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Y62 Patrol

NISSAN

Learning Academy



Nissan Australia Technical Training
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Foreword

The information in this Training Manual should not be interpreted as a basis for warranty or goodwill claims against Nissan Motor Co. (Australia) Pty. Ltd. (NMA) unless so designated.

This Technical Training Manual is intended for use by NMA & Nissan Dealership Technical Personnel. It is not designed for the use by press or for customer distribution.

Before quoting any specifications be sure to check the relevant Service Manual and Technical Bulletins.

Right for alteration to data and specifications at any time is reserved. Any such alterations will be advised by Nissan through Technical and Sales Bulletins.

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Ref: Technical Training Department.



ABOUT THIS TRAINING MANUAL

The purpose of this document is for Nissan Dealer Technical Staff **self study** purposes. If anything contained within this document gives any doubt, please contact Nissan via a Non Vehicle related TechLine enquiry to clarify the information contained within this document.

The information in this Training Manual should not be interpreted as a basis for warranty or goodwill claims against Nissan Motor Co. (Australia) Pty. Ltd. (NMA) unless so designated.

FUTURE UPDATE'S OF THIS TRAINING MANUAL

Additional information will be collated & added to this document at a later date. When this does occur, a special amendment document will be published on the new Nissan Learning Academy.

Log onto www.nissanlearningacademy.com.au for more detail or e-mail training@nissan.com.au

This actual Training Manual will also be readily available at anytime for download & printing within each Nissan Dealership.

OTHER INFORMATION TO SUPPORT THIS TRAINING MANUAL

This Training Manual should be used in conjunction with the "[Nissan Safety Shield](#)" and "[Patrol Y62 Product Knowledge 2012](#)" online training modules. These are located on the "Nissan Learning Academy" under the > Online Learning > Product Training selections.

The Y62 "PDI Pack Insert" should also be referred to. This is also available for download from the NLA. See over page for more details.

Y62 SERVICE MANUAL (ESM)

Y62 Patrol; **SM2E-1Y62G0** (Correct as of November 2012)

These ESM's have been automatically issued to **all** Nissan dealers. (via the parts distribution system). If your dealership does not have any of them, they can be ordered via normal parts channels using the above quoted publication numbers.

This Training Manual is designed for the purpose of relaying information about the vehicle & the systems within it. This Training Manual is **not** to be used as the Service Manual. Throughout this Training Manual, references are made to the Service Manual for additional information regarding fault diagnosis, repairs &/or maintenance.

Once again should there be any doubt, please contact TechLine.

SERVICE TECHNICAL BULLETINS (STB's)

Please ensure you familiarise yourselves with all STB's relating to Y62.

Once on the screen where all STB's are accessed, click on the "**by Model**" link & then all the STB's will be re-sorted so that all the Y62 STB's are together.

1. Click on "by Model"

2. Look for the vehicle model code from the list



PRE DELIVERY INSPECTION

Pre Delivery Inspection Guide

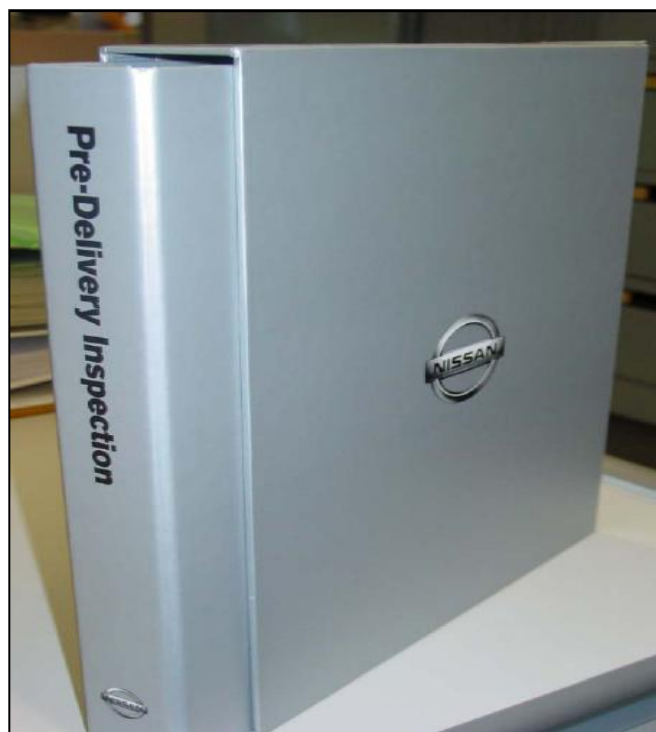
All Nissan vehicles have a **strict** Pre Delivery Inspection (PDI) policy that **must** be adhered to. This package contains detailed information about the exact PDI requirements of **all** Nissan vehicles.

A PDI is **not** just a matter of removing the plastic protective covers & giving the car a bit of a wash!

Pre Delivery Inspection Guide Updates

From time to time new models will appear & model changes will occur Therefore updates to the folder will be required.

These updates are available on the Nissan Learning Academy (NLA) website as follows;
www.nissanlearningacademy.com.au

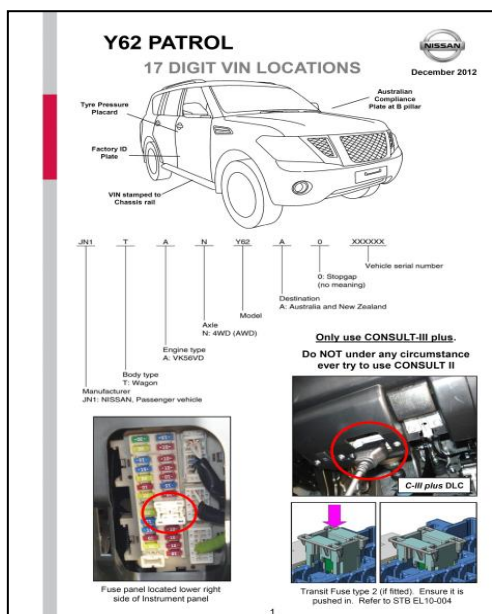
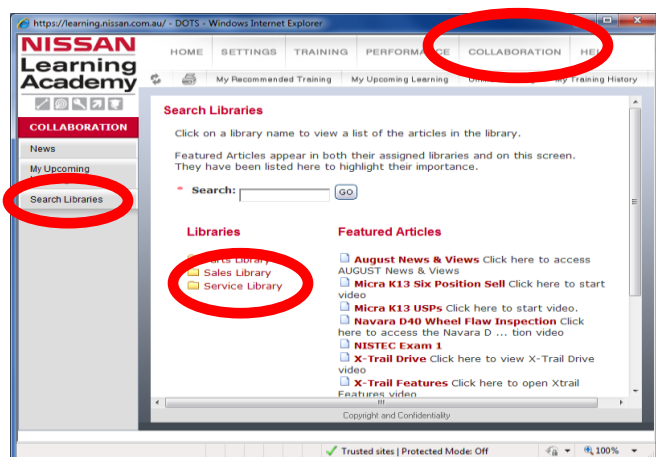


Grey coloured binder was distributed to all dealer Service Managers in 2008.

E-mail; training@nissan.com.au for replacement binders

Accessing PDI inserts

- Log onto your own NLA account, then click on:
- COLLABORATION – tab at the far top right of screen
 - Search Libraries – lower left panel
 - Service Library folder – central on screen
 - Pre Delivery Inspection sub folder – central on screen



Front page of the PDI inserts shown at left.



2013MY Y62 Patrol Overview

The all-new 2011 ~ 2012 Y62 Patrol represents the 5th major change to the model since the 1st Patrol was launched in the early 1960's. Although an all new model – the Y62 continues with the same theme as previously.

Summary of the vehicle & features as follows;

- All new 5.6L Direct injection Gasoline V8 engine with Variable Valve Event & Lift (VK56VD)
- 7 sp. E-A/T with Adaptive Shift Control
- Hydraulic Body Motion Control suspension
- Hill Descent Control / Hill Start Assist
- Intelligent Cruise Control / Distance Control Assist systems (ICC / DCA)
- Blind Spot Warning / Blind Spot Intervention systems (BSW / BSI)
- Forward Collision Warning / Intelligent Brake Assist systems (FCW / IBA)
- Lane Departure Warning / Lane Departure Prevention systems (LDW / LDP)
- Tyre Pressure Monitoring System (TPMS)

Spec Levels, Features & Capacities

Reference should be made to the most current New Vehicle Sales brochure in order to determine the most current Specification Levels & features.

The brochure will also contain information regarding Weights, Dimensions & Capacities.

Country of Manufacture

All Y62 models will be sourced from the Nissan Shatai plant in Japan.





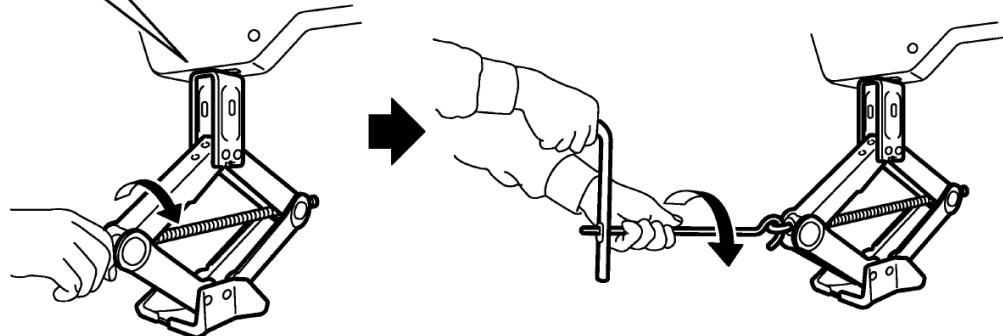
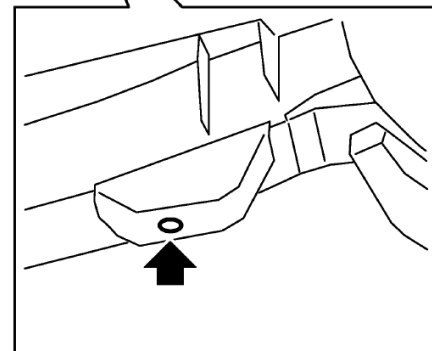
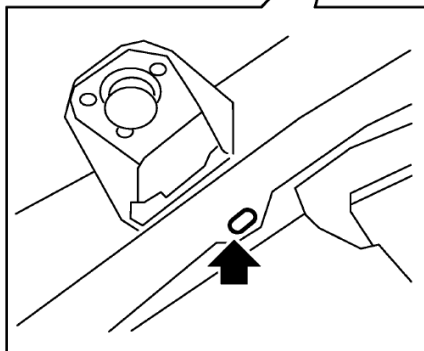
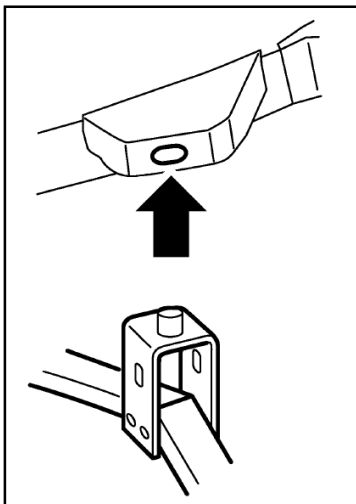
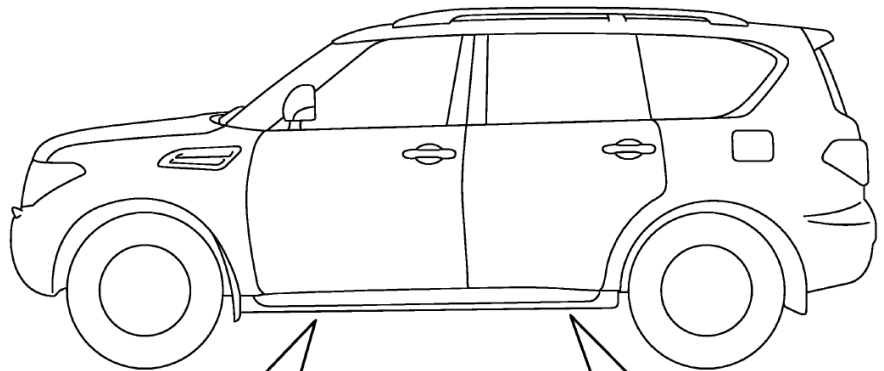
GENERAL INFORMATION

Vehicle Handling

1. Lifting (Vehicle Jack)

Please refer to section "GENERAL INFORMATION" of the Service Manual for detailed instructions regarding Lifting of the vehicle.

In order to avoid serious personal injury & vehicle damage, please observe these precautions.





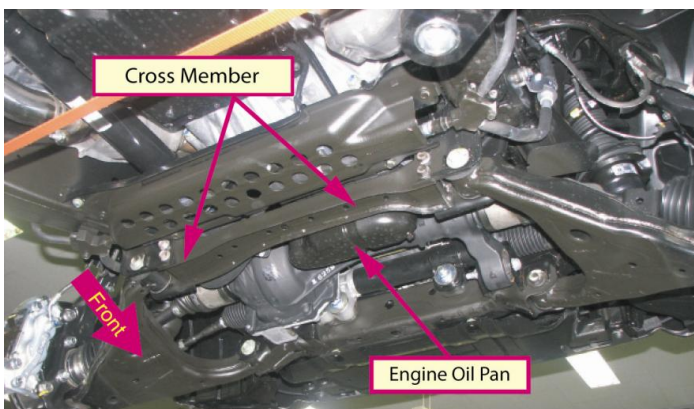
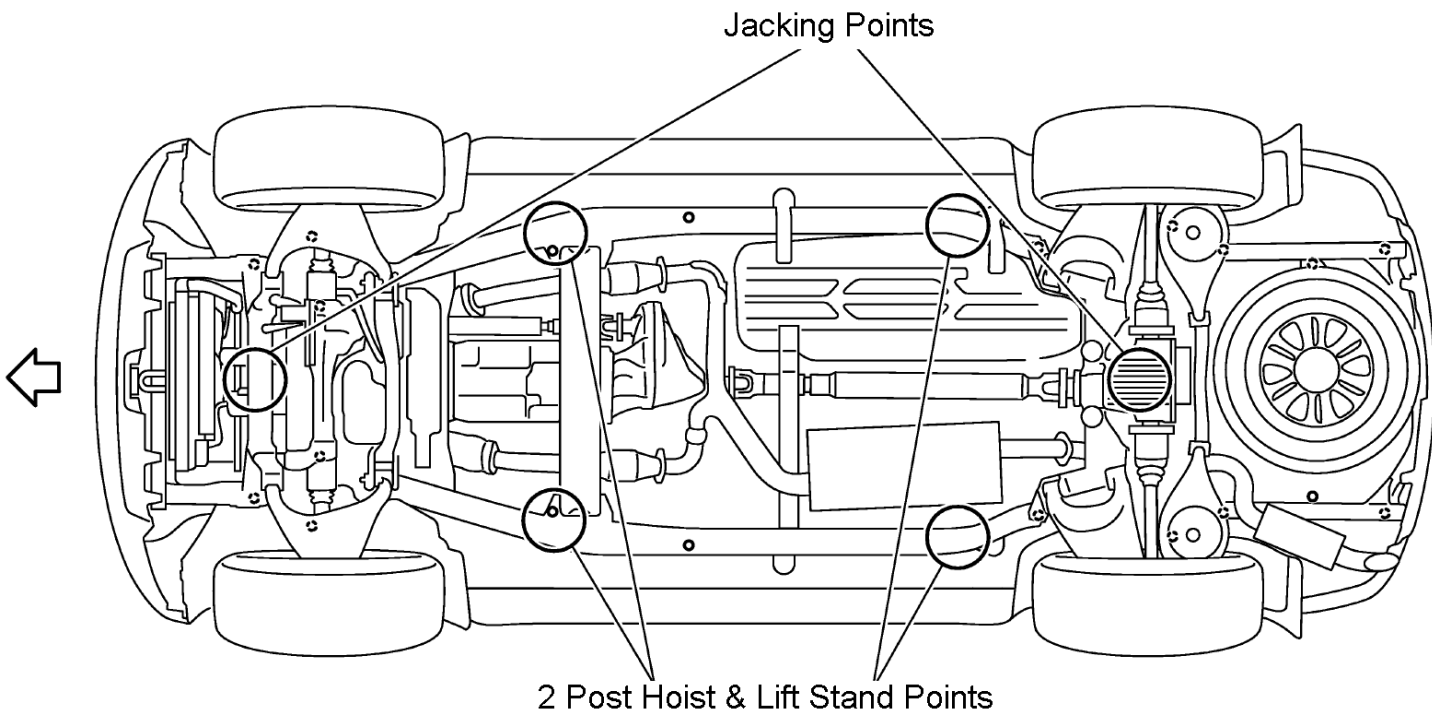
GENERAL INFORMATION

Vehicle Handling

2. Lifting (Hoist)

Please refer to section "GENERAL INFORMATION" of the Service Manual for detailed instructions regarding Lifting of the vehicle.

