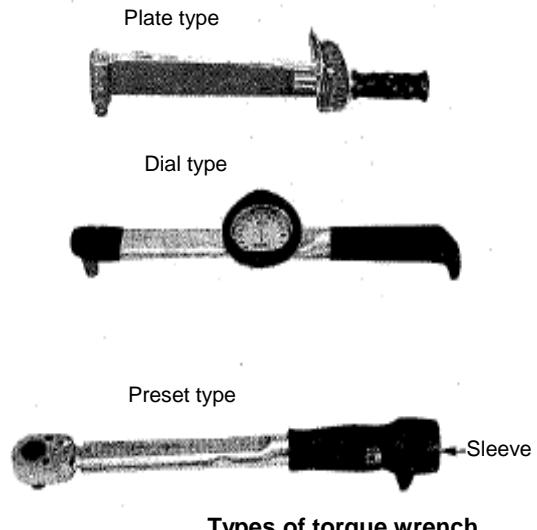
Measuring Tools

Torque Wrench

- It is used to tighten a bolt or nut with a specified torque.

Types of Torque Wrench

- Plate Type – has an arm made of plate spring and allows tightening torque to be read directly at the plate based on the deflection.
- Dial Type – has a twisted square bar that fits into the socket and a dial gauge indicator of the tightening torque.
- Auto-limit Type (Click Type) – designed that a predetermined torque can be set by turning the sleeve at the end of the handle at the desired scale. Tightening is set when a “click” sound is heard.

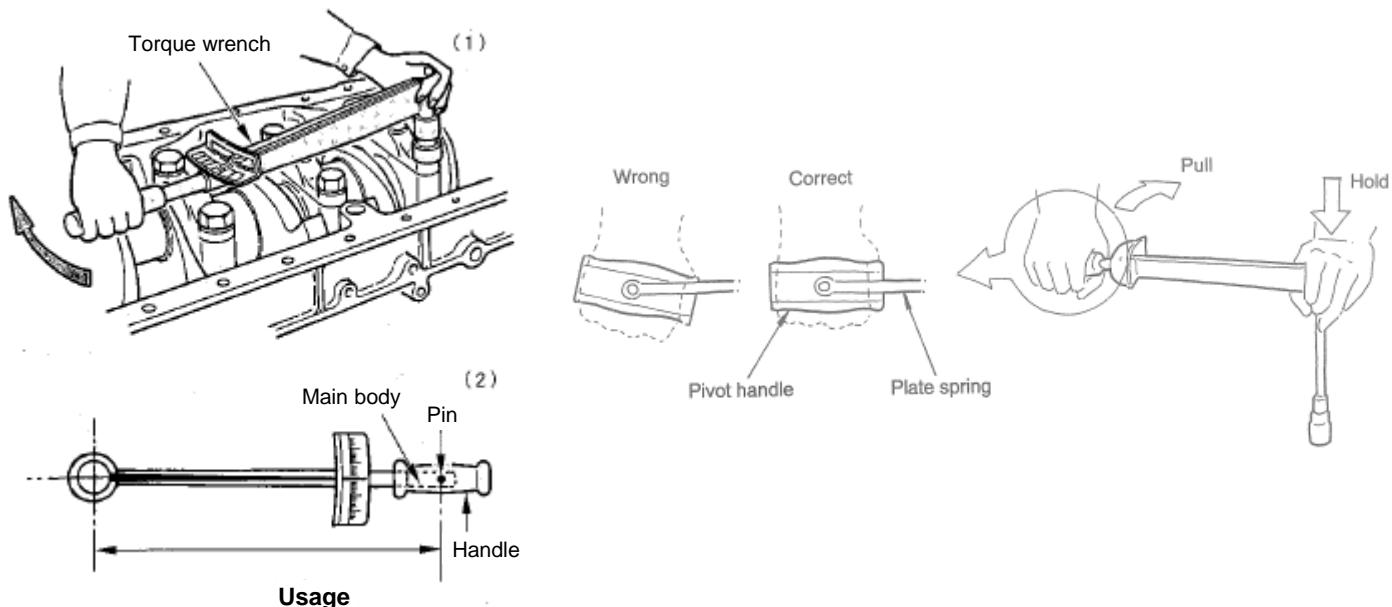


General Tools

General Tool Types Measuring Tools

Proper Usage

- Tighten the bolt or nut temporarily in advance using a socket wrench.
- Hold the head by one hand to keep the torque wrench engaged with the socket and tighten the bolt or nut by pulling it towards you.
- For plate type torque wrench, be sure that the pivot handle and the plate spring will not contact each other when you measure torque. If they contact, you cannot measure the torque correctly.



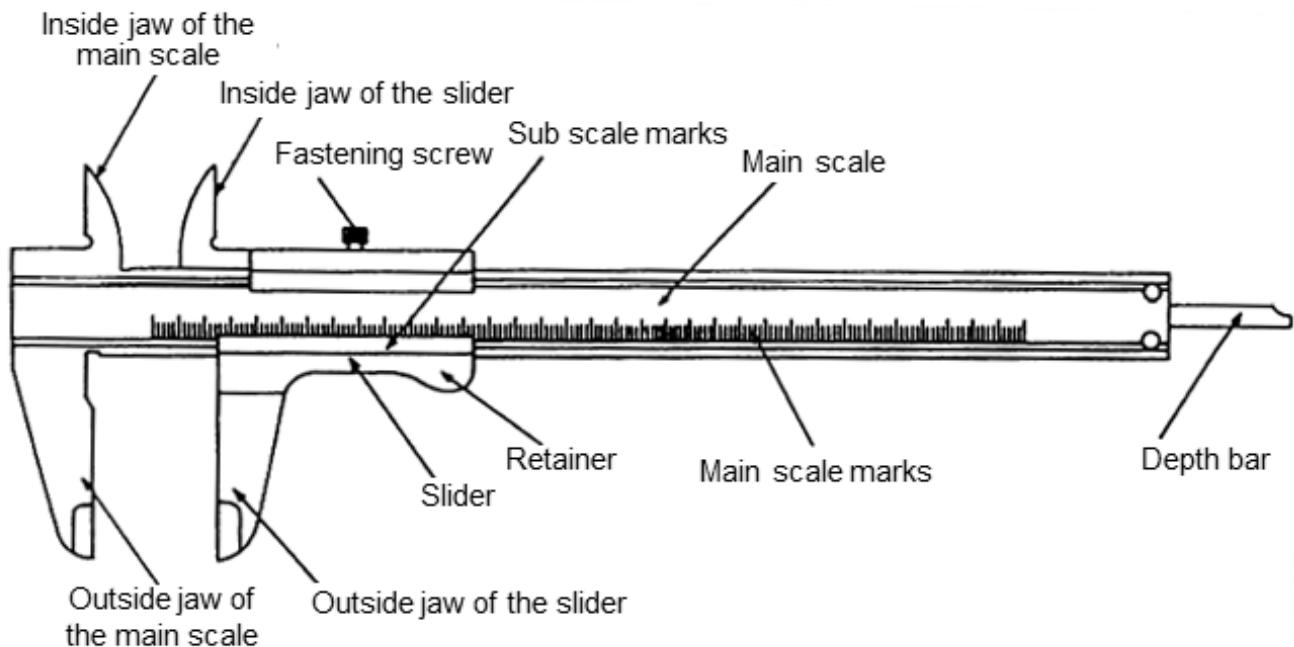
General Tools

General Tool Types

Measuring Tools

Vernier Caliper

- It used to measure the internal diameter, external diameter, height, depth or other dimension of an object. It mostly used for measuring outer diameter of shaft, inner diameter of bush and height of valve spring and the like.



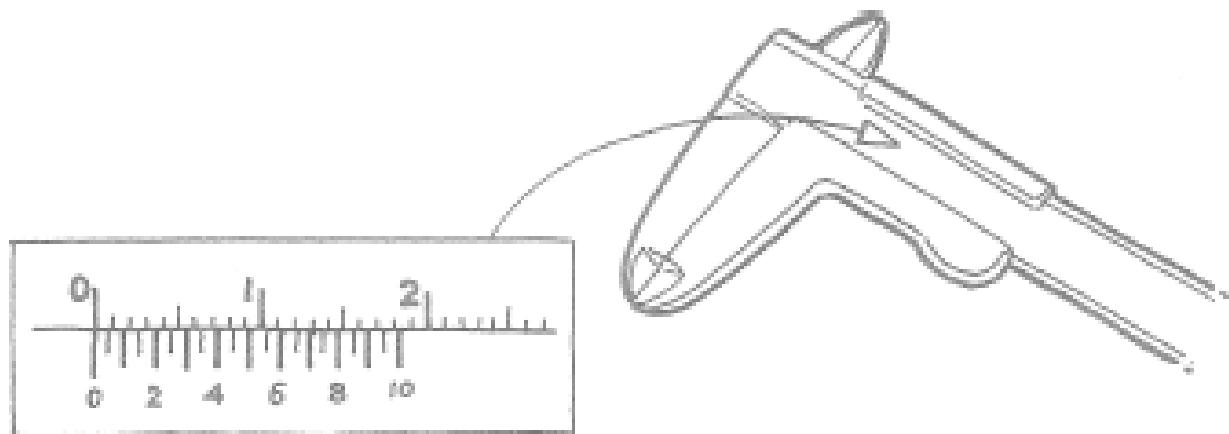
General Tools

General Tool Types

Measuring Tools

How to read the scale

- Check zero position, of main and vernier scale. If zero of both main and vernier scales do not match, measurement will not be accurate.



General Tools

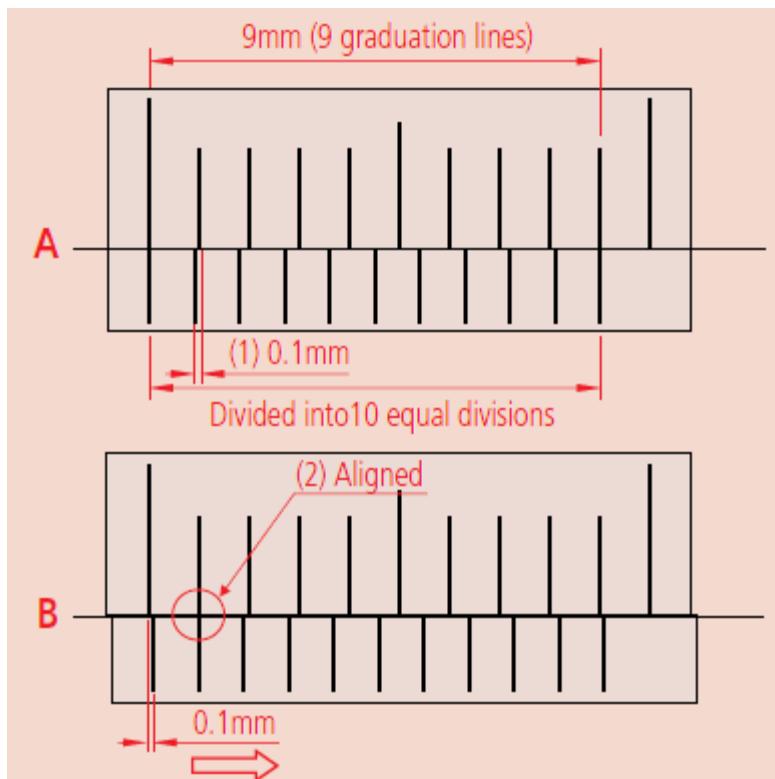
General Tool Types

Measuring Tools

How to read the scale

- Check the scale of the vernier scale by comparing the number of lines of the main scale with the vernier scale.

Ex.:



Lines at Main Scale: 9 lines

Lines at Vernier Scale: 10 lines

Scale = (Main Scale Lines ÷ Vernier Scale) -1 Lines

Scale = (9 lines / 10 lines) – 1 = 0.1 mm

Commonly Used Scale:

0.05 mm

0.02 mm

General Tools

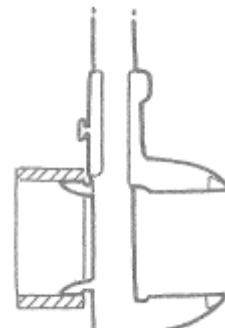
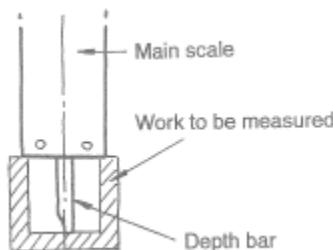
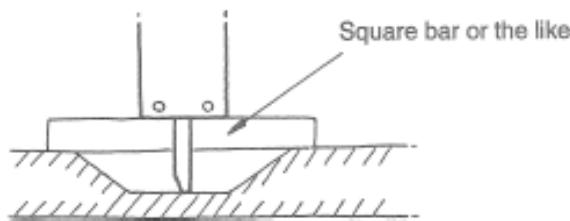
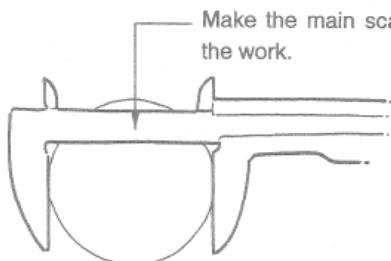
General Tool Types

Measuring Tools

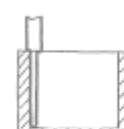
How to read the scale

- Measure your workpiece using the vernier caliper. As mentioned, outside jaws are for outside diameter readings, inside jaws are for inside diameters and depth rod is for depth.

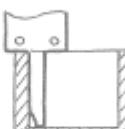
Ex.:



(Correct) (a)



(Correct) (b)



Avoid R of the work.

General Tools

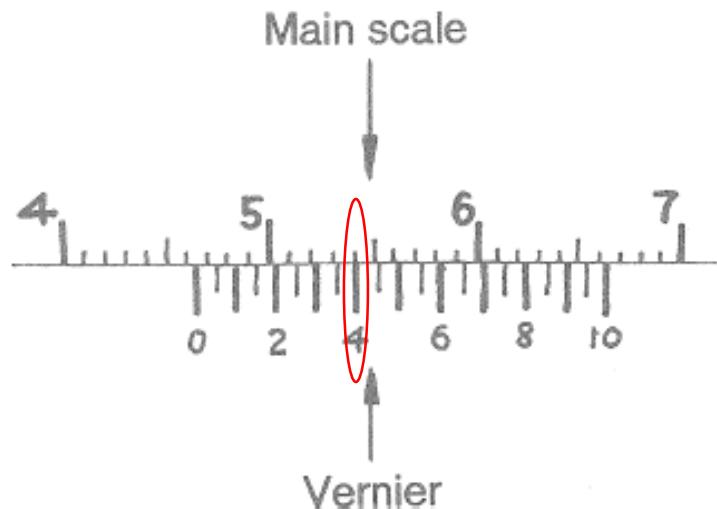
General Tool Types

Measuring Tools

How to read the scale

- The value read on the main scale is the whole number while the value read on the vernier scale when aligned to the main scale is the fraction of the measurement.

Ex.:



Reading in main scale is 46 mm while the reading on the vernier scale is 0.4 mm

Total Reading = Main Scale Reading + Vernier Scale Reading

$$\text{Total Reading} = 46 \text{ mm} + 0.4 \text{ mm} = 46.4 \text{ mm}$$

General Tools

General Tool Types

Measuring Tools

Proper Usage

- Let the measuring surface of the jaw of the main scale contact the workpiece, then set your thumb on the knob of the vernier.



- Use the roots of the jaws for measurement as using the tips will bend the jaws causing incorrect measuring and also will damage the vernier caliper.



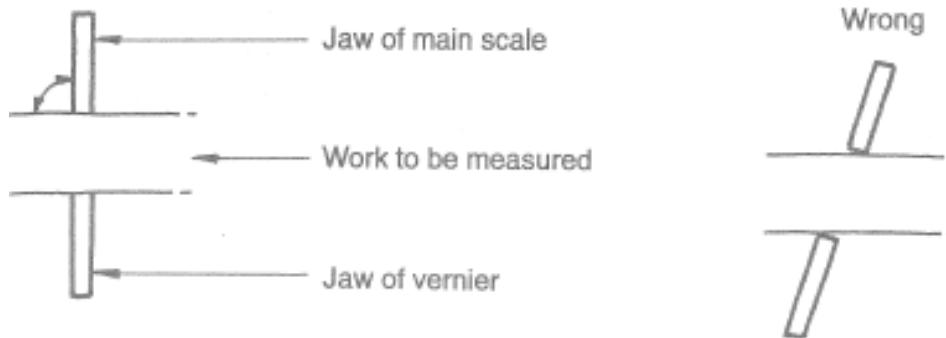
General Tools

General Tool Types

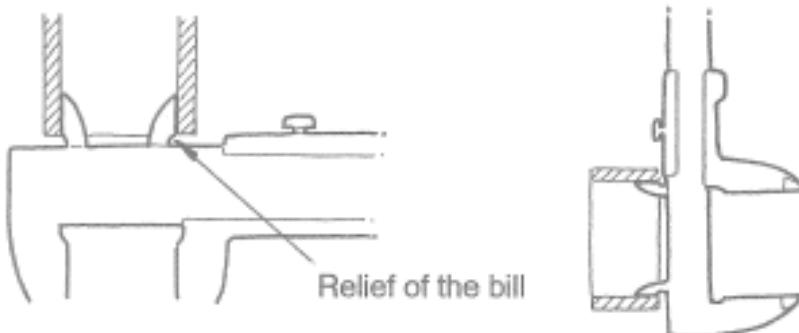
Measuring Tools

Proper Usage

- The jaws should be at right angles with the workpiece to have accurate measurement.



- For inside measurement, insert the bills of the vernier caliper into the workpiece and make the measuring surfaces contact the inside of the workpiece by pulling the vernier slightly with your thumb on the knob.



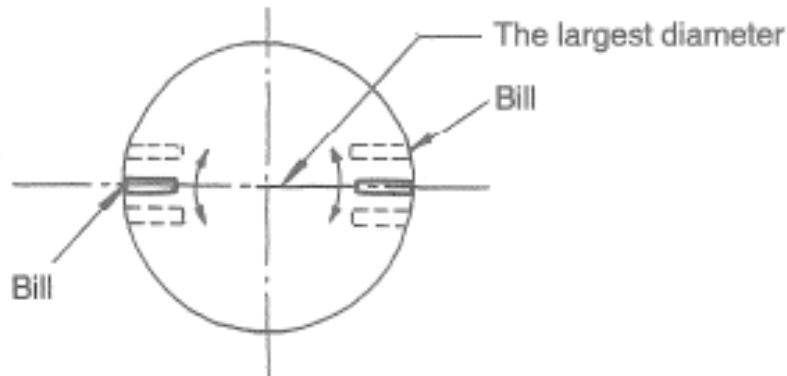
General Tools

General Tool Types

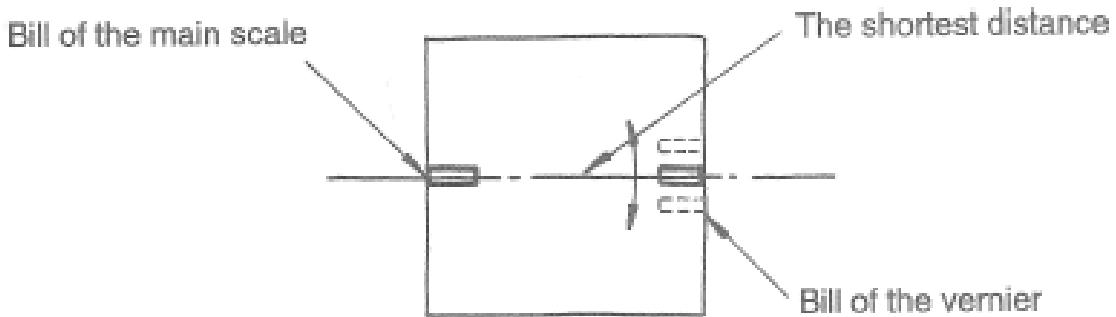
Measuring Tools

Proper Usage

- For round holes, always get the largest measurement of the diameter by pulling the vernier slightly and moving the calipers as shown below.



- For square holes, the shortest distance should be considered as the caliper changes angle, the distance between the two bills will get larger thus giving an incorrect measurement.



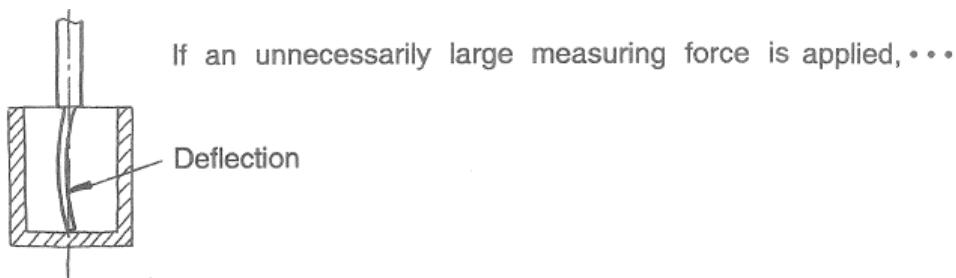
General Tools

General Tool Types

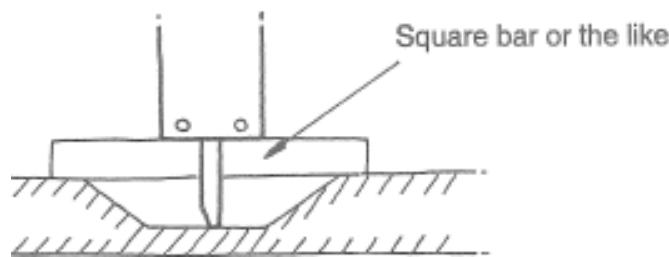
Measuring Tools

Proper Usage

- For depth, place the bottom of the main scale on the surface of the workpiece to be measured, then pull the vernier scale downwards until the tip of the depth rod touches the bottom of the workpiece.



- If the opening of the workpiece is too large for the vernier caliper, use a straightedge as base then subtract its thickness from the actual measured value to get the depth of the workpiece.



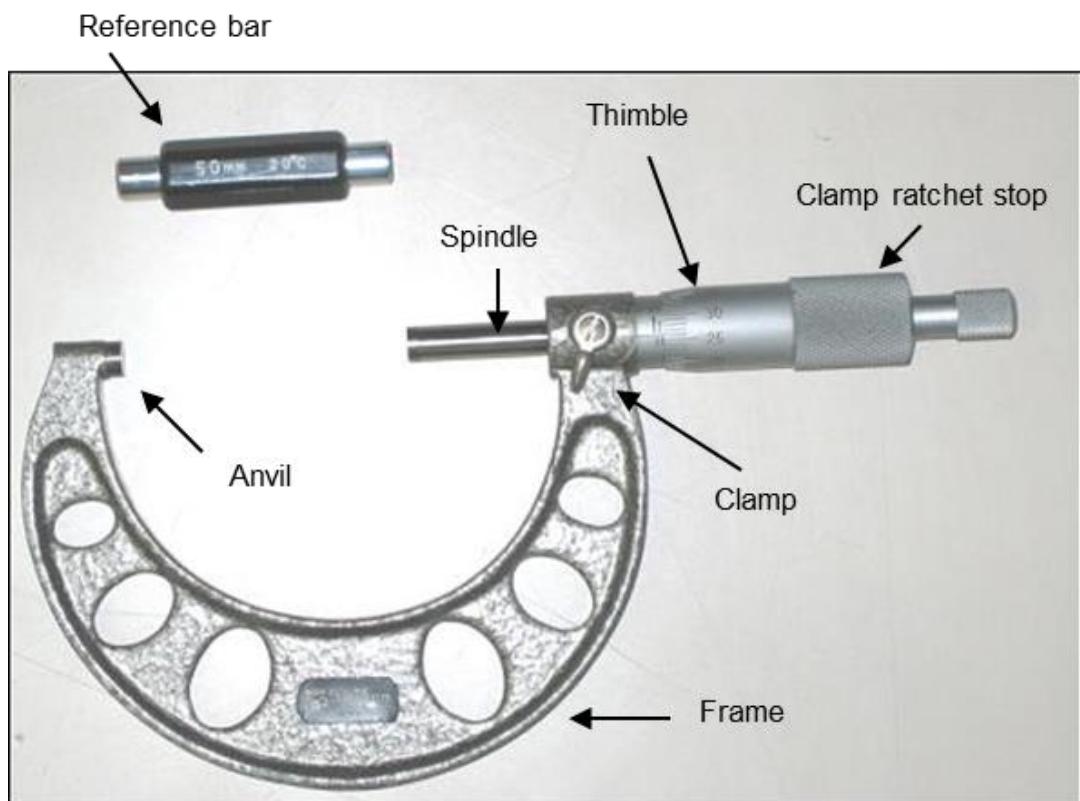
General Tools

General Tool Types

Measuring Tools

Micrometer

- It is used mainly for measuring outer diameter or length which has a minimum reading of 0.01 mm



General Tools

General Tool Types

Measuring Tools

Inspection

- Before starting with the measurement, clean the micrometer using cloth and make sure the measuring surfaces are clean from dust and the like.



- Check the turning condition of the spindle by holding and turning the ratchet stopper. Close the space between the measuring surfaces until the ratchet stopper turns idly (ticking sound) and confirm zero point.



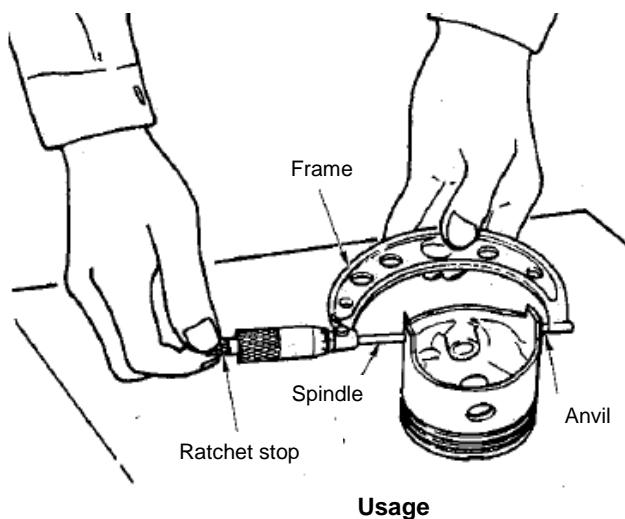
General Tools

General Tool Types

Measuring Tools

Holding a Workpiece

- Clean the workpiece to be measure and place it in a stable position.
- Hold the frame of the micrometer with your left hand and turn the thimble to open the measuring space wider than the workpiece.
- Place the workpiece in between the measuring surfaces and turn the ratchet stopper until it presses it and the ratchet turns idly (ticking sound) two or three times.



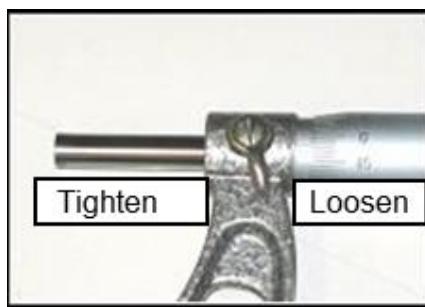
General Tools

General Tool Types

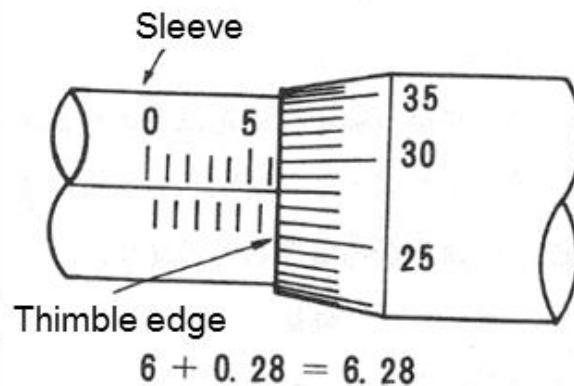
Measuring Tools

How to read the scale

- After setting the micrometer to the workpiece, turn the lock clamp to fix the spindle and gently remove the micrometer from the workpiece.



- Read the scale on the sleeve at the end of the thimble for the value of 0.5 mm. then read the scale on the circumference of the thimble for the unit of 0.01 mm at the point where the circumference scale on the thimble meets the horizontal line of the sleeve.



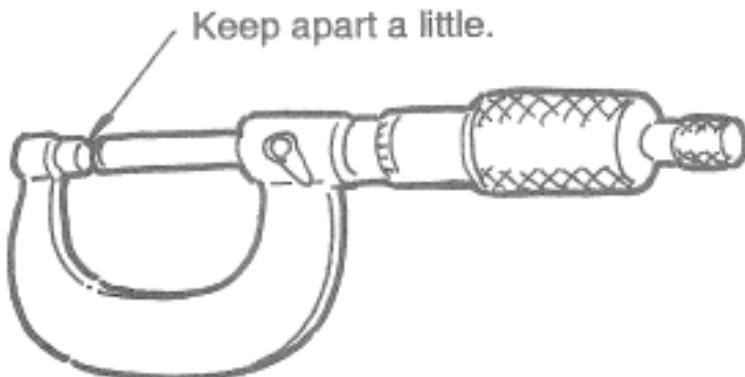
General Tools

General Tool Types

Measuring Tools

Maintenance after use

- Clean the micrometer with a cloth after use.
- Lock the micrometer with the anvil and spindle kept apart to provide space for thermal expansion. In that way , deviation of the scale can be avoided.



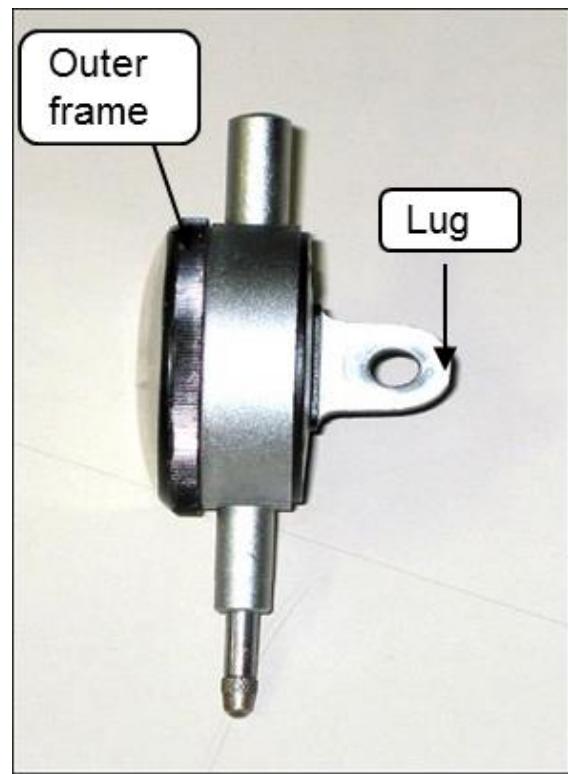
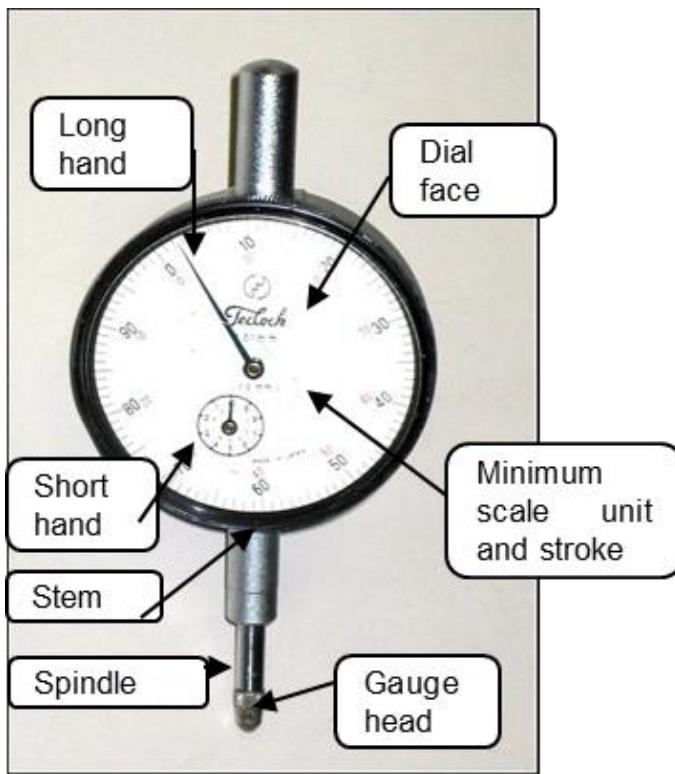
General Tools

General Tool Types

Measuring Tools

Dial Gauge

- It used to measure a bend or runout of a shaft, parallelism or surface roughness. It is also used for difference in height or projection.



- A dial gauge is scaled in 1/100 mm. Movement of 1 mm of the spindle causes one revolution of the long hand.

General Tools

General Tool Types

Measuring Tools

Inspection

- Push the spindle slightly and let the long hand turn by about 20 scale marks. Release the spindle and check if the long hand will return to its original position.
- Check if the spindle moves smoothly when pressed and released.



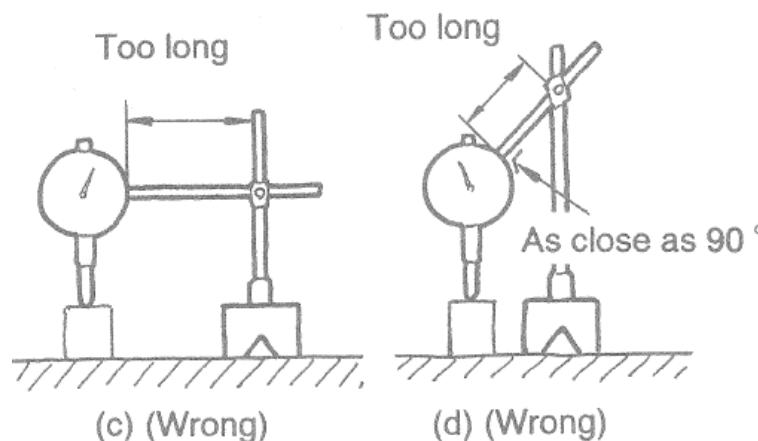
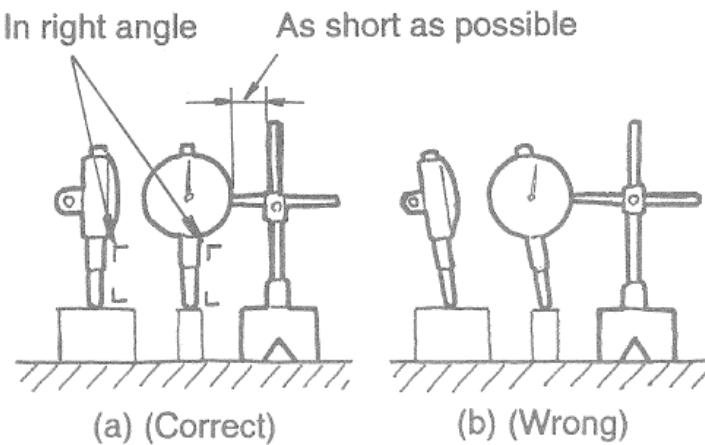
General Tools

General Tool Types

Measuring Tools

Proper Usage

- The spindle should be set in a right angle against the work surface. The beam of the magnetic stand should be as short as possible.



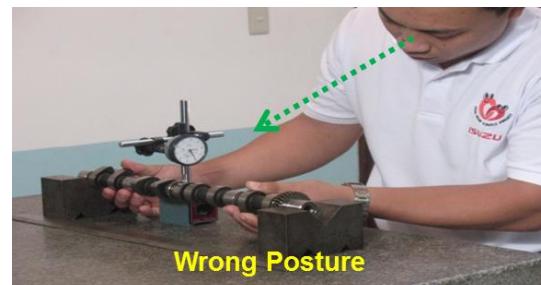
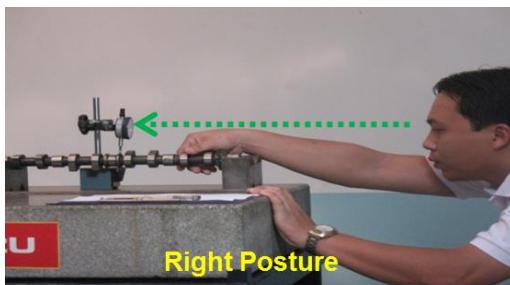
General Tools

General Tool Types

Measuring Tools

Proper Usage

- The scale is to be read from the very front of the dial gauge. Reading from a wrong angle causes incorrect reading.



- Once dial gauge is set to the workpiece, the pointer should be set to zero by rotating the outer ring until it reaches the pointer. Then move the spindle slightly with your fingers to check if pointer will return to zero.



General Tools

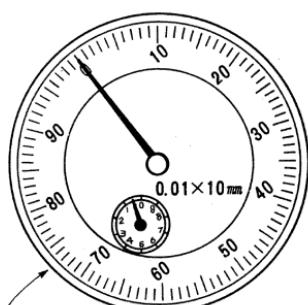
General Tool Types

Measuring Tools

Proper Usage

- One full rotation of the long hand makes one scale unit advance for the short hand, indicating that one full revolution of long hand is equal to 1 mm.
- Note the scale indicated in the scale board as it indicates the value of every scale unit and the maximum value the dial gauge can measure.
- Do not drop the dial gauge or give it a shock so as not to damage it.
- Always clean the dial gauge as oil, grease and dust may cause rough movement of the spindle.

Sample Reading:



Move the outer frame to align the long hand to the zero position.



0.25 mm



0.12 mm

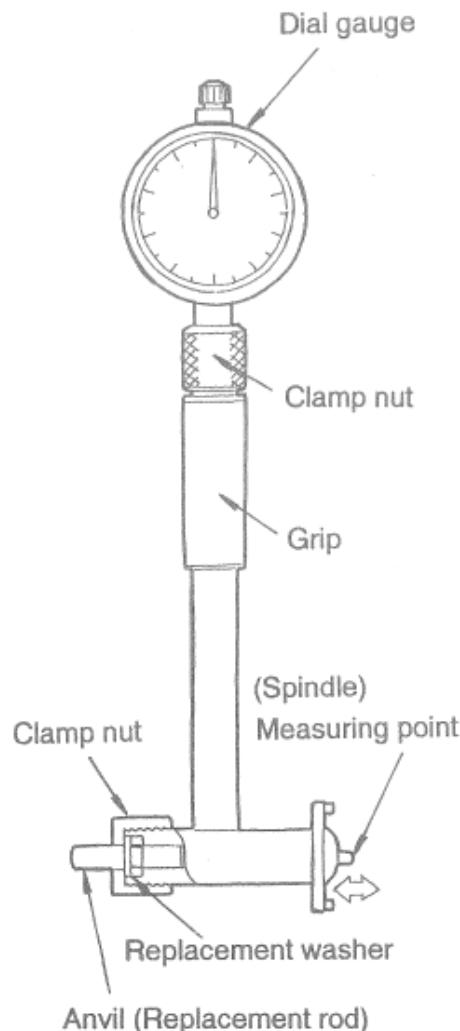
General Tools

General Tool Types

Measuring Tools

Bore Gauge (Cylinder Gauge)

- It is used to measure the exact inner diameter of a workpiece such as the inside diameter of cylinder bore.