In order to avoid serious personal injury & vehicle damage, please observe the vehicle lifting precautions.



Use the **CROSS MEMBER** as the Jacking Point



Use the **DIFFERENTIAL** as the Jacking Point

WARNING

Do **NOT** jack up the front of the vehicle until you ensure that the jack makes contact with the **CROSS MEMBER** only.

Otherwise the Engine Sump or other critical components may be seriously damaged.



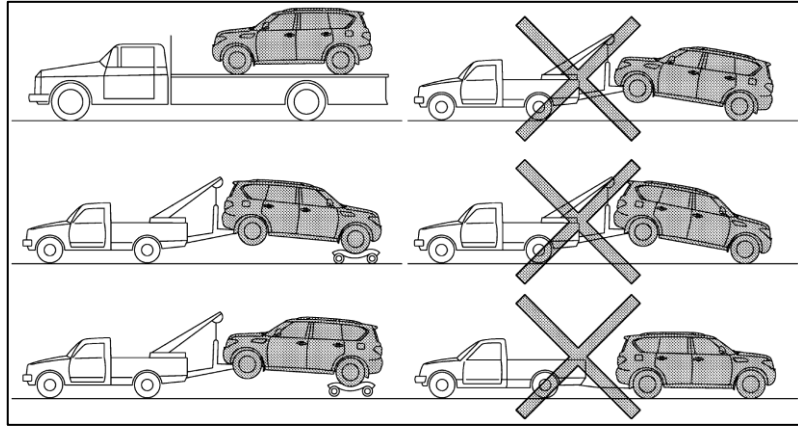
GENERAL INFORMATION

Vehicle Handling

3. Towing

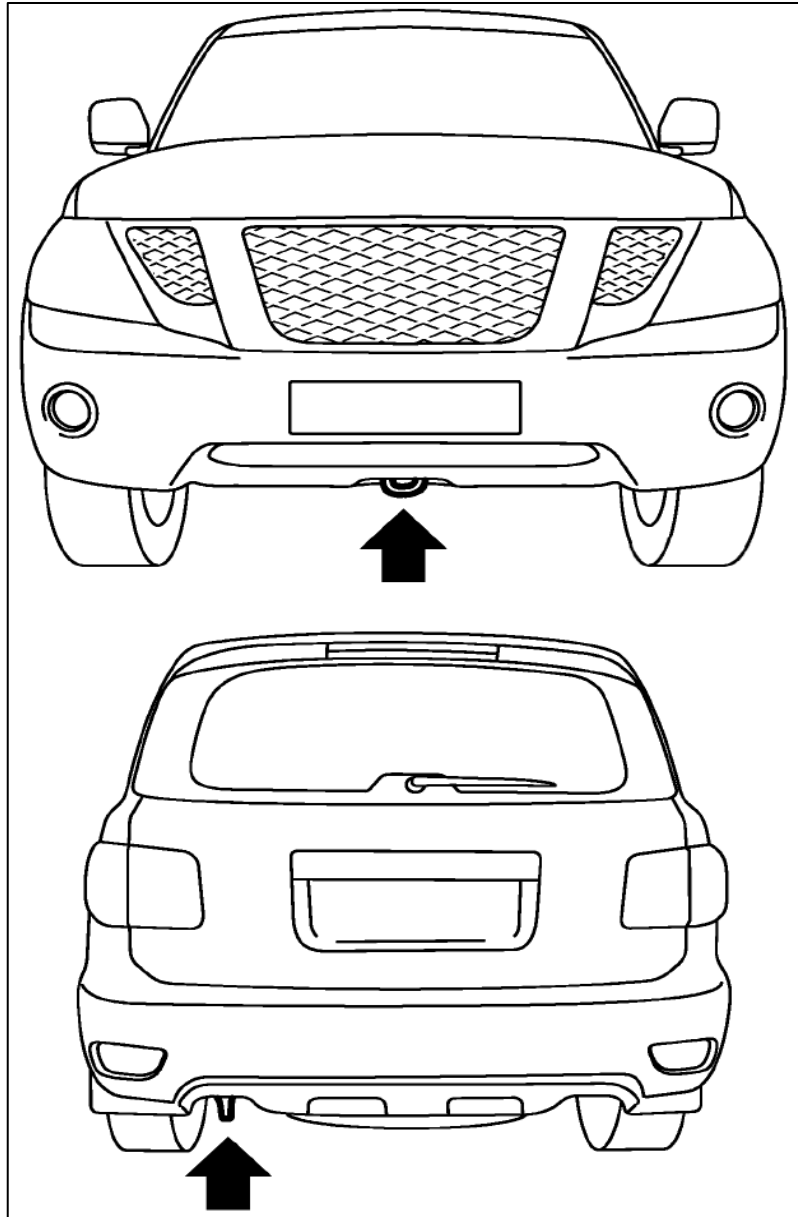
Please refer to section "GENERAL INFORMATION" of the Service Manual or Section 6 of the Owners Manual for information regarding the towing of the vehicle if it is unable to be driven.

In order to avoid serious vehicle damage, please observe these precautions.



Recovery Hooks

Attach the appropriate ropes / cable to the front or rear of the vehicle as shown right. Never connect to any other part of the vehicle if it becomes stuck & requires recovery.



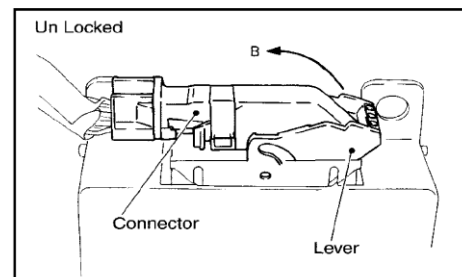
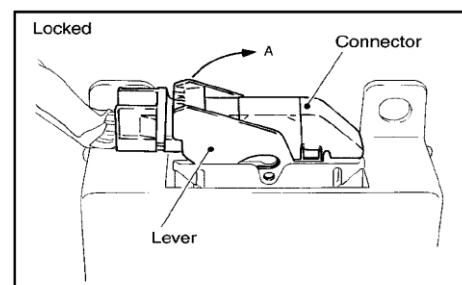
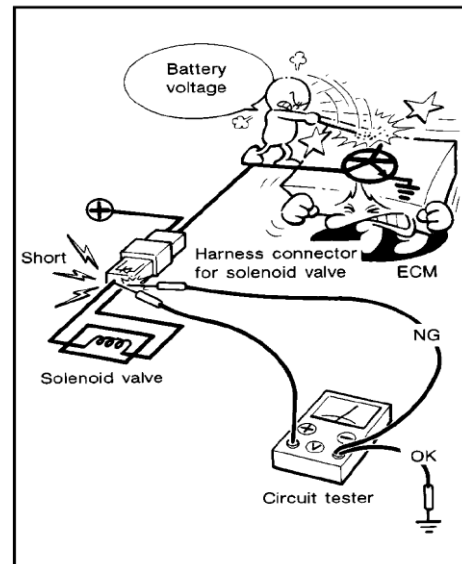


GENERAL INFORMATION

HANDLING OF ELECTRICAL COMPONENTS

Control Units and other Electrical Parts

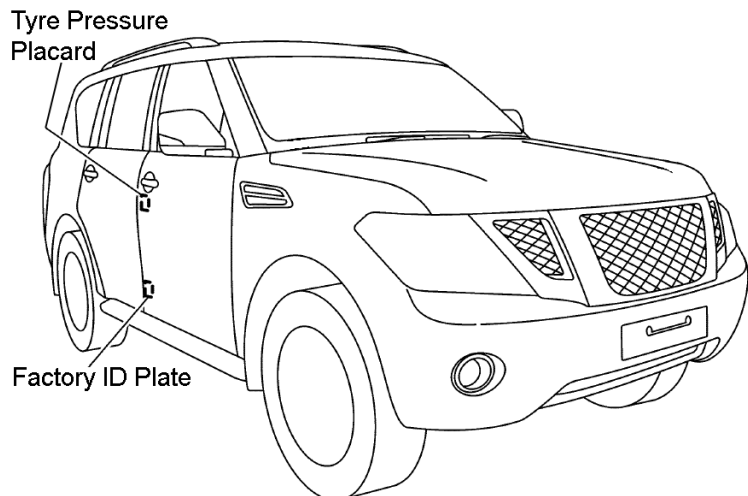
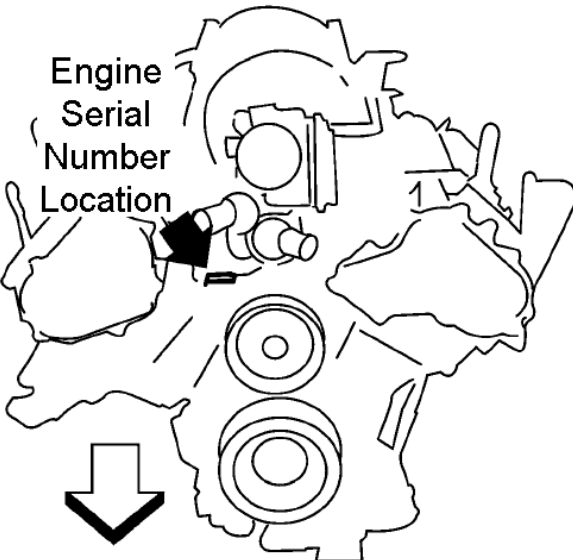
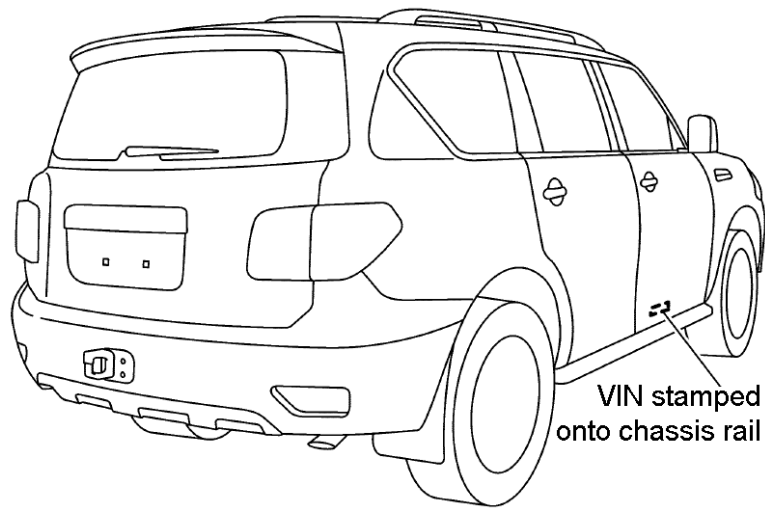
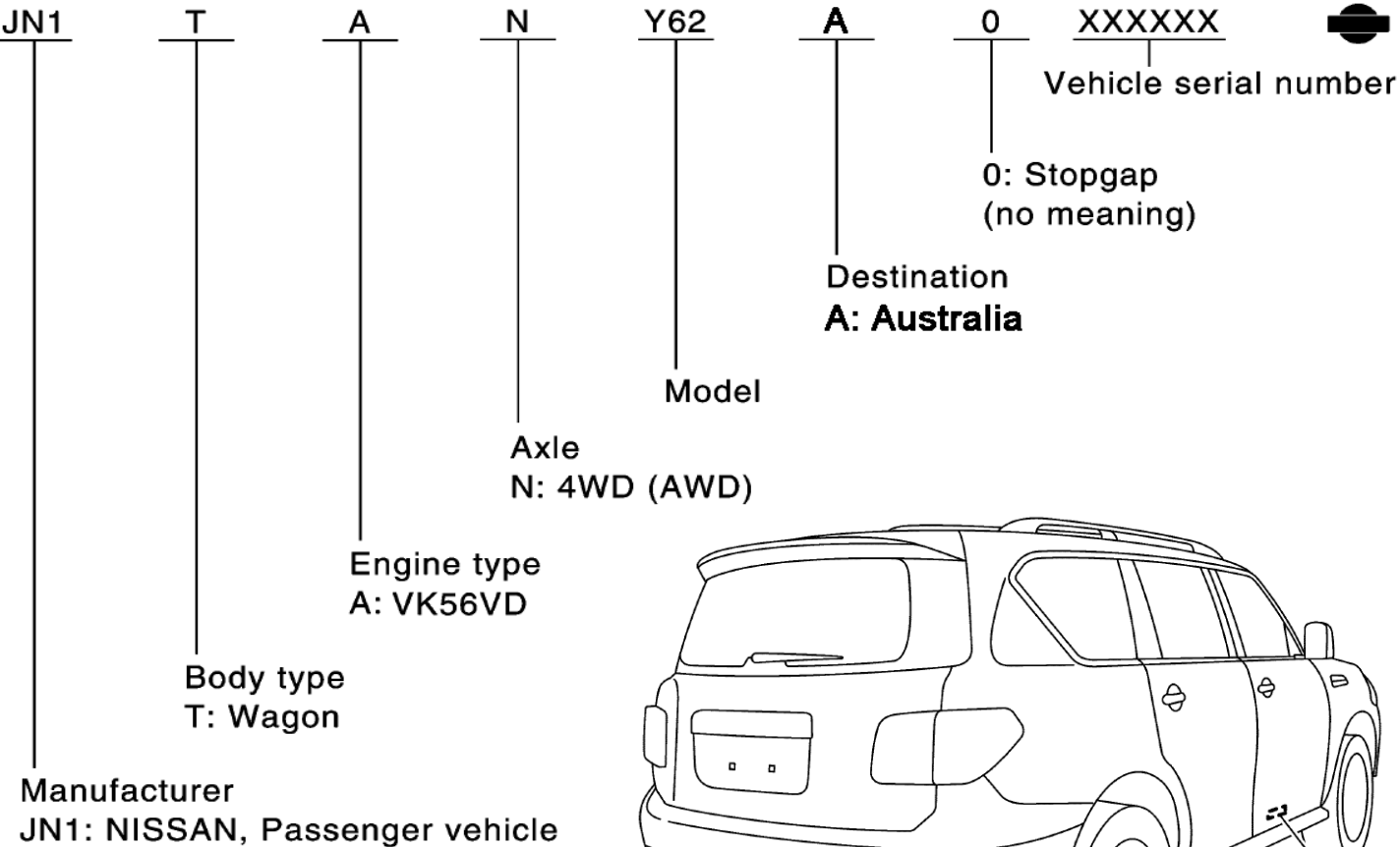
- Disconnect Battery prior to Disconnection & Connection of ECM.
Never reverse polarity of battery terminals.
- Install only parts specified for the vehicle in question.
- **Before replacing the control unit**, check the input and output and functions of the components.
- Do not shock the control unit by dropping or hitting it.
- Be careful to prevent condensation in the control unit due to rapid temperature changes and do not let water get on it.
- Do not let oil to get on to the control unit connector.
- Do not disassemble the control unit.
- When using a Digital Multi Meter (DMM), be careful not to let test probes touch each other. Short circuiting will otherwise result.
- Do not apply excessive force when disconnecting a connector.
- If a connector is installed by tightening bolts, loosen mounting bolt, then remove it by hand.
- When installing a connector by tightening bolts, fix it by tightening the mounting bolt until the painted projection of the connector becomes even with the surface.
- Before installing a connector, make sure the terminal is not bent or damaged, and then correctly connect it.
- For removal of the lever type connector, pull the lever up to the direction pointed to by the arrow A in the figure, and then remove the connector.
- For installation of the lever type connector, pull down the lever to the direction pointed by the arrow B in the figure, and then push the connector until a clicking noise is heard.





GENERAL INFORMATION

Y62 Vehicle Identification Number Arrangement





GENERAL INFORMATION

CONSULT III plus Accessible Systems

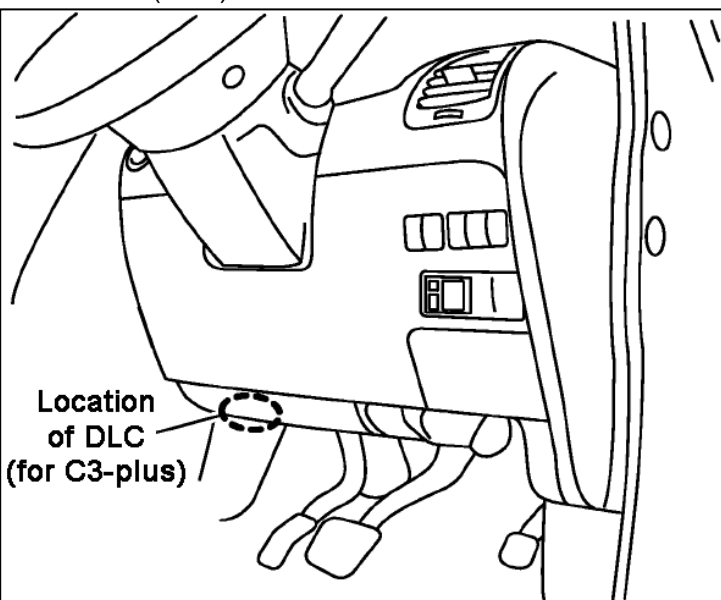
The introduction of Y62 brings with it by far the most complex of Nissan vehicles to date. Dependant on variant (ST-L, Ti or Ti-L) will depend on how many systems that can communicate with CONSULT III plus.