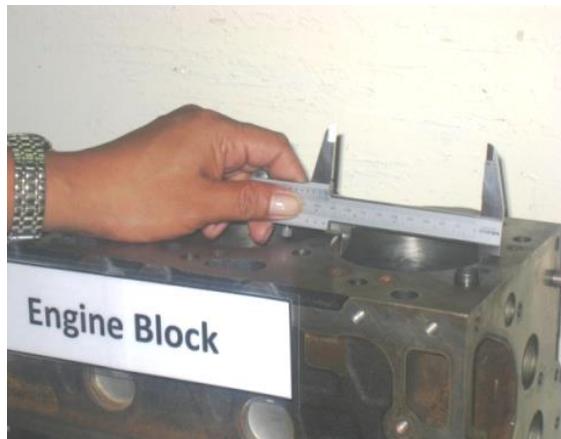
General Tools

General Tool Types

Measuring Tools

Setting Up

- Measure the inner diameter of the work with vernier calipers beforehand.



- Select a replacement rod and replacement washer according to the specified dimension and install them securely to the main body.



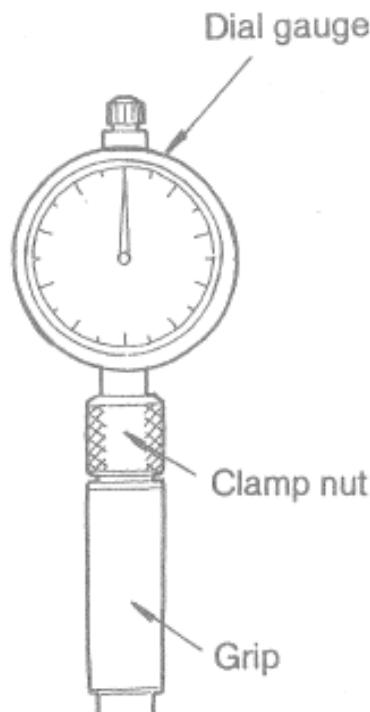
General Tools

General Tool Types

Measuring Tools

Setting Up

- Install the dial gauge into the bore gauge by loosening the fixing screw and set them in the state with the spindle pushed at least 0.3 mm up to 1 turn of the long hand to avoid incorrect measurement due to backlash of the dial gauge.



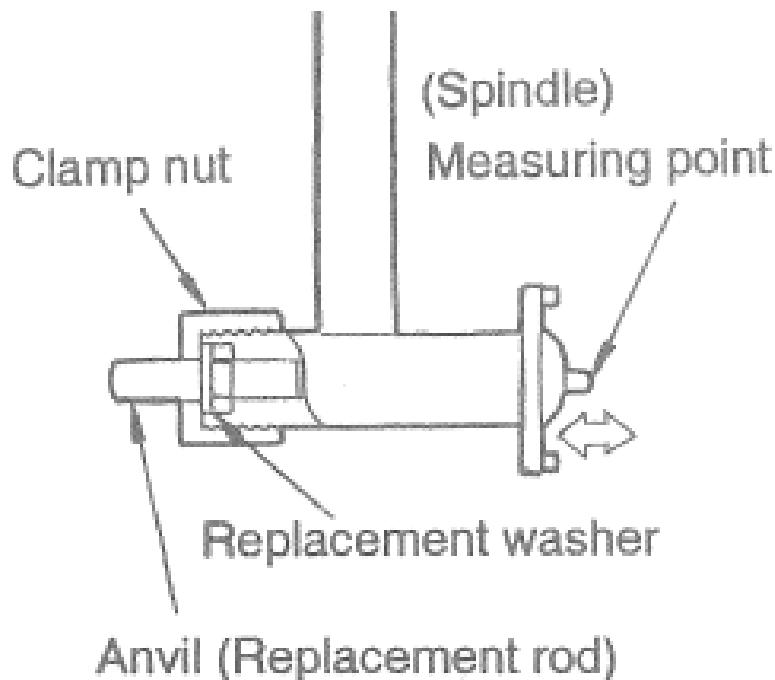
General Tools

General Tool Types

Measuring Tools

Setting Up

- Use replacement rod for major length adjustment and for fine adjustment use replacement washer.



General Tools

General Tool Types

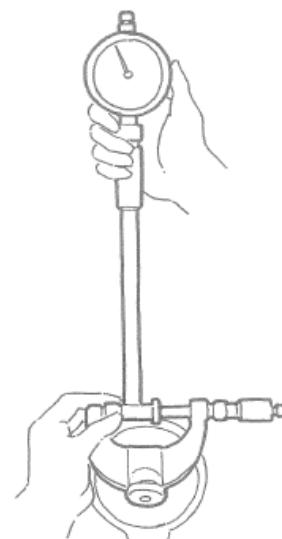
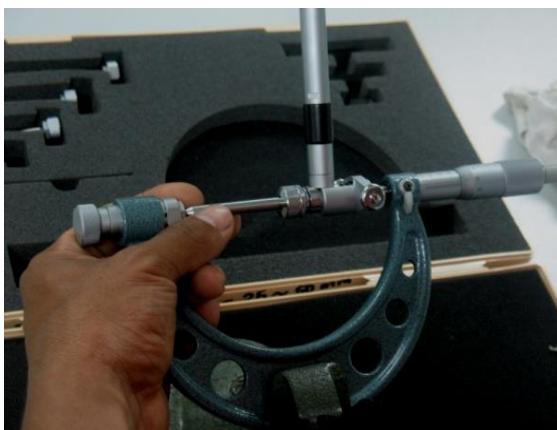
Measuring Tools

Zeroing

- After measuring the bore with a vernier caliper, set the micrometer based from the measure value of the vernier caliper.



- Place the replacement rod and spindle of the bore gauge in the micrometer and turn the outer ring to set the zero point.



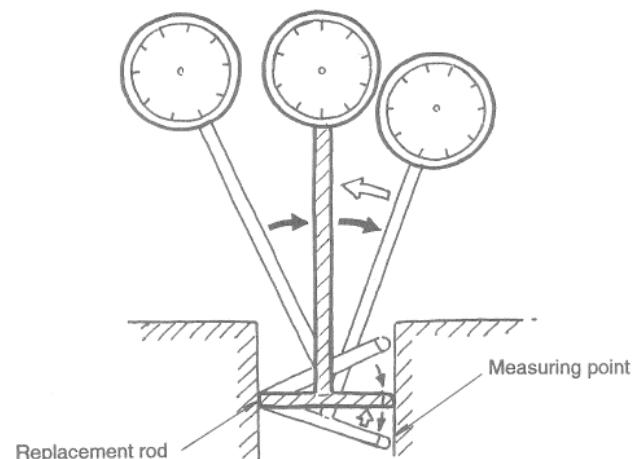
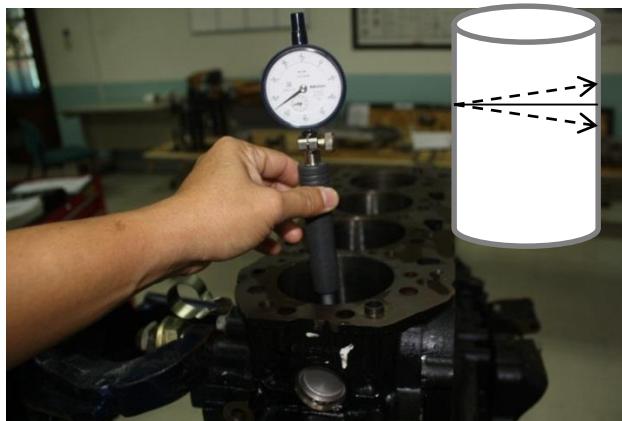
General Tools

General Tool Types

Measuring Tools

How to measure

- Insert the bore gauge into the work in diagonal direction. Fix the measuring point side to prevent shaking and move the alternative rod side in every direction to find the smallest reading of the dial gauge.



- As you reach the smallest diameter reading of the bore gauge, check its position with respect to the zero point indicated by the outer ring.

General Tools

General Tool Types

Measuring Tools

How to measure

- From the zero point indicated by the outer ring, if the long hand rotates to its left the reading should be subtracted from the measured value of the vernier caliper. However, if the long hand rotates to the right of the zero point, add the reading of the bore gauge to the reading from the vernier caliper.

Zero Point

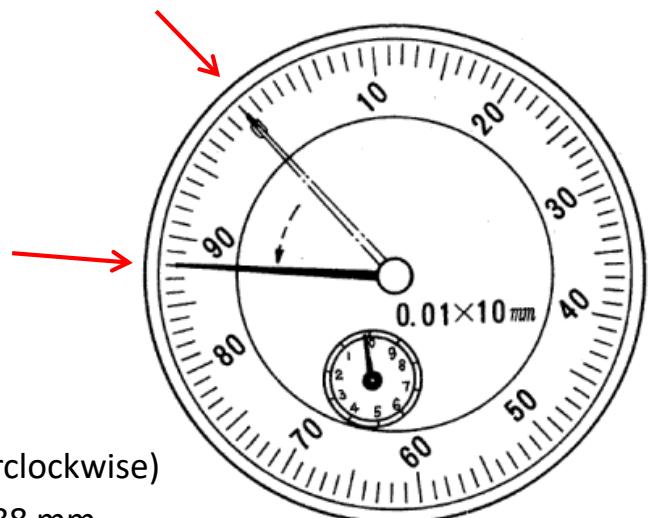
Bore Gauge Reading

Sample Measurement:

Vernier Caliper Reading = 73 mm

Dial Gauge Reading = 0.12 mm (counterclockwise)

Final Reading = $73 \text{ mm} - 0.12 \text{ mm} = 72.88 \text{ mm}$



General Tools

General Tool Types

Measuring Tools

How to measure

Sample Measurement:

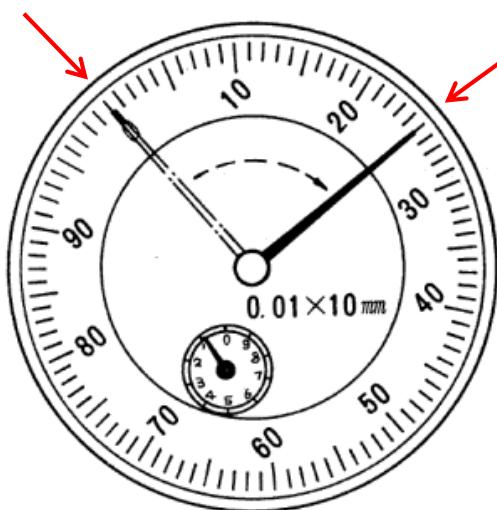
Vernier Caliper Reading = 73 mm

Dial Gauge Reading = 0.25 mm (clockwise)

Final Reading = 73 mm + 0.25 mm = 73.25 mm

Zero Point

Bore Gauge Reading



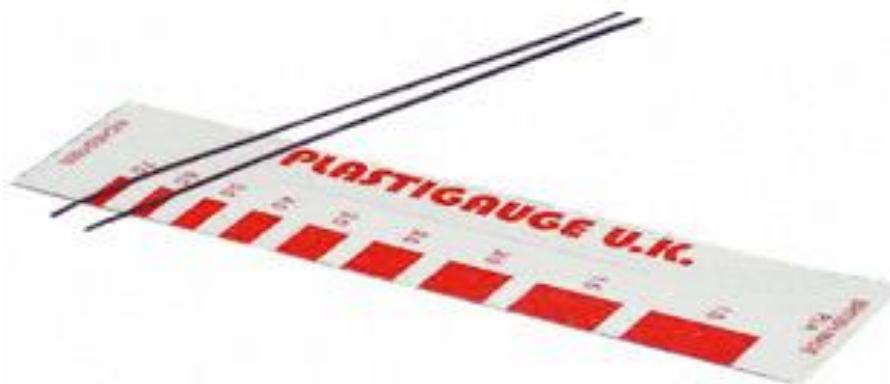
General Tools

General Tool Types

Measuring Tools

Plastigauge

- It used to measure oil clearance between crank pin and bearing. Made out of plastic, it is shaped like a filament with uniform thickness and is kept in a paper envelope.



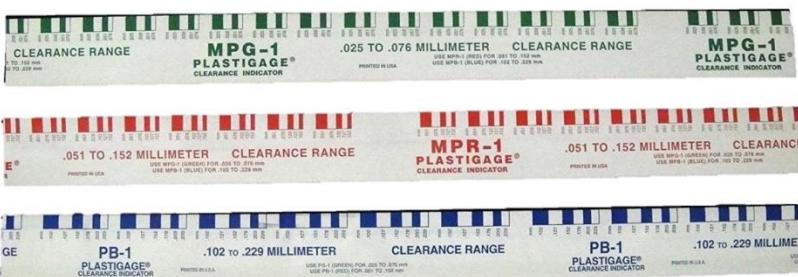
General Tools

General Tool Types

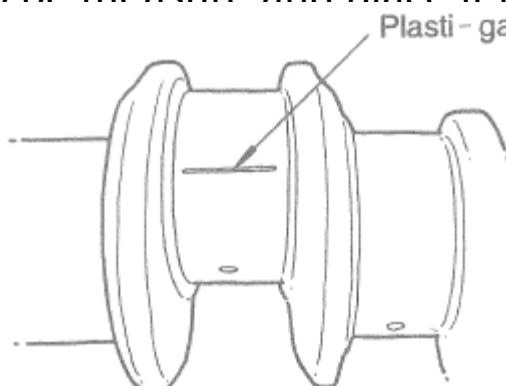
Measuring Tools

How to measure

- Clean the surfaces of the workpiece to be measured. Cut open the corner of the envelope take out the plastigauge. Select the proper size of plastigauge as per service manual



- Cut the plastigauge a little shorter than the width of the workpiece to be measured and place it in the axial direction of the workpi



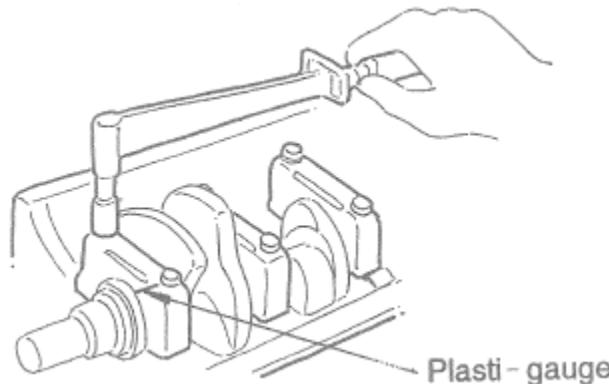
General Tools

General Tool Types

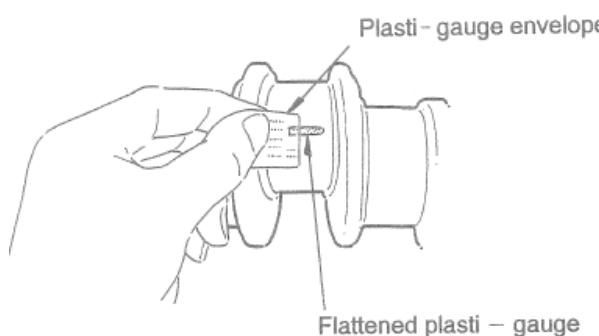
Measuring Tools

How to measure

- For crankshaft oil clearance as an example, place the bearing cap on the crankshaft with the plastigauge and tighten it with a specified torque. Do not turn the crankshaft once the plastigauge is set.



- Remove the bearing cap and measure the width of the flattened plastigauge with scale provided in the envelope. If the width is not even, measure the widest area.



General Tools

General Tool Types

Measuring Tools

Thickness Gauge (Feeler Gauge)

- It is used to measure the clearance between two parts. It consists of thin steel sheets of various thickness with the accuracy of 1/100 (0.01 mm). Thickness of steel sheets is marked on each sheet.



Tapered

Parallel

How to measure

- Clean the thickness gauge and the part to be measured before measuring.
- Increments of the steel sheets vary in case that the workpiece gap is too big for a specific sheet, you may use two sheets and combine their thickness.

General Tools

General Tool Types

Measuring Tools

How to measure

- Insert the gauge carefully into the gap of the workpiece to be measured. If the gauge can be easily pulled out, use a thicker gauge until you feel a resistance for pulling it. The thickness of the gauge is same as the dimension of the gap.



Valve Clearance Adjustment



Cylinder Head Flatness



Piston Ring Gap Measurement



Groove Clearance Measurement

General Tools

General Tool Types

Diagnostic Tools

- These are tools used to diagnose electronic control units by scanning all data parameters being sent by control units like Electronic Control Module (ECM), Transmission Control Module (TCM) and other electronic control units found in a vehicle.
- It aids technicians in performing diagnosis of all Isuzu Vehicles equipped with ECU's, making diagnosis of systems faster and easier.



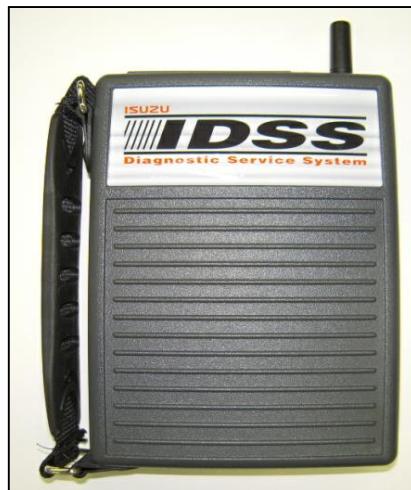
General Tools

General Tool Types

Diagnostic Tools

Global – Isuzu Diagnostic Service System (G-IDSS)

- It is Isuzu's latest state of the art diagnostic tool that is used with all Isuzu current electronic control units.



General Tools

General Tool Types

Diagnostic Tools

G-IDSS Kit

- Below are the components of the G-IDSS.



c) DRM Cable



b) Smart (DLC) Cable



a) Interface Box



e) Set-up Disc



d) USB-AB2B Cable

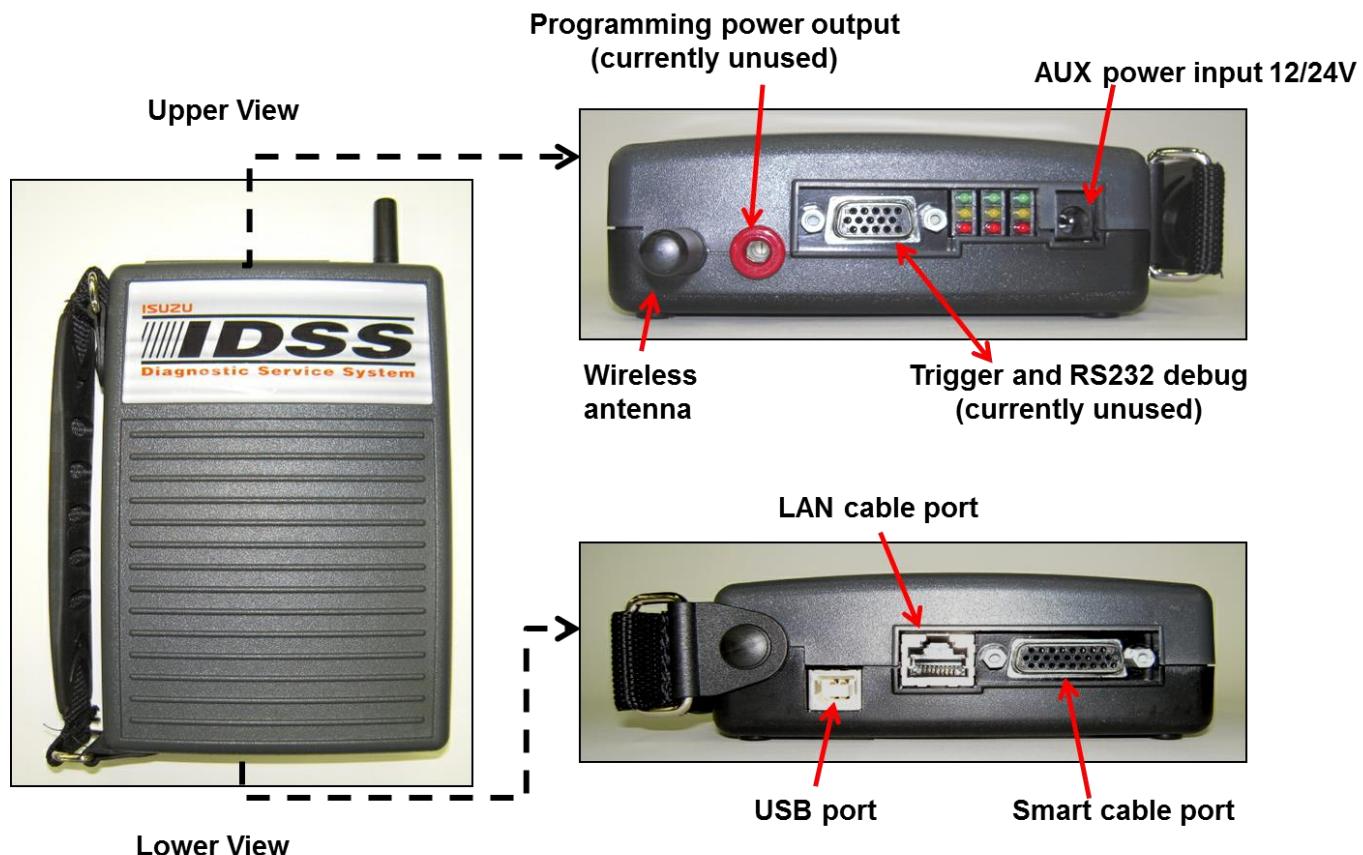
General Tools

General Tool Types

Diagnostic Tools

G-IDSS Kit

Interface Box – it converts data from the vehicle to the PC.



General Tools

General Tool Types

Diagnostic Tools

G-IDSS Kit

Smart DLC Cable – it is the connection between the Interface Box and Vehicle. DLC stands for Data Link Connector used in all Isuzu vehicles equipped with electronic control units.



General Tools

General Tool Types

Diagnostic Tools

G-IDSS Kit

Smart DLC Cable – it is the connection between the Interface Box and Vehicle. DLC stands for Data Link Connector used in all Isuzu vehicles equipped with electronic control units.



General Tools

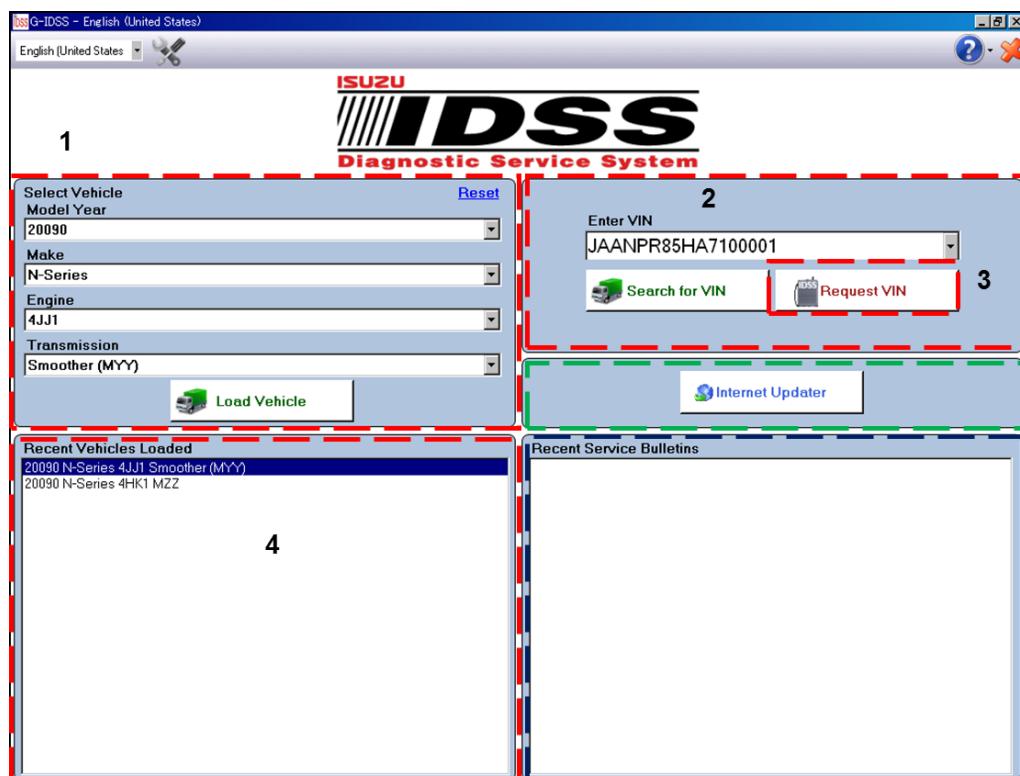
General Tool Types

Diagnostic Tools

How to Use G-IDSS

Main Screen

Vehicle Selection



1. Selecting vehicle from drop down menus
2. Selecting vehicle from entered VIN.
3. Selecting vehicle from programmed VIN in ECM.
4. Selecting vehicle from recently used model.

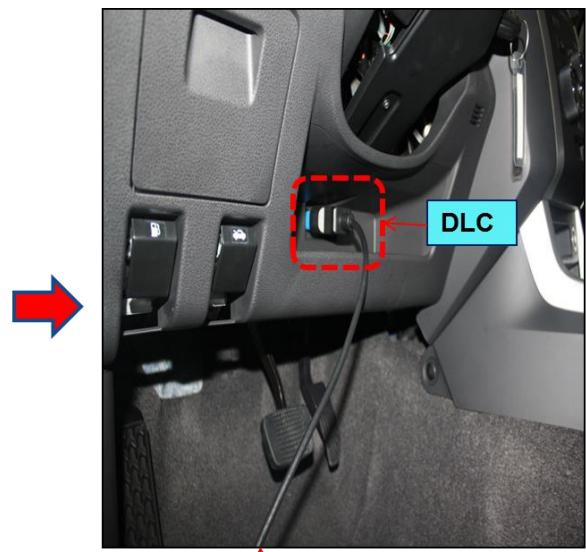
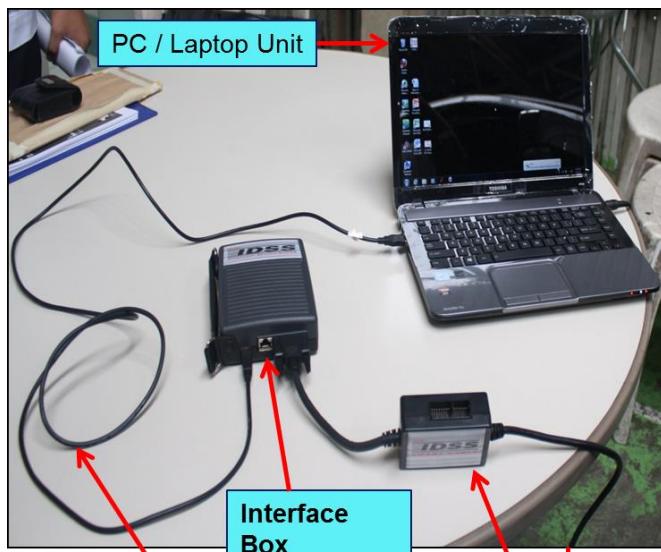
General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Proper Connections



USB-AB2B Cable
• from PC to interface box

Smart (DLC) Cable
• from interface box to DLC

Data Link Connector (DLC) is
directly located below the steering
column.

Note:

- Ignition key should be at “OFF” position before connecting and disconnecting Smart DLC Cable to DLC Terminal.

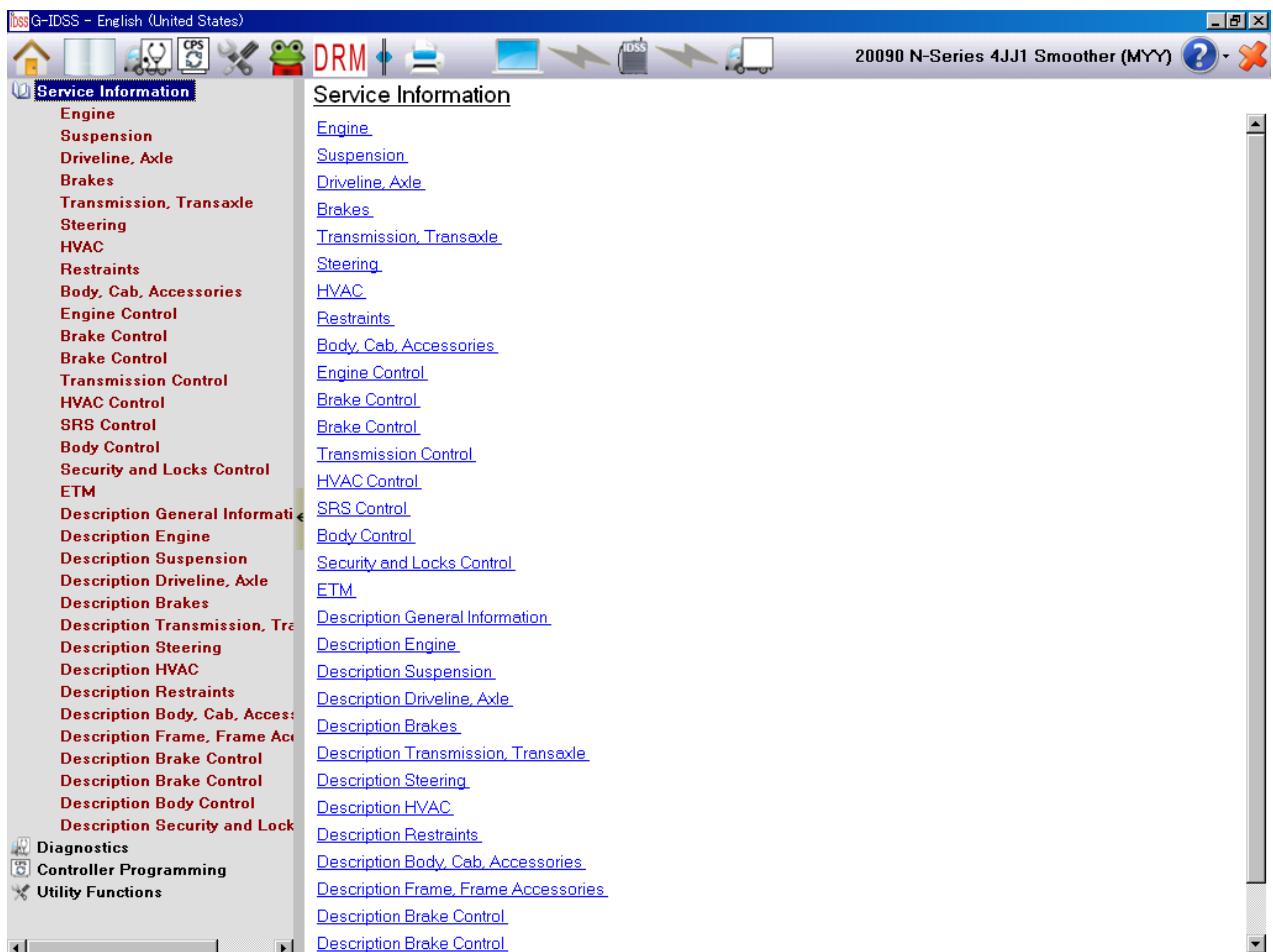
General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Table of Contents – located on the left side, provides a structured view of all G-IDSS options. The following functions can be accessed for the selected vehicle: Service Information, Diagnostics, Controller Programming, & Utility Functions



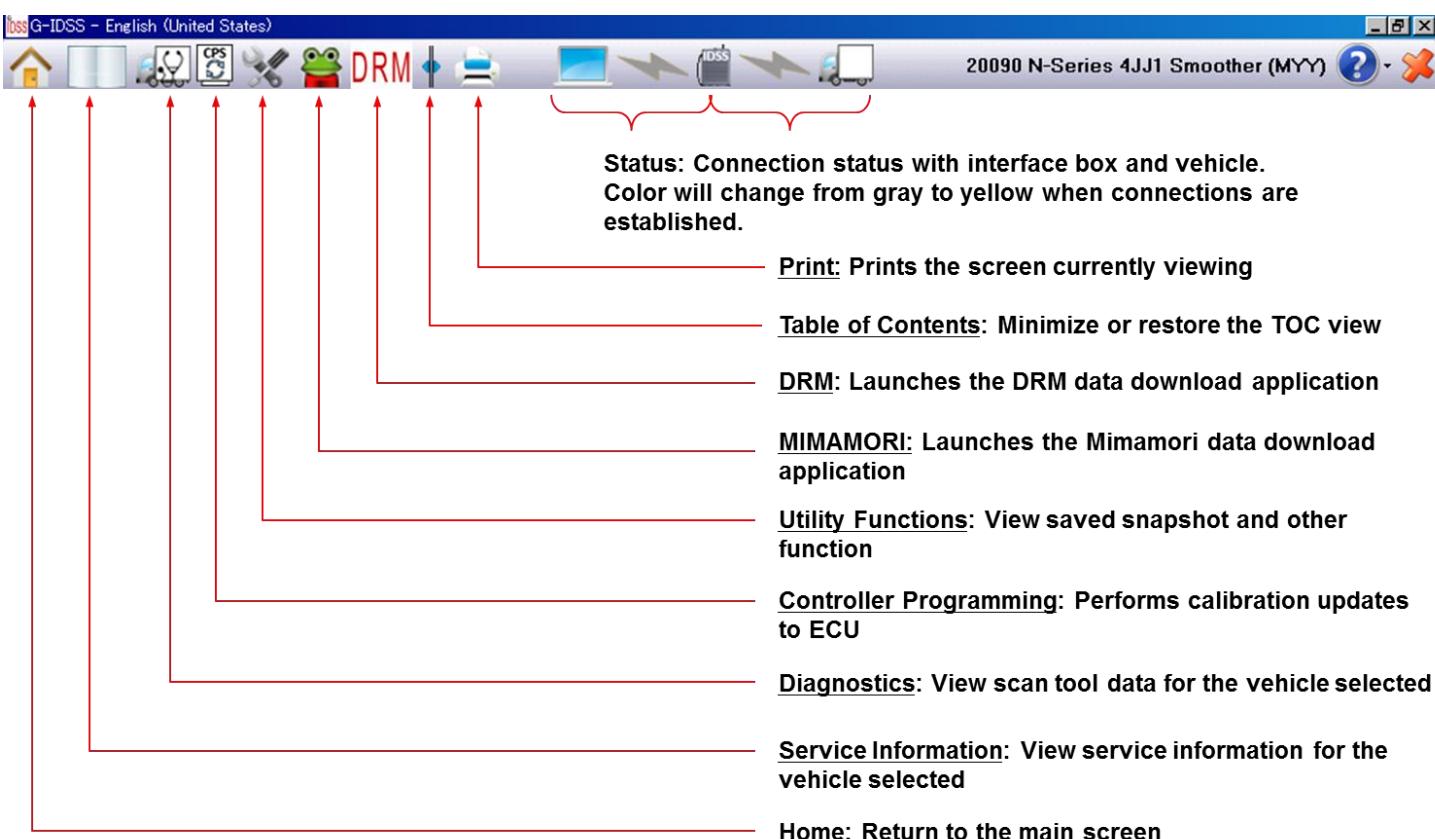
General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Tool Bar – it contains different tools that can be used during inspection and diagnosis of Isuzu Vehicles. Functions of each tool is stated below.



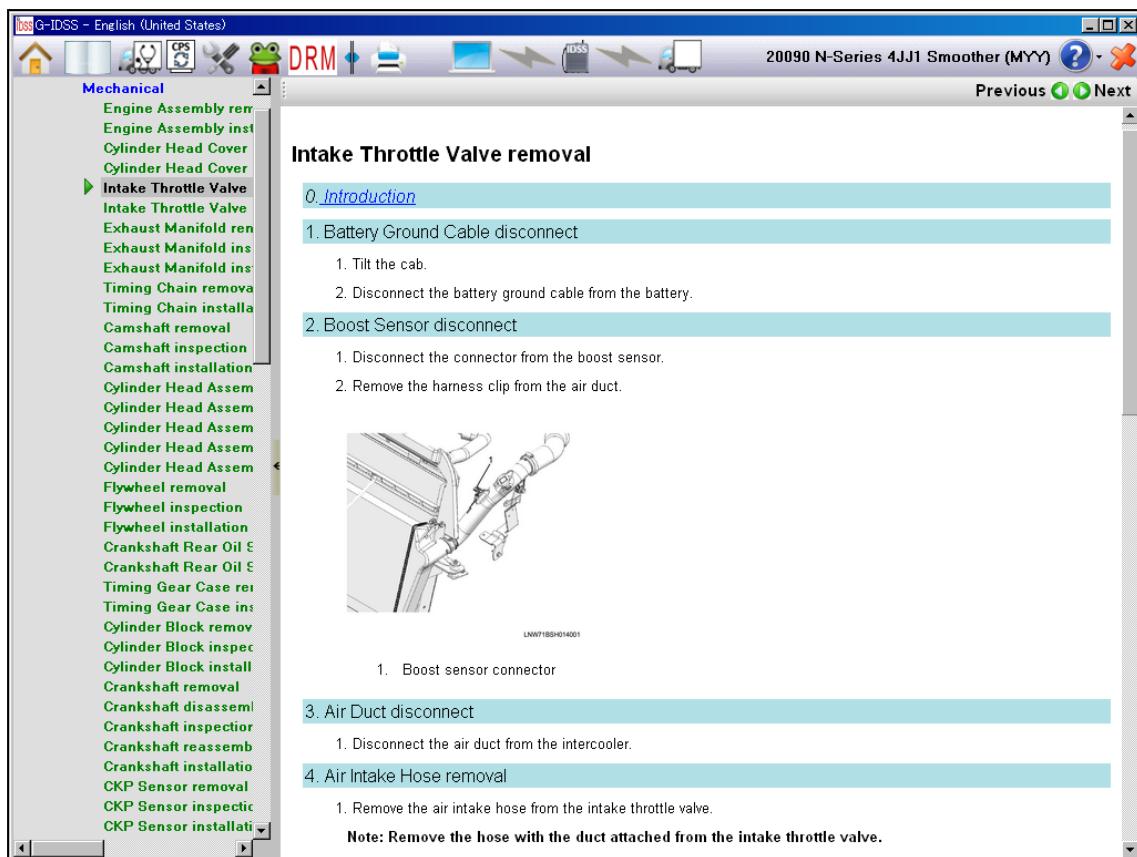
General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Service Information – This contains service information of Isuzu Vehicle components similar to that of workshop manual for quick reference during vehicle servicing with G-IDSS. You can navigate your way through the table of contents by clicking the titles you want to access.



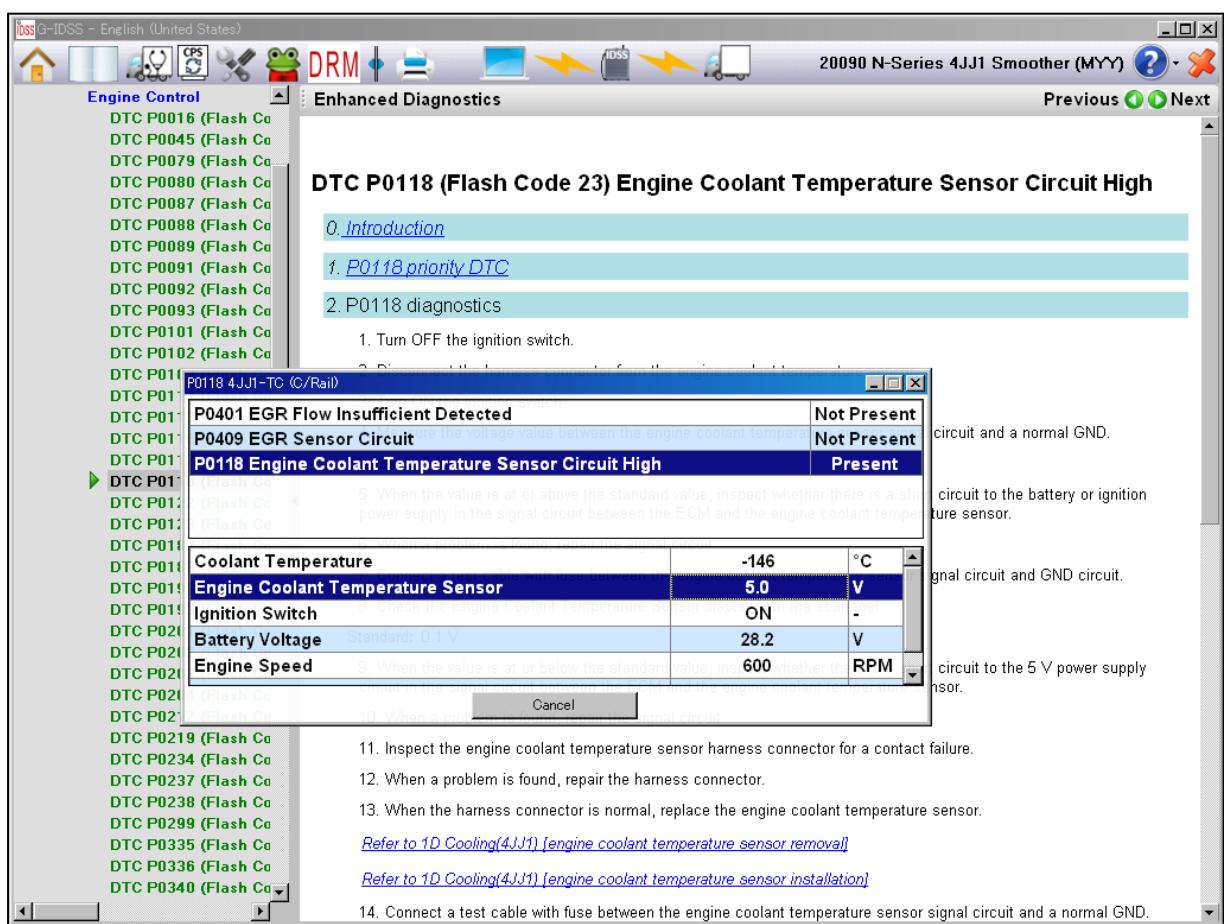
General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Link to Scan Tool – Click “Enhanced Diagnostics” icon to display “live” values from the vehicle for all parameters discussed in the service information. This will also display DTC status for the vehicle module diagnosed by that chart.



General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Electrical Troubleshooting Manual (ETM)

G-IDSS - English (United States)

Service Information

- Engine
- Suspension
- Driveline, Axle
- Brakes
- Transmission, Transaxle
- Steering
- HVAC
- Restraints
- Body, Cab, Accessories
- Engine Control
- Brake Control
- Brake Control
- Transmission Control
- HVAC Control
- SRS Control
- Body Control
- Security and Locks Control
- ETM
- ETM
- Engine
- Chassis
- Brake
- Cab
- Lighting
- Data Link

Description General Inform

Description Engine

Description Suspension

Description Driveline, Axle

Description Brakes

Description Transmission,

Description Steering

Description HVAC

Description Restraints

Description Body, Cab, Acc

Description Frame, Frame

DRM

IDSS

20090 N-Series 4JJ1 Smoother (MYY)

Previous **Next**

Engine

0. Introduction

1. Starter

Note: Starter and Charging

2. Engine Control

IDSS contains electrical schematics/ ETM for the vehicle selected. Navigate through the TOC by clicking on titles to find information you would like to view.

When a title in the TOC is selected, the associated information will display on the right side. Scroll down to view all text and graphics for the title selected.

The Schematics section lists all schematics for the vehicle.

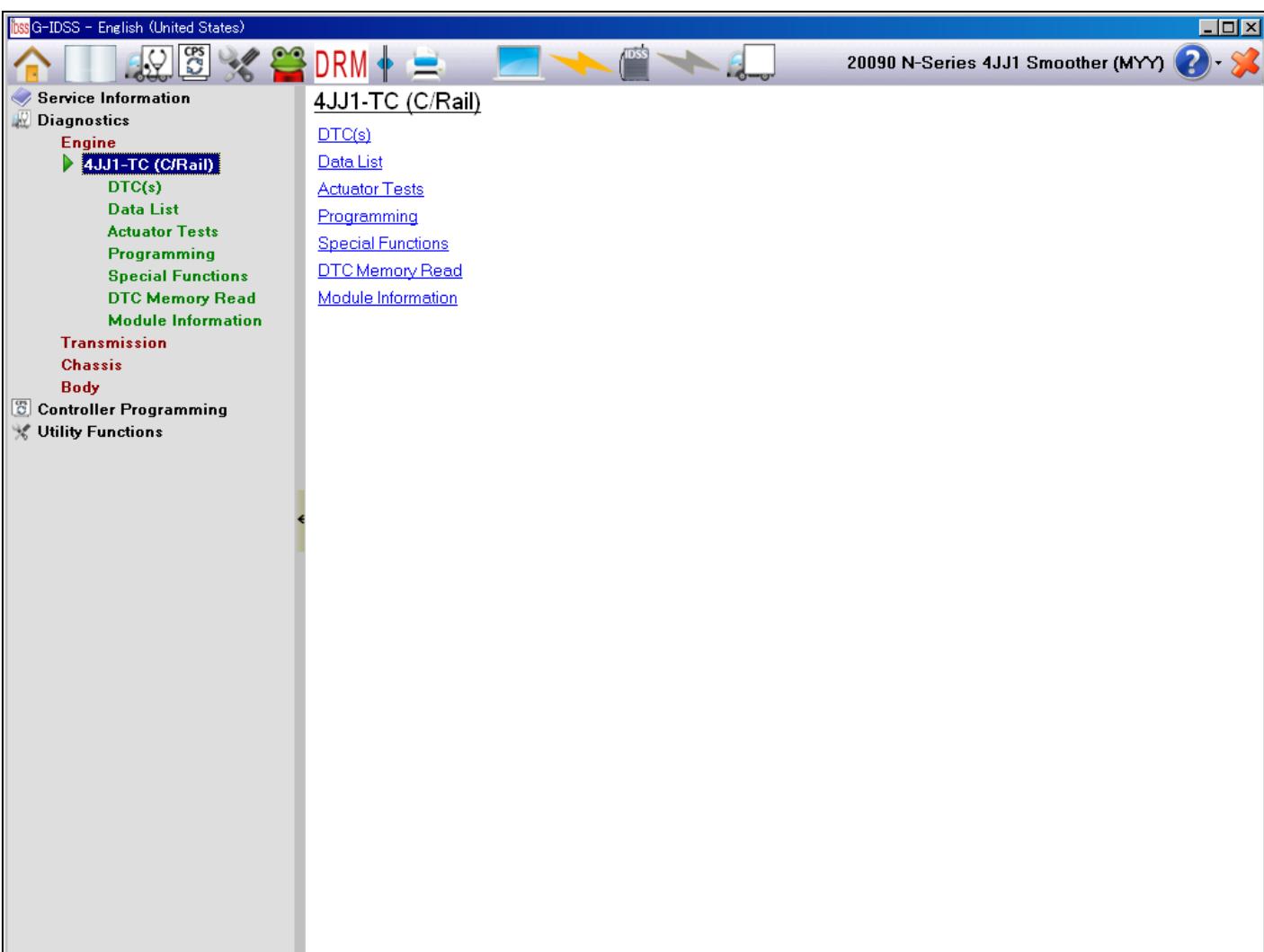
General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Scan Tool – Under Diagnostics Option, G-IDSS will connect to the vehicle ECU's in order to scan for Diagnostic Trouble Codes of each control units.



General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Scan Tool DTC - G-IDSS will provide information regarding DTC's detected in the vehicle.

Description	Status
P0401 EGR Flow Insufficient Detected	Not Present
P0409 EGR Sensor Circuit	Not Present
P0606 ECM Processor	Not Present
P0118 Engine Coolant Temperature Sensor Circuit High	Present

DTCs set for all communicating modules including:

- Current and History.
- DTC information for each communicating module.
- Clear DTC functions for all modules and each specific module

The DTC Description screen will display DTC information for all DTCs set. When a new DTC is set, it will be added to the DTC Description table under the applicable module.

Clear All

General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Live Data- you can monitor live parameters of the vehicles sensors and actuators through Data List. Information for each data list is displayed on a tab along with a search tab.

The screenshot shows the G-IDSS software interface. The title bar reads "G-IDSS - English (United States)". The main window displays "Live Data" for the "20090 N-Series 4JJ1 Smoother (MYY)". The left sidebar contains a navigation menu with categories like Service Information, Diagnostics, Engine, Transmission, Chassis, Body, Controller Programming, and Utility Functions. Under the Engine category, "4JJ1-TC (C/Rail)" is selected, and "DTC(s)" is also listed. The main area has tabs for "Search", "Engine Data 1", "Engine Data 2", "Fuel Data", "DPD Data", and "Immobilizer Data". The "Engine Data 1" tab is active, showing a table of live data parameters. A red box highlights the "Number of DTC(s) Set: 4" and a list of three DTCs: P0401 EGR Flow Insufficient Detected [Not Present], P0409 EGR Sensor Circuit [Not Present], and P0606 ECM Processor [Not Present]. Another red box highlights the "Search" tab. At the bottom right are buttons for "Quick Snap" and "Snapshot".

IDSS Data List functionality includes the following:

- Live Data
- Requested DTCs
- Zoom View
- Graph
- Quick Snap
- Snapshot

General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Zoom Window – by clicking the magnifying glass icon, you can view a certain parameter or multiple parameters in large window for ease of viewing during parameter monitoring.

Live Data

Module: 4JJ1-TC (C/Rail)
Datalist: Engine Data 1

Number of DTC(s) Set: 4

- P0401 EGR Flow Insufficient Detected [Not Present]
- P0409 EGR Sensor Circuit [Not Present]
- P0606 ECM Processor [Not Present]

Parameter 8/47	Value	Units
Engine Speed	0	RPM
Desired Idle Speed	850	RPM
Calculated Engine Load	0	%
Coolant Temperature	-20	°C
	2.0	V
	26	°C
	1.9	V
	29	°C
	1.9	V
	2.2	g/cyl
	0.6	V
	101	kPa
	2.3	V
	100	%
	101	kPa
	-39	kPa
	1.0	V
	32	MPa
	0	MPa
	0.9	V
	0	%

Zoomed-in View:

APP Sensor 1 (Accelerator) Minimum: 0.5 Average: 0.5	APP Sensor 2 (Accelerator) Minimum: 4.3 Average: 4.3
Coolant Temperature °C Minimum: -20 Average: -20	Fuel Temperature °C Minimum: 28 Average: 29
APP Sensor 1 (Accelerator Pedal Position)	0.5
APP Sensor 2 (Accelerator Pedal Position)	4.3
Desired EGR Position	0

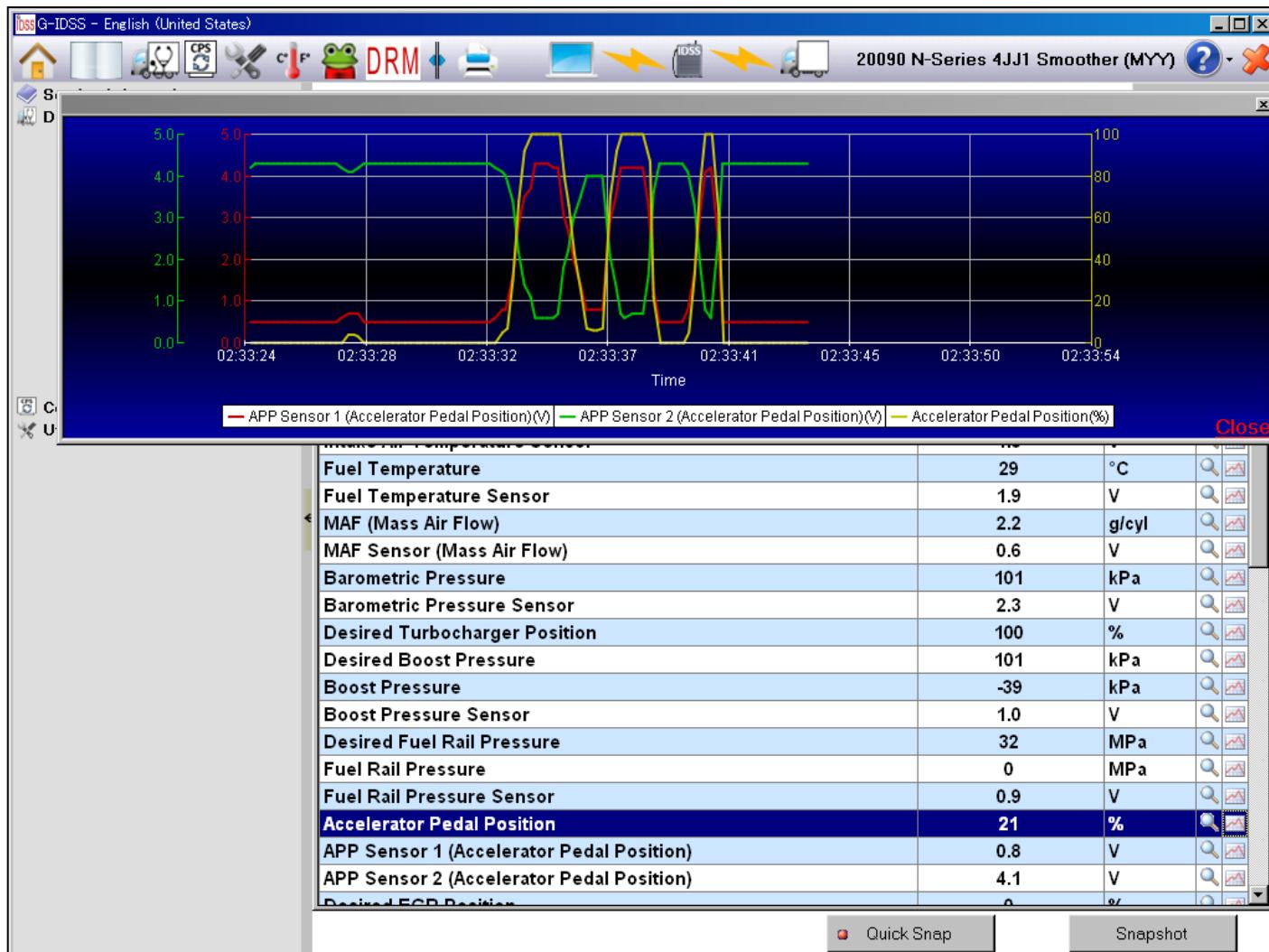
General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Graph – By clicking the graph icon, a new window will show live values of a certain component in a graphical form.



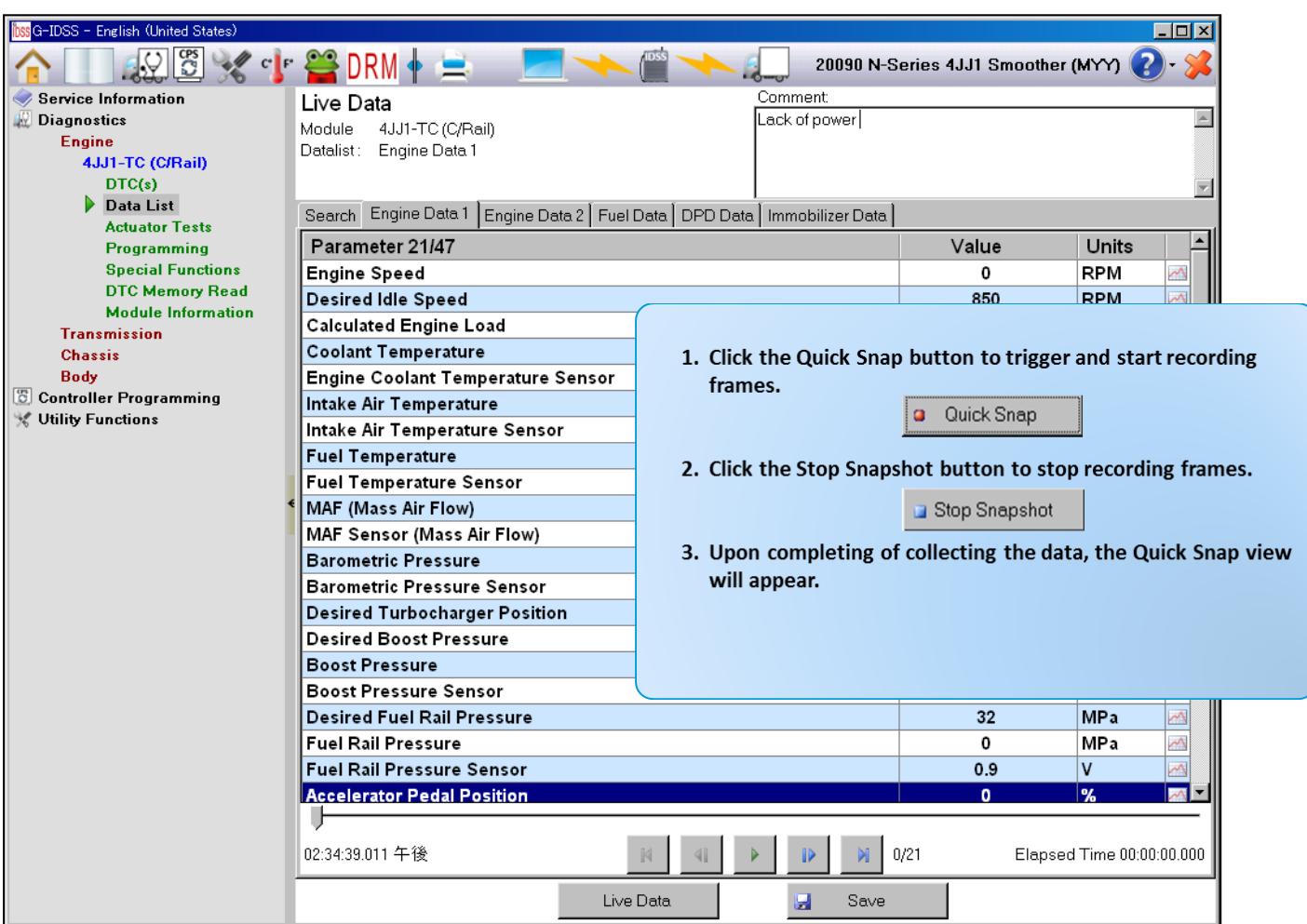
General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Quick Snapshot – it allows users to capture data and review it. They can start and end data collection period by using the Quick Snap Button



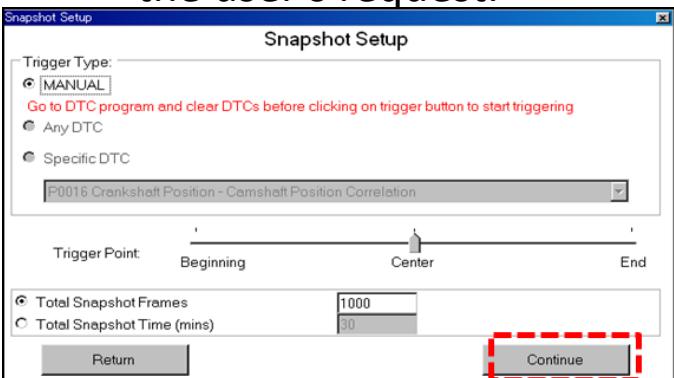
General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Snapshot – similar to Quick Snapshot as it captures data upon the user's request.



The Snapshot function allows the user to capture data and review it. The user starts and ends the data collection period by using the Snapshot button.

1. Click the Snapshot button and a Snapshot Setup window will display.
2. Click the Continue button to open the Snapshot viewer or click the Return button to return to live data.
3. Click the Trigger button to start recording frames.
4. Click the Stop Snapshot button to stop recording frames.

Parameter 21/47	Value	Unit	Search
Engine Speed		V	
Desired Idle Speed		V	
Calculated Engine Load	0	%	
Coolant Temperature	-20	°C	
Engine Coolant Temperature Sensor	2.0	V	
Intake Air Temperature	26	°C	
Intake Air Temperature Sensor	1.8	V	
Fuel Temperature	29	°C	
Fuel Temperature Sensor	1.9	V	
MAF (Mass Air Flow)	2.2	g/cyl	
MAF Sensor (Mass Air Flow)	0.6	V	
Barometric Pressure	101	kPa	
Barometric Pressure Sensor	2.3	V	
Desired Turbocharger Position	100	%	
Desired Boost Pressure	101	kPa	
Boost Pressure	-39	kPa	
Boost Pressure Sensor	1.0	V	
Desired Fuel Rail Pressure	32	MPa	
Fuel Rail Pressure	0	MPa	
Fuel Rail Pressure Sensor	0.9	V	
Accelerator Pedal Position	0	%	
APP Sensor 1 (Accelerator Pedal Position)	0.5	V	
APP Sensor 2 (Accelerator Pedal Position)	4.3	V	

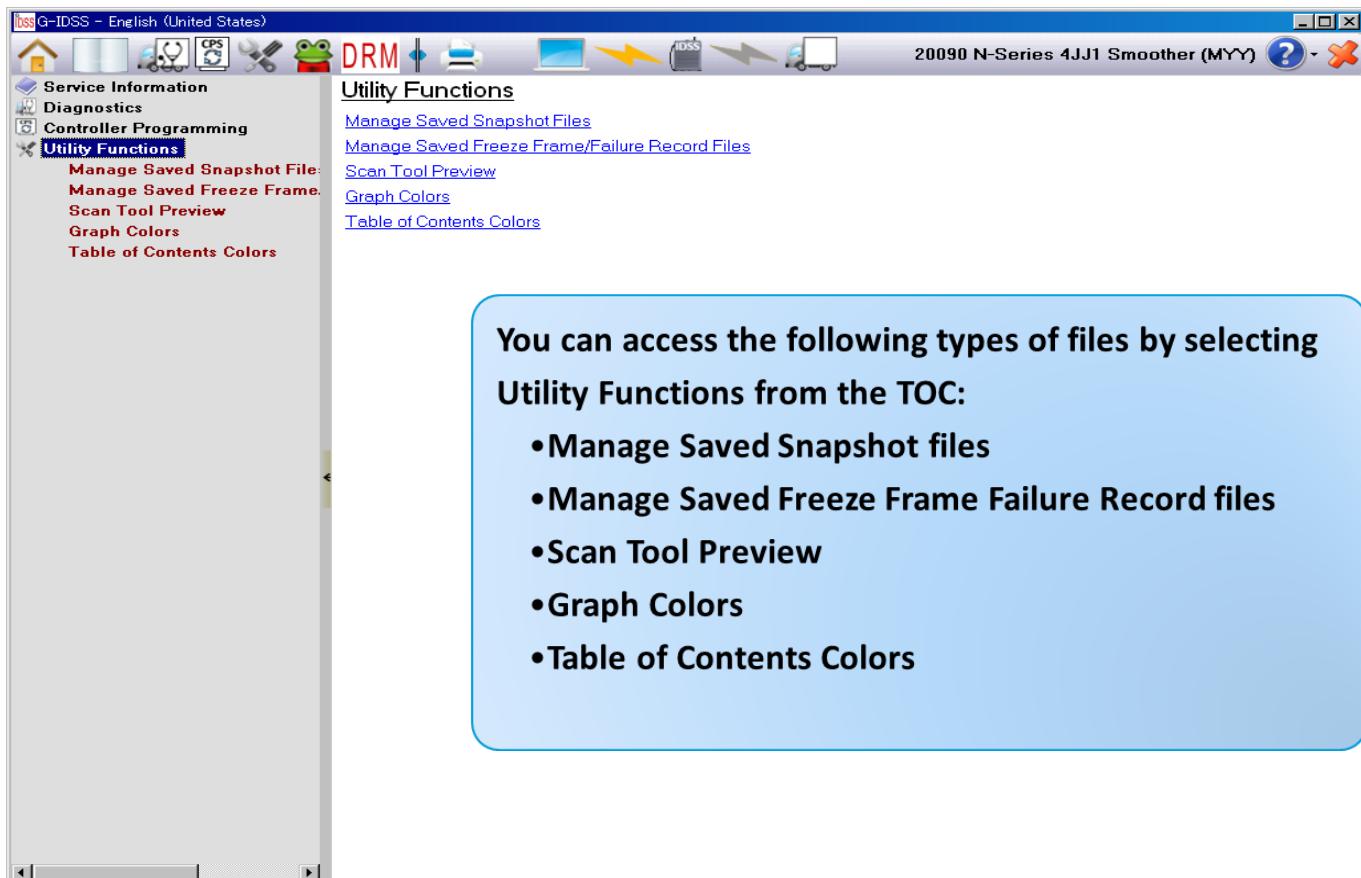
General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Utility Function It allows users to access previously saved information.



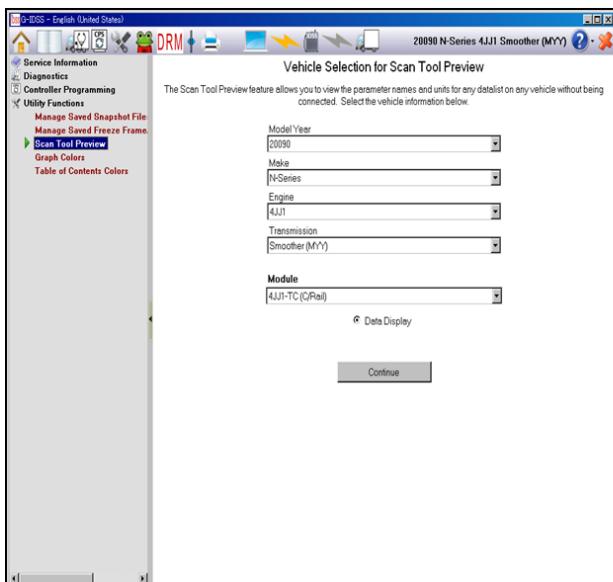
General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Utility Function



Parameter	Units	Datalist
Immobilizer Signal	-	Immobilizer Data
Engine Speed	RPM	Fuel Data
Engine Speed	RPM	DPD Data
Engine Speed	RPM	Engine Data 1
Engine Speed	RPM	DPD Data
Wrong Immobilizer Signal	-	Immobilizer Data
Calculated Engine Load	%	Engine Data 2
Desired Idle Speed	RPM	Fuel Data
Desired Idle Speed	RPM	Engine Data 1
Immobilizer Function Programmed	-	Immobilizer Data
Calculated Engine Load	%	Fuel Data
Calculated Engine Load	%	Engine Data 1
Coolant Temperature	°C	DPD Data
Security Wait Time	-	Immobilizer Data
Coolant Temperature	°C	Fuel Data
Coolant Temperature	°C	Engine Data 2
Coolant Temperature	°C	DPD Data
Intake Air Temperature	°C	Engine Data 1
Engine Coolant Temperature Sensor	V	DPD Data
Fuel Temperature	°C	Engine Data 1
Intake Air Temperature	°C	Engine Data 2

The Scan Tool Preview function allows you to view Data Display and Output Control Test content, without vehicle data, for all vehicles supported by IDSS.

Click the Scan Tool Preview selection in the TOC and then use the drop-down menus to select the vehicle you would like to view.

Once all vehicle information has been selected, choose to view the Data Display for that vehicle and click Continue. The data display for the vehicle you selected will display. You can select all data display.

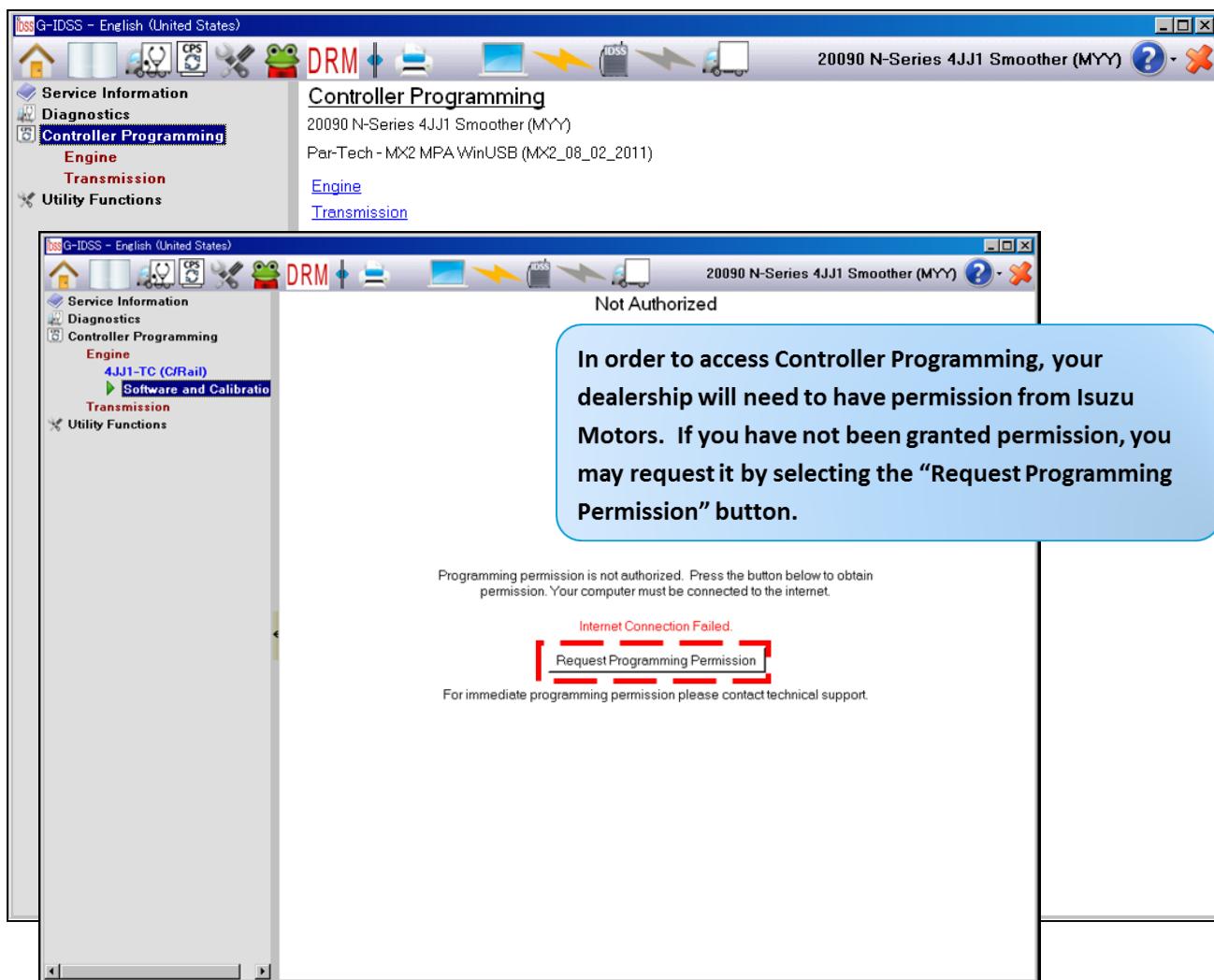
General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Controller Programming – It allows you to update and reprogram various controllers based on part numbers and or available calibration files.



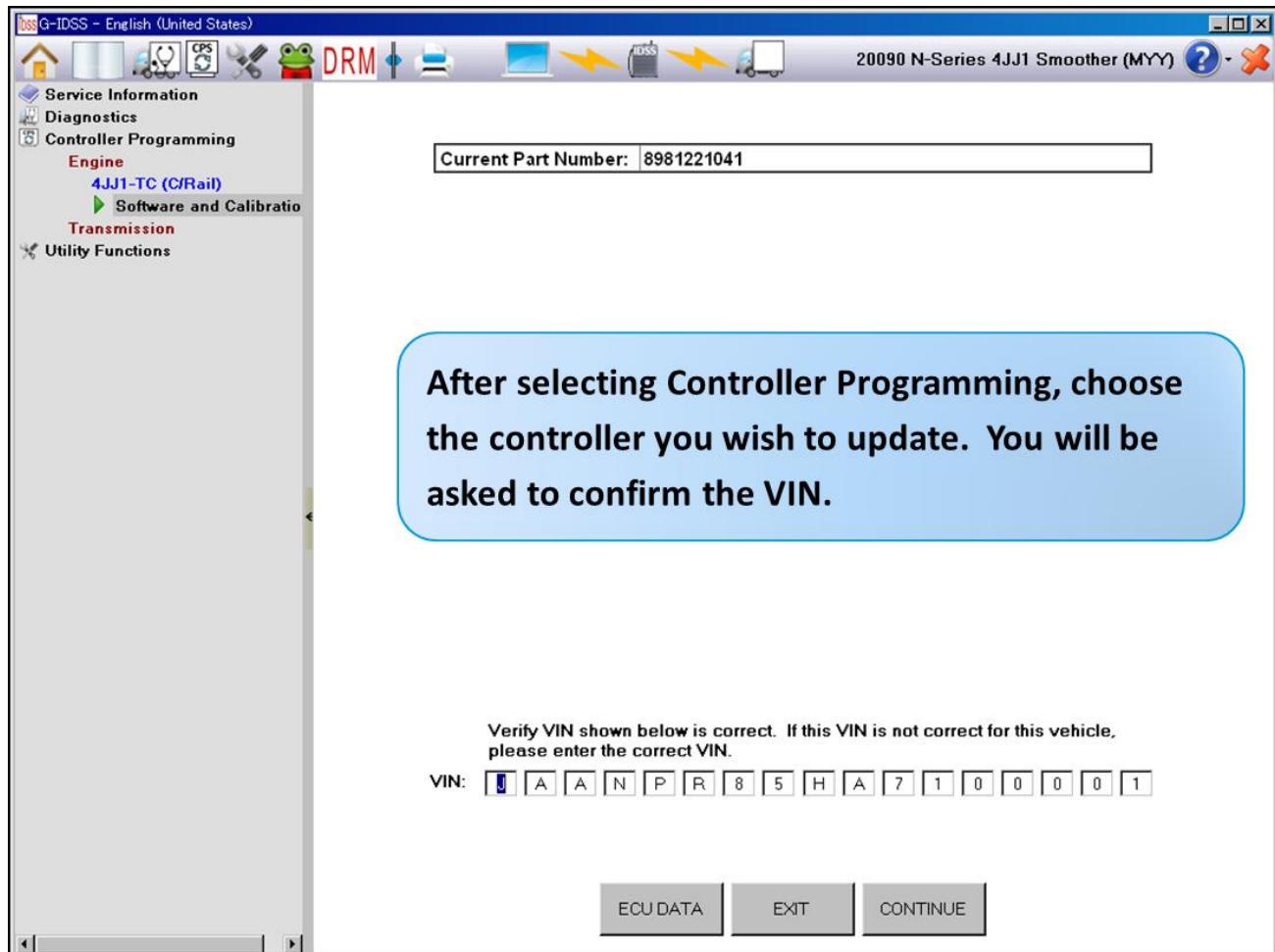
General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Controller Programming



General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Controller Programming

Current Part Number: 8981221041
New Part Number: 8981221042

Calibration update found

Carline:	N'R
Vehicle Name:	N'
Vehicle Engine:	3.0L L4 4JJ1
Electronic System Type:	Engine Control Module (ECM)
Type of Transmission:	Manual Transmission Automated (MTA)
Destination Option Code:	Australia=B13;Turkey=B11;Singapore=2G0;Europe...
Vehicle Equipment:	NMJ available
Equipment Option Code:	Engine 4JJ1-TC=LFB
Model Designator:	General Export RHD=5 or LHD=6
Emission Level:	Euro 5
ABS/TCS Functionality:	ABS=JE5 available
Cabin Type:	Single Cabin
Immobilizer:	With Immobilizer=7KC
Speed Limit Device:	With Speed Limit Device
Vehicle Equipment 2:	7KC available

Please turn the ignition on (engine off) on the vehicle. It is also suggested that a battery charger be connected to the vehicle during controller programming. Please ensure that your laptop battery is fully charged before starting controller programming. Also, go to Control Panel->Power Options and ensure that your 'System Standby' and 'System Hibernates' settings are set to 'Never'. Failure to do this could cause controller programming to fail.

Press PROGRAM to download the new calibration.

EXIT **PROGRAM**

This screen displays the current part number and update status. If an update is available, a new part number, "Calibration update found" and "Program" will be displayed.

If no updates are available, "No updates necessary" and "Overwrite" will be displayed.

Current Part Number: 8981221042

No updates necessary

Carline:	N'R
Vehicle Name:	N'
Vehicle Engine:	3.0L L4 4JJ1
Electronic System Type:	Engine Control Module (ECM)
Type of Transmission:	Manual Transmission Automated (MTA)
Destination Option Code:	Australia=B13;Turkey=B11;Singapore=2G0;Europe...
Vehicle Equipment:	NMJ available
Equipment Option Code:	Engine 4JJ1-TC=LFB
Model Designator:	General Export RHD=5 or LHD=6
Emission Level:	Euro 5
ABS/TCS Functionality:	ABS=JE5 available
Cabin Type:	Single Cabin
Immobilizer:	With Immobilizer=7KC
Speed Limit Device:	With Speed Limit Device
Vehicle Equipment 2:	7KC available

Please turn the ignition on (engine off) on the vehicle. It is also suggested that a battery charger be connected to the vehicle during controller programming. Please ensure that your laptop battery is fully charged before starting controller programming. Also, go to Control Panel->Power Options and ensure that your 'System Standby' and 'System Hibernates' settings are set to 'Never'. Failure to do this could cause controller programming to fail.

Press OVERWRITE button to download the same calibration.