The following Control Units cannot communicate with CONSULT III plus;

- Power Steering Control Unit (Speed sensitive hydraulic power steering. Ti/ Ti-L only)
- Power Window Control Unit (Main Switch assembly)
- Sunroof / Sunshade Control Units (Motor assemblies. Ti/ Ti-L only)

CONSULT III plus communicates to the Camera C/U through the MULTI AV C/U.

See the image below for the location of the Data Link Connector (DLC).

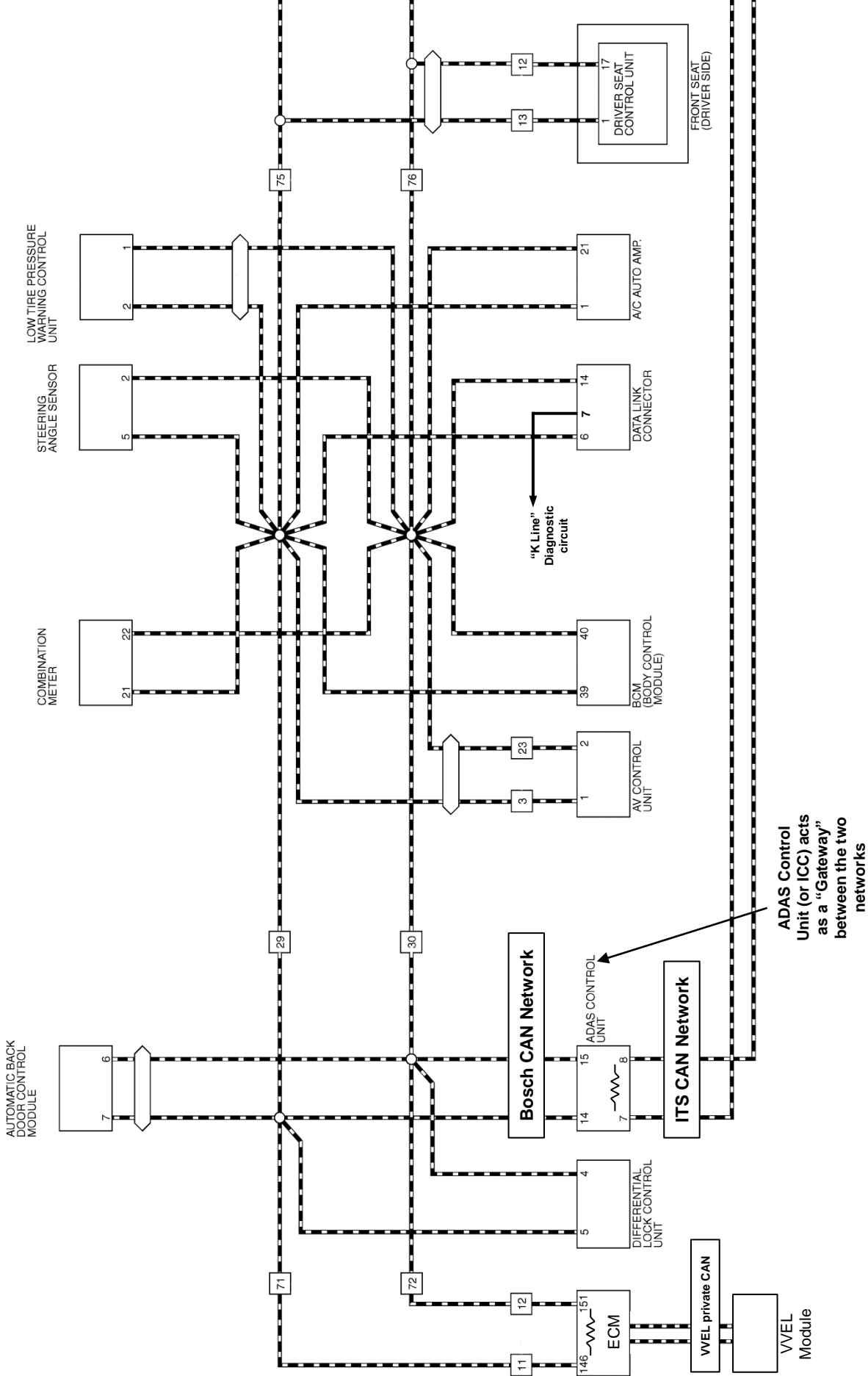


ENGINE	
TRANSMISSION	
AIR BAG	
METER / M&A	
AUTO BACK DOOR	(Ti-L only)
BCM	
AUTO DRIVE POS.	(Ti-L only)
ABS	(includes VDC)
IPDM E/R	
ALL MODE AWD/4WD	
MULTI AV	
ICC/ADAS	(Ti-L only)
SONAR (F & R parking sensors)	
AIR PRESSURE MONITOR (Tyre Air Pressure. TPMS)	(Ti-L only)
HEAD LAMP LEVELIZER	(Ti-L only)
HVAC	
LASER	(Ti-L only)
LANE CAMERA	(Ti-L only)
ACCELE PEDAL ACT	(Ti-L only)
DIFF LOCK	
SIDE RADAR LEFT	(Ti-L only)
SIDE RADAR RIGHT	(Ti-L only)



GENERAL INFORMATION - CAN

Y62 Patrol Ti-L CAN Network example

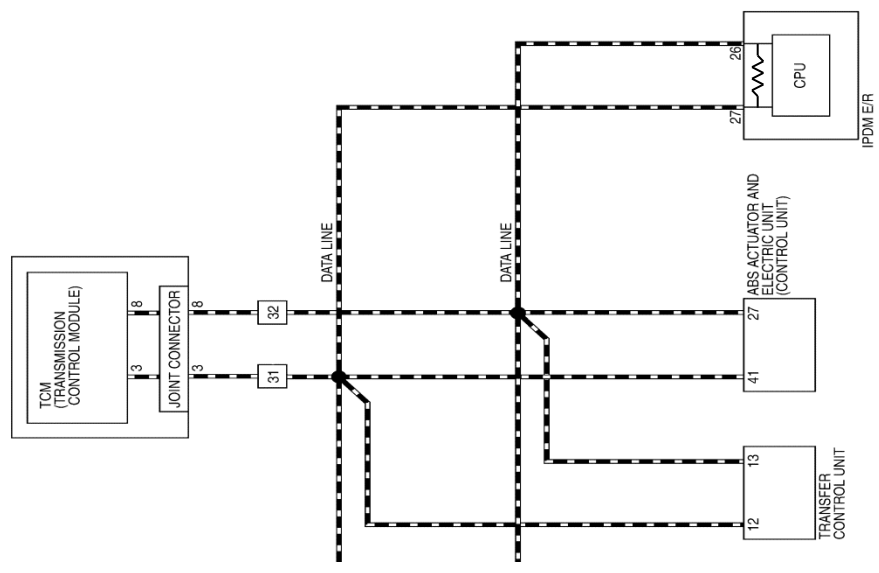




GENERAL INFORMATION - CAN

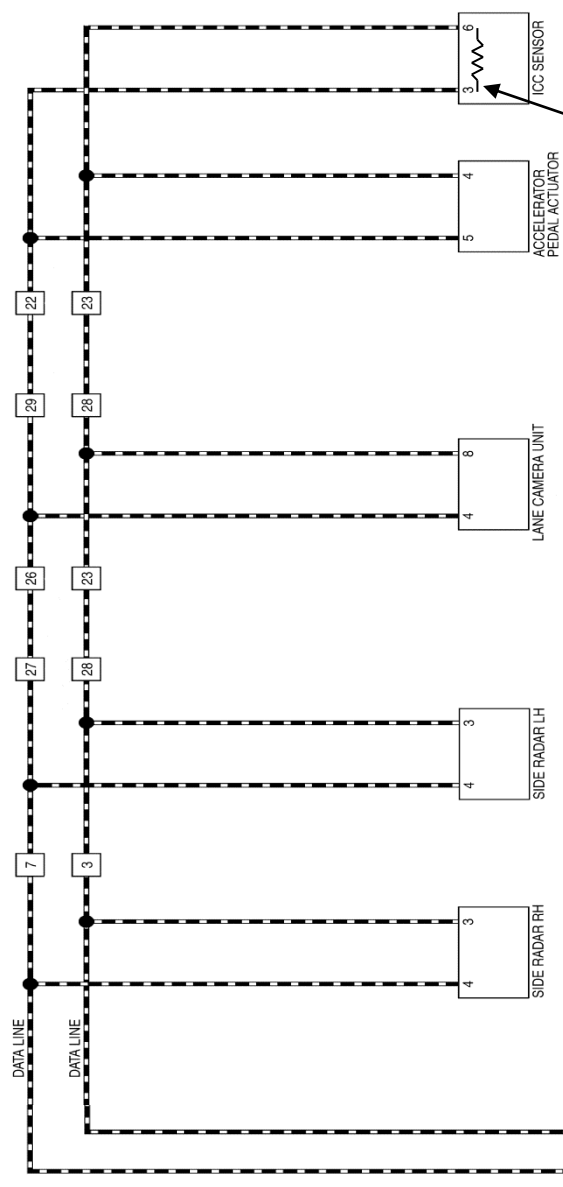
Y62 Patrol Ti-L CAN Network example – continued..

A/T ASSEMBLY



- NOTE: The following modules are linked to the DLC via the "K Line" at DLC pin 7:
- Air Bag Module (All)
 - Headlamp Leveliser Module (Ti-L)
 - F & R Sonar (Parking) Sensor Module (All)

The Around View Monitor module is accessed as an input to the AV Control Module.



ITS CAN Terminating Resistor

ITS CAN Network



GENERAL INFORMATION

DISCONNECTION OF THE BATTERY

The following systems will be affected if the battery is disconnected;

- **HVAC system** (Temp setting trimmer / Foot position setting trimmer / Inlet port memory function)

Refer to ESM section as follows;

VENTILATION, HEATER & AIR CONDITIONER > Heater & Air Conditioning Control System > Inspection & Adjustment

If the Temperature & Foot position settings have been trimmed to suit customer preferences, they will have to be reset.

- **Auto Drive Positioner System**

Refer to section 3 of the Owners Manual or the ESM as follows;

BODY INTERIOR > Automatic Drive Positioner > Inspection & Adjustment

The drivers memory + 2nd drivers memory settings will have to be reset as well as matched to the ignition keys.

- **Power Window Control System**

Refer to the section 2 of the Owners Manual or ESM as follows;

BODY EXTERIOR, DOORS, ROOF & VEHICLE SECURITY > Power Window Control System > Inspection & Adjustment

The Auto Up / Pinch detect function will not operate. The window travel distance will have to be re-learned.

- **Rear View Monitor**

Refer to the ESM as follows;

DRIVER INFORMATION & MULTIMEDIA > Audio, Visual & Navigation System > Inspection & Adjustment

The centre position of the predicted course line will have to be corrected. With the engine idling, turn the steering wheel to the full lock position in both directions.

- **Automatic Back Door System**

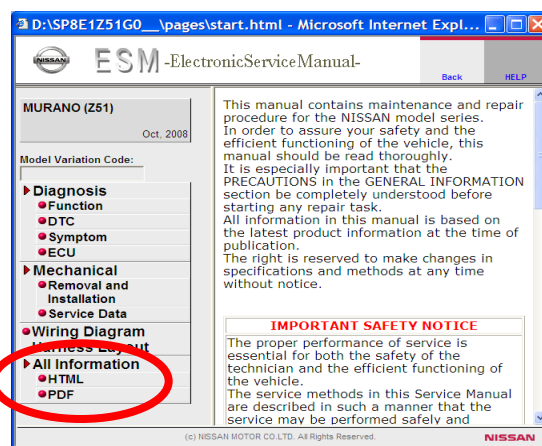
Refer to the ESM as follows;

BODY EXTERIOR, DOORS, ROOF & VEHICLE SECURITY > Door & Door Lock > Inspection & Adjustment

The automatic back door system must be initialised. With the door in the fully closed position, operate the door & allow it to open itself WITHOUT interruption. Then operate the door so that it closes itself.

References in this Training Manual to the ESM;

ESM references in this Training Manual are the "PDF" version of the ESM.





VK56VD ENGINE MECHANICAL

General Specifications

The Y62 Patrol utilises an all new 5.6L V8 Gasoline Engine with DiG & VVEL.

See right for the general specifications of the VK56VD engine.

GENERAL SPECIFICATIONS		
Cylinder arrangement		V-8
Displacement (cm ³)		5,552
Bore and stroke (mm)		98.0 x 92.0
Valve arrangement		DOHC
Firing order		1-8-7-3-6-5-4-2
Number of piston rings	Compression	2
	Oil	1
Number of main bearings		5
Compression ratio		10.8
Engine Oil: (5W 30 ACEA C3)		6.5Lt (With Filter)
Fuel Specification (RON)		95 Min.

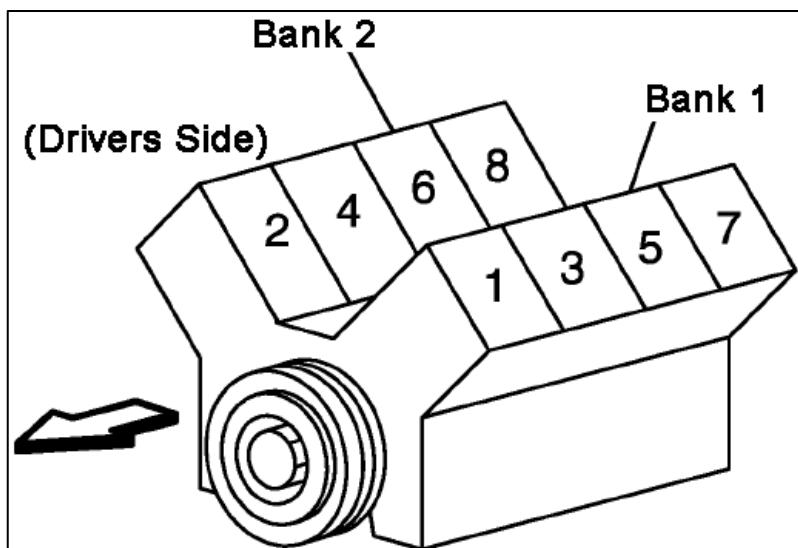
Cylinder Arrangement

The engine is an 8 cylinder engine. The Cylinders are in a "V" arrangement.

Cylinder No. 1 / Bank 1 / Bank 2

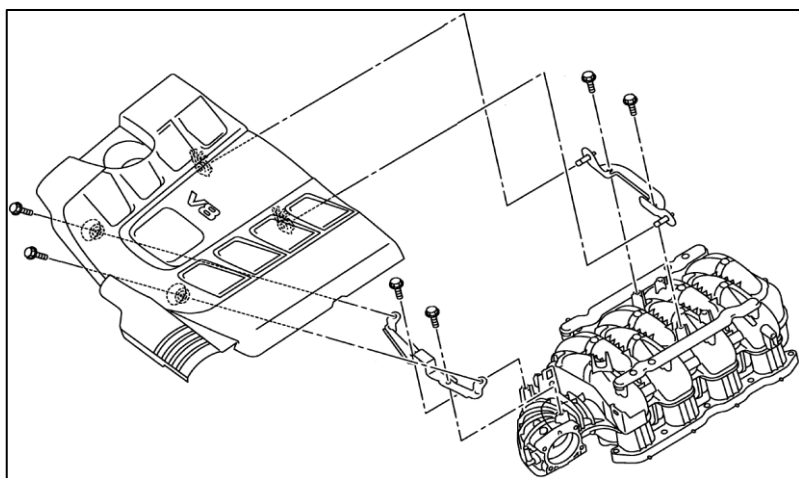
- **Cylinder No. 1** is located at the front of the engine – on it's LEFT. (Passenger side)
- **Bank 1** is on the PASSENGER side of the vehicle
- **Bank 2** is on the DRIVERS side of the vehicle

The Bank 1 Bank 2 arrangement for Nissan V6 Gasoline engines (VQ & VG series) as well as the 3.0L V6 Diesel Engine (V9X) is the opposite to this.



Engine Cover

A plastic engine cover is utilised on the Y62.