EXIT **OVERWRITE**

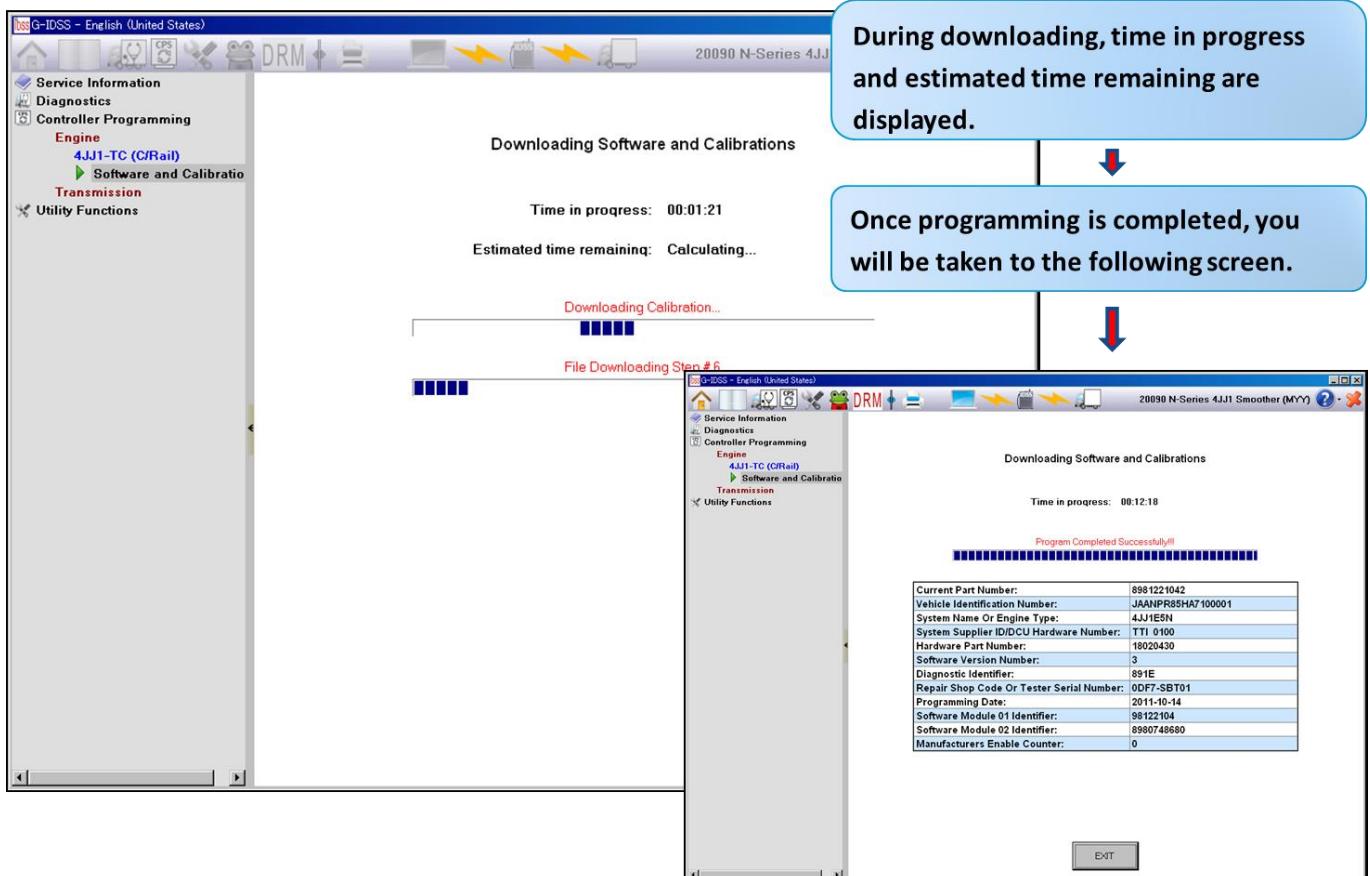
General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

Controller Programming



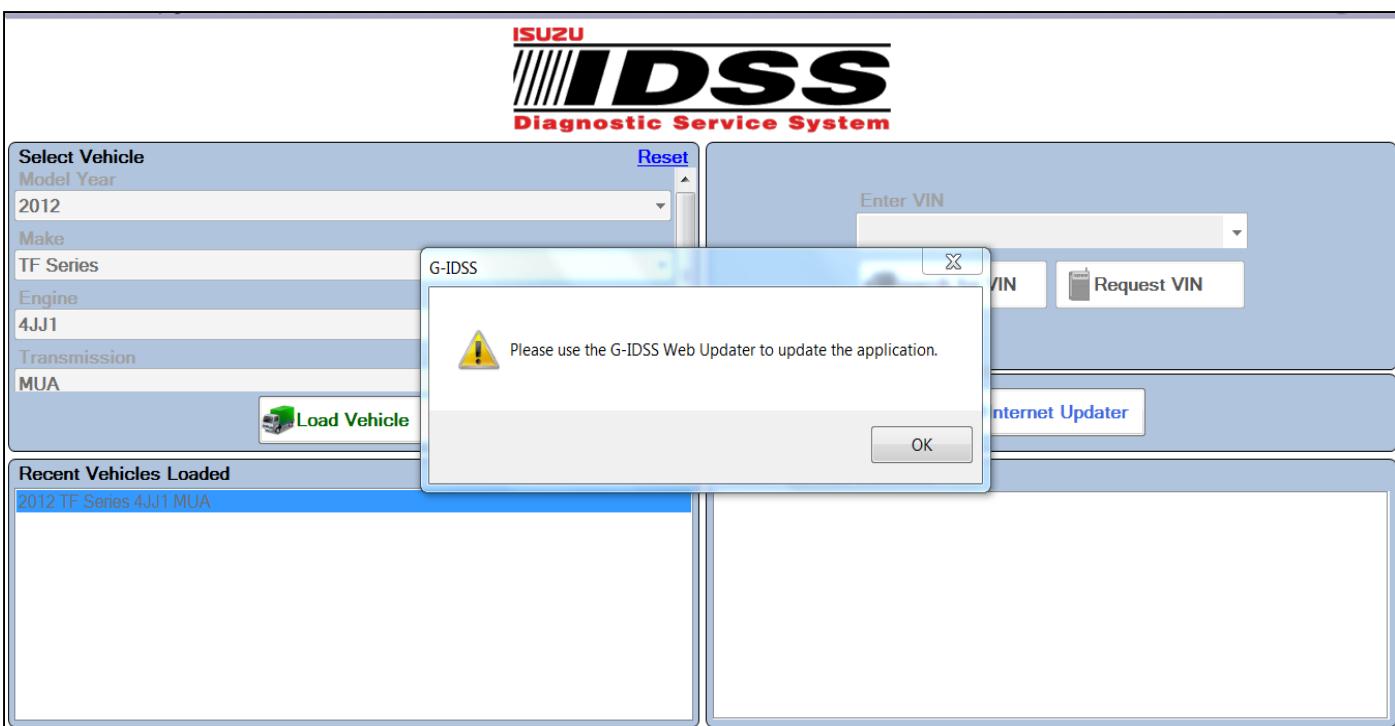
General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

IDSS Update – update application notice will be seen in the monitor every time the G-IDSS will be opened. This informs the user that update files are available a should be installed to the G-IDSS.



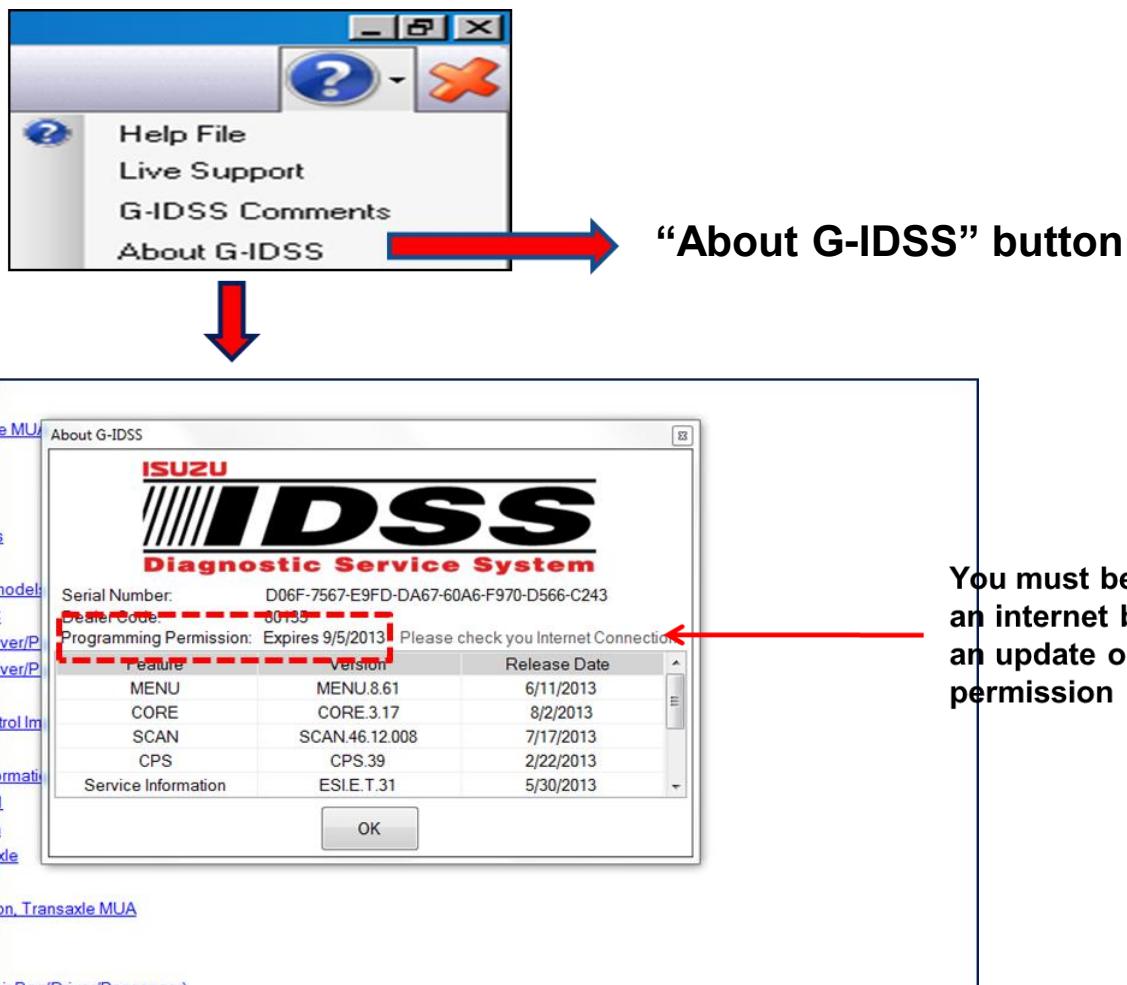
General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

IDSS Update Programming Permission – always check the “About G-IDSS” if programming permission is always updated.



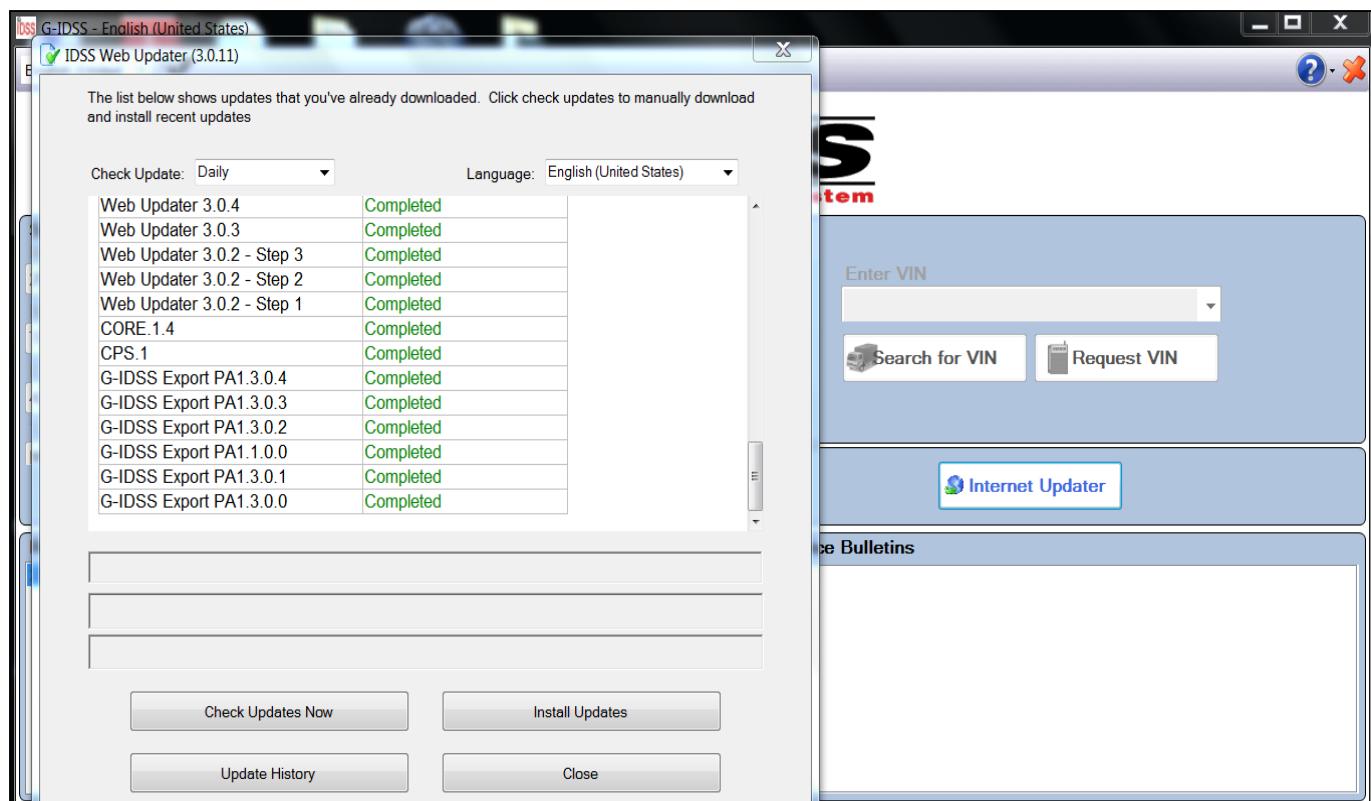
General Tools

General Tool Types

Diagnostic Tools

How to Use G-IDSS

IDSS Update Programming Permission – This window shows the status of each available update files to be installed in the G-IDSS.



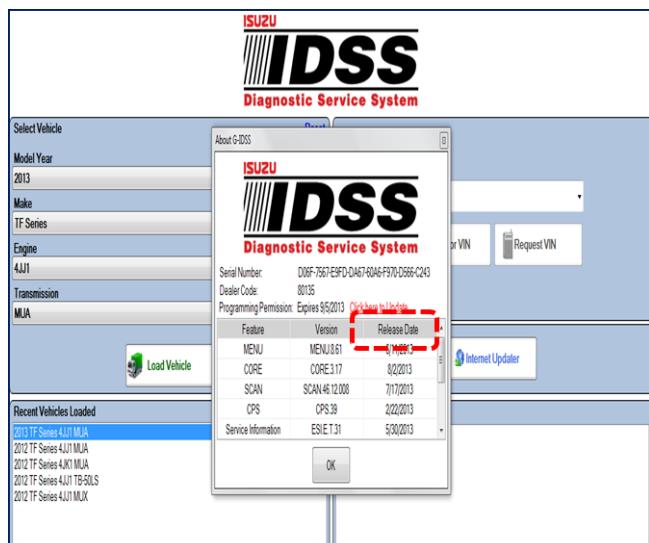
General Tools

General Tool Types

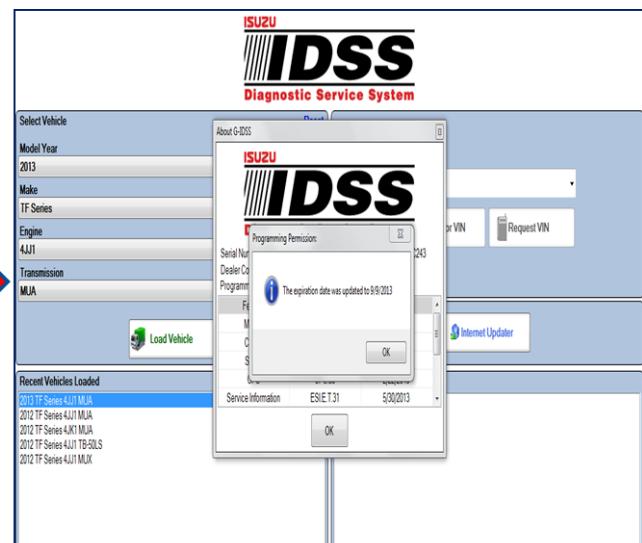
Diagnostic Tools

How to Use G-IDSS

IDSS Update Programming Permission



When connected to an internet, an icon
“Click here to Update” appears.



If successful, “The expiration date was
again updated” icon will appear.

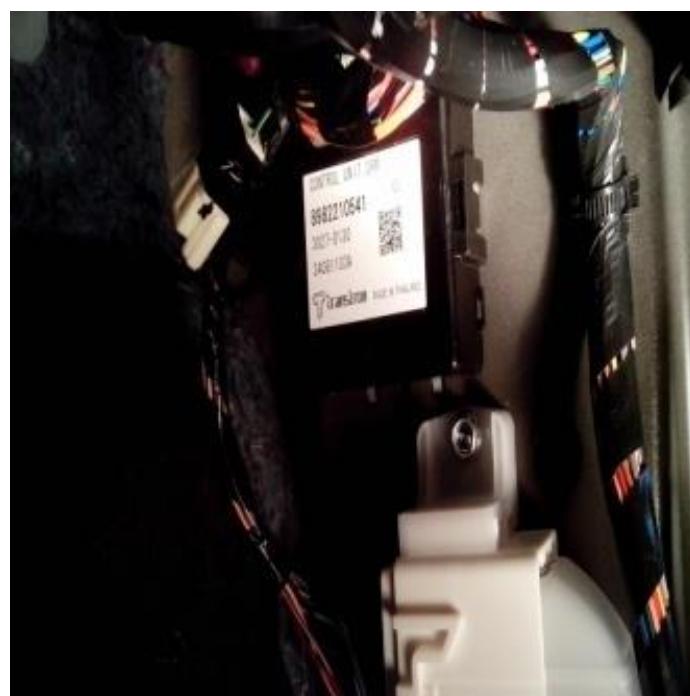
General Tools

General Tool Types

Diagnostic Tools

DRM (Data Recording Module)

- It monitors and records vehicle information useful in diagnosing past, present and future vehicle service issues. Mostly used in cases that the trouble cannot be reproduced or duplicated and cannot be classified as either vehicle problem or customer's severe usage.



General Tools

General Tool Types

Diagnostic Tools

DRM (Data Recording Module)

Function of DRM

Functions of DRM		
Function 1	General Information	
	• Vehicle Information	• Data which are input at the end of assy. line
	• General Information	• Total mileage, key on time, average speed, etc.
	• Engine Idling Information	• Engine idling time from accumulated date
	• History Information	• Maximum engine speed and ATF temperature
Function 2	History of DTC Records	
	• Engine DTC's	• It can record up to 50 DTC's
	• Transmission DTC's	• It can record up to 3 DTC's
	• Other System DTC's	• It can record up to 100 DTC's (BCM)
Function 3	Log Data Records	
	• Engine	• Can record prior and after data when DTC is set (max. 4)
	• Transmission	• Can record prior and after data when DTC is set (max. 3)

General Tools

General Tool Types

Diagnostic Tools

DRM (Data Recording Module)

DRM Sample Report – General Vehicle Information

[N&F-SERIES] DRM MISCELLANEOUS DATA SH

[Go back to opening page](#)

OPENED FILE NAME
DRM_AllData_20130727120140_1.csv

VEHICLE INFORMATION (imputed data when downloaded.)	VIN (SPS_VIN)	JALFVR3479	km YYYY/MM/DD
	VIN (SPS_VIN)	7000319	
	Mileage	136014	
	Download date	11:5/9A/M	
	Distributor's code	V00019	
	Engine type	ORPORATION 82L 6HK1-TCN Y2C --	
GENERAL INFORMATION	T/M model		
	Total Mileage	120100.7	km
	Key ON time	5493.2	Hours
	Engine running time	5450.1	Hours
	Vehicle running time	5450.8	Hours
	Average vehicle speed (included idling)	22.0	km/h
IDLING INFORMATION	Average vehicle speed (excluded idling)	29.1	km/h
	Average fuel economy	2.95	km/L
	Total idle time	1316.7	Hours
	Idle time under 5 min	(24.2)	%
	Idle time over 5 min	912.3	Hours
		(69.3)	%
PTO INFORMATION	Idle time over 5 min	404.4	Hours
		(30.7)	%
	PTO activation time ratio	0.00	%
	DPD automatic regeneration count	0	times
	DPD manual regeneration count	0	times
	DPD automatic regeneration timeout count at the time of distance status '0'	0	times
DPD INFORMATION	DPD manual regeneration timeout count	0	times
	DPD automatic regeneration completion count	0	times
	DPD manual regeneration completion count	0	times
	Regeneration count per unit distance (1,000km)	0.00	time/1,000km
HISTORY INFORMATION	Maximum engine speed history	3476.0	rpm
		86852.6	km
	Maximum water temperature history	94.0	°C
		100915.1	km
	Maximum ATF temperature	25	°C

Vehicle information input by a user when downloading from the DRM.

General information which is calculated by the ECM.

Idling and PTO information

History information for engine speed, engine coolant temp., ATF temperature

General Tools

General Tool Types

Diagnostic Tools

DRM (Data Recording Module)

DRM Sample Report – Diagnostic Trouble Code History

Go back to opening page					
DIST NAME		CORPORATION			
VIN		JALFVR34797000319			
MILEAGE		120100.7 km			
ENG DTC Code History					
No.	DTC code	DTC Name	Total Mileage (km)	Elapsed time from engine start	
1	P0650	Malfunction Indicator Lamp (MIL) Control Circuit	1.06	0.6	
2	P0381	Glow Plug Lamp Control Circuit	1.06	2.0	
3	P0380	Glow Plug Relay Control Circuit	1.06	0.0	
4	P1093	Fuel Rail Pressure (FRP) Too Low	50541.57	772.5	
5	P0219	Engine Overspeed Condition	73525.19	16135.0	
6	P1093	Fuel Rail Pressure (FRP) Too Low	74906.96	4272.5	
7	P1093	Fuel Rail Pressure (FRP) Too Low	75323.58	1521.0	
8	P1093	Fuel Rail Pressure (FRP) Too Low	76855.13	3977.5	
9	P256A	Engine Idle Speed Selector Sensor	94585.89	0.0	
10	P0500	Vehicle Speed Sensor (VSS) Circuit Control Unit Position (CUP) Sensor Performance	94698.3	1528.5	
11	P0336	Vehicle Speed Sensor (VSS) Circuit Control Unit Position (CUP) Sensor Performance	112871.4	90.0	
12	P0500	Vehicle Speed Sensor (VSS) Circuit	117346.8	0.0	
13	P0500	Vehicle Speed Sensor (VSS) Circuit	117856.6	98.0	
14	P0219	Engine Overspeed Condition	118359.8	6397.5	
15	P0500	Vehicle Speed Sensor (VSS) Circuit Control Unit Position (CUP) Sensor Performance	119675.6	270.5	
16	P0336	Vehicle Speed Sensor (VSS) Circuit Control Unit Position (CUP) Sensor Performance	119980.1	1941.5	
17		#N/A	0.0	0.0	
18		#N/A	0.0	0.0	
19		#N/A	0.0	0.0	
20		#N/A	0.0	0.0	
21		#N/A	0.0	0.0	
22		#N/A	0.0	0.0	
23		#N/A	0.0	0.0	
24			0.0	0.0	
25			0.0	0.0	
26			0.0	0.0	
27			0.0	0.0	
28			0.0	0.0	
29			0.0	0.0	
30			0.0	0.0	
31			0.0	0.0	
32		#N/A	0.0	0.0	
33		#N/A	0.0	0.0	
34		#N/A	0.0	0.0	
35		#N/A	0.0	0.0	
36		#N/A	0.0	0.0	
37		#N/A	0.0	0.0	
38		#N/A	0.0	0.0	
39		#N/A	0.0	0.0	
40		#N/A	0.0	0.0	
41		#N/A	0.0	0.0	
42		#N/A	0.0	0.0	
43		#N/A	0.0	0.0	
44		#N/A	0.0	0.0	
45		#N/A	0.0	0.0	
46		#N/A	0.0	0.0	
47		#N/A	0.0	0.0	
48		#N/A	0.0	0.0	
49		#N/A	0.0	0.0	
50		#N/A	0.0	0.0	

TM DTC Code History					
No.	DTC code	DTC Name	Total Mileage (km)	Elapsed time from engine start	
1		#N/A	0.0	0.0	
2		#N/A	0.0	0.0	
3		#N/A	0.0	0.0	

Engine DTC's History can record up to 50

Transmission DTC's History can record up to 3

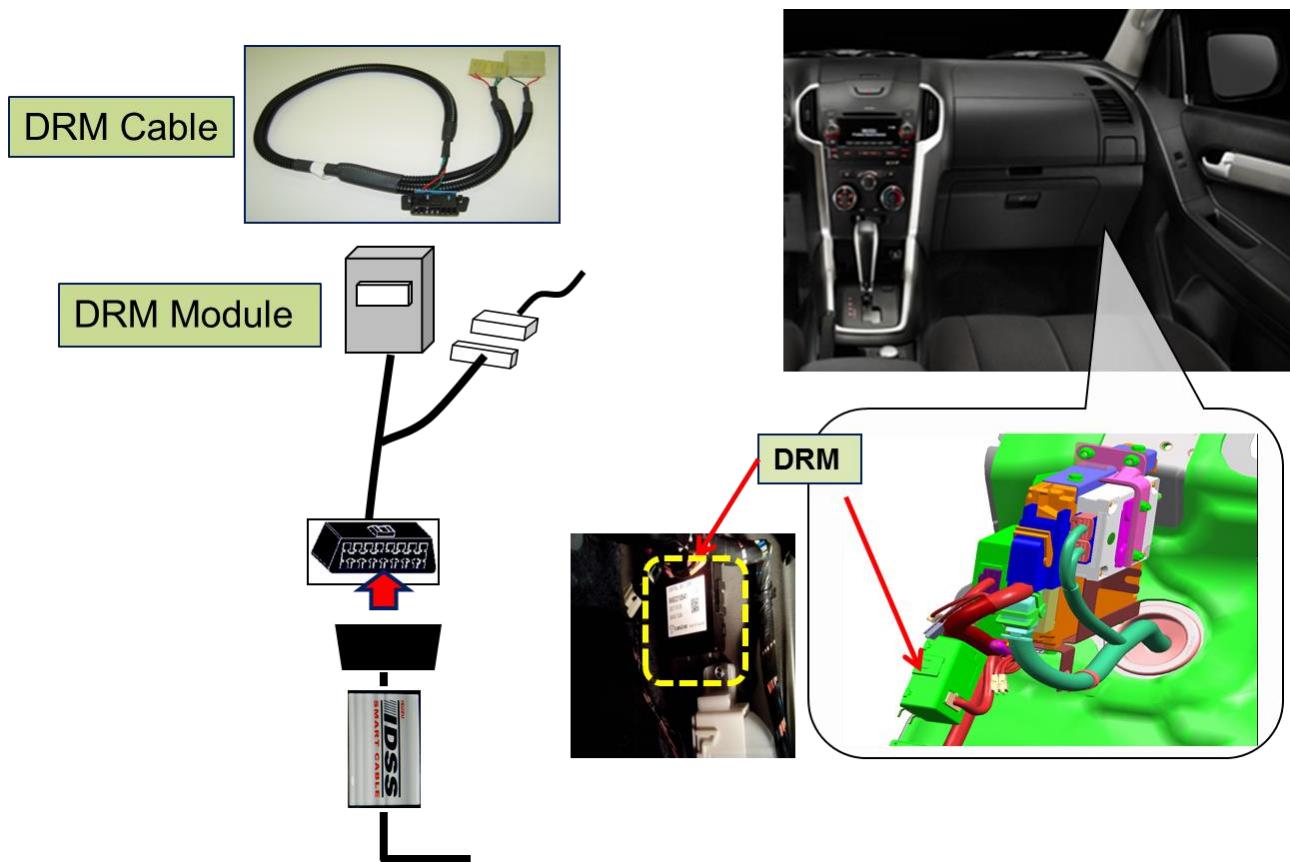
General Tools

General Tool Types

Diagnostic Tools

DRM (Data Recording Module)

DRM Connection Procedure – Included in the G-IDSS package is the DRM cable which is connected on the DRM Module of the vehicle. It is then connected to the Smart DLC cable using the DLC connector at the end of the DRM Cable.



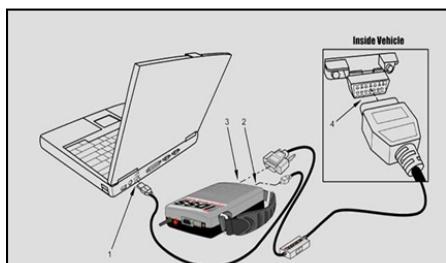
General Tools

General Tool Types

Diagnostic Tools

DRM (Data Recording Module)

DRM Download using G-IDSS – It is the same way as using G-IDSS during diagnosis, however Smart DLC Cable will be connected to the DRM Module instead of the vehicle's DLC.

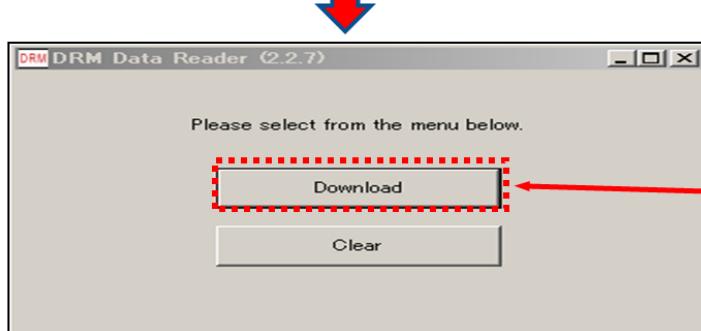


As same manner with hardware connections, following components must be connected;

- USB Cable to the computer
- USB Cable to the IDSS Interface Device
- Smart Cable to the IDSS Interface Device
- Smart Cable to the DLC



Launch the DRM data download application on the toolbar icon



Select the Download

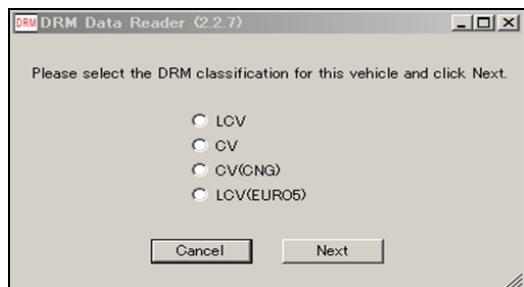
General Tools

General Tool Types

Diagnostic Tools

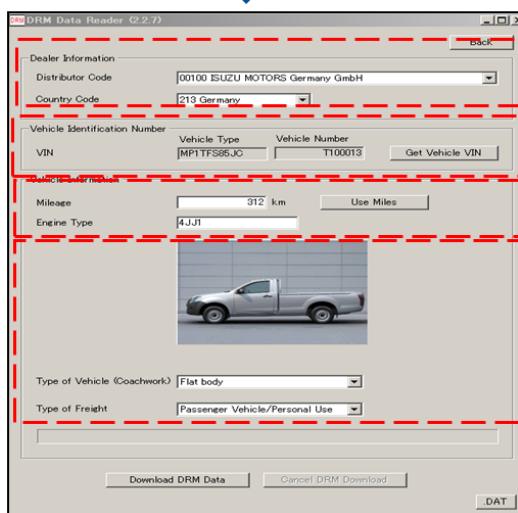
DRM (Data Recording Module)

DRM Download using G-IDSS



Select the DRM classification for the vehicle:

- Vehicle without 4JK1-HIHI: Select the LCV
- Vehicle with 4JK1-HIHI: Select the LCV(EURO5)



Select and input the vehicle information

1. Select your distributor code and country code.
2. Turn ON the ignition and press “Get Vehicle VIN” to retrieve the VIN from the ECM. If the IDSS application is opened, VIN cannot be retrieved. Close the application.
3. Input mileage from the odometer and the engine type.
4. Select the type of vehicle and type of freight

Note: there are units where DRM Data can be downloaded by connecting Smart DLC Cable to the DLC Terminal of the vehicle instead of DRM Module. In this case, “Get Vehicle VIN” can be used after closing the G-IDSS window.

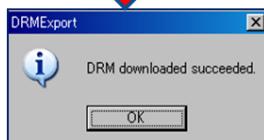
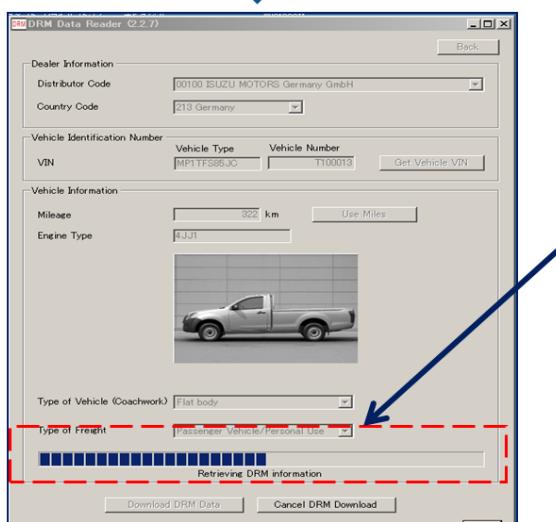
General Tools

General Tool Types

Diagnostic Tools

DRM (Data Recording Module)

DRM Download using G-IDSS



Downloading

1. Turn ON the ignition switch and press “Download DRM Data”. Verify again the download cable connections.
2. Downloading starts after pressing “OK”, and progress bar appears. Until finish of complete download, it takes approximately 3 minutes.

Location of Downloaded File

Downloaded file is located in the G-IDSS folder in your computer hard drive > G-IDSS > DRM Download Data > Dated Folder

General Tools

General Tool Types

Diagnostic Tools

DRM (Data Recording Module)

DRM Data Analysis

Past deflection list					
1	Company name VIN	Kawasaki training center MP1TFS85JCT100013 8 km			
No.	DTC	DTC Name	Occurred Distance(km)	Elapsed time from ignition on(min)	
1	P0237	Turbocharger Boost Sensor Circuit Low	2	3.1	
2	P2122	Pedal Position Sensor 1 Circuit Low Input	4	6.5	
3	P0102	Mass Air Flow Circuit Low Input	6	9.7	
4	P0122	Throttle Position Sensor Circuit Low	8	12.5	
5	-		0	0.0	

1. Distance:

Distance when DRM was downloaded (From the distance after resetting DRM)

2. No:

The order which DTC occurred in (Biggest number is latest DTC)

3. DTC code

4. DTC symptom

5. Occurred Distance (Km)

Distance when DTC occurred (From the distance after resetting DRM)

6. Elapse time from ignition on

Time until DTC occurred (From the time after turning on key)

Caution: It is not added to the List when same DTC occurred within 8 hours (Ignition on time).

General Tools

General Tool Types

Diagnostic Tools

G-IDSS Health Report Introduction

- It is a system that monitors the condition of the vehicle while it is being used. It collects data from the vehicle through the Data Recording Module (DRM) and generates report based from that data to interpret it in a language that users will understand and be able to perform necessary repairs.
- Useful during vehicle diagnosis specially on intermittent problems that are hard to duplicate. It includes the following data:
 - Engine Condition
 - Fuel Economy with History
 - Brake Usage History
 - Driver Operating Habits
- This report can indicate possible areas of concern that may require attention to maximize the uptime of the vehicle.

General Tools

General Tool Types

Diagnostic Tools

G-IDSS Health Report Data Types

- Vehicle Operating Data
 - Distance Travelled (Km)
 - Collection Time (hr)
 - Engine Coolant Over Temperature Frequency (celsius)
- Fuel Economy Data
 - Fuel Economy (Km/Liter)
 - Fuel Consumption (Liter)
 - Accelerator Pedal Opening Frequency (%)
 - Deceleration Frequency (m/sec²)
- Other Data
 - Engine Usage (hr)
 - PTO Activation (if equipped)
 - DPF Degeneration Count (if equipped)

General Tools

General Tool Types

Diagnostic Tools

Applicable Models



General Tools

General Tool Types

Diagnostic Tools

Applicable Models



N-SERIES



F-SERIES



General Tools

General Tool Types

Diagnostic Tools

Understanding Health Report Data

- The items below are the information collected by the Health Report with their corresponding definition for the user to understand to be able to know the current condition of the vehicle as well as any lingering faults that need to be addressed.

GENERAL	
General Information	<ul style="list-style-type: none">• Beginning Report Date, Ending Report Date, VIN and Current Mileage• Customer data entered by the user with the exception of the VIN and reporting dates.• The VIN is extracted from the engine control module , while the reporting date and time is based upon internet server date and time (if an internet connection was detected at the time of the data upload) or PC date and time.
Fuel Economy Summary	<ul style="list-style-type: none">• Distance Travelled, Fuel Consumed and Average Fuel Economy between the selected report dates.
Engine / Emission Condition Summary	<ul style="list-style-type: none">• Engine Coolant Overtemperature Frequency and Engine Overspeed, DPD Regeneration Status, DPD Particulate Matter Accumulation Status and Recent History DTC

General Tools

General Tool Types

Diagnostic Tools

Understanding Health Report Data

Braking Condition Summary	<ul style="list-style-type: none">Driver Braking Rating, Braking Energy Rating per Kilometer (or Mile), Average Brake Pedal Application per Kilometer (or Mile).
VEHICLE OPERATING DATA	
Distance Travelled	<ul style="list-style-type: none">Distances Travelled at each speed range between the selected report dates.
Collection Time	<ul style="list-style-type: none">Driving Time at each speed range between the selected reported dates. Driving Type<ul style="list-style-type: none">(1) Highway Driving is defined as vehicle speed greater than about 60 kph (about 37 mph) for an extended period of time.(2) City Driving is defined as vehicle speed about 1 to 60 kph (about 1 to 37 mph).(3) Low Speed Driving is defined as engine speed less than 1,200 rpm with vehicle speed greater than about 20 kph (1 to 12 mph).(4) Idling While Driving is defined as engine speed less than 1,200 rpm with vehicle speed greater than about 20 kph (about 12 mph) coasting.

General Tools

General Tool Types

Diagnostic Tools

Understanding Health Report Data

Collection Time	(5) Low Speed Idling is defined as engine speed at idle with vehicle speed less than about 20 kph (about 12 mph) creeping. (6) Idling While Parked is defined as engine speed less than idling rpm with the vehicle stopped. PTO operation is defined as the PTO switch turned ON with the engine running.
Engine Coolant Temperature Frequency	<ul style="list-style-type: none">Total time in hours the engine is operating for each engine coolant temperature range between the selected report dates.
Vehicle Speed Frequency	<ul style="list-style-type: none">OWNER MUST APPROVE THE VIEWING OF THIS PAGE. Complete the provided Consent Form to allow viewing. Total time in hours the engine is operating for each KPH/MPH range between the selected report dates.
FUEL ECONOMY DATA	
Fuel Economy	<ul style="list-style-type: none">Km per liter / Miles per gallon at each speed range between the selected report dates.
Fuel Consumption	<ul style="list-style-type: none">Fuel Consumed at each speed range between the selected report dates.

General Tools

General Tool Types

Diagnostic Tools

Understanding Health Report Data

Accelerator Pedal Opening Frequency	<ul style="list-style-type: none">Total time in hours the engine is operating for each accelerator pedal position (10% increments) between the selected report dates. A “heavy footed” driver will operate the vehicle at large accelerator pedal openings, which will be displayed toward the 81% - 100% range.
Decelerator Frequency	<ul style="list-style-type: none">Total number of times the brake pedal was applied between the selected report dates resulting in various vehicle stopping rates.
Other Data	
Engine Usage	<ul style="list-style-type: none">Engine Start Cycles, Engine Run Time, Engine Rotation CountEngine Usage displays the number of times the engine was started, the amount of time the engine was running and the number of times the engine rotated between the selected report dates.
Vehicle Speed	<ul style="list-style-type: none">OWNER MUST APPROVE THE VIEWING OF THIS PAGE. Complete the provided Consent Form to allow viewing. Vehicle Speed displays the maximum speed achieved since vehicle production; the total distance travelled over 75 mph between the selected report dates, and the amount of time the vehicle was driven above 120 kph (above 75 mph) between the selected report dates

General Tools

General Tool Types

Diagnostic Tools

Understanding Health Report Data

* PTO Activation	<ul style="list-style-type: none">PTO Activation displays the number of times and the amount of time that the PTO switch was turned ON with the engine running between the selected report dates.
* DPD Regeneration Count	<ul style="list-style-type: none">DPD Regeneration Count displays the total number of attempted and completed regeneration attempts between the selected report dates.

Note:

- If vehicle is only equipped with Power Take Off (PTO) and /or Diesel Particulate Diffuser (DPD).

General Tools

General Tool Types

Diagnostic Tools

G-IDSS Health Report

Report Generation Procedures

- Download DRM Data of the vehicle by clicking on the DRM icon in the tool bar. Same procedure is applied as discussed under DRM.
- After Downloading DRM Data, disconnect DRM Cable from the DRM module and reconnect the DRM Connector of the vehicle to DRM.
- Connect Smart DLC Connector to the vehicle's DLC terminal and run again G-IDSS. This time, select G-IDSS Health Report Icon in the tool bar.



General Tools

General Tool Types

Diagnostic Tools

G-IDSS Health Report

Main Screen – It displays the various functions used for generating the health report. It is divided into three categories *Data File Management*, *Health Report & Options* and *Accessories*. Functions include:

- Download VIN Information ➤ Report Definitions
- Refresh VIN Information ➤ Consent Form
- Produce Health Report ➤ Metric Units

The screenshot shows the 'Isuzu Health Report Creator' application window. At the top, there's a red 'ISUZU' logo, the title 'Isuzu Health Report Creator', and a language selection dropdown set to 'English'. Below the title, there are three main sections: 'Data File Management', 'Health Report', and 'Options and Accessories'. Each section contains several buttons with descriptions. In 'Data File Management', there are 'Download VIN Information' (described as downloading from the server) and 'Refresh VIN Information' (described as refreshing from the server and local PC folder). In 'Health Report', there is a single button 'Produce Health Report' (described as creating a report using VIN information). In 'Options and Accessories', there are three buttons: 'Report Definitions' (described as opening reference information), 'Consent Form' (described as opening a customer form), and 'Metric Units' (described as toggling display units). At the bottom right of the window is an 'Exit' button.

Data File Management	
Download VIN Information	Download VIN information to this PC from the server.
Refresh VIN Information	Refresh VIN information stored on this PC from the server and local PC folder.

Health Report	
Produce Health Report	Create an ISUZU Health Report using VIN information on this PC.

Options and Accessories	
Report Definitions	Open the "Definitions" reference information.
Consent Form	Open the "Authorization to Extract Vehicle Data" customer form.
Metric Units	Toggle the display units for the generated report.

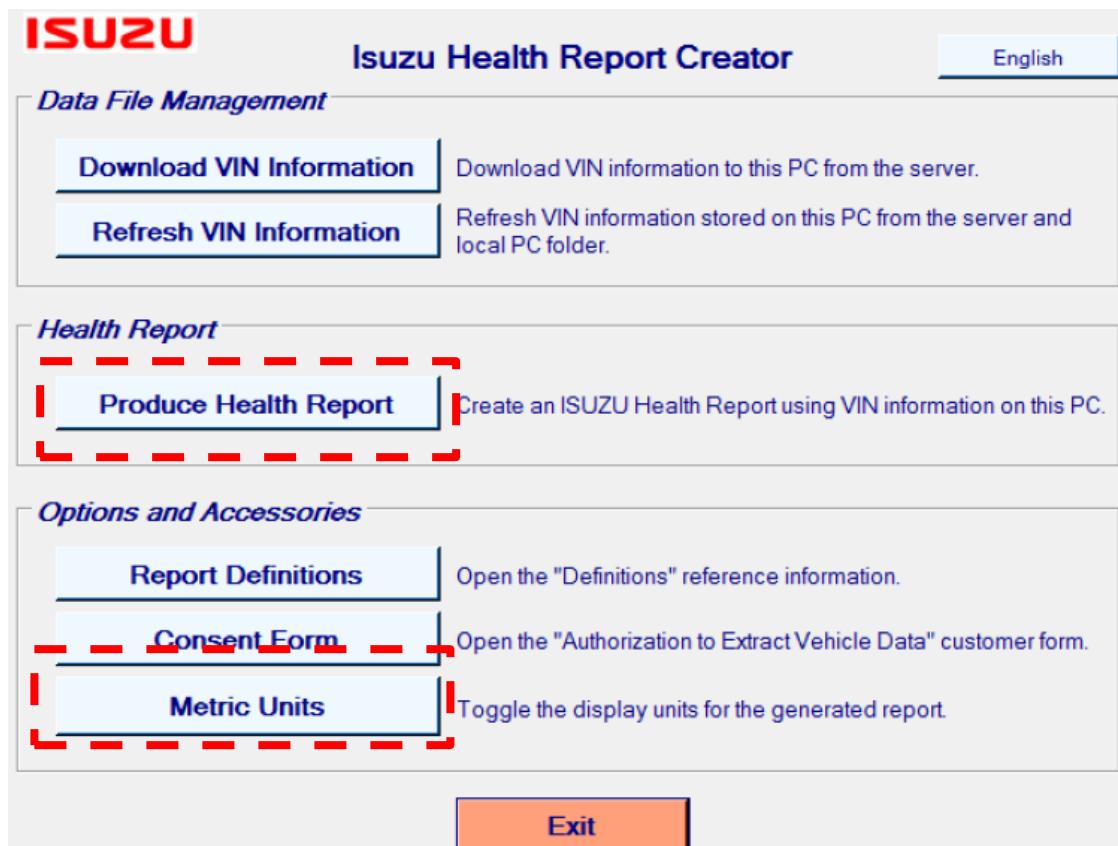
General Tools

General Tool Types

Diagnostic Tools

G-IDSS Health Report

Main Screen



- Check if the units are in “Metric”.
- After clicking the G-IDSS Health Report icon, click the “Produce Health Report” button to generate health report of a particular vehicle.

General Tools

General Tool Types

Diagnostic Tools

G-IDSS Health Report

Produce Health Report Window

Select VIN for Reporting

Enter Whole or Partial VIN (use *)
MP1TFR85J0G000511

Display VIN Data

Select VIN

Select Start Date

Select End Date

Create Health Report

VIN:

Start Date:

End Date:

Units: English

Create Health Report

Check Consent

Delete VIN

Finish

- Click “Display VIN” to show VIN numbers with downloaded DRM Data.
- Select the VIN number of the unit you want to generate health report at the “Select VIN” box.
- “Select Start Date” is where you will select the date that the report will start.
- “Select End Date” is where you will select the date the report will end.

General Tools

General Tool Types

Diagnostic Tools

G-IDSS Health Report

Produce Health Report Window

Select VIN for Reporting

Enter Whole or Partial VIN (use *)
JALC4W164F7004848

Display VIN Data

Select VIN

Select Start Date

Production Date
2016-01-11 20:27

Select End Date

2016-01-11 20:27
2016-04-20 20:09

Create Health Report

VIN: JALC4W164F7004848

Start Date: 2016-01-11 20:27

End Date: 2016-04-20 20:09

Units: English

Create Health Report

Check Consent

Delete VIN

Finish

- After selecting the necessary data, click the “Create Health Report” to generate the health report of the vehicle.
- The dates of DRM Download of a vehicle also shows in the “Select Start Date” so that you can set the date of your vehicle observation by downloading initial health report and final health report for comparison.

General Tools

General Tool Types

Diagnostic Tools

G-IDSS Health Report

Sample Data

Isuzu Vehicle Health Report		ISUZU
General Information		
Beginning Report Date:		Production Date
Ending Report Date:	2016-05-30	
VIN:	JAANPR75HF7XXXXXX	
Current Mileage:		
Fuel Economy Summary		
Distance Traveled:	75,978.08 km	
Fuel Consumed:	20,242.03 Liter	
Fuel Economy Category:	3.75 km/L	
Engine/Emission Condition Summary		
Engine Coolant Overtemperature Frequency:	376	
Mimamori ECU does not record overspeed events		
DPF Regeneration Status: Normal (69% completed)		
DPF Particulate Matter Accumulation Status: Normal		
Recent History Diagnostic Trouble Codes: ECM: P20C9, P1463, U0167, TCM: P1FFFFF907		
Braking Condition Summary		
Driver Braking Rating:	85	
Braking Energy Rating per Kilometer:	91	
Average Brake Pedal Applications per Kilometer:	0.52	
Legend		
DPF Generation Status		
A value of 0 - 28% indicates that the vehicle is being driven in a manner that may cause auto engine shutdown to prevent engine or DPF damage.		
A value of 29 - 64% indicates that the vehicle is being driven in a manner that does not regularly complete the regeneration process.		
A value of 65 - 100% indicates that the vehicle is being driven in a manner that is acceptable for proper regeneration.		
Driver Braking Rating		
A rating of 0 - 40 indicates that the driver has been braking very aggressively.		
A rating of 41 - 70 indicates that the driver has been braking aggressively.		
A rating of 71 - 100 indicates that the driver has been braking normally.		
Braking Energy Rating per		
A rating of 0 - 40 indicates that the brake system is absorbing vehicle stopping energy at a very high rate.		
A rating of 41 - 70 indicates that the brake system is absorbing vehicle stopping energy at a high rate.		
A rating of 71 - 100 indicates that the brake system is absorbing vehicle stopping energy at a normal rate.		

General Tools

General Tool Types

Diagnostic Tools

G-IDSS Health Report

Sample Data

General Information

Beginning Report Date:	Production Date
Ending Report Date:	2016-05-30
VIN:	JAANPR75HF7xxxxxx

Fuel Economy Summary

Distance Travelled:	75,978.08 km
Fuel Consumed:	20,242.05 liter
Fuel Economy Category:	3.75 km/L

Engine/Emission Condition Summary

Engine Coolant Overtemperature Frequency:	376 sec.
MIMAMORI ECU does not record overspeed events:	

Braking Condition Summary

Driver Braking Rating:	65
Braking Energy Rating per Kilometer:	91
Average Brake Pedal Application per Kilometer	0.52

General Tools

General Tool Types

Diagnostic Tools

G-IDSS Health Report

Sample Data

Legend

Driver Braking Rating

A rating of 0 – 40 indicates that the driver has been braking very aggressively.

A rating of 41 – 70 indicates that the driver has been braking aggressively.

A rating of 71 – 100 indicates that the driver has been braking normally.

Braking Energy Rating

A rating of 0 – 40 indicates that the brake system is absorbing vehicle stopping energy at a very high rate.

A rating of 41 – 70 indicates that the brake system is absorbing vehicle stopping energy at a high rate.

A rating of 71 – 100 indicates that the brake system is absorbing vehicle stopping energy at a normal rate.

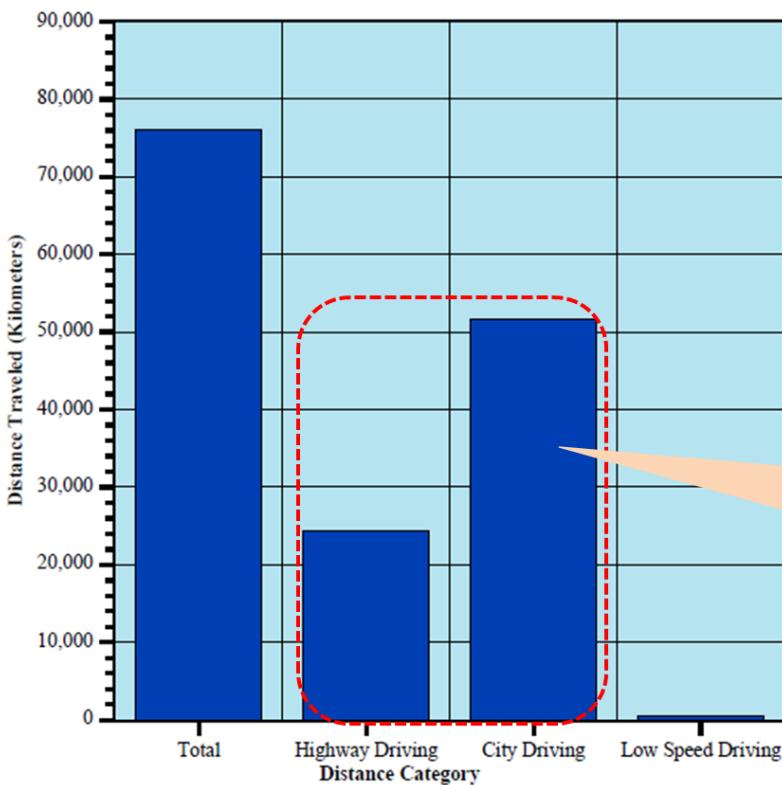
General Tools

General Tool Types

Diagnostic Tools

G-IDSS Health Report

Sample Data



VEHICLE HEALTH REPORT

Distance Traveled (Kilometer)

1. Total: 75,978.08
2. Highway Driving: 24,281.53
3. City Driving: 51,682.40
4. Low Speed Driving: 603.26

- The unit was vastly used on a city and highway driving (w/ an accumulated distance of 75,693.93 kms).

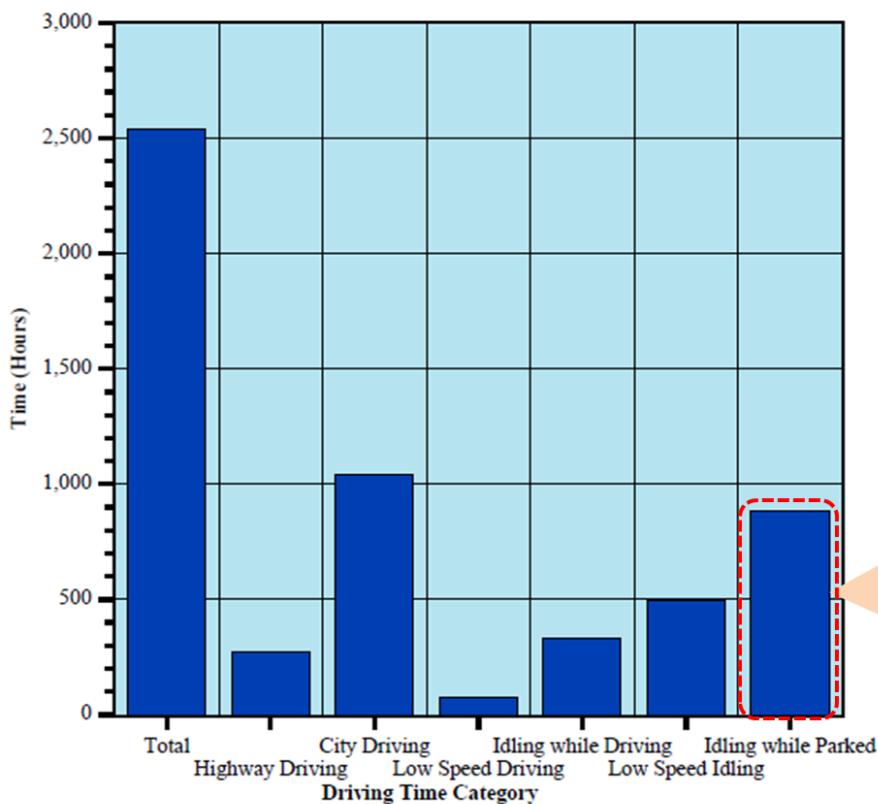
General Tools

General Tool Types

Diagnostic Tools

G-IDSS Health Report

Sample Data



VEHICLE HEALTH REPORT

Collection Time (Hours)

1. Total: 2,543.59
2. Highway Driving: 271.65
3. City Driving: 1,040.13
4. Low Speed Driving: 74.68
5. Idling while driving: 334.11
6. Low Speed Idling: 497.97
7. Idling while Parked: 883.09

- Most of the time, it was observed the vehicle is in operating in excessive idling condition (34%) that will greatly affect fuel economy.

General Tools

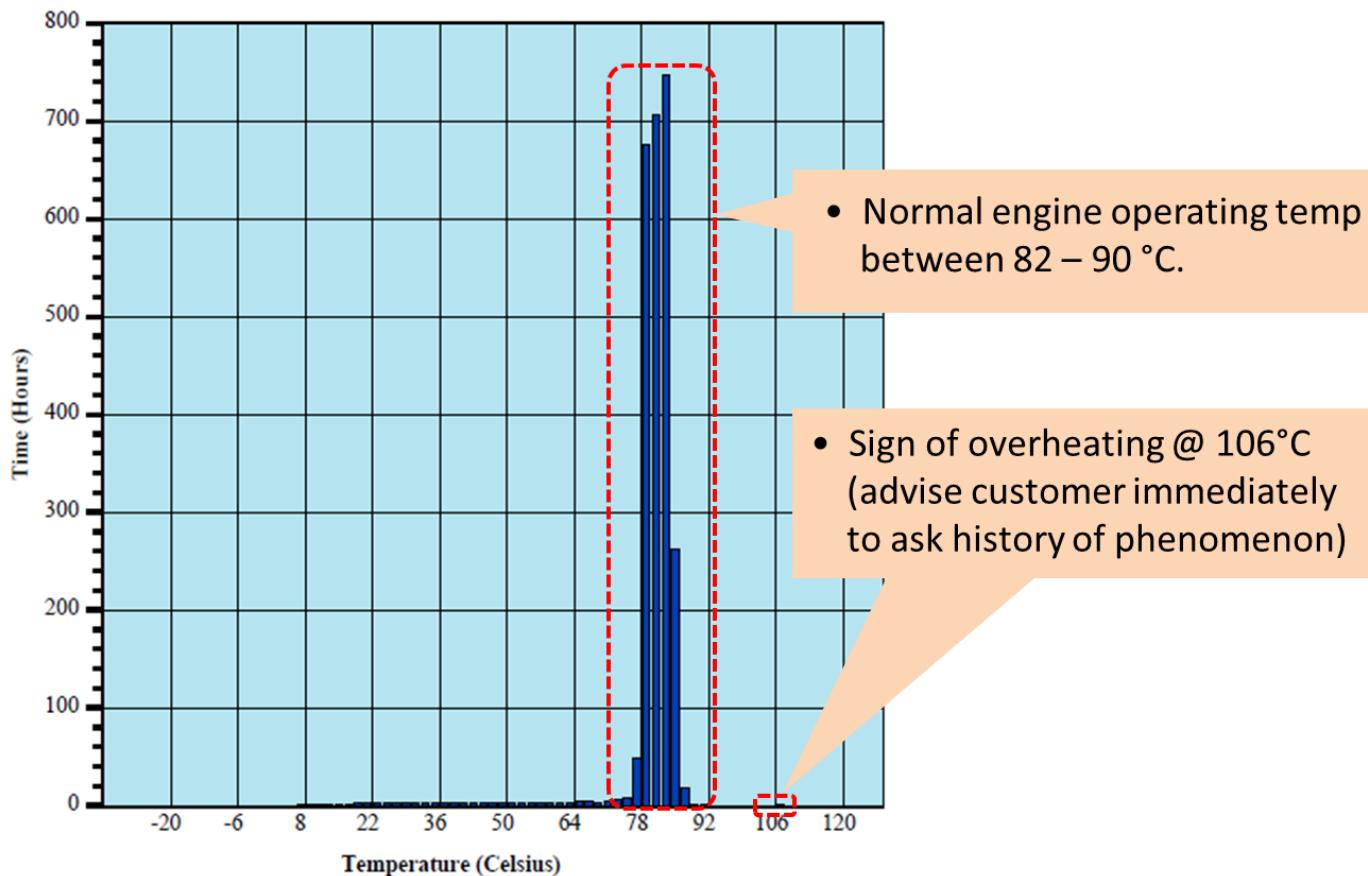
General Tool Types

Diagnostic Tools

G-IDSS Health Report

Sample Data

Engine Coolant Temperature Frequency (Celsius)



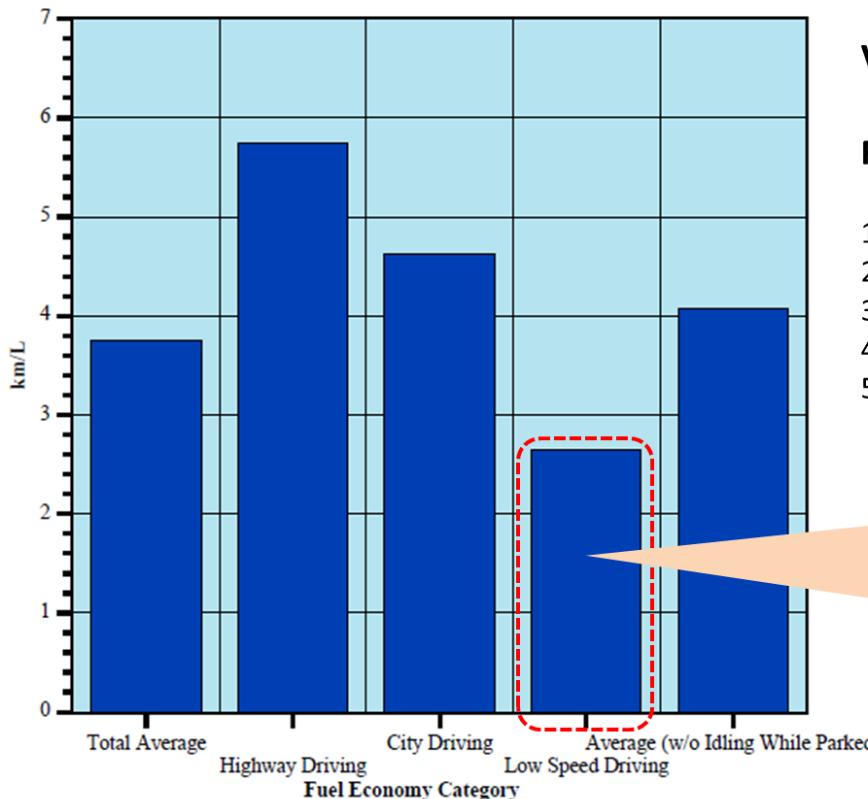
General Tools

General Tool Types

Diagnostic Tools

G-IDSS Health Report

Sample Data



VEHICLE HEALTH REPORT

Fuel Economy (km/L)

1. Total Average: 3.75
2. Highway Driving: 5.75
3. City Driving: 4.63
4. Low Speed Driving: 2.65
5. Average (Idling While Parked): 4.08

- The unit consumes more fuel in low speed driving (stop and go, traffic condition). Find a better route to minimize low speed driving (waze, mmda apps, etc.) or plan your trip.

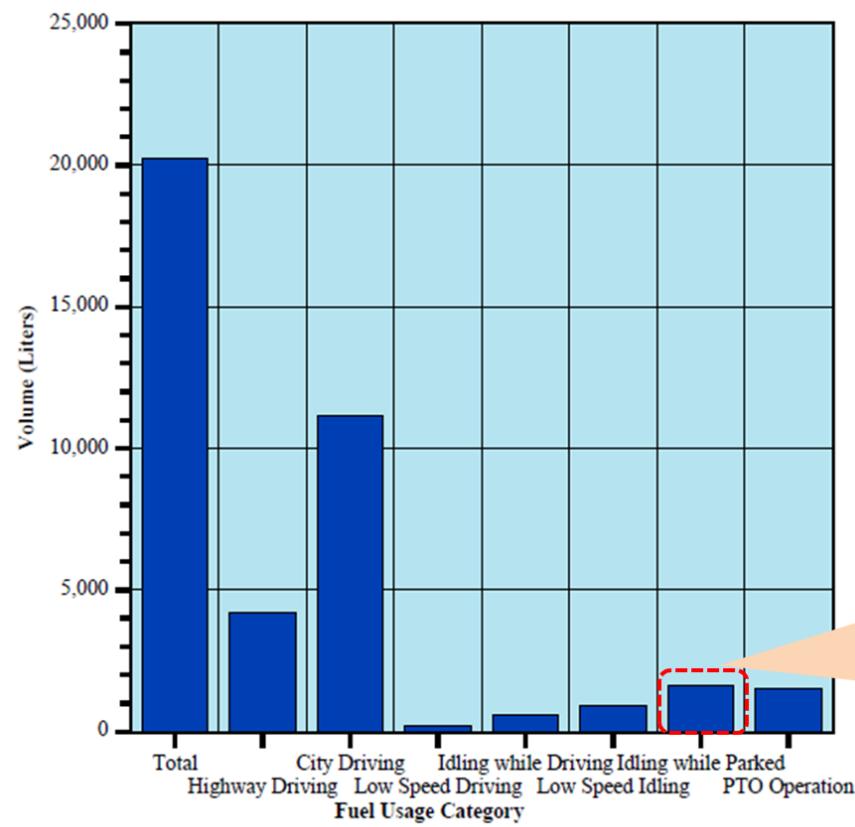
General Tools

General Tool Types

Diagnostic Tools

G-IDSS Health Report

Sample Data



VEHICLE HEALTH REPORT

Fuel Consumption (Liters)

1. Total: 20,242.03
2. Highway Driving: 4,222.72
3. City Driving: 11,169.44
4. Low Speed Driving: 227.34
5. Idling while Driving: 560.73
6. Low Speed Idling: 938.07
7. Idling while Parked : 1,622.27
8. PTO Operation: 1,501.46

• The vehicle wasted unnecessary fuel while in it is in Idling condition. Interview the driver and staff and find a solution on ways to improve fuel economy.

General Tools

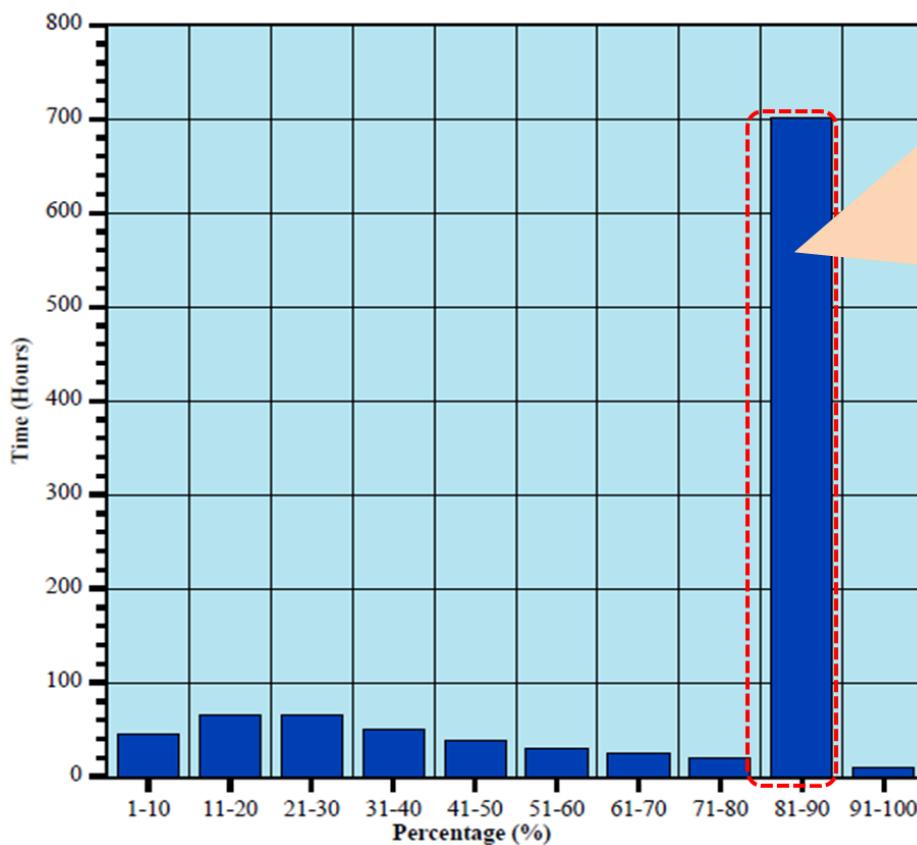
General Tool Types

Diagnostic Tools

G-IDSS Health Report

Sample Data

Accelerator Pedal Opening Frequency



- This confirms why high fuel consumption on the unit. The driver always pushes or press the accelerator pedal excessively ranging from 81 to 90% most of the time. (stop and go, city and highway driving).

General Tools

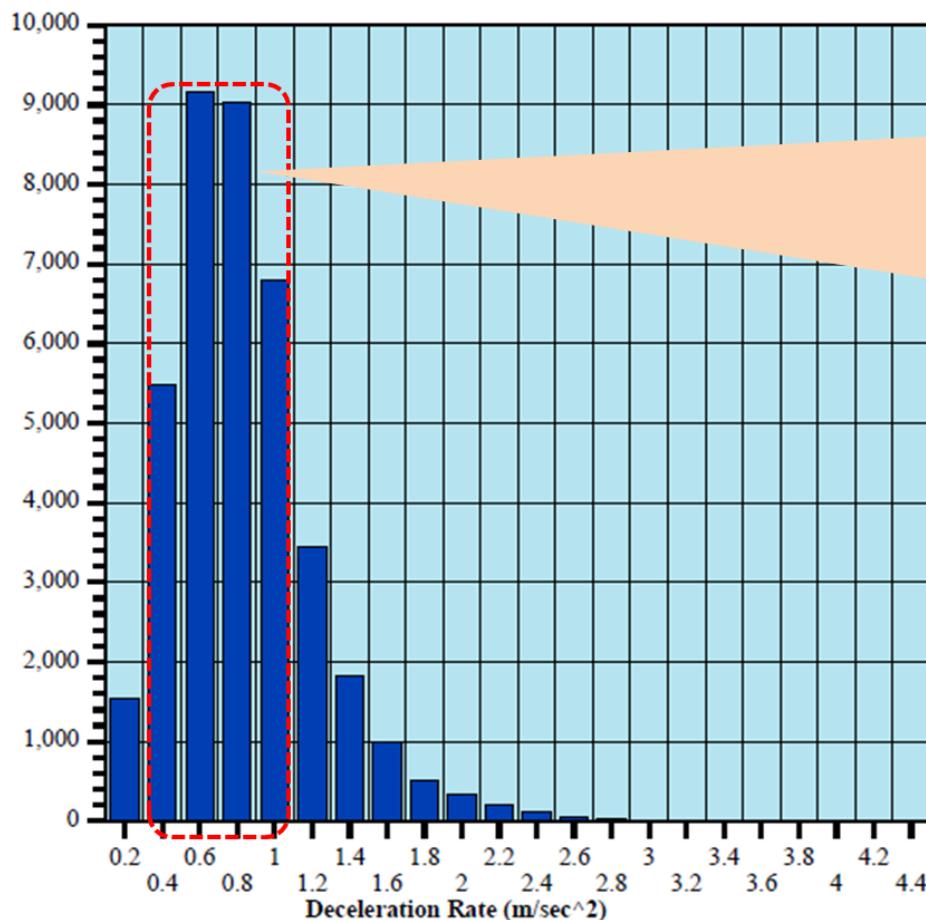
General Tool Types

Diagnostic Tools

G-IDSS Health Report

Sample Data

Deceleration Frequency (m/sec^2)



- The unit was observed to decelerate at a normal rate (the highest at 0.6 to 0.8 m/sec^2 most of the time), which indicates he is using the brakes efficiently.

General Tools

General Tool Types

Diagnostic Tools

G-IDSS Health Report

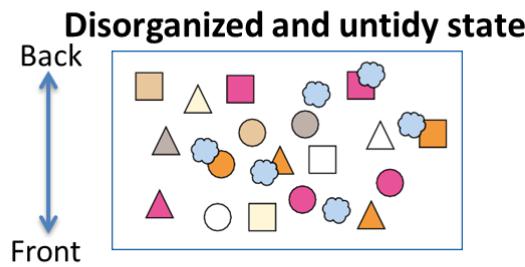
Sample Data (Summary and Recommendation)

- The driver is advised to change his driving habits as he was observed to drive aggressively (especially in city and low speed driving) which contributes to the vehicle's high fuel consumption.
- Too much use of engine braking to slow down the vehicle instead of the exhaust brake and shifting only to low gear ratio which contributes to high fuel consumption that could result a premature wear on engine and other transmission components.
- The driver was observed to use the brakes properly by applying appropriate force to slow down or stop the vehicle possibly by utilizing the auxiliary brakes (exhaust brake) when braking. This will greatly improved the life span of brake lining and other brake components.
- Plan your trip to minimize excessive fuel while the engine is in idling condition.

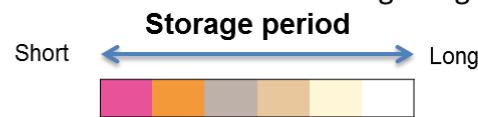
5S Policy

5S Activities

5S activities are the method for a safe, accurate and quick putaway and picking parts.

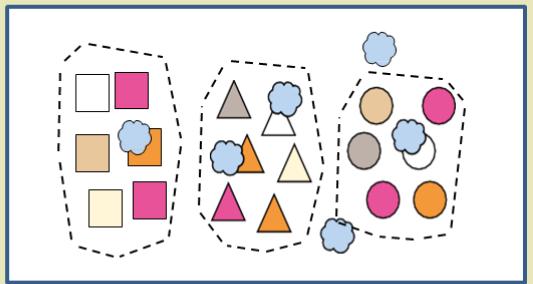


- Necessary items are mixed up with unnecessary items
- New items are mixed up with old items
- Parts cannot be picked out immediately
- The warehouse is scattered with garbage and dust



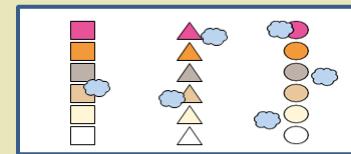
1. Sort (Seiri)

- Separate necessary and unnecessary items



2. Set in order (Seiton)

- Arrange parts with long storage periods in front
- Enable the immediate and accurate putaway of parts



Why are parts with longer storage periods place in front?

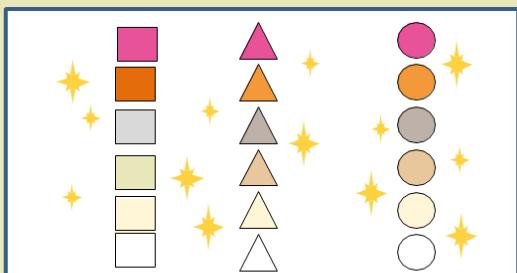
Longer storage periods lead to deterioration of parts quality, so placing these parts in front makes it easier to pick them (rule of first in, first out (FIFO)).

5S Policy

5S Activities

3. Shine (Seisou)

- Clean the warehouse completely
- Maintain machines and equipment so they can be used immediately



4. Sustain (Seiketsu)

Systematically carry out and repeat the three steps to keep safe, easy and comfortable working environment at all times.

Maintain high standards



5. Standardize (Shitsuke)

Training and discipline, to "do without being told"

Periodic Maintenance Service

Periodic Maintenance Service

Periodic Maintenance Service

A periodic maintenance describes the act of inspecting or testing the condition of car sub-systems (engine, transmission, underchassis, etc.) and servicing or replacing parts and fluids. Regular maintenance is critical to ensure the safety, reliability, drivability and comfort.