VK56VD ENGINE MECHANICAL

Drive Belt

There is only 1 belt on the engine to drive all ancillary components & it is automatically tensioned.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

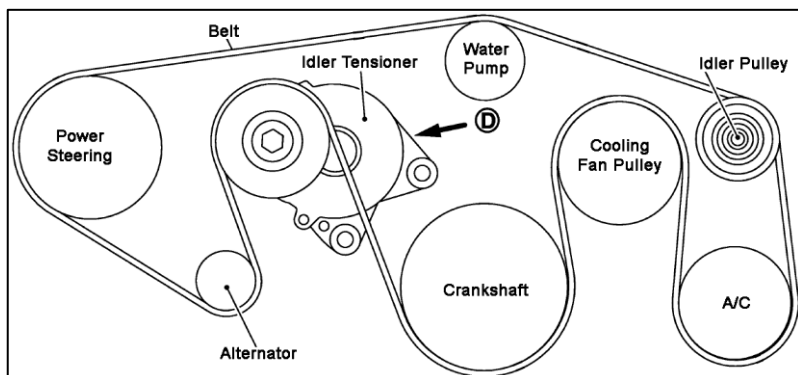
B ENGINE > EM (Engine Mechanical) > PERIODIC MAINTENANCE > DRIVE BELTS

L MAINTENANCE > MA (Maintenance)

It may be advisable to replace the belt every 100,000km's

WARNING

Once the main drive belt has been removed, it must be refitted in the same direction as it came off. Otherwise a noise may develop .



Ensure that the belt is refitted in the same direction as it was prior to removal.

Air Cleaner

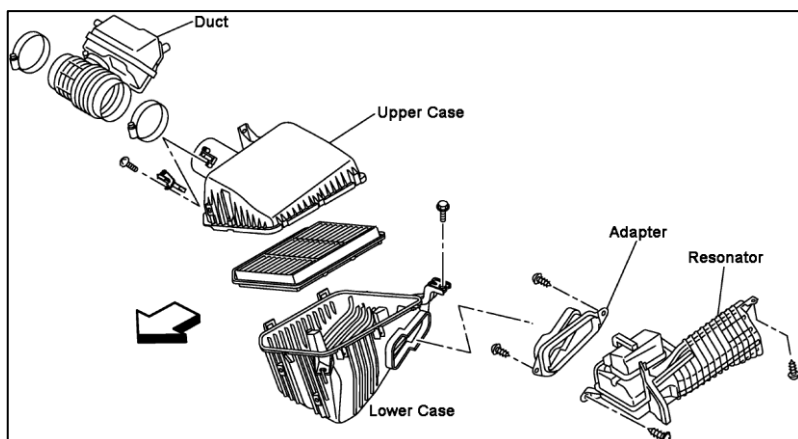
The Air Filter Element is a **viscous paper** type.

It must NOT ever be cleaned with compressed air.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > EM (Engine Mechanical)

L MAINTENANCE > MA (Maintenance)



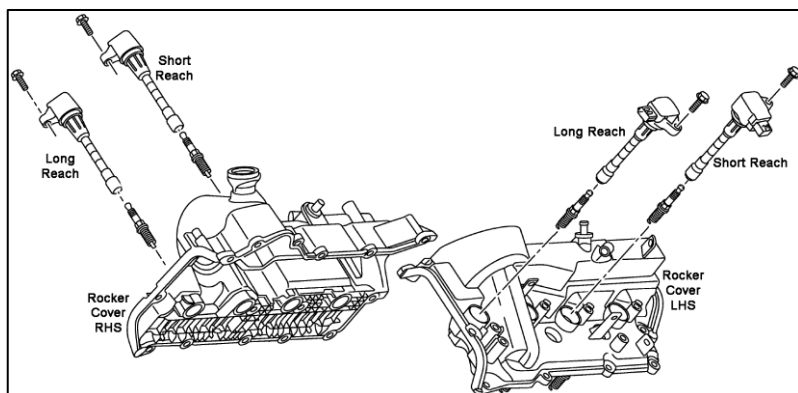
Rocker Cover

Resin type Rocker covers are utilised. The design is similar to other Nissan Gasoline engines.

NOTES:

- Take note of the different Ignition Coil lengths. The Short Coils are to be fitted at the rear of the engine.

- The Ignition Coils can be easily removed via access to them through the front wheel arches (wheels removed).





VK56VD ENGINE MECHANICAL

Intake Manifold

The Intake Manifold as shown right is mounted on the inside of the Cylinder Heads.

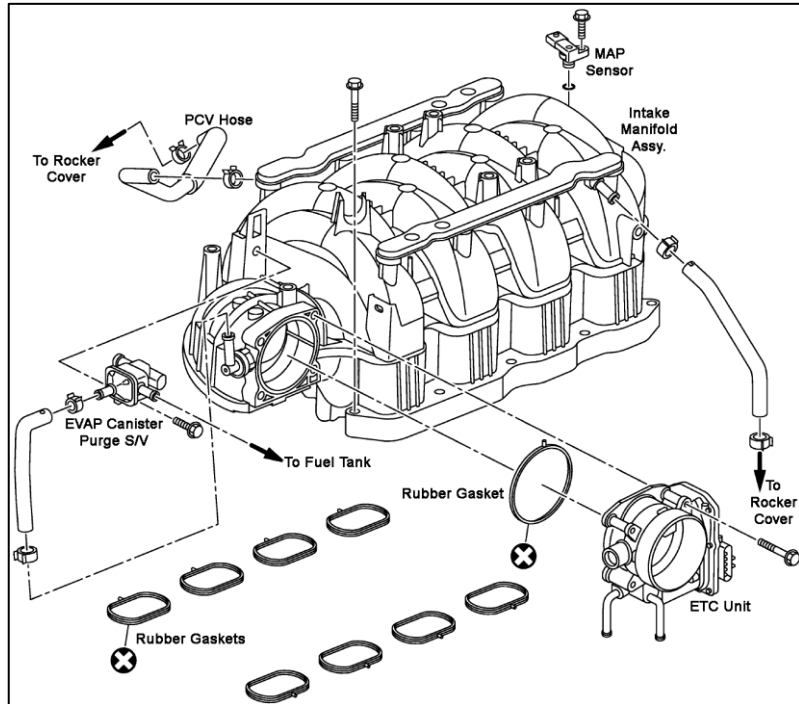
A single Electrically Controlled Throttle (ETC) valve is utilised as is the case with other Nissan Gasoline Engines.

NOTE:

It is NOT necessary to remove the Intake Manifold to replace the Spark Plugs like it is for the VQ series engines.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > EM (Engine Mechanical)

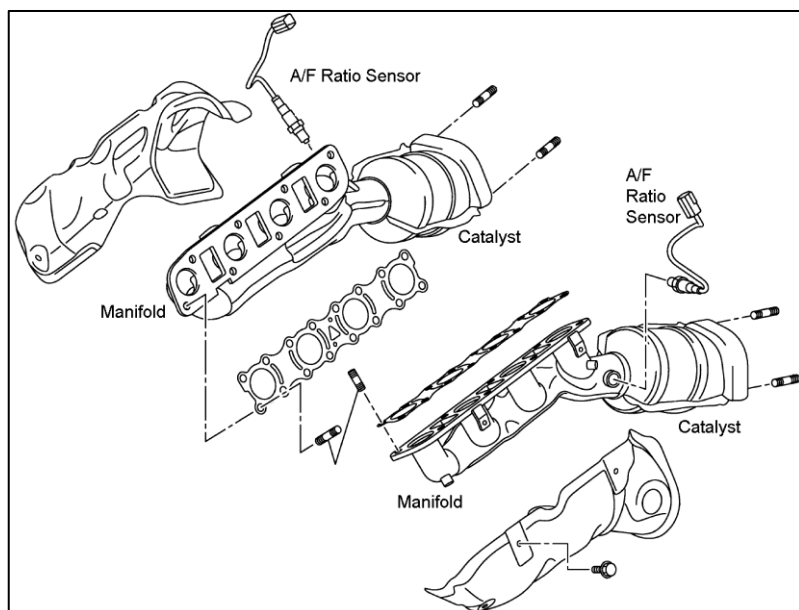


Exhaust Manifold

The Exhaust Manifolds are fitted to the outside of each cylinder head. The exhaust gases are directed through a Catalyst which is fitted to each Bank of Cylinders.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > EM (Engine Mechanical)





VK56VD ENGINE MECHANICAL

Oil Pan

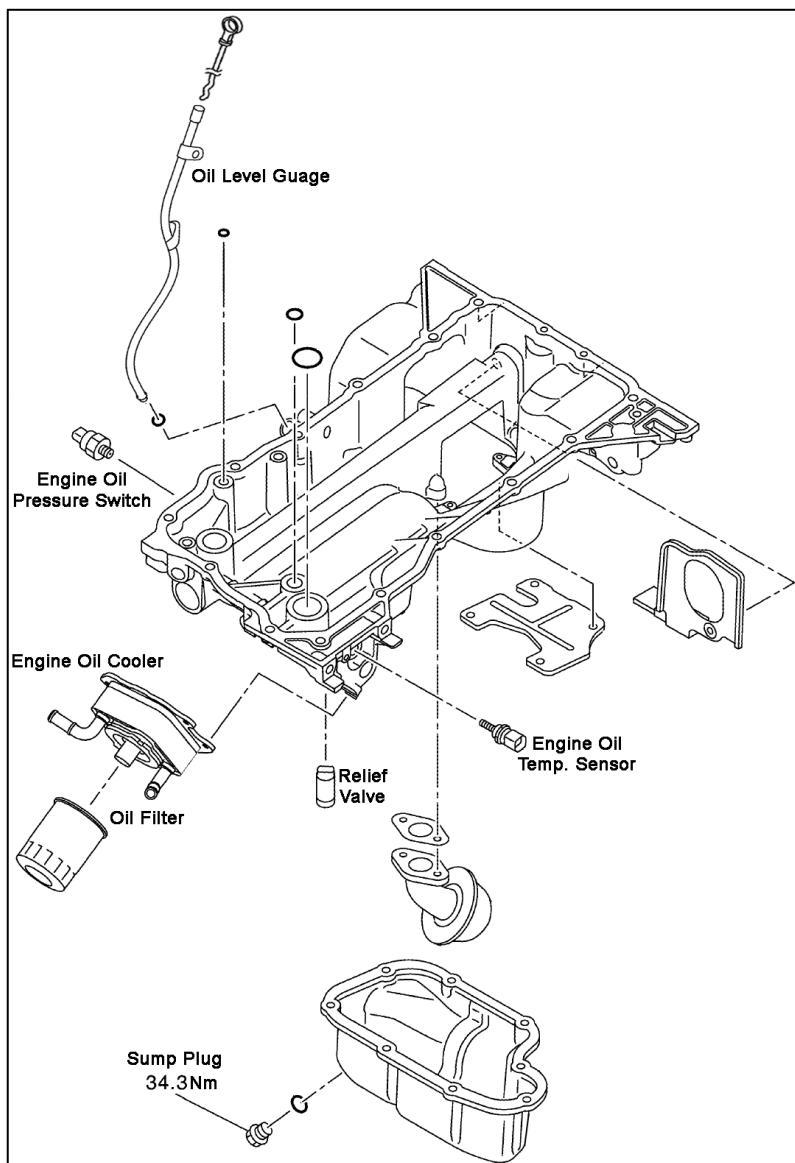
The Oil Pan design is a Cast Alloy type. Take note of the Oil Temperature Sensor. This is discussed in more detail further on in this Training Manual.

NOTE:

Take special note of the Sump Plug Torque Specification.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > EM (Engine Mechanical)

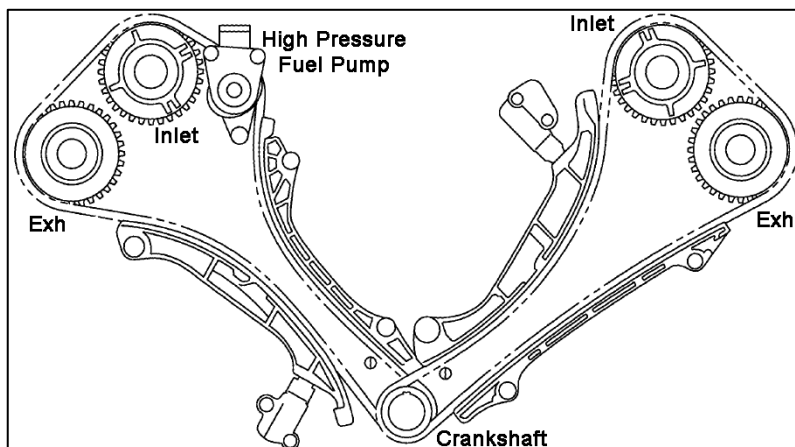


Timing Chains & Gears

The Camshafts are driven by a single row timing chain per cylinder bank. The arrangement is very similar to the V9X Diesel Engine fitted to R51 Pathfinder "550" & D40 Navara "550" variants.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > EM (Engine Mechanical)





VK56VD ENGINE MECHANICAL

Cylinder Head & Valve Train

The design of the Cylinder Head & Valve train is designed to incorporate the VVEL Actuator & Ladder assembly.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > ENGINE MECHANICAL

WARNING

Do NOT disassemble the VVEL components unnecessarily. Once any of the following components are separated from each other, none of the below can be re-used;

- VVEL Control Shaft Position Sensor
- VVEL Ladder assembly
- Cylinder head.

The Cylinder head / VVEL Ladder / VVEL Actuator-Sensors are matched sets. Once a new sensor / actuator / ladder assy. / cylinder head are fitted, the "VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT" must be carried out with CONSULT III plus.

From the CONSULT III plus "All System DTC", select the following items;
> ENGINE > WORK SUPPORT > VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT

WARNING

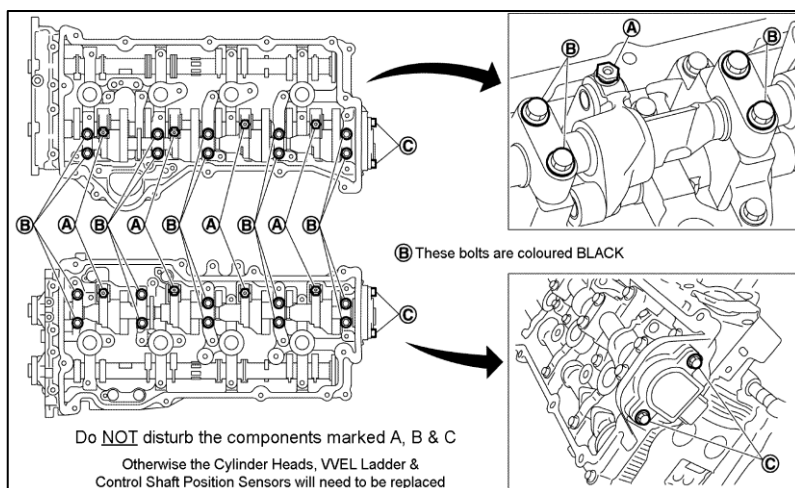
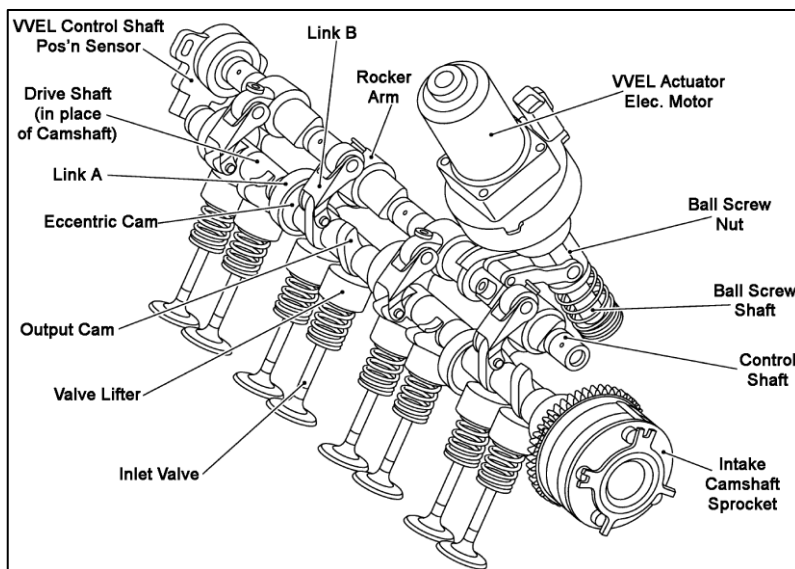
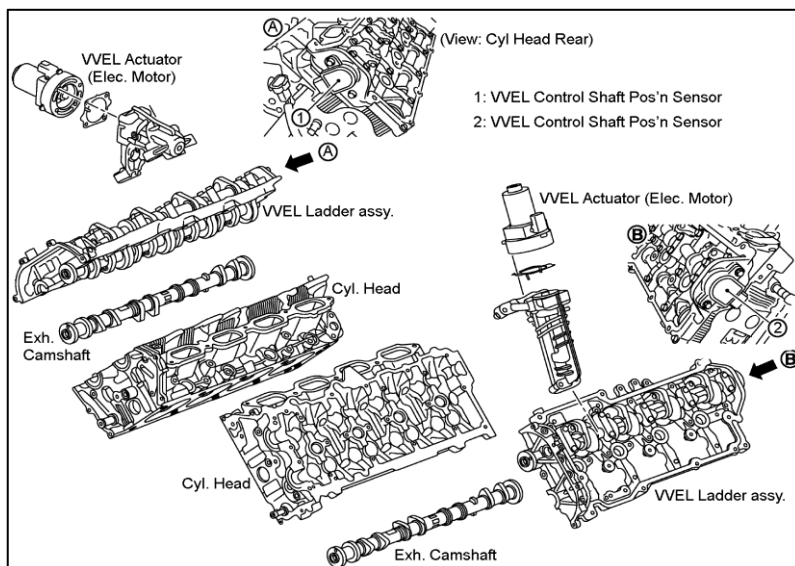
- Only do this if all of the above parts have been replaced with new ones! -

Follow the on screen prompts.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > ENGINE MECHANICAL

Or
B ENGINE > ENGINE CONTROL > BASIC INSPECTION > INSPECTION AND ADJUSTMENT





VK56VD ENGINE MECHANICAL

HP Fuel Pump (Mechanical)

The High Pressure Fuel Pump is a mechanical type. The Pump is operated via an eccentric lobe which is in turn driven via the Bank 2 Timing Chain.