Recommended the so-called extreme or the ideal service schedule based on impact parameters such as;

- a. Number of trips and distance travelled per trip per day
- b. Extreme hot or cold climate conditions
- c. Normal paved, mountainous, dusty roads
- d. Heavy stop-and-go as against long distance cruising
- e. Towing a trailer or other heavy loads

Periodic Maintenance Service

Periodic Maintenance Service

PMS Menu for Euro 2 Vehicles

ISUZU CROSSWIND / D-MAX / mu-X / ALTERRA / N-SERIES / F-SERIES

Legend:

I : Inspect and correct or replace as necessary
 T : Tighten to the specified torque
 C : Clean / Check
 L : Lubricate

A : Adjust
 R : Replace
 D : Drain
 P : Perform

S/N	SERVICE ITEM	every 5K	every 10K	every 20K
1	Engine oil	R	R	R
2	Engine oil filter	R	R	R
3	Engine oil leakage and contamination	I	I	I
4	Engine Idling speed and acceleration	I	I	I
5	Fan belt tension and damage	I/A	I/A	I/A
6	All hoses and pipes in engine compartment for leak of damage	I	I	I
7	Valve clearance (Common Rail Engine)			I/A
8	Valve clearance (Non-Common Rail Engine)		I/A	I/A
9	Air cleaner element	I/C	I/C	R
10	Fuel filter		R	R
11	Drain fuel sedimentor	D/C	D/C	D/C
12	Engine coolant	I	I	R
13	Cooling system for water leakage	I	I	I
14	Clutch fluid	I	I	R
15	Clutch pedal travel and free play	I	I	I
16	Clutch system	I	I	I
17	[M/T] Manual transmission oil			R
18	[4WD M/T] Transfer case oil			R
19	[4WD M/T] Manual transmission and transfer case oil leakage	I	I	I
20	[A/T] Automatic transmission fluid	I	I	R
21	[A/T] Automatic transmission fluid filter (*every 60K) for (D-Max RT 50 and mu-X)			*C

Periodic Maintenance Service

Periodic Maintenance Service

PMS Menu for Euro 2 Vehicles

S/N	SERVICE ITEM	every 5K	every 10K	every 20K
22	[4WD A/T] Transfer case oil			R
23	[4WD A/T] Automatic transmission and transfer case oil leakage	I	I	I
24	Propeller shaft loose connections		I	I
25	Propeller shaft universal joints and splines for wear		I	I
26	[4WD] Propeller shaft universal joints and sliding sleeve		L	L
27	Differential gear oil (Front and rear)			R
28	Front and rear axle oil leakage	I	I	I
29	[4WD] Shift on the fly system operation		I	I
30	[4WD] Front axle shaft rubber boot for damage	I	I	I
31	Power steering fluid	I	I	R
32	Power steering oil leakage	I	I	I
33	Steering Column bolts for looseness or damage	I	I	I
34	Power steering hose	I	I	I
35	Steering wheel play	I	I	I
36	Steering function	I	I	I
37	Right and left turning radius	I	I	I
38	Steering joint ball for oil leakage or damage		I	I
39	Brake fluid	I	I	R
40	Brake system for fluid leakage	I	I	I
41	Brake function	I	I	I
42	Front disc brake pads and discs wear / lining and drum wear	I	I	I
43	Rear brake lining and drum wear	I	I	I
44	Brake pedal travel and play	I	I	I
45	Brake pipes and hoses for loose connections or damage	I	I	I
46	Parking brake function & cables for looseness or damage	I	I	I
47	Leaf/coil springs for damage		I	I
48	Suspension mount for looseness or damage		I	I
49	Shock absorbers for oil leakage		I	I

Periodic Maintenance Service

Periodic Maintenance Service

PMS Menu for Euro 2 Vehicles

S/N	SERVICE ITEM	every 5K	every 10K	every 20K
50	Shock absorbers mount for looseness		I	I
51	Rubber bushes of suspension wear or damage		I	I
52	Grease, Hub Bearing			R
53	Tire air pressure and damage	C	C	C
54	Tire rotation		P	P
55	Bolts and Nuts on chassis and body	T	T	T
56	[F Series] Front brake lining and drum wear		I	I
57	[F Series] Rear brake lining and drum wear		I	I
58	[F Series] King Pin	L	L	L
59	[F Series] Center Bearing, Propeller Shaft	L	L	L
60	[F Series] Bushing, Leaf Spring	L	L	L
61	[F Series] Water Pump	L	L	L
62	[F Series] Brake Lining Adjust /Thickness	I	I	I

Periodic Maintenance Service

Periodic Maintenance Service

PMS Menu for Euro 2 Vehicles

ISUZU HEAVY DUTY TRUCKS (C & E SERIES)

Legend:

I : Inspect and correct or replace as necessary

T : Tighten to the specified torque

C : Clean / Check

L : Lubricate

A : Adjust

R : Replace

D : Drain

P : Perform

S/N	SERVICE ITEM	every 5K	every 10K	every 20K
1	Engine oil		R	R
2	Engine oil filter - Main		R	R
3	Engine oil filter - Partial		R	R
4	Engine oil leakage and contamination	I	I	I
5	Engine idling speed and acceleration	I	I	I
6	Fan belt tension and damage	I/A	I/A	I/A
7	All hoses and pipes in engine compartment for leak and damage	I	I	I
8	Valve clearance (Common Rail Engine)			I/A
9	Air cleaner element	I/C	I/C	R
10	Main fuel filter			R
11	Pre-fuel filter element			R
12	Engine coolant (Replace every two yrs)	I	I	R (@2yrs)
13	Cooling system for water leakage	I	I	I
14	Clutch fluid			R
15	Clutch pedal travel and free play	I	I	I
16	Clutch system	I	I	I
17	Transmission gear oil			R
18	Propeller shaft loose connections	I	I	I
19	Propeller shaft universal joints and spline for wear			I
20	Propeller shaft universal joints and sliding sleeve	L	L	L
21	Differential gear oil			R

Periodic Maintenance Service

Periodic Maintenance Service

PMS Menu for Euro 2 Vehicles

S/N	SERVICE ITEM	every 5K	every 10K	every 20K
22	Front and rear axle oil leakage			R
23	Power steering fluid			R
24	Power steering oil leakage	I	I	I
25	Steering column bolts for looseness or damage	I	I	I
26	Power steering hose	I	I	I
27	Steering wheel free-play	I	I	I
28	Steering function		I	I
29	Right and left turning radius	I	I	I
30	Steering ball joint for oil leakage or damage		I	I
31	Brake fluid		n/a	
32	Brake system for fluid leakage	I	I	I
33	Brake function	I	I	I
34	Brake pedal travel and free-play	I	I	I
35	Brake pipes and hoses for loose connections or damage	I	I	I
36	Parking brake function & cables for looseness or damage	I	I	I
37	Leaf / coil springs for damage		I	I
38	Suspension mount for looseness or damage		I	I
39	Shock absorbers for oil leakage		I	I
40	Shock absorbers mount for looseness		I	I
41	Rubber bushing of suspension wear or damage		I	I
42	Grease, hub bearing (* every 40K)			*R
43	Tire air pressure and damage	C	C	C
44	Bolts and nuts on chassis / body	T	T	T
45	Front and rear brake lining wear	I	I	I
46	Front and rear drum wear			I
47	King pin	L	L	L
48	Center bearing, propeller shaft	L	L	L
49	Bushing, leaf spring	L	L	L

Periodic Maintenance Service

Periodic Maintenance Service

PMS Menu for Euro 2 Vehicles

S/N	SERVICE ITEM	every 5K	every 10K	every 20K
50	Brake lining adjustment / thickness	I	I	I
51	Water pump (6WF1)	L	L	L
52	Air dryer	R – every two yrs		
53	Power steering fluid filter (* Every 50K)	*I		
54	Function of brake chamber	I	I	I
55	Brake chamber boots and diaphragm	*R- every two yrs		
56	Tierod end greasing (*every 25K)	*L- every 25K		
57	Function of brake valve	I	I	I
58	ABS Modulator	*R – every two yrs		
59	Electro-hydraulic cab tilt pump oil	*R – every two yrs		
60	Intake and exhaust manifold (*every 40K)	*T- every 40K		
61	Air compressor, governor and unloader valve functions (*every 40 K)	*T- every 40K		
62	Leaf spring U-bolt and nut			T

ADD ON SERVICE ITEMS		Remarks
1	Air-con General Service	Every 25K or 1 year, whichever comes first
2	Wheel Alignment	As needed
3	Injection timing (4JA1 / 4JB1 / 4HF1 / 4HG1)	As needed
4	Injector Nozzle Spray Pattern (4JA1 / 4JB1 / 4HF1 / 4HG1)	As needed
5	[F Series] Tire Rotation	As needed

Periodic Maintenance Service

Periodic Maintenance Service

Standard Fluids and Lubricants for Euro 2 Vehicles

a. Isuzu Crosswind

Parts and Materials Periodic Maintenance	REPLACEMENTSCHEDULE										
	Engine Oil (litres)	Oil Filter (pc)	Manual Trans. Oil (liter)	Auto Trans. Fluid (liter)	Fuel Filter (pc)	Air Filter (pc)	Engine Coolant (liter)	Brake Fluid (liter)	Clutch Fluid for manual trans (liter)	Power Steering Fluid (liter)	Rear Diff. Gear Oil (liter)
1,500 km	5 L	1	2 L								2 L
5,000 km, 15,000 km, 25,000 km, 35,000 km, 45,000 km, 55,000 km, 65,000 km, 75,000 km, 85,000 km, 95,000 km	5 L	1									
10,000 km, 30,000 km, 50,000 km, 70,000 km, 90,000 km	5 L	1			1						
20,000 km, 40,000 km, 60,000 km, 80,000 km, 100,000 km	5 L	1	2 L	3 L	1	1	5 L	0.5 L	0.20 L	0.5 L	2 L

Periodic Maintenance Service

Periodic Maintenance Service

Standard Fluids and Lubricants for Euro 2 Vehicles

b. Isuzu Alterra / Isuzu D-Max / Isuzu mu-X

Parts and Materials	REPLACEMENT SCHEDULE												
	Engine (Oil filter)	Oil Filter (pc)	Manual Trans. Oil (liter)	Auto Trans. Fluid (liter)	Fuel Filter	Air Filter	Engine Coolant (liter)	Brake Fluid (liter)	Clutch Fluid for manual trans (liter)	Power Steering Fluid (liter)	for 4WD		Rear Diff. Gear Oil (liter)
											4x4 Transfer Case Oil (liter)	Front Diff. Gear Oil (liter)	
1,500 km	7.6 L	1	3 L										3 L
5,000 km, 15,000 km, 25,000 km, 35,000 km, 45,000 km, 55,000 km, 65,000 km, 75,000 km, 85,000 km, 95,000 km	7.6 L	1											
10,000 km, 30,000 km, 50,000 km, 70,000 km, 90,000 km	7.6 L	1			1								
20,000 km, 40,000 km, 60,000 km, 80,000 km, 100,000 km	7.6 L	1	3 L	3.5 L	1	1	8 L	0.5 L	0.2 L	0.5 L	2 L	1.5 L	3 L

Periodic Maintenance Service

Periodic Maintenance Service

Standard Fluids and Lubricants for Euro 2 Vehicles

c. Isuzu D-Max (RT-50) / Isuzu mu-X Recommended Lubricants and Fluids

	SYSTEM	BRAND / SPECIFICATION	PART NO.	SUPPLY FORM	CAPACITY
1.	Engine Oil (4JJ1/4JK1)	Besco Genuine SAE 10W-30	1884057460	Gallons	7.5 L
		Isuzu Genuine Motor OIL (IGMO) "Extreme" SAE 15W-40 API CH-4	As per dealer assigned P/N		
2.	Transmission Oil MUA (4x2) / MUX 4x4)	Besco Transaxle Oil SAE 5W-30	1884057520	Pail	3.0L (M/T) 2.0L Transfer Case
3.	Automatic Transmission (TB-50LS)	Mobil AT3309	SOTFR00061L	Quarts	10.2L(Overhauling) 2.9L (Change Oil)
4.	Front Differential	Unioil 80W-90 Thuban GL-5 EP SAE 140	LSD80W-9000 As per dealer assigned P/N	Liters	2.0 L
5.	Rear Differential (4x2) / (4 x 4) mu-X	Thuban GL-5 EP SAE 140	As per Dealer assigned P/N	Drum	3.0 L
6.	Rear Differential (4x4)	Besco Gear Oil LSD SAE 140 (RT50)	1884057860	Gallons	3.0 L
7.	Power Steering Oil	Texamatic 8885	510279243CL	Liters	1.0 L
8.	Engine Coolant	LLC Premix	510279296CL	Liters	10.0 L
9.	Brake Fluid	DOT 3		250ml / 500ml	1.0 L

Periodic Maintenance Service

Periodic Maintenance Service

Standard Fluids and Lubricants for Euro 2 Vehicles

Vehicle Model		Engine Oil (L)	Transmission Oil (L)		Differential Oil (L)		Transfer Case Oil (L)	Engine Coolant (L)	P/S Fluid (L)	Brake Fluid (L)	Clutch Fluid (for M/T models)
			A/T	M/T	Front	Rear					
Alterra	4 x 2	7.6	3.5	3.0		3.0		8.0	0.5	0.5	0.2
	4 x 4	7.6	3.5	3.0	1.5	3.0	2.0	8.0	0.5	0.5	0.2
D-Max	4 x 2	7.6	3.5	3.0		3.0		8.0	0.5	0.5	0.2
	4 x 4	7.6	3.5	3.0	1.5	3.0	2.0	8.0	0.5	0.5	0.2
TBR 07		5.0	3.0	2.0		2.0		5.0	0.5	0.5	0.2
TBR 05		4.5	3.0	2.0		2.0		5.0	0.5	0.5	0.2
NHR55		7.5		4.0		3.0		10.0	2.0		2.0
NKR71	9.5			6.0		3.0		10.0	2.0		2.0
NPR71				6.0		8.0		10.0	2.0		2.0
NQR71				6.0		8.0		10.0	2.0		2.0
FSR34	18.0			10.0		12.0		29.0	4.0	2.0	1.0
FVR34				10.0		12.0		29.0	4.0	2.0	1.0
LT132		14.0		10.0		12.0		29.0	4.0		1.0

Periodic Maintenance Service

Periodic Maintenance Service

Standard Fluids and Lubricants for Euro 2 Vehicles

d. Lubrication Capacity per Model (Isuzu C & E Series)

Description		Capacity (li.)			Viscosity / Specification
		CYZ/CYH51	EXZ 51	EXR51	
ENGINE OIL		28 liters	28 liters	28 liters	SAE 15W-40, SAE 10W-30 (API CI-4 / CH-4 / CF-4 or Higher Grade)
TRANSMISSION OIL		19 liters	17 liters	19 liters	SAE 90
DIFFERENTIAL OIL	Front	18 liters	18 liters	18 liters	SAE 140, GL5 (Hypoid Gear)
	Rear	12 liters	12 liters	N/A	
STEERING OIL		6 liters	6 liters	6 liters	Automatic Transmission Fluid (ATF) Dextron III, Type A
CLUTCH FLUID		1 liter	1 liter	1 liter	DOT 3
ENGINE COOLANT		45 liters	45 liters	45 liters	Besco LLC

Periodic Maintenance Service

Periodic Maintenance Service

PMS Menu for Euro 4 Vehicles

ISUZU D-MAX / mu-X / N-SERIES

Legend:

I : Inspect and correct or replace as necessary
 T : Tighten to the specified torque
 C : Clean / Check
 L : Lubricate

A : Adjust
 R : Replace
 D : Drain
 P : Perform

S/N	SERVICE ITEM	First 1.5K	every 5K	every 10K	every 20K
1	Engine oil	R	R	R	R
2	Engine oil filter	R	R	R	R
3	Engine oil leakage and contamination	I	I	I	I
4	Engine Idling speed and acceleration	I	I	I	I
5	Fan belt tension and damage	I / A	I / A	I / A	I / A
6	All hoses and pipes in engine compartment for leak of damage	I	I	I	I
7	Valve clearance (Common Rail Engine)	-	-	-	I / A
8	Valve clearance (Non-Common Rail Engine)	-	-	I / A	I / A
9	Air cleaner element	-	I / C	I / C	R
10	Fuel filter	I	-	R	R
11	Drain fuel sedimenter	D / C	D / C	D / C	D / C
12	Engine coolant	I	I	I	R
13	Cooling system for water leakage	I	I	I	I
14	Clutch fluid	I	I	I	R
15	Clutch pedal travel and free play	I	I	I	I
16	Clutch system	I	I	I	I
17	[M/T] Manual transmission oil	R	-	-	R
18	[4WD M/T] Transfer case oil	-	-	-	R
19	[4WD M/T] Manual transmission and transfer case oil leakage	I	I	I	I
20	[A/T] Automatic transmission fluid	I	I	I	R
21	[A/T] Automatic transmission fluid filter (JR405 Transmission)	C – EVERY 60K			

Periodic Maintenance Service

Periodic Maintenance Service

PMS Menu for Euro 4 Vehicles

S/N	SERVICE ITEM	First 1.5K	every 5K	every 10K	every 20K
22	[4WD A/T] Automatic transmission and transfer case oil leakage				
23	Propeller shaft loose connections		-		
24	Propeller shaft universal joints and splines for wear		-		
25	[4WD] Propeller shaft universal joints and sliding sleeve		-	L	L
26	Differential gear oil (Front and rear)	R	-	-	R
27	Front and rear axle oil leakage				
28	[4WD] Shift on the fly system operation	-	-		
29	[4WD] Front axle shaft rubber boot for damage				
30	Power steering fluid				R
31	Power steering oil leakage				
32	Steering Column bolts for looseness or damage				
33	Power steering hose				
34	Steering wheel play				
35	Steering function	-			
36	Right and left turning radius				
37	Steering ball joint for oil leakage or damage		-		
38	Brake fluid				R
39	Brake system for fluid leakage				
40	Brake function				
41	Front disc brake pads and discs wear / lining and drum wear				
42	Rear brake lining and drum wear				
43	Brake pedal travel and play	-			
44	Brake pipes and hoses for loose connections or damage				
45	Parking brake function & cables for looseness or damage				
46	Leaf/coil springs for damage		-		
47	Suspension mount for looseness or damage		-		
48	Shock absorbers for oil leakage		-		

Periodic Maintenance Service

Periodic Maintenance Service

PMS Menu for Euro 4 Vehicles

S/N	SERVICE ITEM	First 1.5K	every 5K	every 10K	every 20K
49	Shock absorbers mount for looseness	I	-	I	I
50	Rubber bushes of suspension wear or damage	I	-	I	I
51	Grease, Hub Bearing	-	-	-	R
52	Tire air pressure and damage	-	C	C	C
53	Tire rotation	-	-	P	P
54	Bolts and Nuts on chassis and body	T	T	T	T

Periodic Maintenance Service

Periodic Maintenance Service

PMS Menu for Euro 4 Vehicles

ISUZU F-SERIES

Legend:

I : Inspect and correct or replace as necessary
 T : Tighten to the specified torque
 C : Clean / Check
 L : Lubricate

A : Adjust
 R : Replace
 D : Drain
 P : Perform

S/N	SERVICE ITEM	First 1.5K	every 5K	every 10K	every 20K	every 40K
1	Engine oil	R	-	R	R	R
2	Engine oil filter	R	-	R	R	R
3	Engine oil leakage and contamination	-	I	I	I	I
4	Engine Idling speed and acceleration	-	I	I	I	I
5	Fan belt tension and damage	I/A	I/A	I/A	I/A	I/A
6	All hoses and pipes in engine compartment for leak or damage	-	I	I	I	I
7	Valve clearance	-	-	-	-	I/A
8	Air cleaner element	-	I	I	I/R	I/R
9	Main fuel filter	-	-	-	R	R
10	Pre fuel filter	-	-	-	R	R
11	Engine coolant	I – EVERY (1) YEAR R – EVERY (2) YEARS OR 40K KILOMETERS				
12	Cooling system for water leakage	I – EVERY (1) YEAR				
13	Clutch fluid	R – EVERY (1) YEAR OR 20K KILOMETERS				
14	Clutch pedal travel and free play	-	I	I	I	I
15	Clutch system	-	I	I	I	I
16	Transmission gear oil	R	-	-	R	R
17	[4WD] Transfer case oil	-	-	-	R	R
18	[4WD AND/OR M/T] Transmission and transfer case oil leakage	-	I	I	I	I

Periodic Maintenance Service

Periodic Maintenance Service

PMS Menu for Euro 4 Vehicles

S/N	SERVICE ITEM	First 1.5K	every 5K	every 10K	every 20K	every 40K
19	Propeller shaft loose connections	-	I	I	I	I
20	Propeller shaft universal joints and splines for wear	-	-	-	I	I
21	[4WD] Propeller shaft universal joints and sliding sleeve	-	L	L	L	L
22	Differential gear oil (Front and rear)	R	-	-	R	R
23	Front and rear axle oil leakage	-	I	I	I	I
24	Power steering fluid	-	-	-	-	R
25	Power steering oil leakage	-	I	I	I	I
26	Steering Column bolts for looseness or damage	-	I	I	I	I
27	Power steering hose	-	I	I	I	I
28	Steering wheel play	-	I	I	I	I
29	Steering function	-	-	I	I	I
30	Right and left turning radius	-	I	I	I	I
31	Steering ball joint for oil leakage or damage	-	-	I	I	I
32	Brake fluid	R – EVERY (1) YEAR OR 20K KILOMETERS				
33	Brake system for fluid leakage	-	I	I	I	I
34	Brake function	-	I	I	I	I
35	Brake pedal travel and play	-	I	I	I	I
36	Brake pipes and hoses for loose connections or damage	-	I	I	I	I
37	Parking brake function & cables for looseness or damage	I	I	I	I	I
38	Front and rear drum wear	-	-	-	I	I
39	Front and rear brake lining adjust / thickness / wear	-	I	I	I	I
40	Leaf / coil springs for damage	-	-	I	I	I

Periodic Maintenance Service

Periodic Maintenance Service

PMS Menu for Euro 4 Vehicles

S/N	SERVICE ITEM	First 1.5K	every 5K	every 10K	every 20K	every 40K
41	Suspension mount for looseness or damage	-	-	I	I	I
42	Shock absorbers for oil leakage	-	-	I	I	I
43	Shock absorbers mount for looseness	-	-	I	I	I
44	Rubber bushes of suspension wear or damage	-	-	I	I	I
45	Grease, Hub Bearing	-	-	-	-	R
46	Tire air pressure and damage	-	C	C	C	C
47	Water Pump (6HK1)	-	L	L	L	L
48	Air dryer cartridge	R – EVERY 60K				
49	Function of brake chamber (Full air brake system)	-	I	I	I	I
50	Brake chamber boots and diaphragm (Full air brake system)	R – EVERY (2) YEARS				
51	Function of brake valve (Full air brake system)	I	I	I	I	I
52	Air compressors, governors, and unloader valve functions (Full air brake system)	-	-	-	-	I
53	Power steering fluid filter	I – EVERY 50K				
54	Tie rod end greasing	L – EVERY 25K				
55	Intake and exhaust manifolds	T	-	-	-	T
56	Leaf spring U-bolt nut	T	-	-	T	T
57	Wheel nuts	T	T	T	T	T

Periodic Maintenance Service

Periodic Maintenance Service

PMS Menu for Euro V Heavy Duty Trucks

ISUZU HEAVY DUTY TRUCKS (C & E SERIES)

Legend:

I : Inspect and correct or replace as necessary
 T : Tighten to the specified torque
 C : Clean / Check
 L : Lubricate

A : Adjust
 R : Replace
 D : Drain
 P : Perform

S/N	SERVICE ITEM	First 1.5K	every 5K	every 10K	every 20K	every 40K
1	Engine oil	R	-	R	R	R
2	Engine oil filter – Main	-	-	R	R	R
3	Engine oil filter – Partial	-	-	-	R	R
4	Engine oil leakage and contamination	-	I	I	I	I
5	Engine idling speed and acceleration	-	I	I	I	I
6	Fan belt tension and damage	I/A	I/A	I/A	I/A	I/A
7	All hoses and pipes in engine compartment for leak and damage	-	I	I	I	I
8	Valve clearance (Common Rail Engine)	-	-	-	-	I/A
9	Air cleaner element	-	I	I	I/R	I/R
10	Main fuel filter	-	-	-	R	R
11	Pre-fuel filter element	-	-	-	R	R
12	Engine coolant	I – EVERY (1) YEAR R – EVERY (2) YEARS OR 40K KILOMETERS				
13	Cooling system for water leakage	-	I	I	I	I
14	Clutch fluid	R – EVERY (1) YEAR OR 20K KILOMETERS				
15	Clutch pedal travel and free play	-	I	I	I	I
16	Clutch system	-	I	I	I	I
17	Transmission gear oil	R	-	-	R	R
18	Propeller shaft loose connections	-	I	I	I	I
19	Propeller shaft universal joints and spline for wear	-	-	-	I	I
20	Propeller shaft universal joints and sliding sleeve	-	L	L	L	L
21	Differential gear oil	R	-	-	R	R

Periodic Maintenance Service

Periodic Maintenance Service

PMS Menu for Euro V Heavy Duty Trucks

S/N	SERVICE ITEM	First 1.5K	every 5K	every 10K	every 20K	every 40K
22	Front and rear axle oil leakage	-				
23	Power steering fluid	-	-	-	-	R
24	Power steering oil leakage	-				
25	Steering column bolts for looseness or damage	-				
26	Power steering hose	-				
27	Steering wheel play	-				
28	Steering function	-	-			
29	Right and left turning radius	-				
30	Steering ball joint for oil leakage or damage	-	-			
31	Brake function	-				
32	Brake pedal travel and free-play	-				
33	Brake pipes and hoses for loose connections or damage	-				
34	Parking brake function & cables for looseness or damage					
35	Leaf / coil springs for damage	-	-			
36	Suspension mount for looseness or damage	-	-			
37	Shock absorbers for oil leakage	-	-			
38	Shock absorbers mount for looseness	-	-			
39	Rubber bushing of suspension wear or damage	-	-			
40	Grease, hub bearing	-	-	-	-	R
41	Tire air pressure and damage	-	C	C	C	C
42	Bolts and nuts on chassis / body	-	T	T	T	T
43	Front and rear brake lining adjust / thickness / wear	-				
44	Front and rear drum wear	-	-	-		
45	King pin	-	L	L	L	L
46	Center bearing, propeller shaft	-	L	L	L	L
47	Bushing, leaf spring	-	L	L	L	L

Periodic Maintenance Service

Periodic Maintenance Service

PMS Menu for Euro V Heavy Duty Trucks

S/N	SERVICE ITEM	First 1.5K	every 5K	every 10K	every 20K	every 40K
48	Water pump (6WF1)	-	L	L	L	L
49	Air dryer		R – EVERY 60K KILOMETERS			
50	Power steering fluid filter		I – EVERY 50K KILOMETERS			
51	Function of brake chamber	-	I	I	I	I
52	Brake chamber boots and diaphragm		R – EVERY (2) YEARS			
53	Tie rod end greasing		L – EVERY 25K KILOMETERS			
54	Function of brake valve	I	I	I	I	I
55	Intake and exhaust manifold (*every 40K)	T	-	-	-	T
56	Air compressor, governor and unloader valve functions (*every 40K)	-	-	-	-	T
57	Leaf spring U-bolt and nut	T	-	-	T	T
58	Wheel nuts	T	T	T	T	T

Periodic Maintenance Service

Periodic Maintenance Service

PMS Menu for EXR and EXZQL Euro V Heavy Duty Trucks

I: Inspect and correct , or replace as necessary

A: Adjust

T: Tighten to the specified torque

R: Replace

C: Clean / Check

D: Drain

L: Lubricate

P : Perform

S/N	SERVICE ITEM	First 1500	every 5K	every 10K / 30K / 50K / 70K / 90K	every 20K / 100K / 140K	every 40K, 80K, 120K	every 60K
31	Right and left turning radius	I	I	I	I	I	I
32	Steering joint ball for oil leakage or damage			I	I	I	I
33	Brake system for air leakage	I	I	I	I	I	I
34	Brake chamber function	I	I	I	I	I	I
35	Brake valve function	I	I	I	I	I	I
36	Front and Rear brake lining wear			I	I	I	I
37	Front and Rear brake drum wear			I	I	I	I
38	Brake lining adjust /thickness		I	I	I	I	I
39	Brake pedal travel and play		I	I	I	I	I
40	Brake hoses for loose connections or damage	I	I	I	I	I	I
41	Parking brake control valve system function & hoses for looseness or damage	I	I	I	I	I	I
42	Leaf springs for damage		I	I	I	I	I
43	Leaf spring U-bolt nut		T		T	T	T
44	Trunnion Shaft		L	L	L	L	L
45	Suspension mount for looseness or damage		I	I	I	I	I
46	Shock absorbers for oil leakage		I	I	I	I	I
47	Shock absorbers mount for looseness		I	I	I	I	I
48	King Pin		L	L	L	L	L
49	Tie rod end greasing				L	L	L
50	Steering Link Arm greasing				L	L	L
51	Center Bearing, Propeller Shaft		L	L	L	L	L
52	Rubber bushes of suspension wear or damage		I	I	I	I	I
53	Grease,Hub Bearing (Front only)					R	
54	Grease,Hub Bearing (Rear only) Non Meritor Axle					R	
55	Bolts and Nuts on chassis and body			T	T	T	T
56	Tire air pressure and damage	C	C	C	C	C	C
57	Tire rotation			P	P	P	P
58	Water Pump leakage		I	I	I	I	I
59	Air-Con filter			I/C	I/C	I/C	I/C
60	Air-Con General Service				Perform (every 25K)		
61	Air dryer - Cartridge				R- EVERY 100K OR 1 YEAR		

Periodic Maintenance Service

Periodic Maintenance Service

PMS Menu for EXR and EXZQL Euro V Heavy Duty Trucks

I: Inspect and correct , or replace as necessary

A: Adjust

T: Tighten to the specified torque

R: Replace

C: Clean / Check

D: Drain

L: Lubricate

P : Perform

S/N	SERVICE ITEM	First 1500	every 5K	every 10K / 30K / 50K / 70K / 90K	every 20K / 100K / 140K	every 40K, 80K, 120K	every 60K
1	Engine oil	R		R	R	R	R
2	Engine oil filter (Main)			R	R	R	R
3	Engine oil filter (Partial)				R	R	R
4	Engine oil leakage and contamination	I	I	I	I	I	I
5	Engine Idling speed and acceleration	I	I	I	I	I	I
6	Drive belt tension and damage	I/A	I/A	I/A	I/A	I/A	I/A
7	All hoses and pipes in engine compartment for leak of damage	I	I	I	I	I	I
8	Valve clearance	I/A				I/A	
9	Intake and exhaust manifolds	T				T	
10	Air cleaner element		C	C	R	R	R
11	Fuel filter (Main)				R	R	R
12	Fuel filter (Pre)				R	R	R
13	Urea Filter (SCR System)					R	
14	Engine coolant	I	I	I	I	R	I
15	Cooling system for water leakage	I	I	I	I	I	I
16	Clutch fluid	I	I	I	R	R	R
17	Clutch system function	I	I	I	I	I	I
18	Transmission oil	R	I	I	I	I	R
19	Transmission oil leakage		I	I	I	I	I
20	Propeller shaft loose connections		I	I	I	I	I
21	Propeller shaft universal joints and splines for wear		I	I	I	I	I
22	Rear differential gear oil	R			R	R	R
23	Rear axle oil leakage	I	I	I	I	I	I
24	Power steering fluid	R	I	I	I	R	I
25	Power steering fluid filter					R	
26	Power steering oil leakage	I	I	I	I	I	I
27	Steering Column bolts for looseness or damage	I	I	I	I	I	I
28	Power steering hose	I	I	I	I	I	I
29	Steering wheel play	I	I	I	I	I	I
30	Steering function	I	I	I	I	I	I

Periodic Maintenance Service

Periodic Maintenance Service

Standard Fluids and Lubricants for Euro 4 Vehicles

Isuzu mu-X

	SYSTEM	BRAND / SPECIFICATION	PART NO.	SUPPLY FORM	CAPACITY (L)
1	ENGINE OIL (4JJ1-TCX)	BESCO GENUINE (10W-30)	1884057460	GALLONS	7.5
		IGMO MULTI Z+ (10W-30)	570670459		
		IGMO "XTRM" (15W-40)	570671459		
2	TRANSFER CASE	BESCO TRANSAXLE (5W-30)	1884057520	PAIL	2.0
3	A/T TRANSMISSION (AWR6B45)	ENEOS (JX NWS-9638)	5877030010	LITERS	3.0
4	FRONT DIFFERENTIAL	DELO GL-5 EP (80W-90), (85W-140)	510411HRK/ 510412HRK	PAIL	2.0
5	REAR DIFFERENTIAL				3.0
6	POWER STEERING	TEXAMATIC 1888	510134N JL	LITERS	1.0
7	ENGINE COOLANT	ISUZU LLC PREMIX	570622NFE	LITERS	8.0
8	BRAKE FLUID	DOT 3	5106620IL	500 mL	1.0

Periodic Maintenance Service

Periodic Maintenance Service

Standard Fluids and Lubricants for Euro 4 Vehicles

Isuzu D-Max

	SYSTEM	BRAND / SPECIFICATION	PART NO.	SUPPLY FORM	CAPACITY (L)
1	ENGINE OIL (4JJ1-TCX)	BESCO GENUINE (10W-30)	1884057460	GALLONS	7.5
		IGMO MULTI Z+ (10W-30)	570670459		
		IGMO "XTRM" (15W-40)	570671459		
2	TRANSFER CASE	BESCO TRANSAXLE (5W-30)	1884057520	PAIL	2.0
3	A/T TRANSMISSION (TB50LS)	MOBIL ATF AT3309	SOTFR00070L	PAIL	3.0
4	M/T TRANSMISSION (MUA OR MUX)	BESCO TRANSAXLE (5W-30)	1884057520	PAIL	3.0
5	FRONT DIFFERENTIAL	DELO GL-5 EP (80W-90), (85W-140)	510411HRK/ 510412HRK	PAIL	2.0
6	REAR DIFFERENTIAL				
7	POWER STEERING	TEXAMATIC 1888	510134NJP	LITERS	1.0
8	ENGINE COOLANT	ISUZU LLC PREMIX	570622NFE	LITERS	8.0
9	BRAKE/CLUTCH FLUID	DOT 3	5106620IL	500 mL	1.0

Periodic Maintenance Service

Periodic Maintenance Service

Standard Fluids and Lubricants for Euro 4 Vehicles

Isuzu NLR77 Model

	SYSTEM	BRAND / SPECIFICATION	PART NO.	SUPPLY FORM	CAPACITY (L)
1	ENGINE OIL (4JH1-TC)	IGMO MULTI Z+ (10W-30)	570670459	GALLONS	8.0
		IGMO "XTRM" (15W-40)	570671459		
2	M/T TRANSMISSION (MSB5S)	IGMO "XTRM" (15W-40)	570671459	LITERS	2.7
		BESCO TRANSAXLE (5W-30)	1884057520	PAIL	
3	REAR DIFFERENTIAL	DELO GL-5 EP (80W-90), (85W-140)	510411HRK/ 510412HRK	PAIL	2.7
4	POWER STEERING	TEXAMATIC 1888	510134NJP	LITERS	1.0
5	ENGINE COOLANT	ISUZU LLC PREMIX	570622NFE	LITERS	11.0
6	BRAKE/CLUTCH FLUID	DOT 3	5106620IL	mL	1.0

Periodic Maintenance Service

Periodic Maintenance Service

Standard Fluids and Lubricants for Euro 4 Vehicles

Isuzu NLR85 / NMR85 / NPR85 Model

	SYSTEM	BRAND / SPECIFICATION	PART NO.	SUPPLY FORM	CAPACITY (L)
1	ENGINE OIL (4JJ1-TC)	IGMO MULTI Z+ (10W-30)	570670459	GALLONS	8.0
		IGMO "XTRM" (15W-40)	570671459		
2	M/T TRANSMISSION (MYY5M)	IGMO "XTRM" (15W-40)	570671459	LITERS	2.8
		BESCO TRANSAXLE (5W-30)	1884057520	PAIL	
3	REAR DIFFERENTIAL	DELO GL-5 EP (80W-90), (85W-140)	510411HRK/ 510412HRK	PAIL	3.4
4	POWER STEERING	TEXAMATIC 1888	510134NJP	LITERS	1.0
5	ENGINE COOLANT	ISUZU LLC PREMIX	570622NFE	LITERS	11.0
6	BRAKE/CLUTCH FLUID	DOT 3	5106620IL	mL	1.0

Periodic Maintenance Service

Periodic Maintenance Service

Standard Fluids and Lubricants for Euro 4 Vehicles

Isuzu NQR75 Model

	SYSTEM	BRAND / SPECIFICATION	PART NO.	SUPPLY FORM	CAPACITY (L)
1	ENGINE OIL (4HK1-TCN)	IGMO MULTI Z+ (10W-30)	570670459	GALLONS	11.0
		IGMO "XTRM" (15W-40)	570671459		
2	M/T TRANSMISSION (MYY6S)	IGMO "XTRM" (15W-40)	570671459	LITERS	4.4
		BESCO TRANSAXLE (5W-30)	1884057520	PAIL	
3	REAR DIFFERENTIAL	DELO GL-5 EP (80W-90), (85W-140)	510411HRK/ 510412HRK	PAIL	4.3
4	POWER STEERING	TEXAMATIC 1888	510134NJL	LITERS	2.0
5	ENGINE COOLANT	ISUZU LLC PREMIX	570622NFE	LITERS	18.0
6	BRAKE/CLUTCH FLUID	DOT 3	5106620IL	mL	1.0

Periodic Maintenance Service

Periodic Maintenance Service

Standard Fluids and Lubricants for Euro 4 Vehicles

Isuzu FRR90 Model

	SYSTEM	BRAND / SPECIFICATION	PART NO.	SUPPLY FORM	CAPACITY (L)
1	ENGINE OIL (4HK1-TCC)	IGMO MULTI Z+ (10W-30)	570670459	GALLONS	11.0
		IGMO "XTRM" (15W-40)	570671459		
2	M/T TRANSMISSION (MZZ6W)	DELO GL-5 EP (80W-90), (85W-140)	510411HRK/ 510412HRK	PAIL	4.4
3	REAR DIFFERENTIAL				6.5
4	POWER STEERING	TEXAMATIC 1888	510134NJP	LITERS	3.0
5	ENGINE COOLANT	ISUZU LLC PREMIX	570622NFE	LITERS	18.0
6	BRAKE/CLUTCH FLUID	DOT 3	5106620IL	mL	3.0

Periodic Maintenance Service

Periodic Maintenance Service

Standard Fluids and Lubricants for Euro 4 Vehicles

Isuzu FSR34 / FVR34 Model

	SYSTEM	BRAND / SPECIFICATION	PART NO.	SUPPLY FORM	CAPACITY (L)
1	ENGINE OIL (6HK1-TCN)	IGMO MULTI Z+ (10W-30)	570670459	GALLONS	19.5
		IGMO "XTRM" (15W-40)	570671459		
2	M/T TRANSMISSION (MZW6P)	DELO GL-5 EP (80W-90), (85W-140)	510411HRK/ 510412HRK	PAIL	5.3
3	REAR DIFFERENTIAL				6.5
4	POWER STEERING	TEXAMATIC 1888	510134NJL	LITERS	3.0
5	ENGINE COOLANT	ISUZU LLC PREMIX	570622NFE	LITERS	28.0
6	BRAKE/CLUTCH FLUID	DOT 3	5106620IL	mL	3.0

Periodic Maintenance Service

Periodic Maintenance Service

Standard Fluids and Lubricants for Euro 4 Vehicles

Isuzu FVM34 Model

	SYSTEM	BRAND / SPECIFICATION	PART NO.	SUPPLY FORM	CAPACITY (L)
1	ENGINE OIL (6HK1-TCS)	IGMO MULTI Z+ (10W-30)	570670459	GALLONS	19.5
		IGMO "XTRM" (15W-40)	570671459		
2	M/T TRANSMISSION (FULLER ES11109)	DELO GL-5 EP (80W-90), (85W-140)	510411HRK/ 510412HRK	PAIL	8.5
3	REAR DIFFERENTIAL (TANDEM AXLE)				14.0
4	POWER STEERING	TEXAMATIC 1888	510134NJP	LITERS	3.0
5	ENGINE COOLANT	ISUZU LLC PREMIX	570622NFE	LITERS	28.0
6	BRAKE/CLUTCH FLUID	DOT 3	5106620IL	mL	3.0

Periodic Maintenance Service

Periodic Maintenance Service

Standard Fluids and Lubricants for Euro 5 Vehicles

Isuzu CYZ52 / CYH52 / EXR52 / EXZ52 Model

	SYSTEM	BRAND / SPECIFICATION	PART NO.	SUPPLY FORM	CAPACITY (L)
1	ENGINE OIL (6WG1-TCR)	IGMO MULTI Z+ (10W-30)	570670459	GALLONS	28.5
		IGMO "XTRM" (15W-40)	570671459		
2	M/T TRANSMISSION (MJT7S)	DELO GL-5 EP (80W-90), (85W-140)	510411HRK/ 510412HRK	PAIL	17.0
3	M/T TRANSMISSION (MJX16)				19.0
4	FRONT DIFFERENTIAL				18.0
5	REAR DIFFERENTIAL				12.0
6	POWER STEERING	TEXAMATIC 1888	510134NJP	LITERS	6.0
7	ENGINE COOLANT	ISUZU LLC PREMIX	570622NFE	LITERS	47.4
8	BRAKE/CLUTCH FLUID	DOT 3	5106620IL	mL	1.0

Periodic Maintenance Service

Periodic Maintenance Service

Standard Fluids and Lubricants

EXR and EXZQL Euro V Heavy Duty Trucks

	SYSTEM	BRAND / SPECIFICATION	PART NO.	SUPPLY FORM	CAPACITY (L)
1	ENGINE OIL (6WG1-TCG52)	IGMO MULTI Z (10W-30)	570670459	GALLONS	29
		IGMO "XTRM" (15W-40)	570671459		
2	M/T TRANSMISSION (ZF16S2230TO)	ZF-ECOFLUID M	0671090383 (4L) 0671090384 (18L)	LITERS/PAIL	16
3	FRONT DIFFERENTIAL (EXZQL ONLY)	DELO GL-5 EP (80W-90), (85W-140)	510411HRK/ 510412HRK	PAIL	18.0
4	REAR DIFFERENTIAL				12.0
5	POWER STEERING	TEXAMATIC 1888	510134NJP	LITERS	6.0
6	ENGINE COOLANT	ISUZU LLC PREMIX	570622NFE	LITERS	40
7	CLUTCH FLUID	DOT 3	5106620IL	mL	1.0

Periodic Maintenance Service

Periodic Maintenance Service *Engine*

- Perform preventive maintenance on various engine systems that includes;
 - Engine Oil and Filter Change
 - Engine Oil Leakage and Contamination
 - Engine Idling Speed and Acceleration
 - Valve Clearance Inspection and Adjustment
 - Air Cleaner Element
 - Fuel Filter and Sedimentor
 - Cooling System for Water Leakage
- Always follow the manufacturer's service manuals to determine the engine specifications and explain why this information is necessary when servicing Isuzu engines.

Periodic Maintenance Service

Periodic Maintenance Service

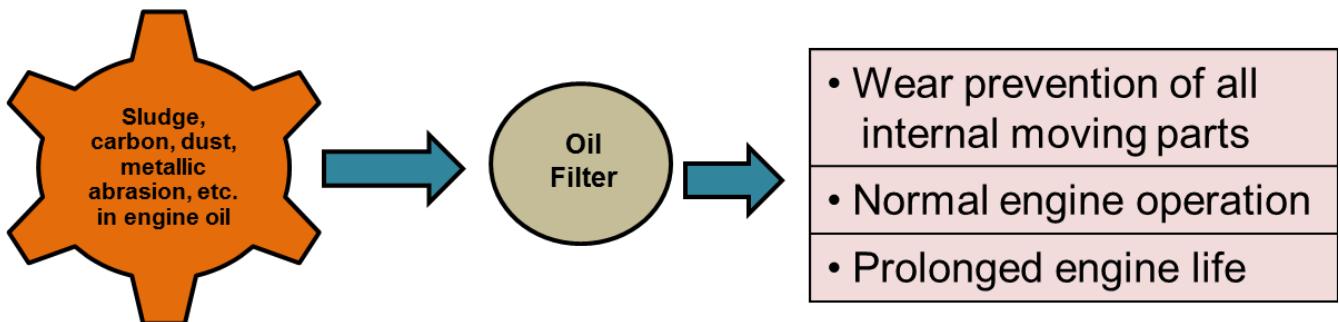
Engine

Engine Oil Filter

Purpose

The oil filter removes impurities contained in the engine oil through the filter paper, thus, allowing clean oil to lubricate the internal parts of engine.

Function



The filter paper is the heart of the filter, which works to remove sludge, dust, carbon, etc. in the engine oil.

Periodic Maintenance Service

Periodic Maintenance Service Engine

Difference between Isuzu Genuine and Non-Genuine Parts

GENUINE PARTS

The degree of machining accuracy of the primary-side oil holes is satisfactory.

A proper quantity of engine oil is supplied and maintained.



The filter paper is folded with a high degree of accuracy and properly bonded.



NON-GENUINE PARTS

The number of primary-side oil holes is half.

Much pressure is lost, and the supplied quantity of engine oil decreases.



The filter paper is folded at irregular pitches and is not securely bonded.

Foreign substances cannot be filtered.



Since the area of the filter paper is small, it becomes clogged by foreign substances soon and causes insufficient hydraulic pressure.

Periodic Maintenance Service

Periodic Maintenance Service

Engine

Engine Oil

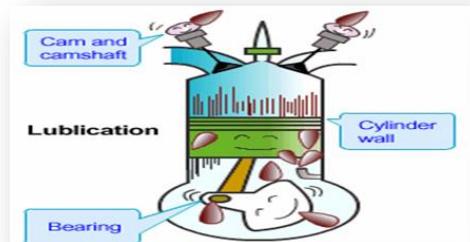
Purpose

It provides the lubrication of all engine moving parts in order to protect them from wear and be able to move smoothly during operation.

Function

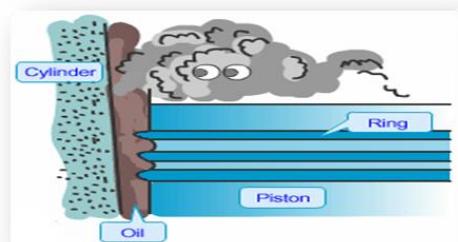
I. Lubricating Action

- Reduce friction and prevents wearing making for smooth movement of metal parts.



II. Cooling Action

- Absorbs heat generated by friction and combustion.



III. Cleaning Action

- Clean foreign materials such as carbon and metal particles from the wear of metal surfaces.



Periodic Maintenance Service

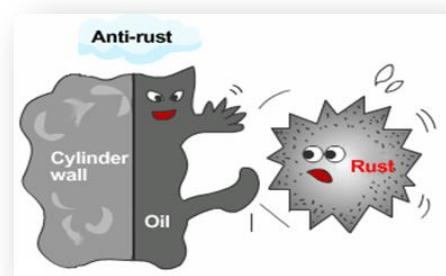
Periodic Maintenance Service

Engine

Engine Oil

IV. Rust Preventive Action

- Prevents the occurrence of rust and corrosion due to corrosive gas and mixture.



V. Sealing Action

- Prevents leakage of compressed air and burned gases.



Periodic Maintenance Service

Periodic Maintenance Service Engine

Engine Oil Viscosity Chart

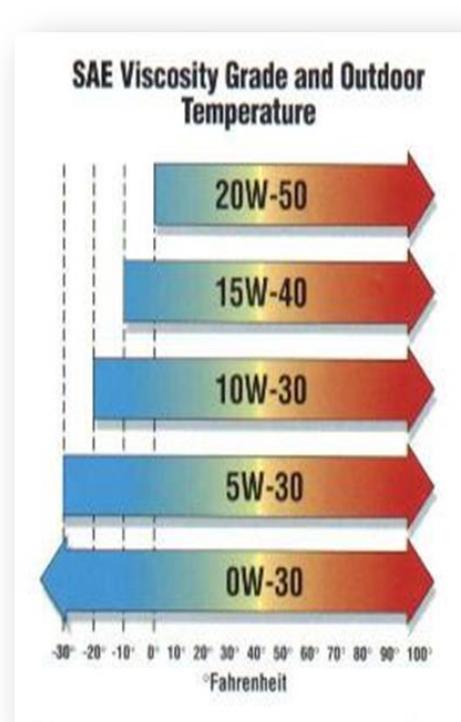
Classification of Engine Oil:

I. Viscosity

- Measurement of oil resistance to flow.
 - Low viscosity is thin and flow easily.
 - High viscosity is thicker and flow slowly.

Why do we need to use the right viscosity of engine oil?

- If the oil is too thin, it reduces the ability of the oil to stay in place between moving parts.
- If the oil is too thick, it flows slowly to the engine parts, especially when the engine and oil are cold.



Periodic Maintenance Service

Periodic Maintenance Service Engine

Engine Oil Service Rating and Specification

● SAE (Society of Automotive Engineers)

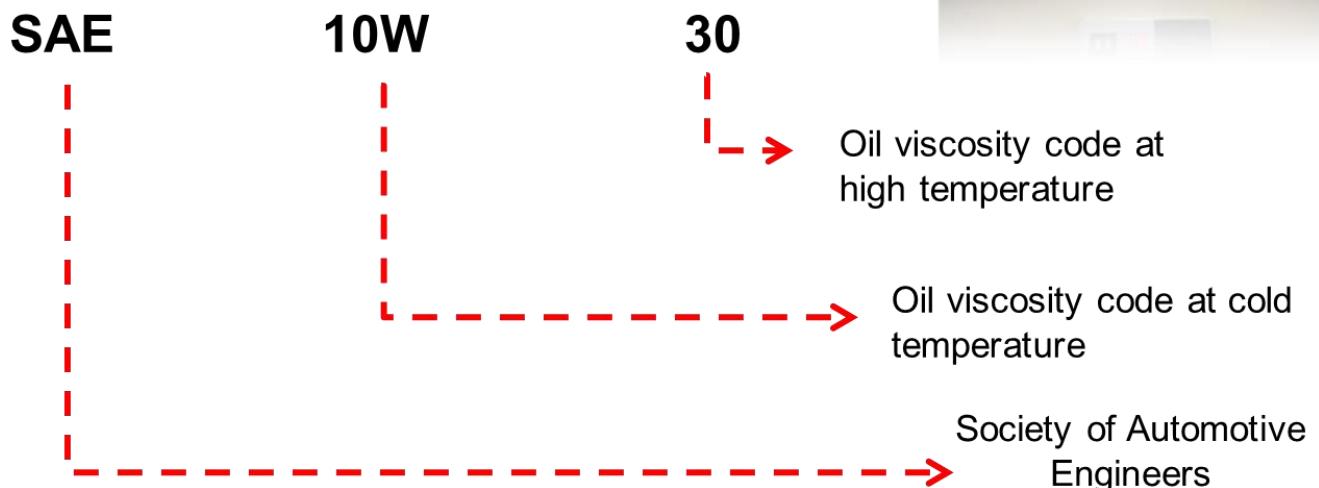
- Rating for the thickness and thinness of an oil.

Example: SAE 5W-40 / SAE 10W-30 / SAE 15W-40

Note: W means winter



Engine Oil Viscosity Grade



Periodic Maintenance Service

Periodic Maintenance Service Engine

Engine Oil Service Rating and Specification

● API (American Petroleum Institute)

- Shows if the oil can be used for diesel or gasoline engine.
- Shows the quality of the engine oil

Diesel Engine	Gasoline Engine
CI-4	SN
C means commercial	S means service
I-4 means oil rating	N means oil rating



Periodic Maintenance Service

Periodic Maintenance Service

Engine

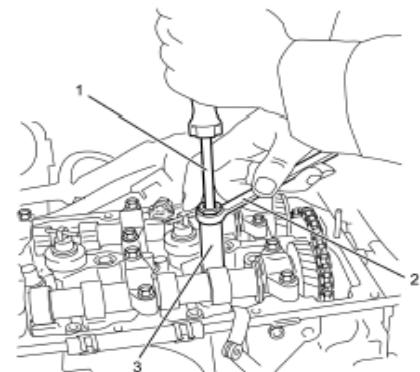
Valve Adjustment

- Loosen the adjust screw using special tool.
- Adjust valve clearance to a standard value using a feeler gauge

Note:

- Insert feeler gauge between rocker arm roller and the cam.
- When the movement becomes stiff, fasten the adjust screw nut of the rocker arm.

Check Service Manual for Standard Feeler Gauge Thickness and Tightening Torque of Isuzu Vehicles



- (1) Driver
- (2) Ring Spanner
- (3) Adjusting nut wrench



Periodic Maintenance Service

Periodic Maintenance Service Engine

Valve Adjustment

- When the No. 1 cylinder is at the compression top dead center, a “O” is marked in the table for valve clearance adjustment.
- When the No. 4 cylinder is at the compression top dead center, an “X” is marked in the table for adjustment of valve clearance.

Cylinder Number	1		2		3		4	
Valve Arrangement	IN	EX	IN	EX	IN	EX	IN	EX
• When the No. 1 cylinder is at compression top dead center (TDC)	O	O	O			O		
• When the No. 4 cylinder is at compression top dead center (TDC)				X	X		X	X

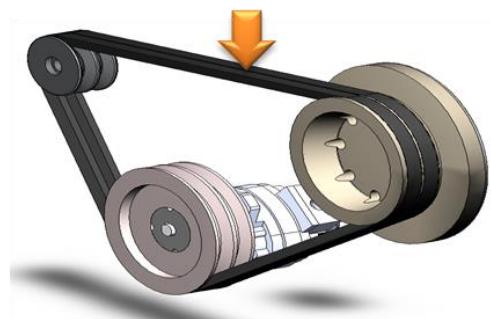
Valve sequence adjustment for Isuzu 4 Cylinder Engine

Periodic Maintenance Service

Periodic Maintenance Service *Engine*

Drive Belt

- It is a continuous belt used to drive multiple accessories in a car's engine such as the alternator and the water pump. The belt also pulls the alternating current compressor.
 - It is a mechanical system consisting of a flexible belt and at least two fixed pulleys that is used to transmit motion. Belt drive systems are low maintenance and do not require lubrication.
- a. Purpose of Drive Belts
- The belts deliver crankshaft power to the water pump, cooling fan, alternator, power steering pump, air-con compressor and vacuum pump.
 - Water Pump
 - Alternator
 - Cooling Fan
 - Air Compressor
 - Power Steering Pump



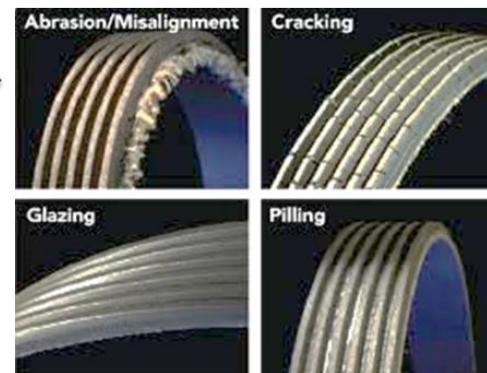
Periodic Maintenance Service

Periodic Maintenance Service

Engine

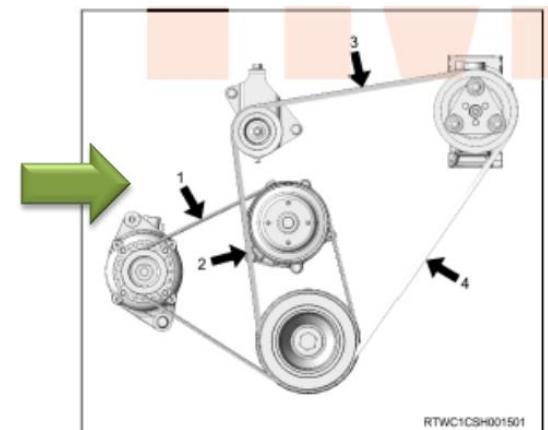
Drive Belt

- Inspect for cracks, fraying, wear or oil adhesion.
If necessary, replace with a new one.



- Inspect the belt deflections by pushing on the belt midway between pulleys with a force of 98N (10 kg, 22 lbs.) or as specified by the workshop manual.

- Check if the fan belt gives a deflection of approximately 10 mm(0.4 in) or as specified by the workshop manual, adjust if belt deflections are too large or too small.



Periodic Maintenance Service

Periodic Maintenance Service Engine

Drive Belt (for 4JJ1 Engine)

Cooling Fan Belt Adjustment

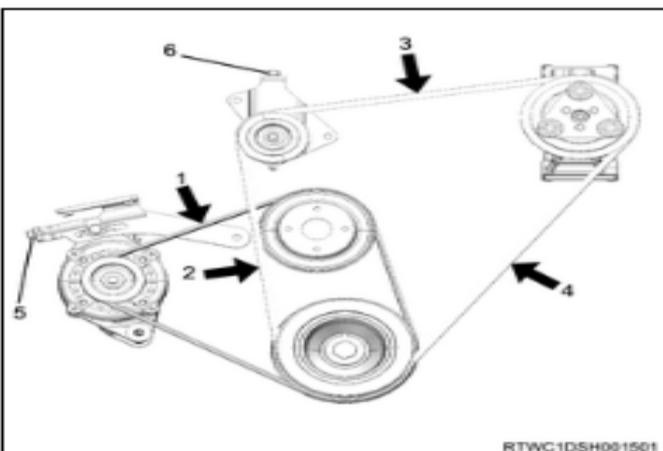
- Adjust tension to the specified value using a belt tension meter.
Note: Move the generator to adjust the tension.

- Check tension of the cooling fan belt.

Note: Apply a load to a measurement point 1 of the cooling fan belt and

adjust the amount of flex.

Load: 98 N (10 kg / 22 lb)



Position of Belt Tension	
	Amount of Flex
New Product	5.4 to 6.6 mm (.213 to .260 in.)
Reuse	7.7 to 8.5 mm (.303 to .335 in)

1. Measurement point 1
2. Measurement point 2
3. Measurement point 3
4. Measurement point 4
5. Adjust bolt (cooling fan belt)
6. Adjust bolt (A/C compressor drive belt)

Periodic Maintenance Service

Periodic Maintenance Service Engine

Drive Belt (for 4JJ1 Engine)

A/C Drive Belt Adjustment

- Adjust tension to the specified value using a belt tension meter.

Note: Apply a load to measurement points 2,3 and 4 of the A/C compressor drive belt and adjust the amount of flex.

Load: 98N (10kg / 22 lb)

Measurement Point 2

	Amount of Flex
For a new product	12.5 to 16.5 mm (0.492 to 0.650 in)
Reuse	16.5 to 19.1 mm (0.650 to 0.752 in)

Measurement Point 3

	Amount of Flex
For a new product	12.4 TO 16.4 mm (0.488 to 0.646 in)
Reuse	16.5 to 19.1 mm (0.650 to 0.752 in)

Measurement Point 4

	Amount of Flex
For a new product	15.9 to 20.7 mm (0.626 to 0.815 in)
Reuse	20.7 to 23.7 mm (0.815 to 0.993 in)

Note:

- After adjusting the tension, tighten the tensioner fixing nut.
- Tightening Torque:
41 N·m (4.2 kg·m / 30 ft-lb)

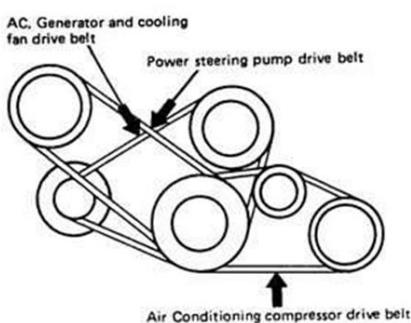
Periodic Maintenance Service

Periodic Maintenance Service Engine

Drive Belt

Importance of Maintenance

- Belts gradually become worn and harden due to;
 - Friction with pulley.
 - The heat due to friction.
 - The elongation created by the engine torque change.
- If the power steering belt breaks,
 - The steering will suddenly become extremely heavy.
 - Water pump will not operate, thus causing the engine to overheat.
 - If alternator belt breaks, battery will not charged.
 - Air-con belt breaks, air conditioner will not operate.



G00145923



Overheat



Dead battery

Periodic Maintenance Service

Periodic Maintenance Service

Engine

Air Filter

- Air contains impurities such as fine dust and dirt. If such impurities goes into the engine, there will adverse effect such as acceleration of wear of the cylinder and piston rings or deterioration of oil.
- Impurities in air are removed by the filter paper of the air-cleaner element to clean the air before going into the engine. Air-filters are used in applications where air quality is important to air intake system of the engine.



Periodic Maintenance Service

Periodic Maintenance Service

Engine

Air Filter

Purpose

- The air cleaner traps dust and dirt particles in the air with its filter; thus, preventing them from entering the cylinders.
- The filter paper element is the heart of the air cleaner which plays a key role in removing dust in the air.

Function



Periodic Maintenance Service

Periodic Maintenance Service Engine

Air Filter Element Inspection

- Inspect the air cleaner element.

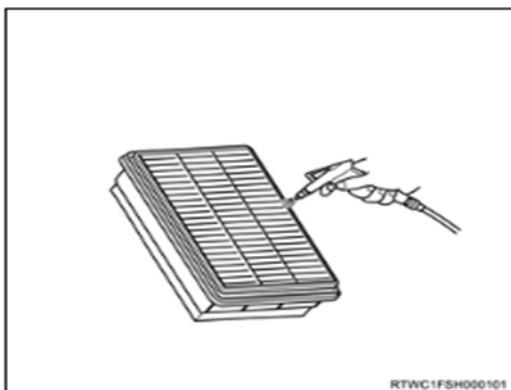
Note: Inspect for excessive dirt or damage.

- Air cleaner element cleaning

- Clean the air cleaner element using dry air.

Note: Clean the element by applying the compressed air from the element clean side.

Air pressure: 392 to 490 kpa (4 to 5 kg/cm² / 57 to 71 psi)



Note: Do not knock the air cleaner element against a hard surface or beat it with a hard object in an attempt to remove accumulated dirt. Element damage will result.

Periodic Maintenance Service

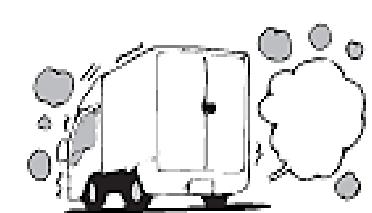
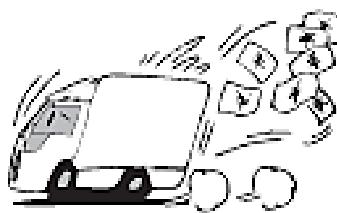
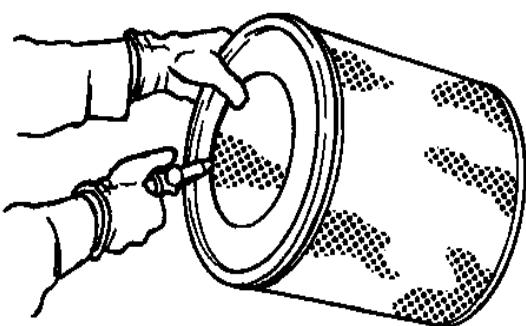
Periodic Maintenance Service Engine

Air Filter Element

Importance of Maintenance

If too much dust or other particles enters the cylinder, the airflow will be restricted due to clogging, resulting to:

- Cylinder will wear rapidly
- Increase fuel consumption
- Reduced engine performance
- Increased exhaust emissions (too much black smoke)



Increase in fuel consumption

Co concentration increasing and emitting black exhaust

Allowable Air Pressure = 3 - 5 kg/cm² (75 psi)

Periodic Maintenance Service

Periodic Maintenance Service

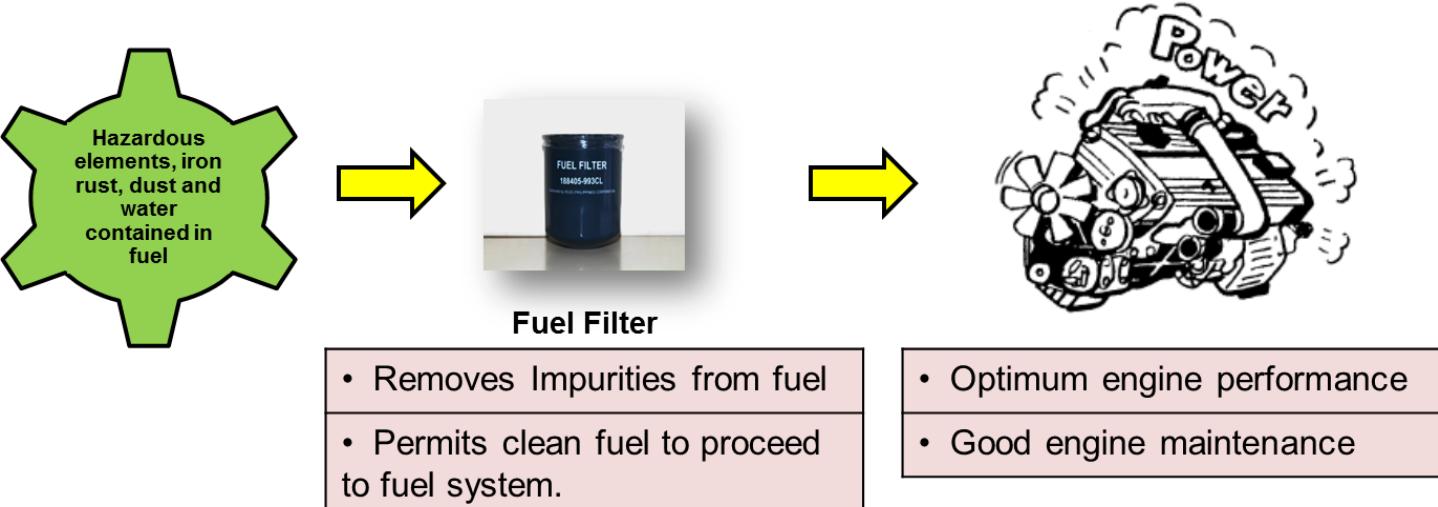
Fuel System

Fuel Filter

Purpose

Fuel may contain impurities, such as iron rust and dust and dirt, and water. Such fuel supplied to the engine may cause clogging or wear of the supply pump and injector and will eventually shorten the life of the engine. The impurities are removed by the filter paper of the fuel filter to clean the fuel to be supplied to the engine.

Function

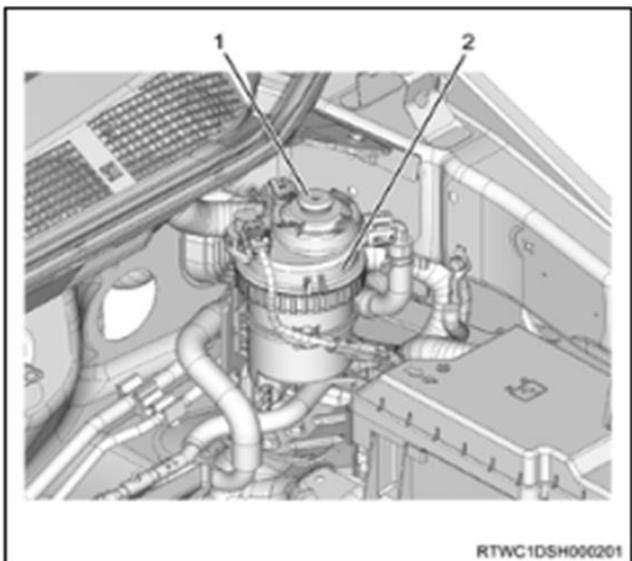


Periodic Maintenance Service

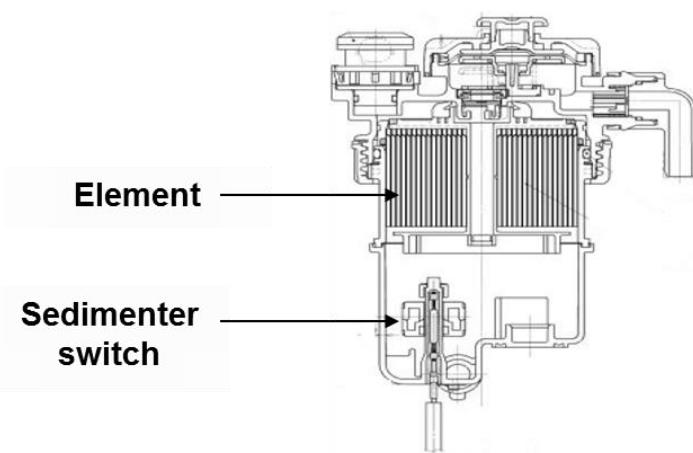
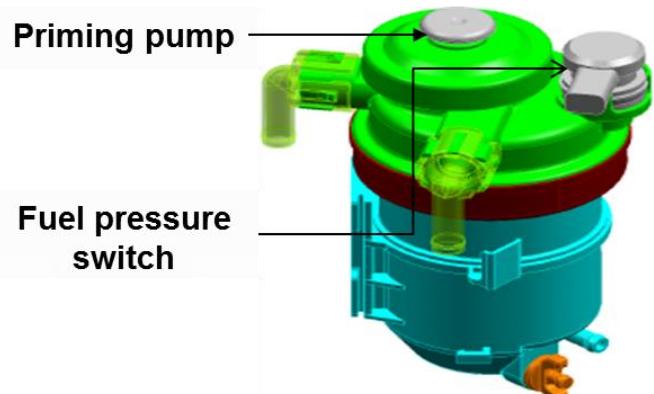
Periodic Maintenance Service

Fuel System

Components of Fuel Sedimentor



1. Priming pump
2. Fuel filter with sedimenter



Periodic Maintenance Service

Periodic Maintenance Service

Fuel System

Service Inspection for Fuel System

Fuel Air Bleeding

1. Press the priming pump until it gets stiff.

Caution: Insufficient air removal may lead to engine malfunction.

Fuel Drain Water

Note: If the water sedimentor warning light turns ON, follow the procedures described below:

- a. Install a hose to the drain plug (install it on the tip of the drain plug).
- b. Prepare a container (place it on the end of the hose attached to the drain plug).
- c. Drain water from the sedimenter.

Note: - loosen the drain plug and drain the water.

- Press the priming pump several times to completely drain water.

- d. Tighten the drain plug using a wrench.

Tightening Torque: 3 N·m (0.3 kg·m / 27 ft-lb)

- e. Turn ON the ignition switch

Note: - Turn ON the ignition switch for 15 secs. and check for fuel leakage.

- Confirm that the water sedimenter warning light is turned OFF.

Periodic Maintenance Service

Periodic Maintenance Service

Fuel System

Importance of Maintenance

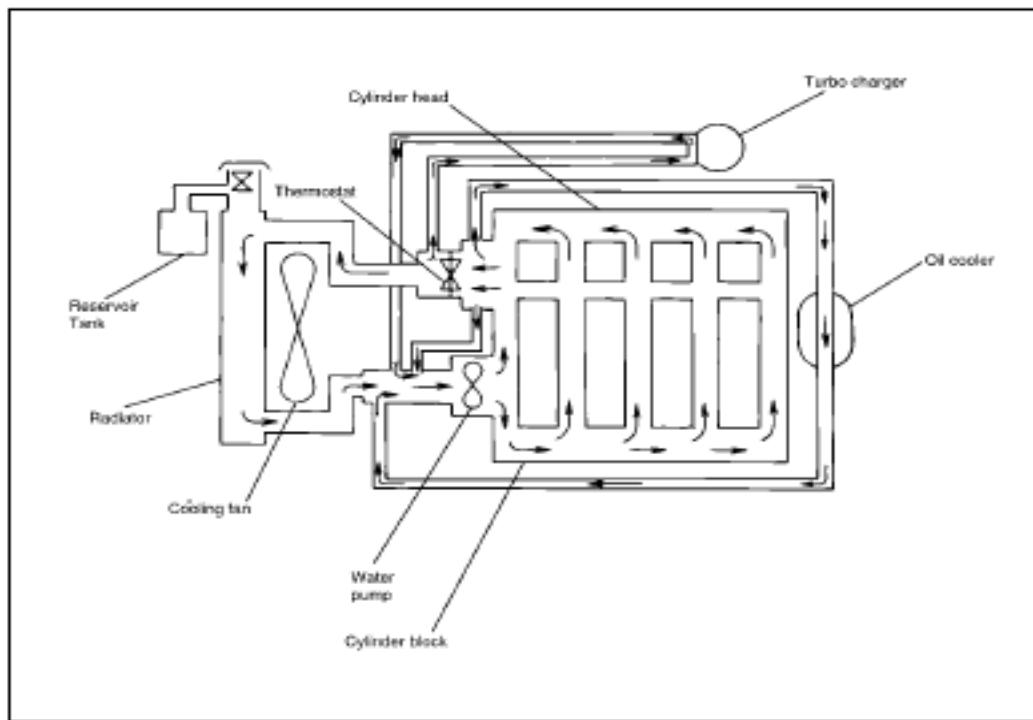
- The filter paper used to removed impurities in the fuel will gradually be clogged. Dirt and moisture can be mixed into the diesel fuel.
- If this dirt and moisture passes through the injection pump or injection nozzles, it could cause;
 - Fuel clogging
 - Seizure of precision parts
 - Premature wear of fuel system related parts

Periodic Maintenance Service

Periodic Maintenance Service

Cooling System

- Burning of fuel inside the engine cylinder may reach 4000 °F or 2200 °C or higher.
Some of the heat must be taken away before it damages engine parts.
- Cylinder walls must not get hotter than about 500 °F or 260 °C because higher temperatures cause lubricating oil to break down and lose its lubricating ability.

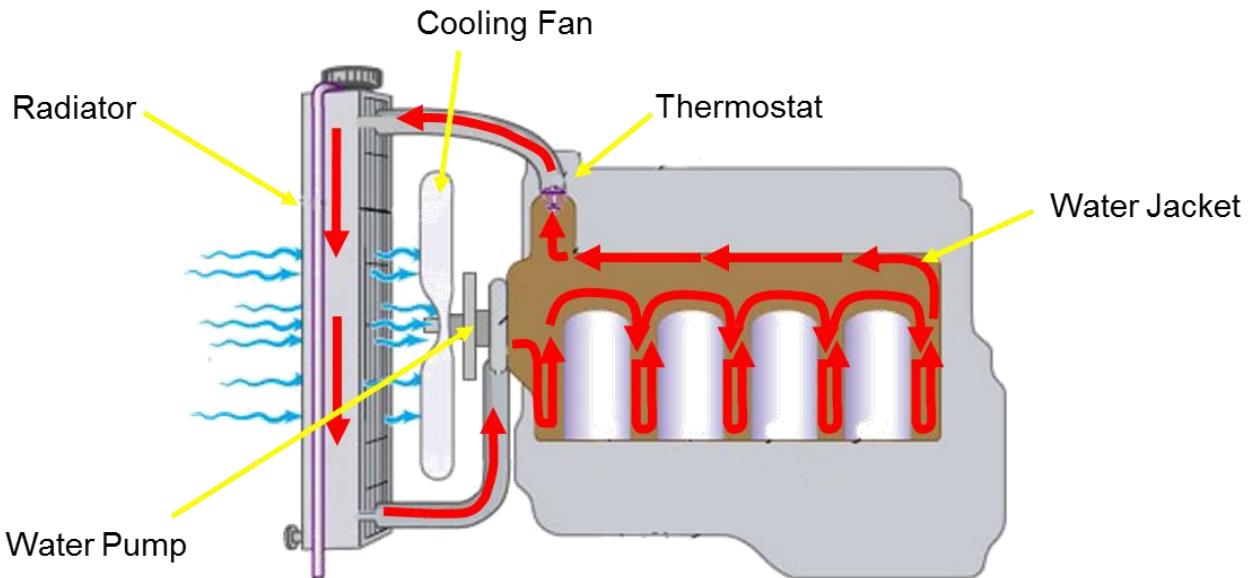


Periodic Maintenance Service

Periodic Maintenance Service

Cooling System

Cooling System Diagram



- The engine cooling system uses five (5) basic components to do its main job of controlling the engine temperature.

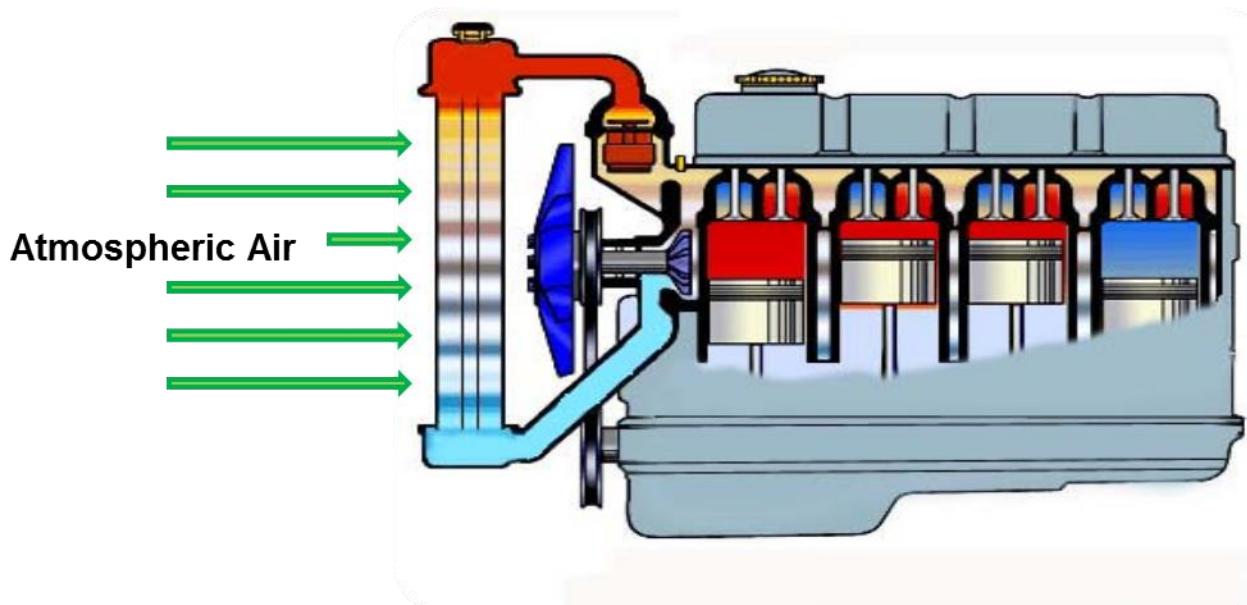
Periodic Maintenance Service

Periodic Maintenance Service

Cooling System

Purpose

- The purpose of the engine's cooling system is to remove excess heat from the engine, to keep the engine operating at its most efficient temperature, and to get the engine up to the correct temperature as soon as possible after starting.
- Ideally, the cooling system keeps the engine running at its most efficient temperature no matter what the operating conditions are.



Periodic Maintenance Service

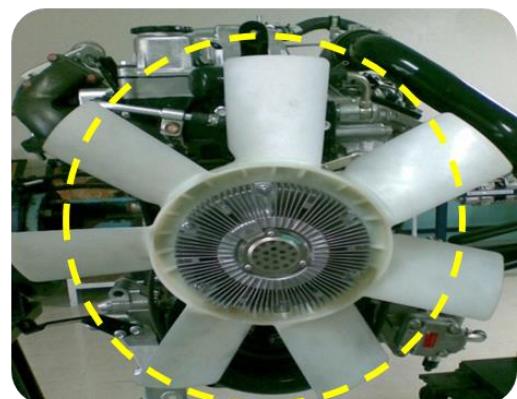
Periodic Maintenance Service

Cooling System

Cooling Fan Clutch Inspection

1. Vehicle Inspection

- Visually inspect for abnormalities such as silicon grease leakage.
- Rotate the fan clutch by hand while the engine is still cold before starting, and confirm that it rotates easily.
- Start the engine and warm it up until the temperature of the fan clutch section reaches about 85° C.
- Then, stop the engine, and confirm that a considerable amount of force and clutch torque are necessary to rotate the clutch by hand.
- If the fan clutch is easier to rotate, that indicates the silicon grease leaks inside. Replace it with a new one.