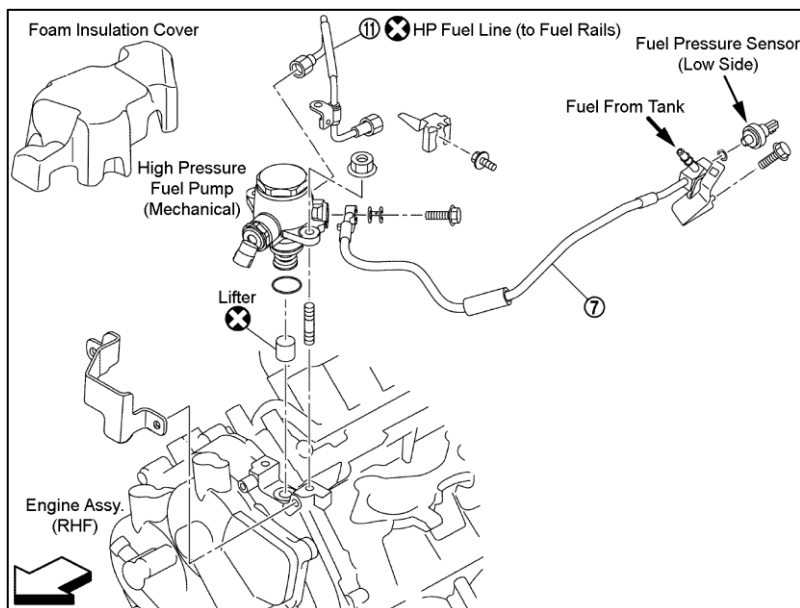
NOTE:

Take note of the components that cannot be re-used:

- The Lifter that is in contact with the HP Pump Plunger (only replace Lifter if the HP Pump or Cam Lobe is replaced).

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > EM (Engine Mechanical)



Fuel Rails & Injectors

The VK56VD Engine is a "Direct injection Gasoline" (DiG) engine. Therefore the Fuel is injected directly into the combustion chamber in a very similar manner to Diesel engines. Although not the same, the Fuel Rail & Injector arrangement is very similar to a Common Rail Diesel Engine.

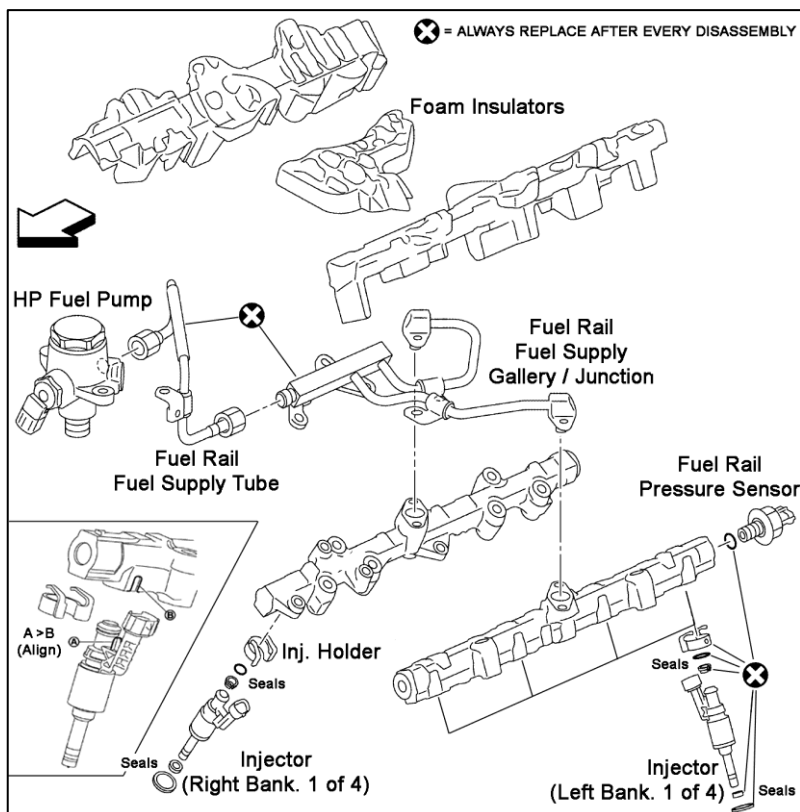
NOTE:

Take note of the components that cannot be re-used:

- The HP Fuel Line that connects to the Fuel Gallery / Junction
- The Fuel Rail Supply Gallery / Junction
- The Injector Seals.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

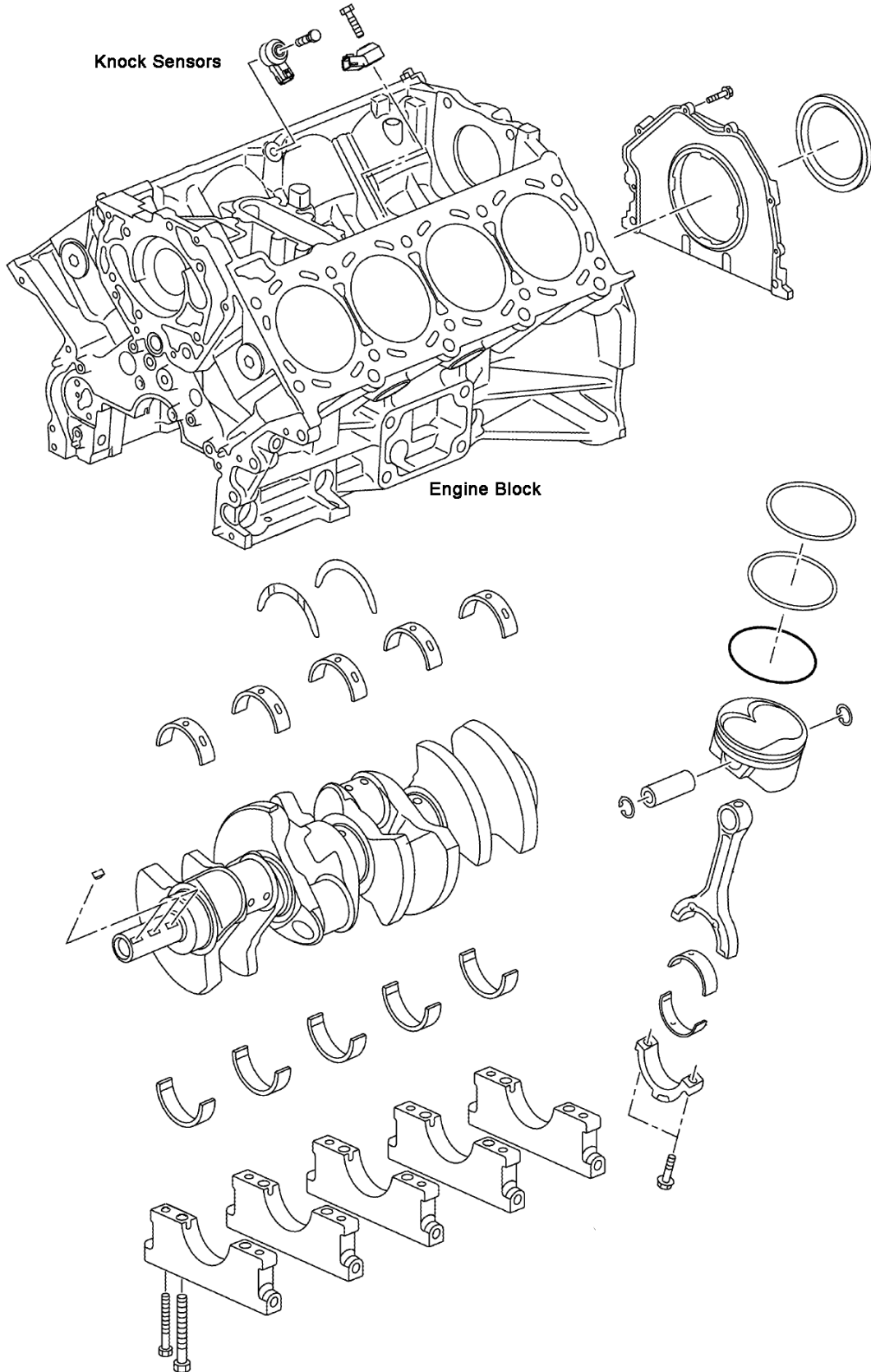
B ENGINE > EM (Engine Mechanical)





VK56VD ENGINE MECHANICAL

Cylinder Block





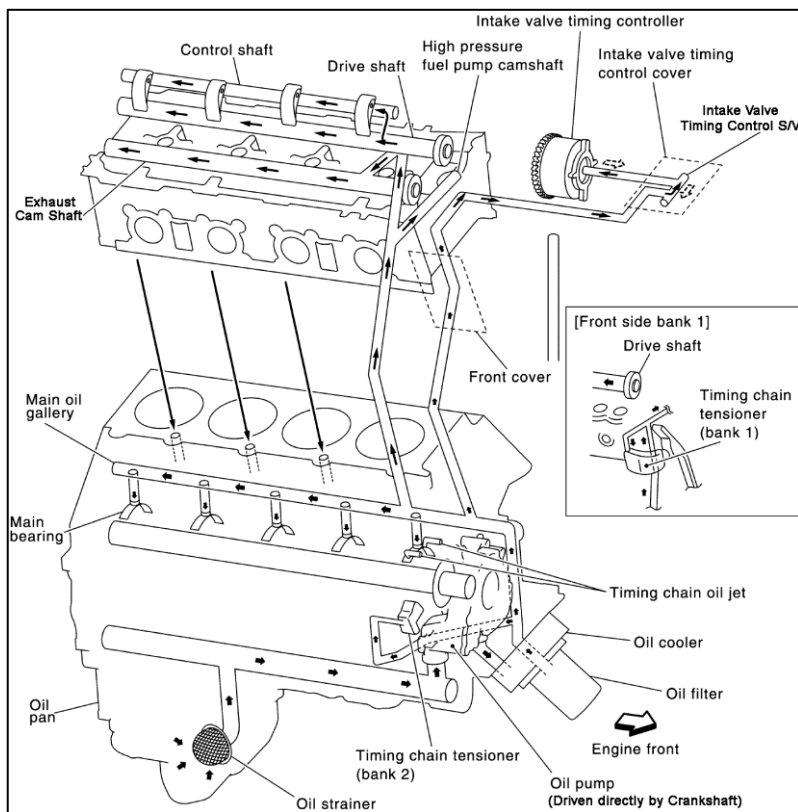
VK56VD ENGINE LUBRICATION SYSTEM

Engine Lubrication System

The Engine Lubrication is similar in its design & operation to other Nissan Gasoline Engines.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > LU (Engine Lubrication System)



Engine Oil Pump

The Engine Oil Pump is similar in design & operation to the VQ range of Nissan Gasoline Engines.

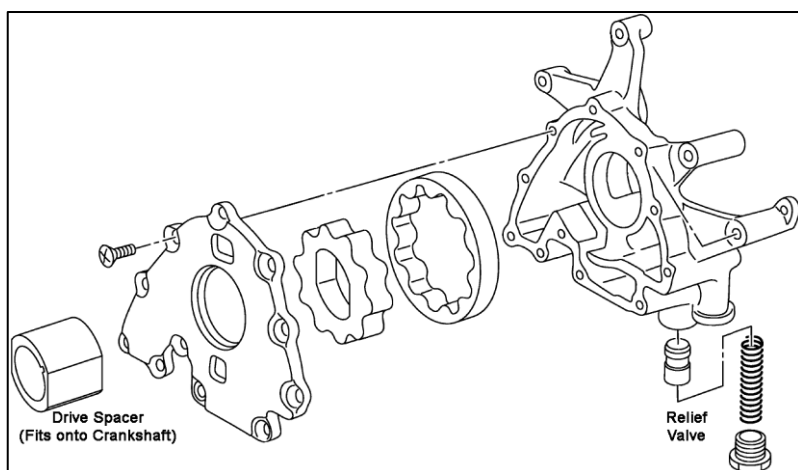
The Engine Oil Pump is installed in the lower timing chain cover & it is driven by the crankshaft. The Oil Pump Key is removable.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > LU > PERIODIC MAINTENANCE > ENGINE OIL (Oil Pressure Check Procedure)

B ENGINE > LU > REMOVAL AND INSTALLATION (Oil Pump R&R)

B ENGINE > EM > REMOVAL AND INSTALLATION (Oil Seal R&R)





VK56VD ENGINE LUBRICATION SYSTEM

Engine Oil Filter

A conventional "Spin On" type of Oil Filter is located on the front side of the engine.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

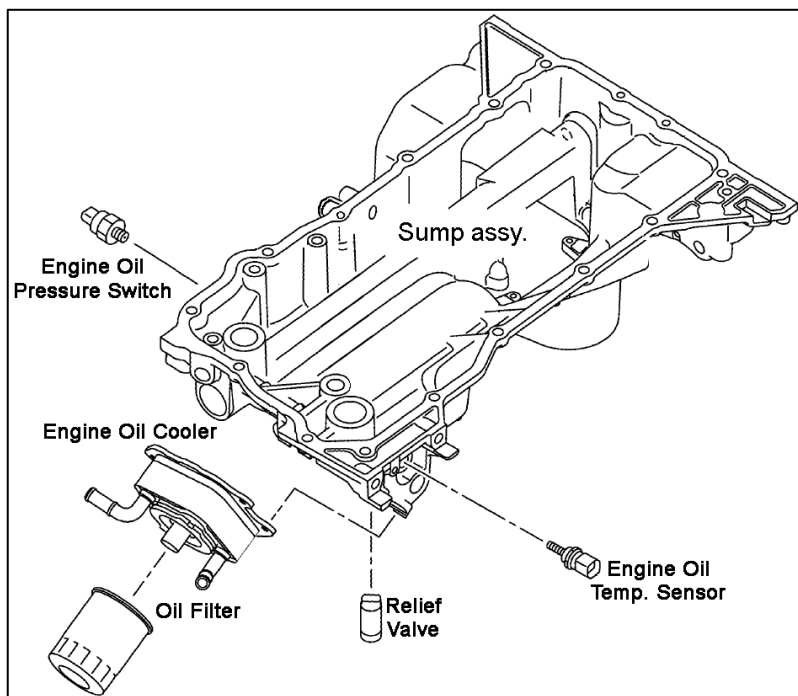
B ENGINE > LU > PERIODIC MAINTENANCE
L MAINTENANCE > MA (Maintenance)

Engine Oil Cooler

The Engine Oil Cooler is attached to the Front side of the Sump. Engine Coolant circulates through the cooler in the conventional manner.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > LU > REMOVAL AND INSTALLATION





VK56VD ENGINE COOLING SYSTEM

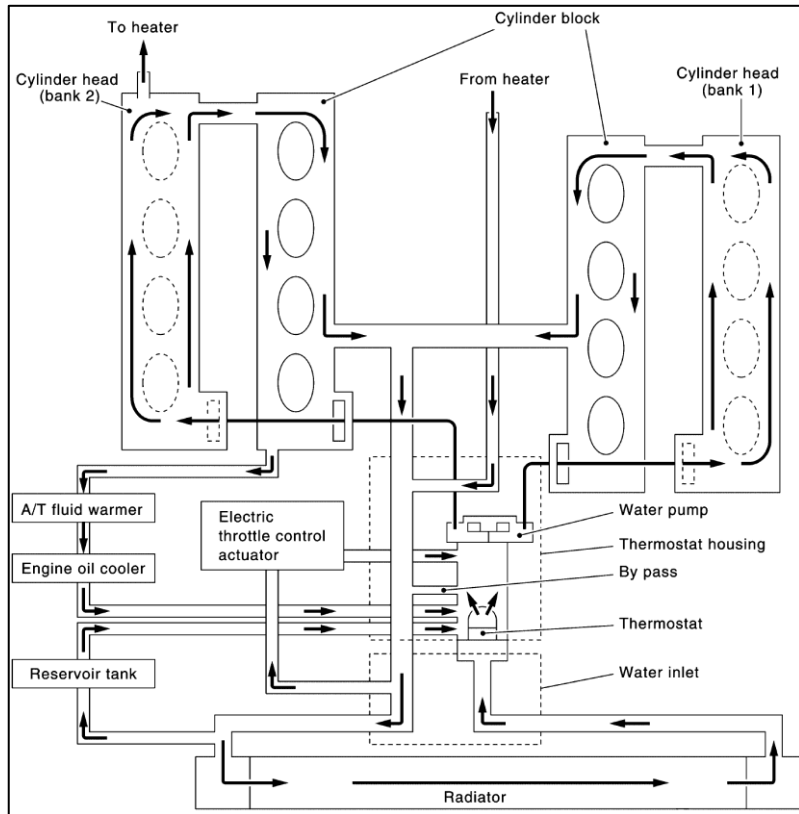
Cooling System

The Cooling System consists of 1 x engine driven Water Pump as per other Nissan Gasoline Engines. The cooling system is of a typical design.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > CO (Engine Cooling System)

L MAINTENANCE > MA (Maintenance)



Radiator & Expansion Tank

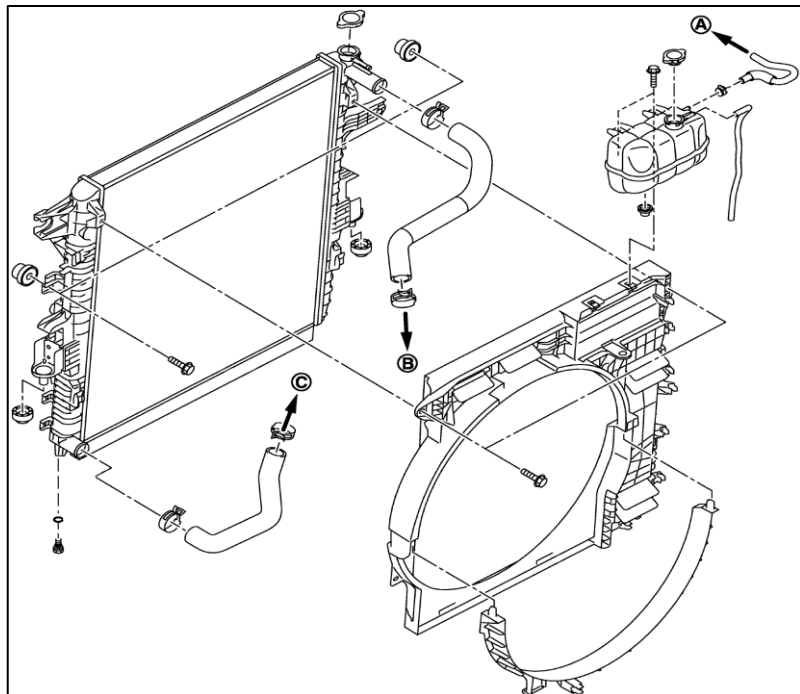
The Radiator is a cross flow type made from an aluminium core which is crimped onto plastic upper & lower tanks. Plastic fan shrouds are attached to the inner side of the radiator in order to assist the main Viscous Fan (engine driven) draw air through the radiator.

NOTE:

An electrically operated auxiliary cooling fan is **not** fitted to VK56VD equipped vehicles.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > CO (Engine Cooling System)





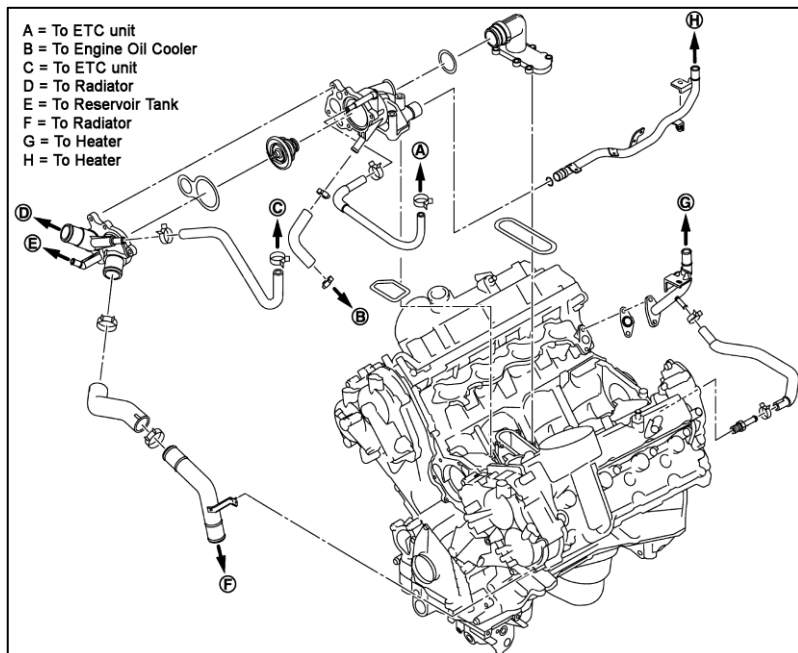
VK56VD ENGINE COOLING SYSTEM

Thermostat & Coolant Piping Arrangement

The picture shown right further details the layout of the Cooling System piping / component location.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > CO (Engine Cooling System)



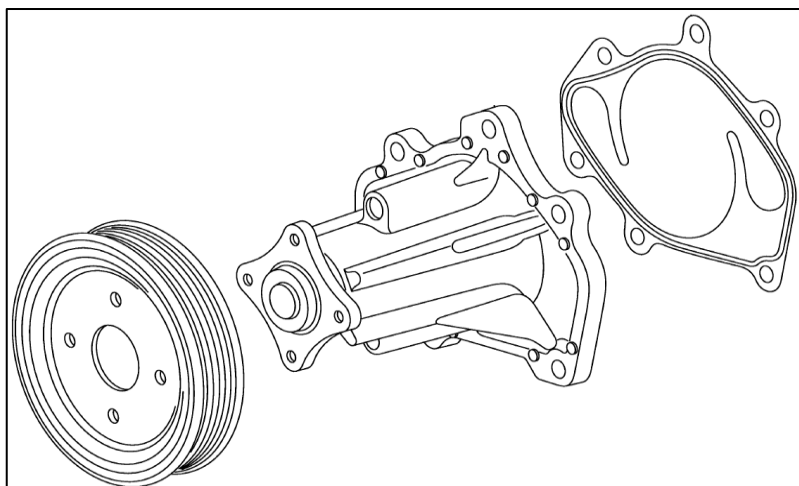
Water Pump

The Water Pump is engine driven via the auxiliary drive belt.

It is installed into the centre front of the Engine.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > CO (Engine Cooling System)



Electric / Viscous Cooling Fan

The engine driven Cooling Fan has a viscous coupling & which is electrically operated via a signal from the ECM (via the IPDM E/R). A Fan speed sensor which sends a signal direct to the ECM is incorporated into the hub as well.

The Fan is mounted on a pulley which is in turn driven by the auxiliary drive belt. The Cooling Fan is driven separately to the Water Pump.

NOTE:

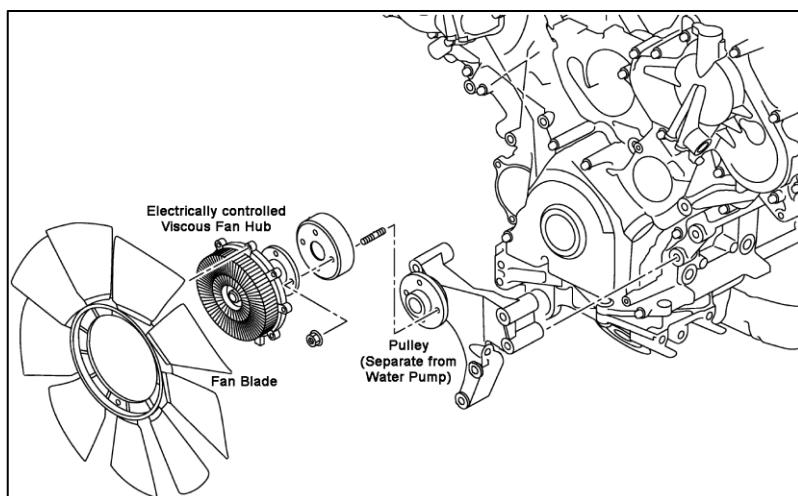
An electrically operated auxiliary cooling fan is **not** fitted to VK56VD equipped vehicles.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > CO (Engine Cooling System)

B ENGINE > EC SYSTEM DESCRIPTION

B ENGINE > EC DTC/CIRCUIT DIAGNOSIS





VK56VD ENGINE COOLING SYSTEM

Cooling System Maintenance

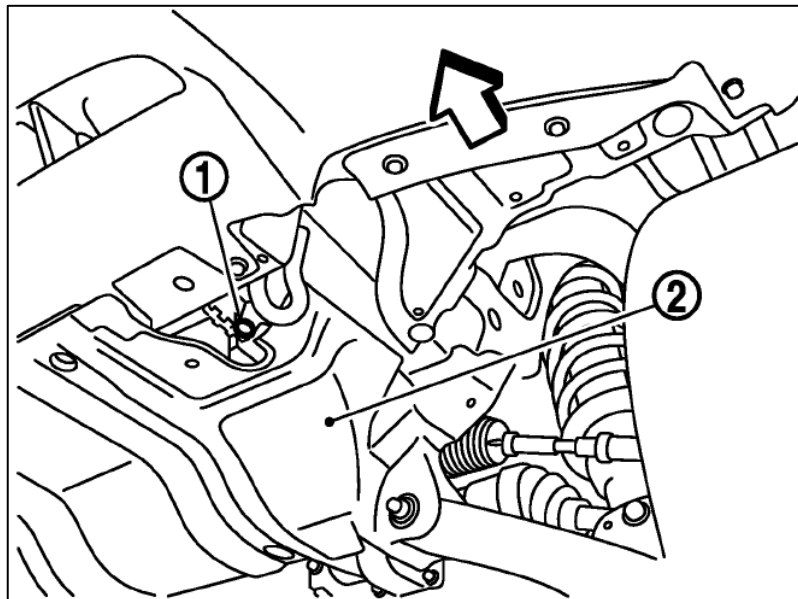
When the Coolant is to be replaced, please ensure the coolant is completely drained & flushed prior to new coolant being added.

Drain in base of Radiator shown right:

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > CO (Engine Cooling System)

L MAINTENANCE > MA (Maintenance)



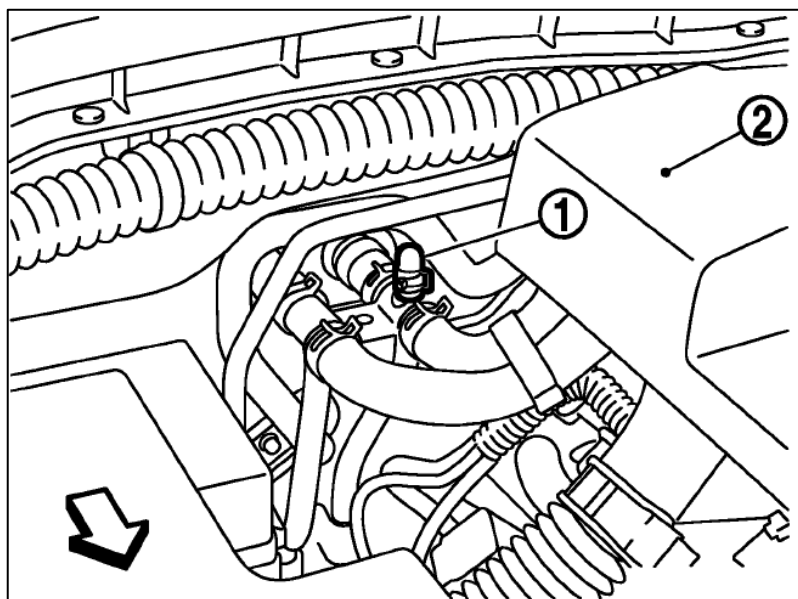
When re-filling, take note of the point where to bleed any air which is trapped in the system.

The Air Relief Plugs in the heater hose on top of engine shown right:

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > CO (Engine Cooling System)

L MAINTENANCE > MA (Maintenance)





EXHAUST SYSTEM / FUEL TANKS / STARTER MOTOR

Exhaust System

There are 4 Catalyts in the Exhaust System of the VK56VD Engine. The 1st 2 Catalyts form part of the Exhaust Manifolds in each bank of cylinders. The 2nd two Catalyts are located downstream – underneath the drivers seat & front passenger seat.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > EX (Exhaust System)

Main & Sub Fuel Tank System

There are 2 Fuel Tanks fitted to the Y62 Patrol. Total fuel carrying capacity is 140Lt. When the tanks are being filled, the Main Tank fills 1st. Once the Main Tank is full, fuel will then begin to flow over into the Sub Tank which is mounted higher up than the Main Tank.

Fuel is transferred from the sub Tank to the Main tank via a siphoning arrangement.

SPECIAL NOTES:

- An electrically operated Fuel Pump is **not** fitted to the Sub Tank of Y62. There is however a Fuel Level Sender unit fitted.
- There is only 1 Fuel Gauge in the instrument cluster. The Main Tank & Sub Tank Fuel Gauges are wired in series. Just as the 2 x sender units in T31 / Z51 are.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

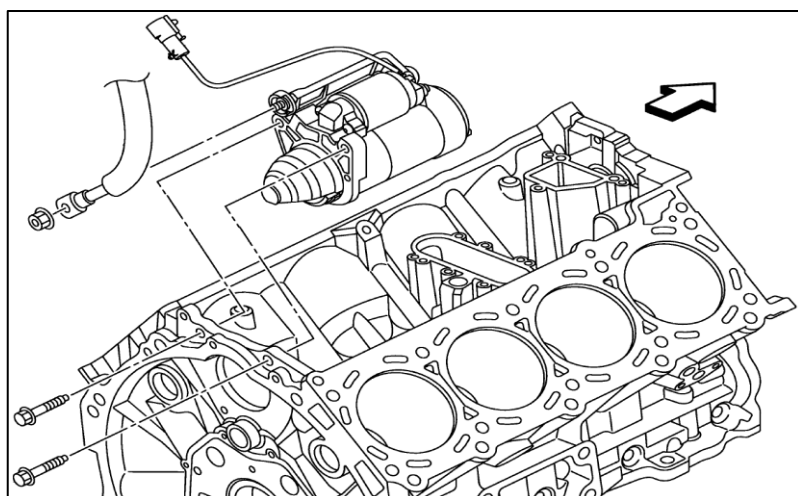
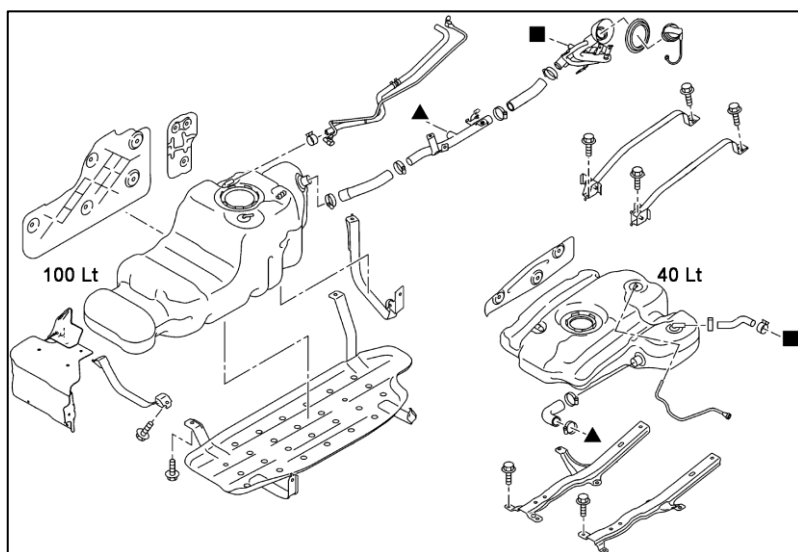
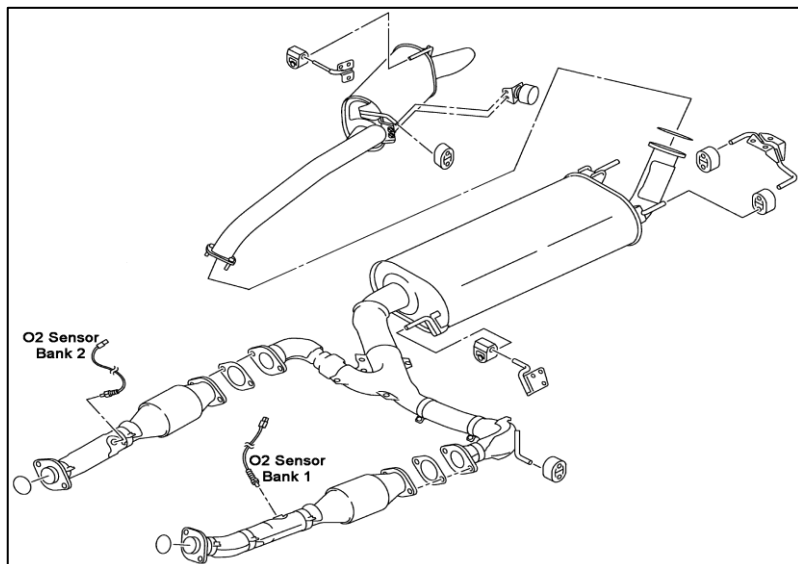
B ENGINE > FL (Fuel System)

Starter Motor

The Starter Motor assembly is mounted on top of the engine, underneath the Intake Manifold assembly.