Periodic Maintenance Service

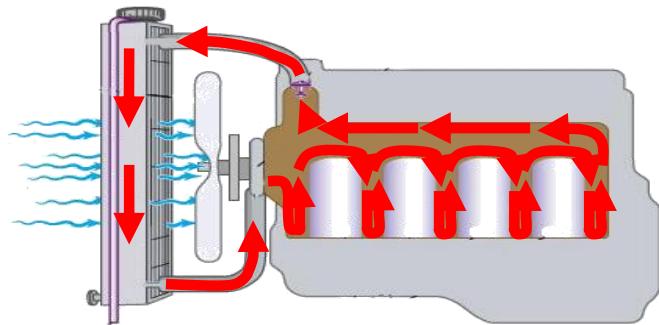
Periodic Maintenance Service

Cooling System

Long Life Coolant (LLC)

Purpose

- Used as a heat transfer medium having a cryoprotective and rust prevention performance.



Function

- a. Cooling Action
 - It cools the engine system to prevent overheating.



Periodic Maintenance Service

Periodic Maintenance Service

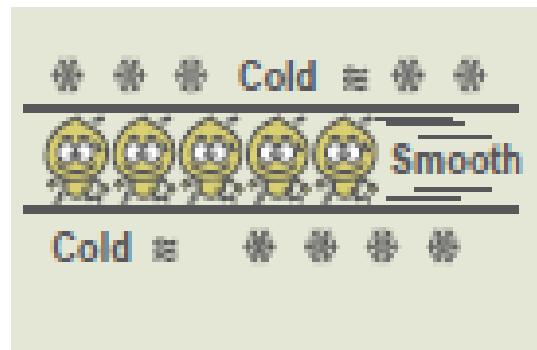
Cooling System

Long Life Coolant (LLC)

Function

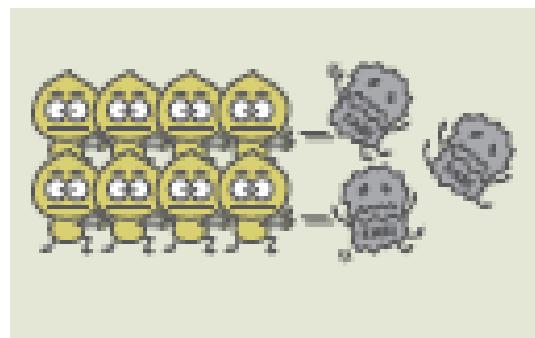
b. Cryoprotective Action

- It lowers the freezing point of the engine coolant.



c. Rust Prevention Action

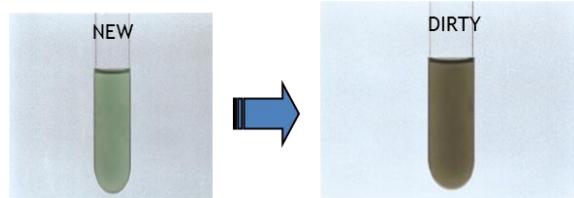
- It helps protect the cooling system from metal deposits and corrosion.



Importance of Maintenance

Deteriorated coolant can cause;

- Engine overheating
- Minerals contribute to scale formation, impedes efficient functioning of the coolant system, leading to a failure.



Periodic Maintenance Service

Periodic Maintenance Service

Clutch System

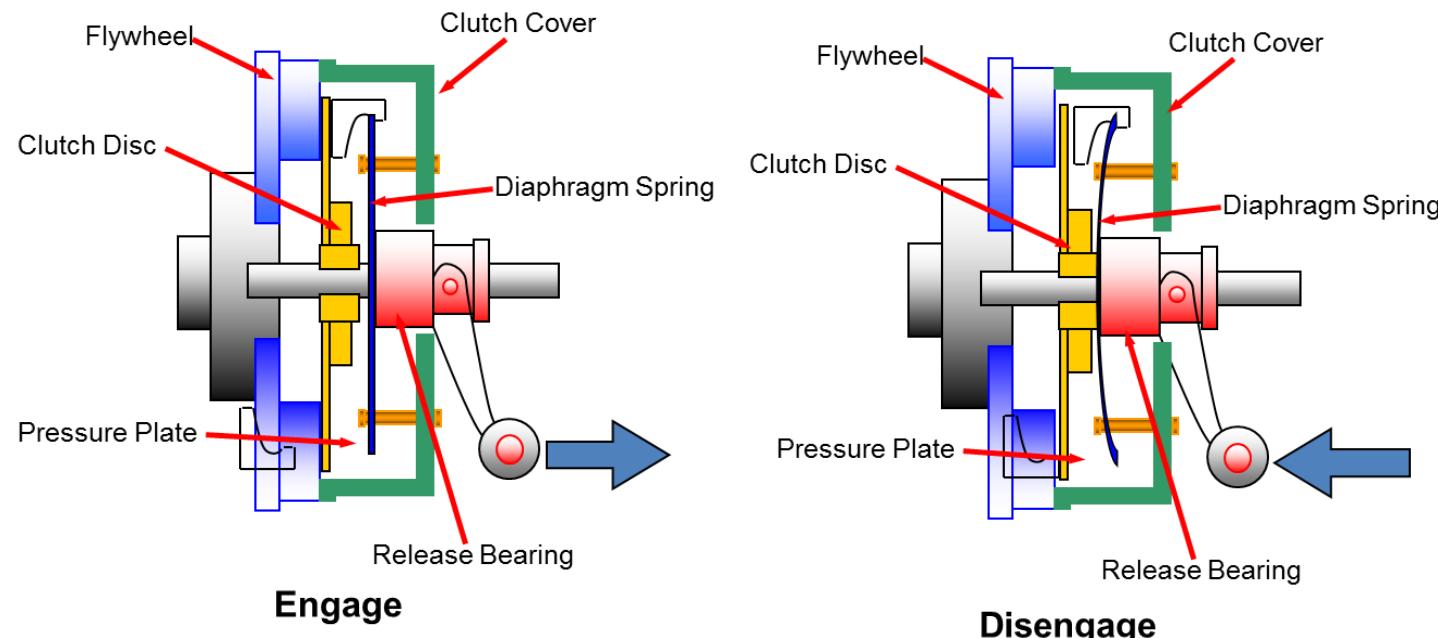
- A clutch is a mechanical device that provides transmission of power and usually motion from one component (the driving member) to another (the driven member) when engaged, but can be disengaged.
- Asbestos were used in the past. Modern clutches typically use a compound organic resin with copper wire facing or a ceramic material.
- Ceramic materials are typically used in heavy applications such as racing or heavy-duty hauling, though the harder ceramic materials increase flywheel and pressure plate wear.



Periodic Maintenance Service

Periodic Maintenance Service

Clutch System



- a. The clutch transmits power from the engine to the transmission.
- b. This action provides smooth engagement and lessen the shock on gears, shafts and other drivetrain parts.

- a. Allows the engine cranking and permits the engine to run freely without delivering power to transmission
- b. Allows the driver to select / shift into various gears.

Periodic Maintenance Service

Periodic Maintenance Service

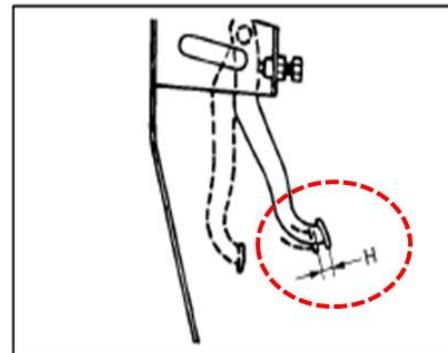
Clutch System

Service Inspection

Clutch Pedal Inspection

1. Inspection of Free-play

- Lightly press the clutch pedal with a hand to inspect that the free-play is within the standard value range.
Standard: 5.0 to 15.0 mm (0.2 to 0.6 in.)



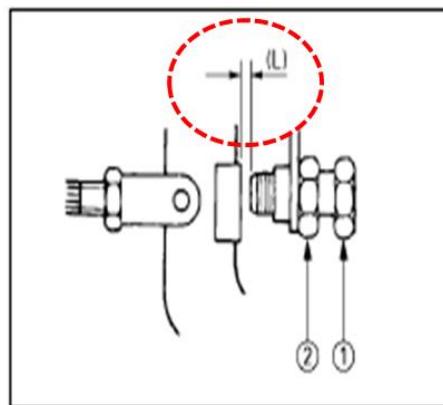
2. Clutch Pedal Adjustment

- Loosen the lock nut using a wrench.
- Turn the stopper bolt and adjust so that the clearance is within the standard value range.
- After adjustment, tighten the lock nut.

Clearance: 0.5 to 1.5 mm (0.020 to 0.059 in)

- Turn the clutch switch so that the clearance is within the standard value range.
- After adjustment, tighten the lock nut.

Clearance: 0.5 to 1.5 mm (0.020 to 0.059 in)



Periodic Maintenance Service

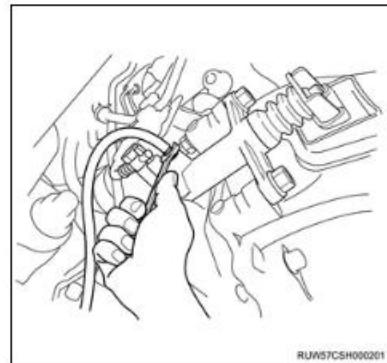
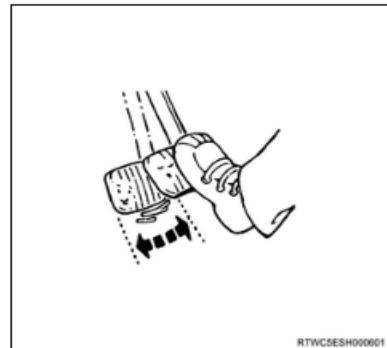
Periodic Maintenance Service

Clutch System

Service Inspection

Clutch Fluid Air Bleeding

- a. Apply the parking brake.
- b. Replenish the reservoir tank with the brake fluid.
- c. Fully depress the clutch pedal several times (press it many times and hold it down).
- d. With clutch pedal fully depressed, loosen the bleeder screw using a wrench to drain the brake fluid.
- e. Tighten the bleeder screw using a wrench.
- f. Repeat several times or more until the air has been completely bled out.



Periodic Maintenance Service

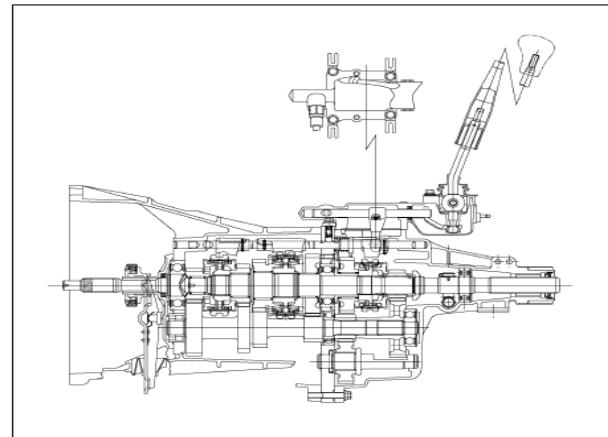
Periodic Maintenance Service

Manual Transmission

- It is important to properly maintain transmission components in accordance with the manufacturer's recommendation to ensure safe and reliable operation of the vehicle. It is important to the overall maintenance of vehicle to ensure transmission is reliable to prevent future problems .

a. Service Inspection

- Level and Condition of Fluid
- Unusual Noises
- Leaks
- Worn Clutch (Causes Judder)
- Clutch pedal free-play



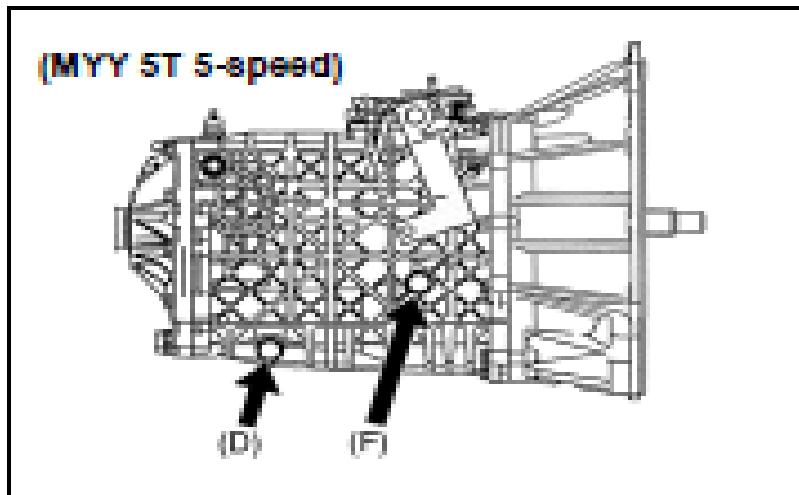
Periodic Maintenance Service

Periodic Maintenance Service

Manual Transmission

Changing Transmission Oil

- Drain transmission oil from transmission case by removing the drain plug (D) on the lower face of the transmission case. Fill the transmission case using the filler plug (F) with the specified engine oil through the filler plug hole. After filling, tighten to specified torque as per workshop manual



Periodic Maintenance Service

Periodic Maintenance Service

Automatic Transmission

- An automatic transmission is a type of motor vehicle transmission that can automatically change gear ratios as the vehicle moves, freeing the driver from having to shift gears manually.
- Regular periodic maintenance will help prevent expensive repairs and keep the transmission in good working order.

Function of Automatic Transmission Fluid

- Lubricates the gears and clutches inside the automatic transmission.
- Controls the friction of clutches.
- Cools down components inside the automatic transmission.

Periodic Maintenance Service

Periodic Maintenance Service

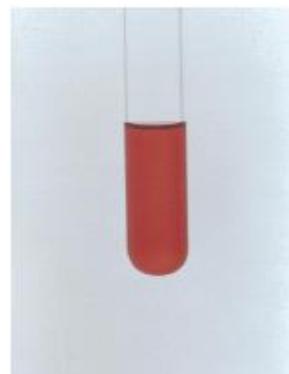
Automatic Transmission

Service Inspection

Condition of Automatic Transmission Fluid

- Visually inspect the condition of the ATF.
- If the ATF smells burnt out, replace it and investigate the cause of trouble.

Color of ATF	Condition
Clear Red	Normal
Blackish discoloration	Defects of power train parts (clutches)
White turbidity	Include water
Discoloration of red brown	Deterioration of ATF



New
A/T fluid



Deteriorated
A/T fluid

Periodic Maintenance Service

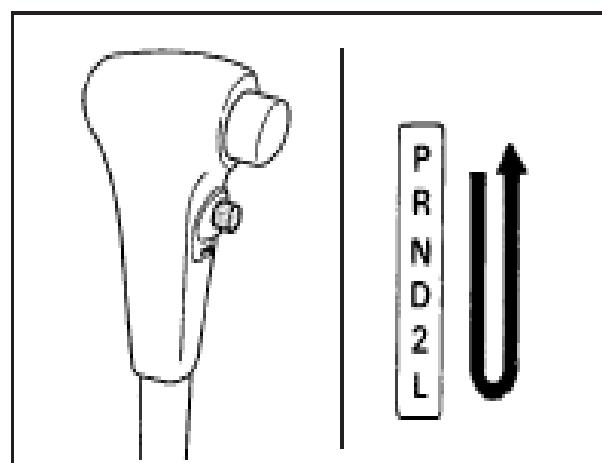
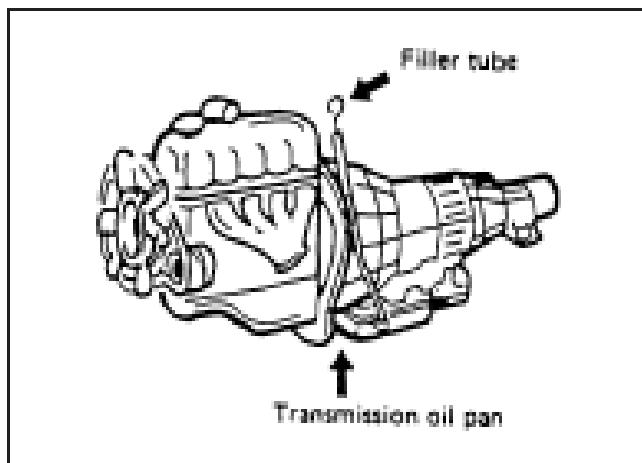
Periodic Maintenance Service

Automatic Transmission

ATF Replacement for Conventional AT

- Remove the drain plug from the oil pan and drain the fluid.
- Reinstall the drain plug securely.
- With the engine OFF, add new fluid through the filler tube.
- Start the engine and shift the selector into all positions from “P” through “L”, and then shift back to “P” position.
- With the engine idling, check the fluid level. Add fluid up to the “COLD” level on the dipstick.
- The ATF level must be checked again for correct level in the “HOT” level.

Note: Do not overfill the ATF.



Periodic Maintenance Service

Periodic Maintenance Service

Automatic Transmission

ATF Replacement for Conventional for TB50LS

- Park the vehicle on level area and confirmed the shift lever is in "P" position (implement after A/T is in cold condition).

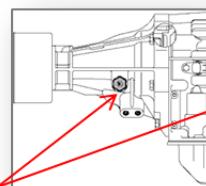


- If you can check the transmission fluid temperature by using the scan tool, check the temperature and if the value is less than following value, go to the next step.

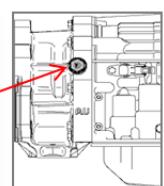
4JJ1 : Less than 40° C (104° F)
4JK1 : Less than 42° C (108° F)

- Initially add ATF (at least 500 ml) to the filler plug of A/T.

2WD



4WD



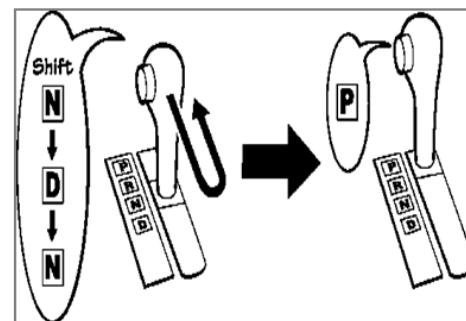
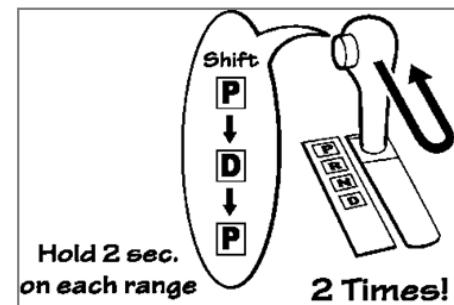
Periodic Maintenance Service

Periodic Maintenance Service

Automatic Transmission

ATF Replacement for Conventional for TB50LS

- Start the engine.
- Shift to all ranges, from “P” to “D” to circulate the ATF in the oil pressure circuit.
- Stay in each range for at least two (2) seconds.
- Perform this step twice before returning the shift lever to “P” position.
- Move the shift lever from the “N-D-N” position within 1.5 seconds continuously more than six (6) seconds.



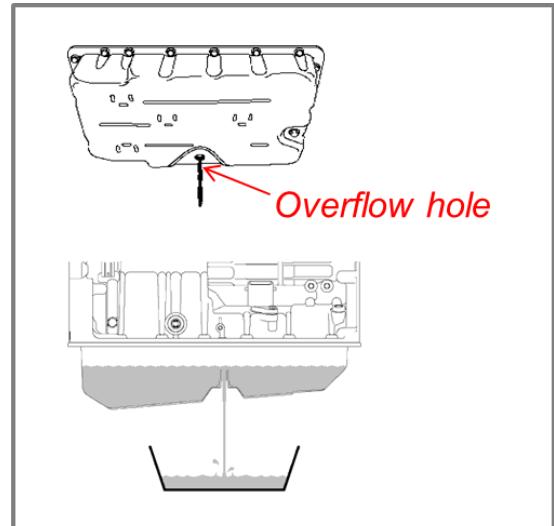
Periodic Maintenance Service

Periodic Maintenance Service

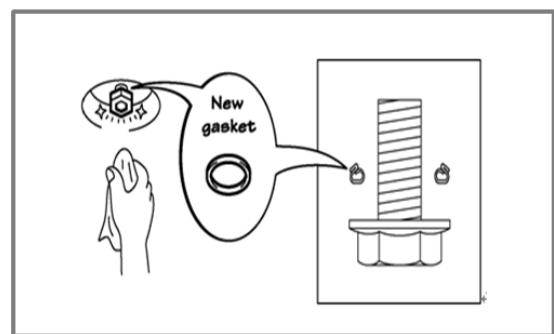
Automatic Transmission

ATF Replacement for Conventional for TB50LS

- Remove the overflow plug to check if the ATF drops from the overflow hole.
- If the ATF drops, the ATF is at level position.
- If ATF does not drop, Add the ATF until fluid drops out from the overflow hole.



- Using a new gasket, tighten the overflow plug within a specified torque. Check if the gasket is in correct position during replacement. Make sure to wipe off the spilled ATF after tightening the overflow plug.



Importance of Maintenance

- A/T fluid gradually deteriorates by oxidation due to heat and sludge
If it is deteriorated;
 - Shift shock will increase
 - Fuel economy will be affected because of increase slippage
 - Brakes and clutches will damage

Periodic Maintenance Service

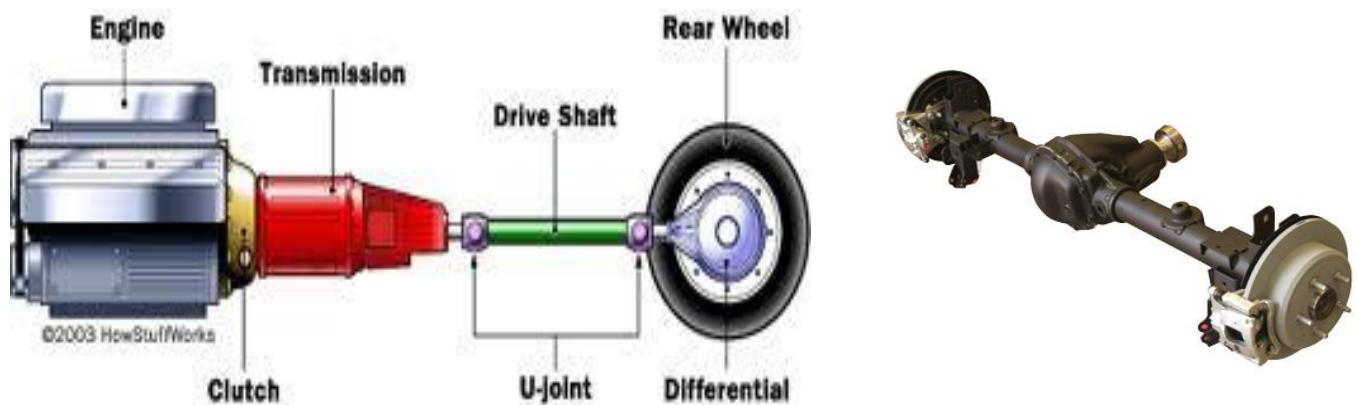
Periodic Maintenance Service

Front and Rear Axle

- A differential is a device or gear assembly between two shafts that permits the shaft to turn at different speed while continuing to transmit torque. It is used in drive axles to allow different rates of wheel rotation on curves.

Differentials are used in:

- The rear drive-axle of front engine, rear-wheel-drive vehicles.
- The transaxles of front-engine, front wheel-drive and rear-engine, rear-wheel-drive vehicles.
- The front-drive and rear drive axles of four wheel-wheel drive vehicles.



Periodic Maintenance Service

Periodic Maintenance Service

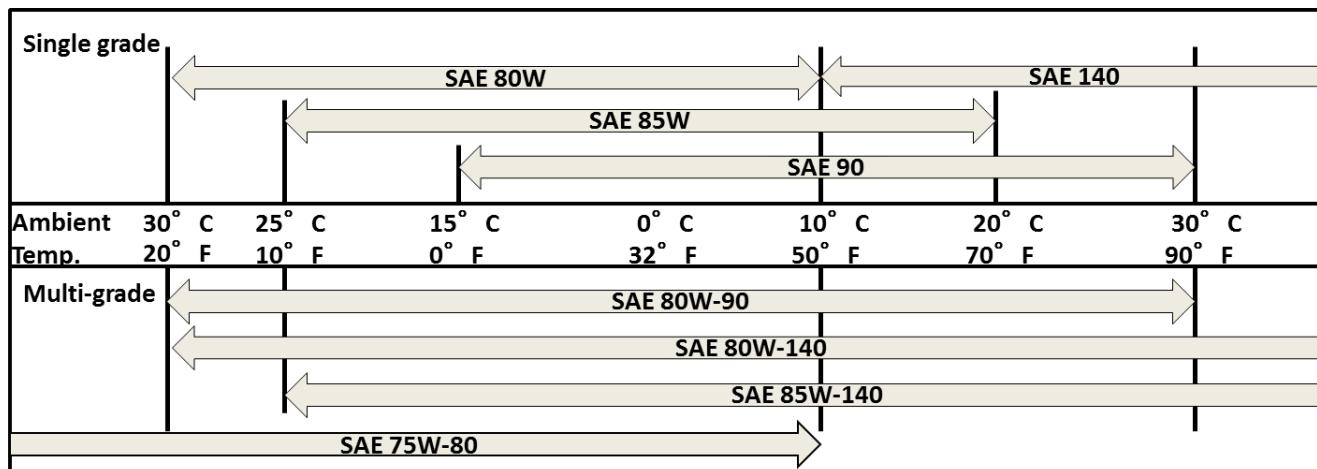
Front and Rear Axle

Differential Gear Oil

- Differential gear oil prevents seizure of the gears composing the differential. The oil has a characteristic of a high viscosity since a large force is applied to the gear tooth flank.

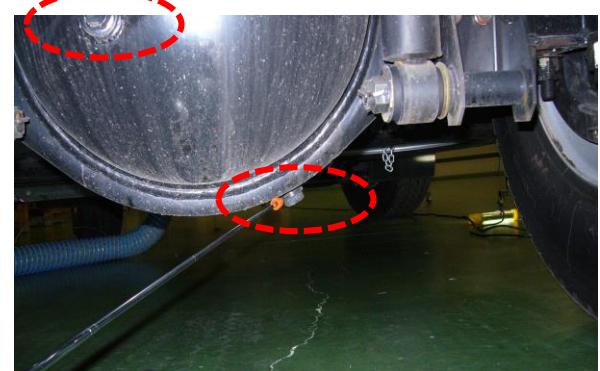
Importance of Maintenance

- The oil gradually deteriorates by heat or dust contamination. If oil viscosity deteriorates or amount of oil diminishes because of oil leak, it could cause bearings or gears to seize up and produce abnormal noise.



Maintenance Procedures:

- Check for oil leakage
- Check for oil level



Periodic Maintenance Service

Periodic Maintenance Service

Steering System

- The steering system allows the driver to control the direction of vehicle travel. The basic operation is the same for both manual & power steering. As the driver turns the steering wheel, the movement is carried to the steering gear.

Importance of Maintenance

When the power steering fails, it is extremely difficult to keep a vehicle under control and could cause a driver to crash. It is therefore important that professional technicians inspect and service power steering malfunctions immediately.

Maintenance Inspection:

- Check power steering fluid
- Check oil leakage
- Check steering wheel pre-play
- Check steering function
- Check turning radius
- Check steering linkages



Periodic Maintenance Service

Periodic Maintenance Service

Steering System

Service Inspection

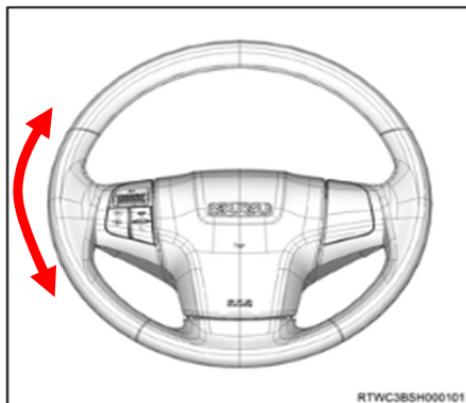
Steering Wheel Free-Play Inspection

- With the tires in straight-ahead position, check the amount of steering wheel play by turning the wheel in both directions until the tires begin to move.

Note: The steering wheel free-play should be checked with the engine running.

Free-play: 0 – 30 mm (0 – 1.18 in)

- Also, check for play and looseness by moving the steering wheel back and forth, left and right. During a test drive, check for hard steering shimmy and a tendency to be pulled toward one side.

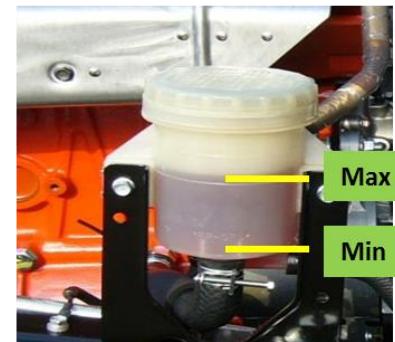


Periodic Maintenance Service

Periodic Maintenance Service

Steering System

- Perform the following check with the engine running at idle.
- Bleeding is considered to be completed if the following conditions apply:
 - Turn the steering wheel to lock in both directions 3 to 4 times.
 - Stop the engine with steering wheel in a straight-ahead position and the level of fluid in reservoir does not increase.
- Start the engine, slowly turn the steering wheel right and left, lightly contacting the wheel stops. Check the fluid level, add if necessary.
- Lower the vehicle, set the steering wheel at the straight forward position after turning to the full steer position 2 to 3 times, and stop the engine. Again, check the fluid level and refill if required.
- If the fluid is extremely foamy, allow the vehicle to set for a few minutes, then repeat the above procedures.



Warning:

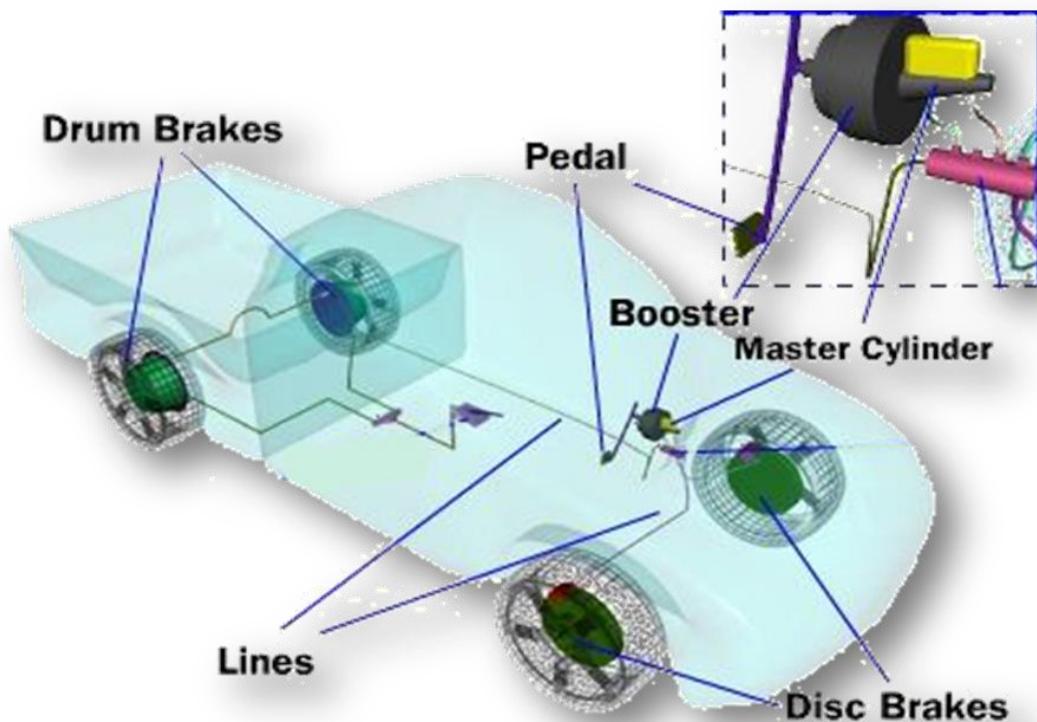
Do not let the steering wheel in a lock position for more than 5 seconds, or temperature of fluid will increase rapidly.

Periodic Maintenance Service

Periodic Maintenance Service

Braking System

- The brake system is installed to absorb the inertia energy to reduce speed a moving vehicle or prevent the vehicle from moving while on a stop.
- Brake is an energy-conversion device used to stop, slow, or hold the vehicle.



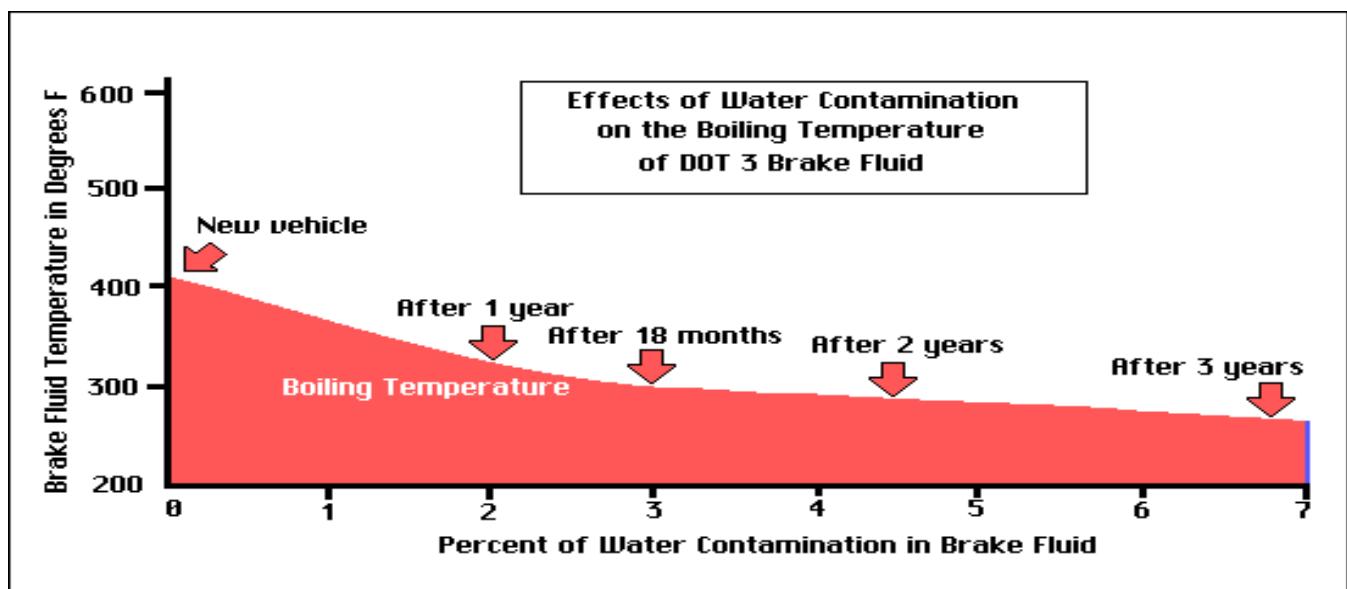
Periodic Maintenance Service

Periodic Maintenance Service

Braking System

Functions of Brake Fluid

- It is used to transfer force into pressure, and to amplify braking force.
- Serve as a lubricant for the moving parts in a brake system.
- Brake fluids must have certain characteristics and meet certain quality standards for the braking system to work properly.



Periodic Maintenance Service

Periodic Maintenance Service

Braking System

Classification of Brake Fluid

Property	DOT 3	DOT 4	DOT 5
Boiling Point (° C)	205	230	260
Wet Boiling Point (° C)	140	155	180
Main Component	Ether Glycol Based	Ether Glycol / Borate Ester	Silicon Based



Brake Fluid (DOT 3)

- If your vehicle was designed for a particular type of fluid, you should make every attempt to stick with that fluid.
- If your vehicle was designed to be DOT 3 fluid specification, the internal components of the system (seals, brake hoses, and fittings) were specifically designed and tested for compatibility with DOT 3 because DOT 4 and DOT 5 fluid contain a different chemical composition.

Periodic Maintenance Service

Periodic Maintenance Service

Braking System

Maintenance Inspection

- For fluid level and leaks, inspect every maintenance check-up.
- If brake fluid is leaking from a pipe or hose, fluid will not be transmitted to the wheel cylinders / disc brake cylinders, resulting in an extremely dangerous situation where the brakes lose its effectiveness.
- Check the brake and clutch fluid level
 - Check brake fluid lines for improper attachment, leaks, abrasions and deteriorations.
 - Check brake pads and shoes for thickness
 - Check fluid pipes and hoses for leaks and looseness
 - Check pedal pre-play
 - Check brake pad thickness



Periodic Maintenance Service

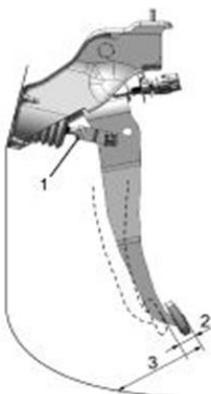
Periodic Maintenance Service

Braking System

Service Inspection

Brake Pedal Height and Free-Play

- Measure the brake pedal height after making sure the pedal is fully returned by the pedal spring.
- Pedal height must be measured after starting the engine and increasing the engine rpm several times by stepping on the accelerator pedal.



Pedal Height	M/T	177 to 189 mm (6.97 to 7.44 in)
	A/T	180 to 192 mm (7.09 to 7.56 in)

Pedal Free-Play

- Measure the pedal free-play after stopping the engine and depressing the brake pedal 5 or more times.
- Adjust the brake pedal if the measured value is not in the specified range.

Pedal Free-Play	6 to 10 mm (0.24 to 0.39 in)
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For Isuzu Dmax

Periodic Maintenance Service

Periodic Maintenance Service

Braking System

Importance of Maintenance

- Brake fluid will deteriorate by moist in air and oxidation due to the friction heat. If brake fluid deteriorates, it may cause the corrosion inside the cylinder.
- If brake fluid contains moist, the boiling point becomes lower. It is very dangerous because the brake may become weak or may also fail to work.

Periodic Maintenance Service

Periodic Maintenance Service

Braking System

Fluctuation of Rotor Brake

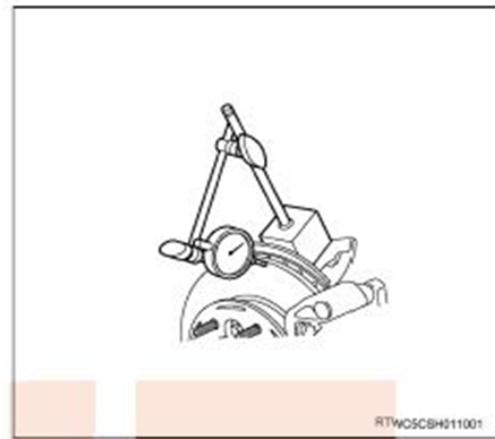
- Adjust the wheel bearing properly before the inspection.
- Measure the amount of fluctuation with a dial gauge at a position 10 mm away from the rotor outside end on the contact surface of the disc brake pad.

Limit: 0.075 mm (0.00295 in)

Fluctuation of Rotor Brake

- Measure the parallelism of the brake rotor.
- The contact surface is within 0.023 mm at a position inside the position 10 mm from the rotor outside end.
- Perform measurement at 8 locations or more in a circumferential direction.

Limit: 0.023 mm (0.00091 in)



For Isuzu Dmax

The End