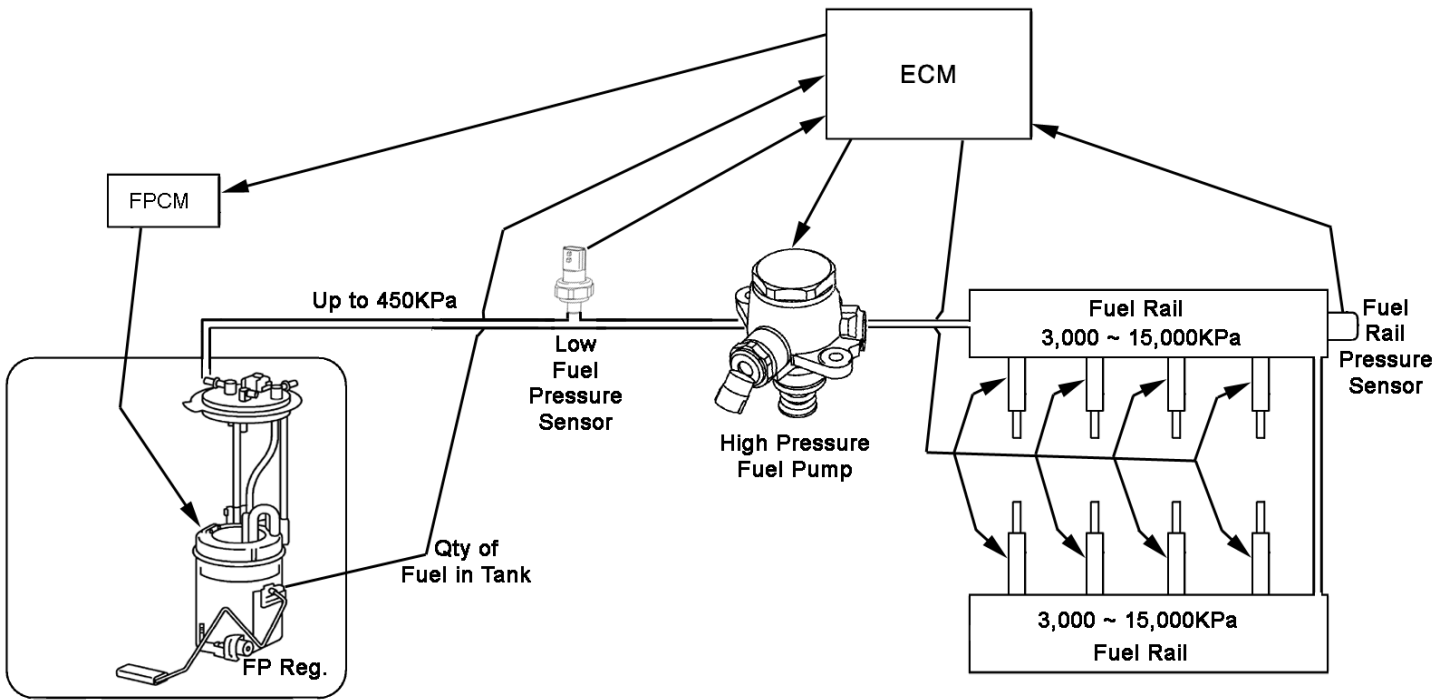
Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > STR (Starting System)





Direct injection Gasoline (DiG)



Direct Injection Gasoline (DiG) Engine Operation

The fuel delivery system on DiG engines is very similar to that on Common Rail Diesel Engines. The Fuel is injected directly into the combustion chamber under High Pressure instead of being injected under lower pressure outside of the combustion chamber.

As a result – fuel efficiency & exhaust emissions have significantly improved in comparison to the In-Direct (port injection) fuel injection designs.

Apart from the cylinder head design which allows for the Injector to be mounted so that Direct Fuel Injection is possible, the overall engine construction of a DiG Engine vs an in-Direct (conventional) Gasoline Engine is very similar. Piston crown design changes in order to better direct the fuel/air parcel towards the spark plug.

DiG advantages over Diesel:

- Engine design complexity which in turn reduces engine manufacturing costs. DiG engines are very much the same in terms of design & construction as In-Direct Injection Gasoline engines
- Vehicle driveability. Performance of a DiG engine is overall better than a Diesel engine of similar size. Modern diesel engines require a Turbo Charger. The VK56VD engine does not require a Turbo Charger – yet it's performance (especially the torque output) is comparable to a large capacity Turbo Diesel Engine
- Engine maintenance complexity & costs. Gasoline engines are more cost effective for servicing
- Cost effective recovery following accidental filling of wrong fuel incidences. Diesel fuel being accidentally added to the Fuel tank of a Gasoline engine will cause minimal damage
- Fuel Consumption is comparable to the Fuel Consumption of large capacity Diesel engines which are required to operate complex systems such as DPF & SCR Catalysts ("Ad Blue" systems)
- Long term reliability in adverse "real world" conditions. DiG engines will require regular maintenance & good supply of clean fuel. However there will be times when this may not always be possible. Modern diesel engines are unable to cope with any kind of poor serving & poor fuel quality conditions in anyway for any length of time. Although not ideal – a DiG engine will fair better in similar circumstances



Direct injection Gasoline (DiG)

Direct injection Gasoline (DiG) Features & Advantages

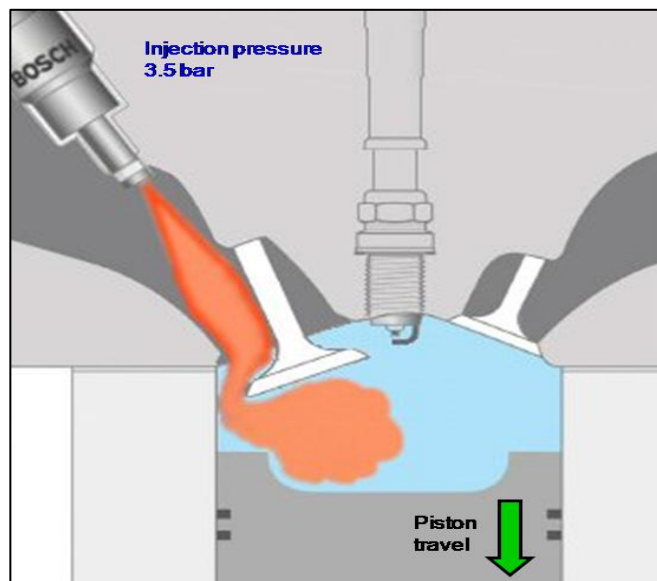
In comparison to In-direct Gasoline engines, the adoption of DiG provides for the following advantages:

- Improves anti-knock performance (allows for higher compression ratio)
- Improves fuel economy & even cleaner exhaust emissions are achievable
- Engine operation is controlled more precisely

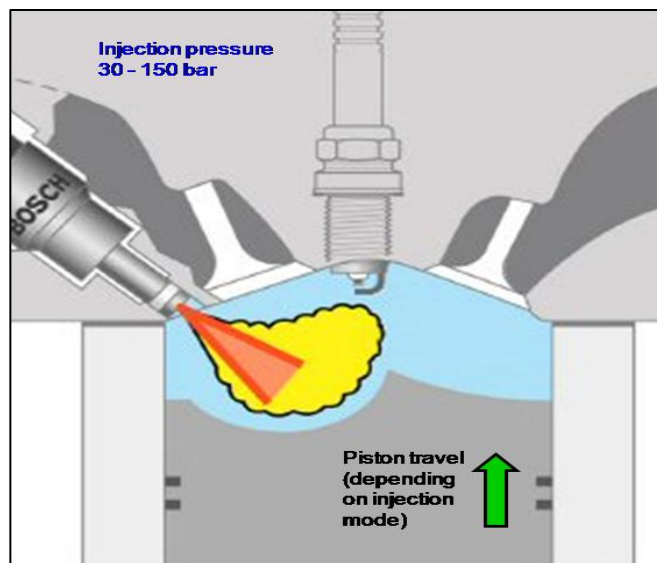
Fuel is injected from the injector nozzle directly into the combustion chamber which is relatively large. This increased size results in a higher “latent heat of vaporization”, which in turn cools the intake air efficiently. This cooler intake air then allows for better anti knock control. Higher compression ratio’s & ignition timing strategies with more advance are now possible.

The adoption of DiG enables more accurate control of fuel quantity by injecting atomized high-pressure fuel directly into the combustion chamber. This allows for fuel control to occur after the intake valve has closed. This; together with multiple injections under certain conditions, allows for more engine power output, lower fuel consumption and a further reduction in exhaust emissions.

The amount of fuel injected is determined by the ECM. The ECM controls the length of time the injector remains open (injection pulse duration). The amount of fuel injected is a program value stored in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals from the crankshaft position sensor, camshaft position sensor, mass air flow sensor and the fuel rail pressure sensor. (Engine speed, intake air quantity and fuel rail pressure).



Conventional “In-direct” Injection
 (Graphic courtesy of Bosch)



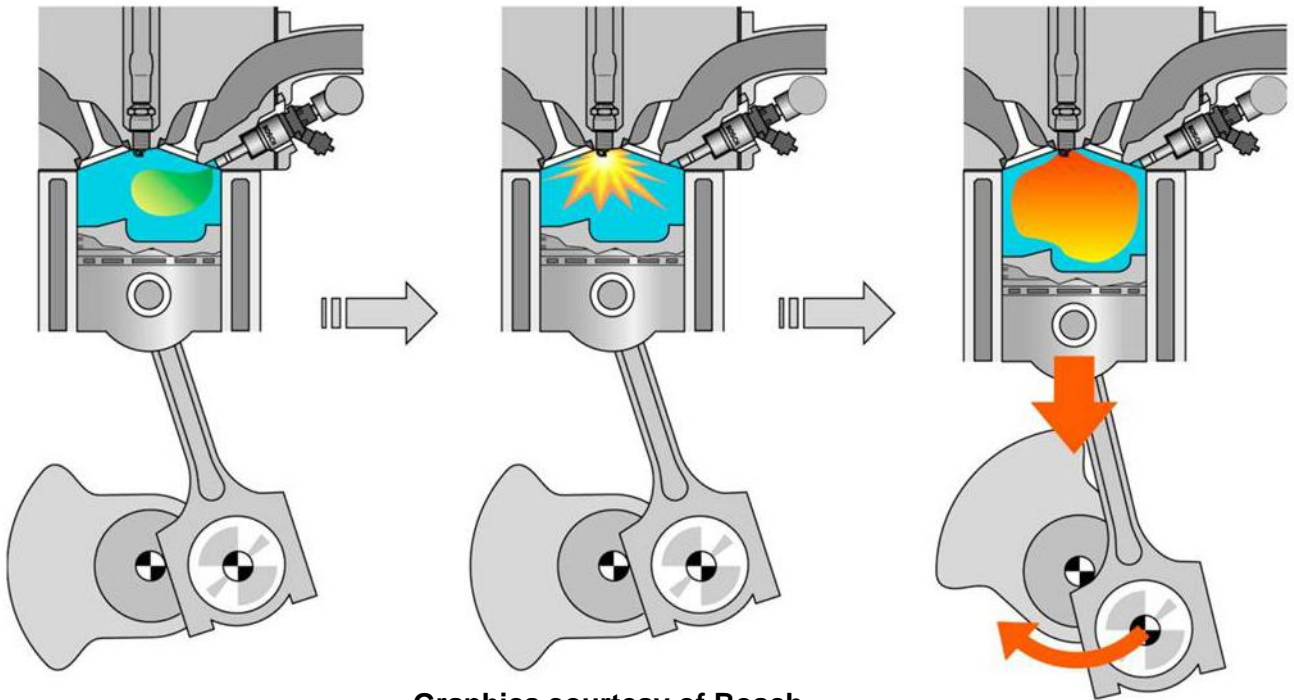
DiG (Graphic courtesy of Bosch)



Underside of VK56VD Cylinder Head



Direct injection Gasoline (DiG)



Graphics courtesy of Bosch

The Merits of Intake Air Cooling

The DiG fuel injectors inject fuel directly into the combustion chamber. The injectors are located directly beneath the intake valves. The intake ports transfer air only. Because the air intake ports are not used to mix the fuel and air, air flow efficiency increases. The control of the fuel injection event is very precise resulting in better combustion efficiency and fuel consumption at all throttle openings. At times, multiple fuel injections per cycle are employed.

A higher compression ratio on DiG engines is possible due to the cooling effect as the injected fuel vaporizes in the combustion chamber rather than sitting in the intake manifold. This cooling effect reduces the intake charge temperature, thus reducing the chances of spark knock. DiG fuel injectors have been developed to withstand the greater heat and pressure inside the combustion chamber, utilizing multiple outlets for precise fuel injection control – both spray quality and direction.

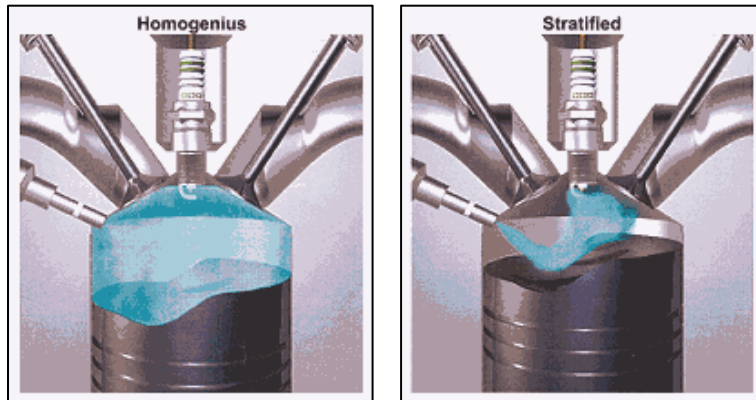
The increased combustion efficiency and control helps reduce exhaust gas emissions, particularly during cold engine starts.

Increased Power & Torque, Improved Fuel Efficiency:

- Volumetric efficiency is greatly improved as the intake system is used to carry AIR ONLY. No air is displaced by fuel during the intake process. This improves engine response, thereby producing more power under rapid acceleration and high engine loads.
- A DiG engine is designed to operate safely with a higher compression ratio. A much leaner mixture can be used without the occurrence of engine knock (detonation). Even though a higher compression ratio can be used, ignition timing can be set at a more advanced setting, providing greater torque.
- The most common mode of operation is Homogeneous, where a stoichiometric (14.7:1) mixture is utilised. During a cold start (and warm up period), the A/F mixture can be set lean (and with delayed injection) to help the catalyst build up temperature much faster, improving cold running emissions.



Direct injection Gasoline (DiG)



Bosch's illustration of spark-ignition-engine with DiG

1. Homogeneous Fuel Injection

Homogeneous Fuel Injection is where the Air & Fuel is completely blended as it ideally should be in any Gasoline Engine. This injection mode is the most commonly used injection mode in Nissan DiG engines (once engine has warmed up a little).

The Homogeneous Air & Fuel blend is the same as what is achieved in an In-direct injected engine.

- The injection timing occurs similarly to that of in-direct injected engines during the intake stroke.
- The “latent heat of vaporization” characteristics of the fuel help cool down the intake air thus improving the quality of the Air / Fuel mixture helping to minimize the occurrence of engine knock
- To increase power during hard acceleration, the system performs two injections (during the latter part of the intake stroke and compression stroke) where the optimum amount of fuel is injected thereby reducing fuel consumption.

2. Stratified Fuel Injection

The ultimate aim of engine designers is to run an engine on minimal Fuel & to have a minimal output of exhaust emissions. The Stratified Fuel Injection strategy is utilised on Nissan DiG engines for cold starting & cold idling conditions.

On a conventional engine, the cold start up & idling period is a time of high fuel consumption (engine running very rich). An engine with DiG can employ a strategy where the fuel needs of a cold engine can be met, yet the overall fuel consumption is minimal & exhaust emissions are greatly improved.

To be more specific, when the engine is running in the Stratified mode, a small parcel of Fuel & Air swirls around the area of the spark plug. The remaining area of the combustion chamber (away from the spark plug) contains mostly air & very little fuel.

Putting it simply – it’s a clever way of making the engine run fairly lean when it is cold. End result is less HC emission & improved cold running fuel consumption is reduced.

The Stratified mode will only occur for the 1st ~30 seconds of cold engine running.

Stratified combustion is active under the following conditions:

- The engine coolant temperature is 10°C - 40°C (50°F - 104°F)
- The system employs a single injection strategy up to 1,000 rpm (30 - 40 degrees before TDC, a rich air-fuel mixture is the result)
- A double injection occurs above 1,000 rpm. The injection timings are approximately 120 degrees and again at 30 - 40 degrees before TDC.
- Stratified combustion is employed for 15 ~ 30 seconds after the engine starts



Direct injection Gasoline (DiG)

DiG Engine Design

For the most part, the Engine design between DiG & conventional (in-direct injection) engines is very much the same.

The Cylinder Head is modified to cater for the Fuel Injector which protrudes directly into the Combustion Chamber.

The Piston design is slightly different. The top is designed to encourage a swirling effect when the Fuel is injected into the combustion chamber under high pressure.

The Intake Ports are slightly larger as they do not have to increase the air velocity to assist with fuel atomisation outside the cylinder.



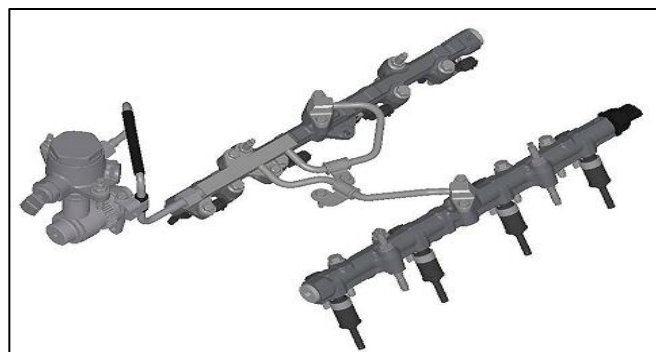
Nissan DiG Combustion Chamber

High Pressure Fuel Pump & Fuel Rail

The HP Fuel Pump, Fuel Rail & Fuel Injector arrangement is very similar to those found on Common Rail Diesel engines.

The most significant difference between CRD & DiG is the Fuel Pressures involved. CRD can operate up to a maximum of 2000 BAR. DiG will only operate up to maximum of 150 BAR.

Notably, it is far easier to atomise Petrol than it is to atomise Diesel fuel. Hence diesels operating at higher Fuel pressures in comparison to Petrol engines.



VK56VD HP Fuel Pump, Rail & Injector arrangement

HP Fuel Pump Suction Control Valve

The ECM switches the Solenoid ON & OFF which in turn controls the amount of Fuel entering the Fuel Rail (Fuel Rail Pressure)

NOTE:

The SCV solenoid does not operate in the same way as it does on the Denso CRD system. The SCV on the CRD system has a variable current applied to it.

The SCV on the DiG engine is simply switched "ON & OFF"

See over page for more details about the operation of the HP Fuel Pump.



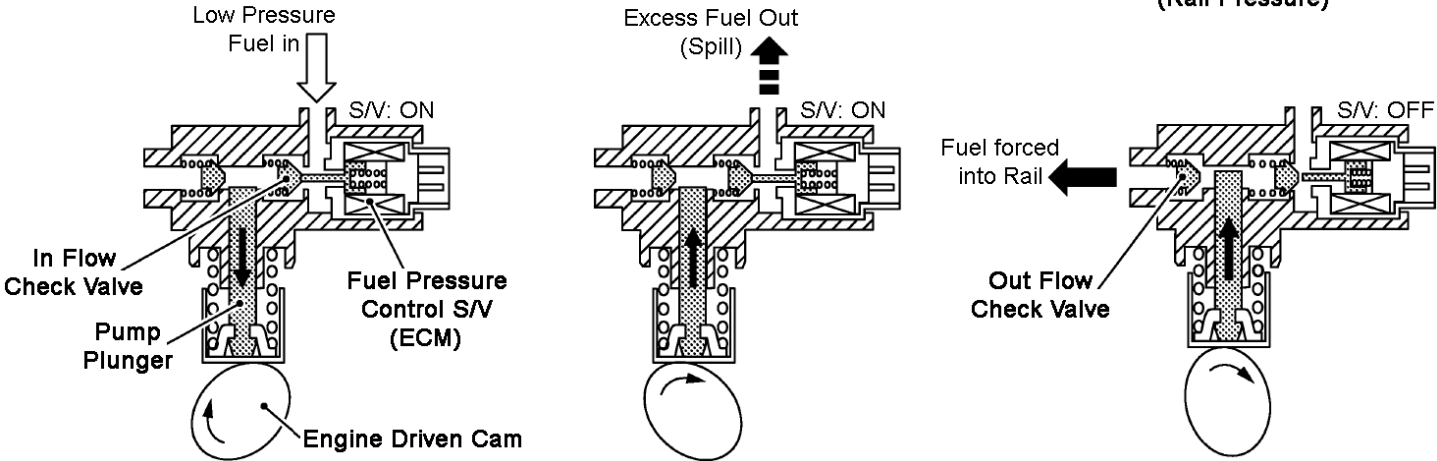


Direct injection Gasoline (DiG)

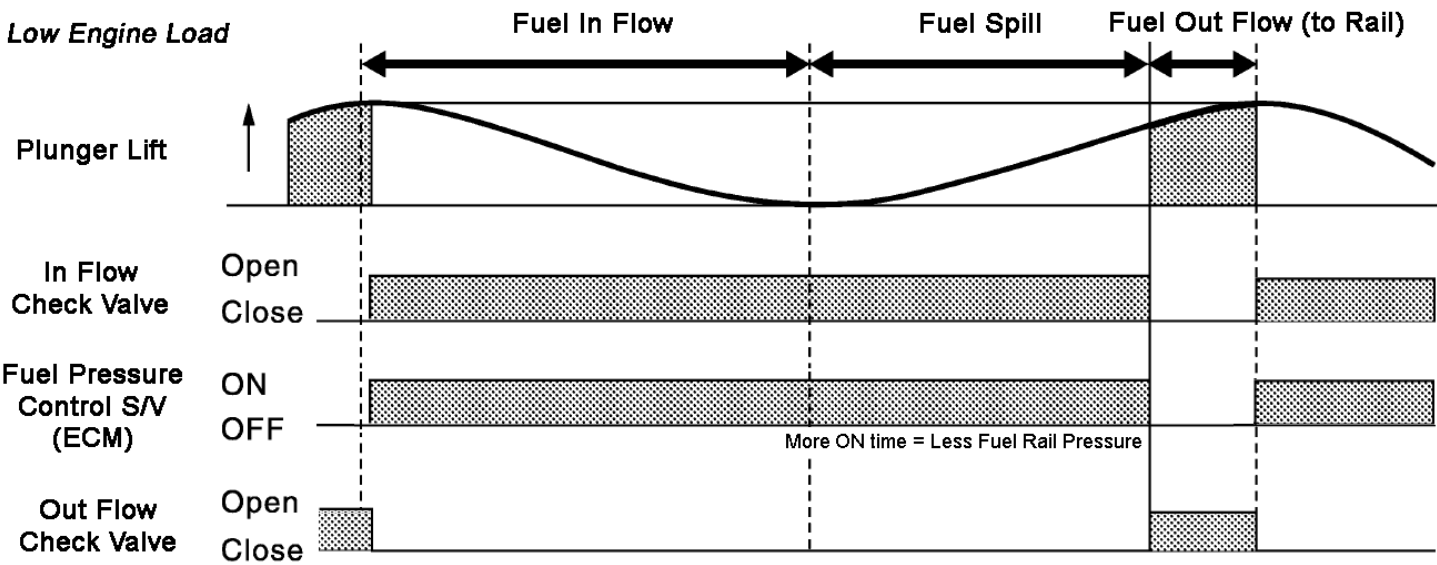
1. Fuel in (from Fuel Tank)

2. Fuel Pressure Regulation

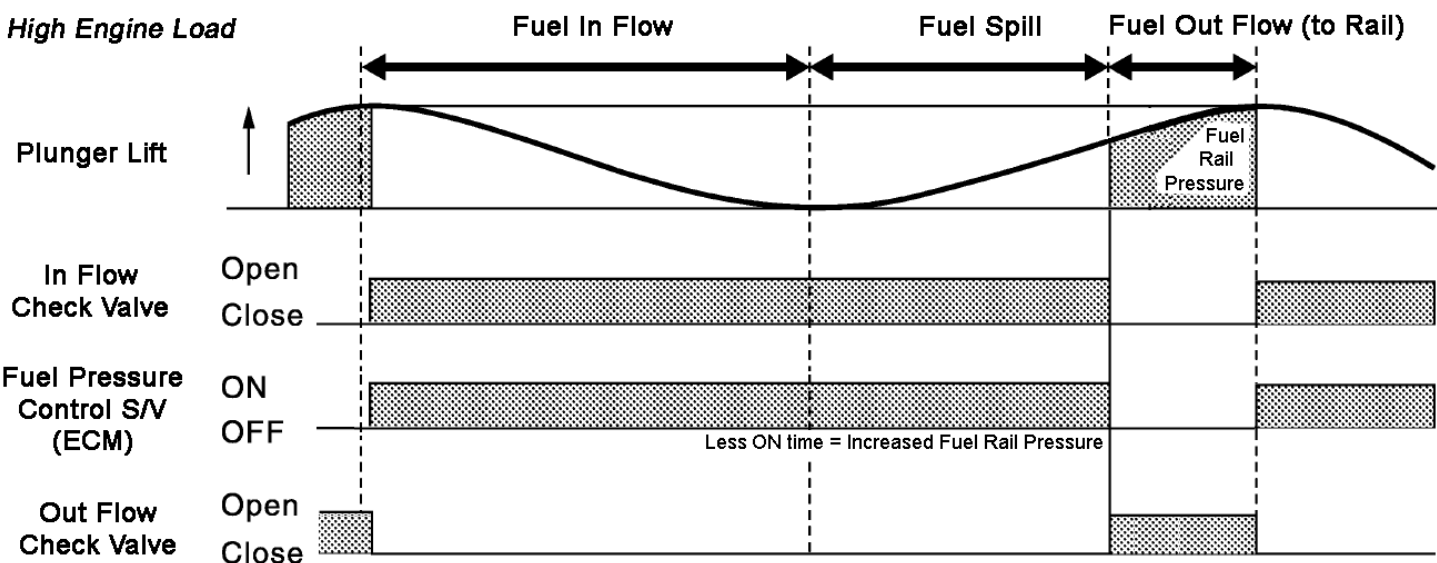
3. Fuel to Rail (Rail Pressure)



Low Engine Load



High Engine Load





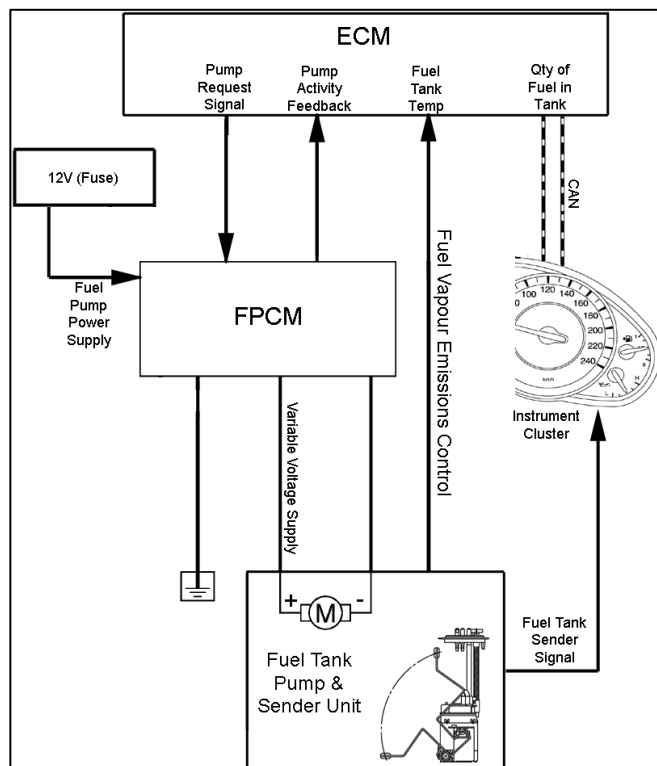
Direct injection Gasoline (DiG)

Low Pressure Fuel System (Fuel Supply from the Fuel Tank)

Fuel is pumped out of the Fuel Tank up to the engine driven High Pressure Fuel Pump.

The Low Pressure Fuel System construction & operation is basically the same as the Fuel system of Nissan conventional Gasoline Engines apart from the following differences:

- Fuel Pressure is variable & operates up to 450KPa. (Conventional systems operate at a constant 350KPa)
- Fuel Pump operation is via a Fuel Pump Control Module (FPCM). This allows for the variable control of the Electric Fuel Pump (variable Fuel Pressure). The conventional engine Fuel System has a fixed power supply which drives the Fuel Pump. (Fuel Pump Relay)
- The ECM monitors the Low Fuel System Pressure & the Level of Fuel in the Fuel Tank. DTC's for running out of Fuel can be logged.

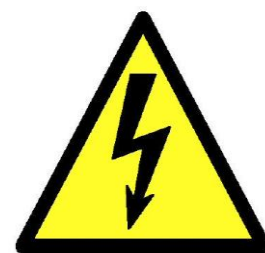


DiG Engine Safety Precautions

High Injector Operating Voltage: Care should be taken when working around the DiG Wiring whilst the engine is running. Voltage peaks of up to 70V can occur on DiG engines.

High Fuel Pressures: Care must also be taken when loosening the Fuel Pipes on a DiG Engine. Always utilise the CONSULT III plus to determine if there is any residual Fuel Pressure in the rails prior to loosening the Fuel Pipes. If this is not possible, then the engine must rest for 1 hour with the battery disconnected prior to loosening the Fuel pipes

HP Fuel Pipes: Fuel System components on the HP side of the Fuel system (between the HP Fuel Pump & Fuel Rails) must **never** be re-used



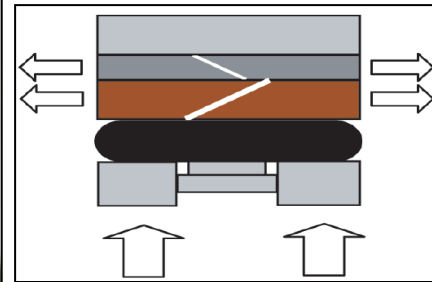


Direct injection Gasoline (DiG)

HP Fuel System Servicing

Seal Replacements:

Take careful note of the O-Ring seals & spacers etc.
When re-installing the new HP Fuel System parts.



Also ensure that all seals have engine oil applied to them prior to re-assembly.



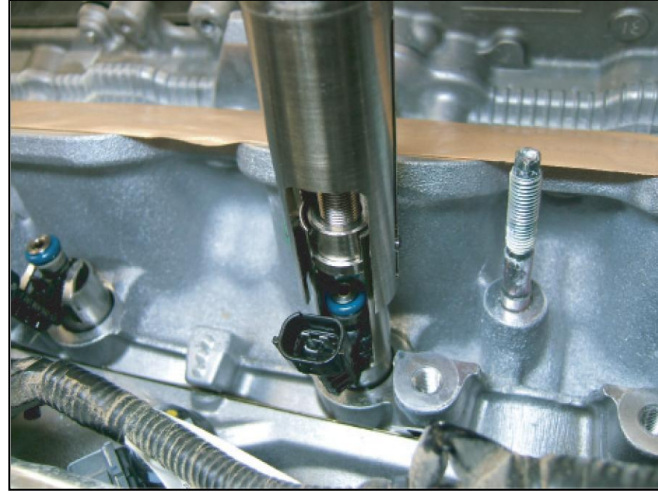


Direct injection Gasoline (DiG)

HP Fuel System Servicing

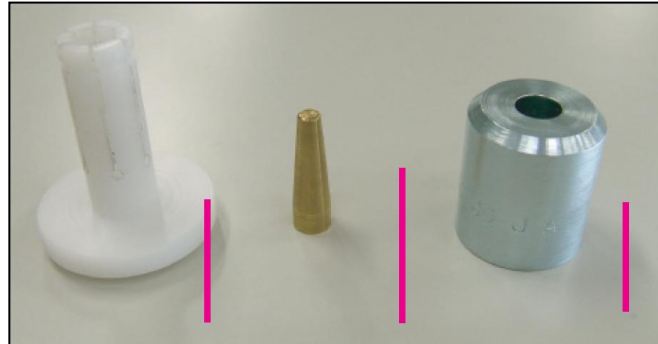
SST KV10119600 Injector Remover:

This is designed to facilitate the removal of the Fuel Injectors from the cylinder head.



SST KV101197S0 Injector Seal Drift Set:

This is a 3 piece set which is designed to facilitate the installation of new Teflon Injector seals.





Variable Valve Event & Lift (VVEL)

VVEL is a technology which is unique to Nissan. The system is a combination of Variable Valve Timing Control (“Event”) as well as a **Variable Valve Lift**.

Using VVEL reduces CO₂ and other emissions, further improves fuel economy as well as improving power and response at higher engine speeds.

VVEL Benefits

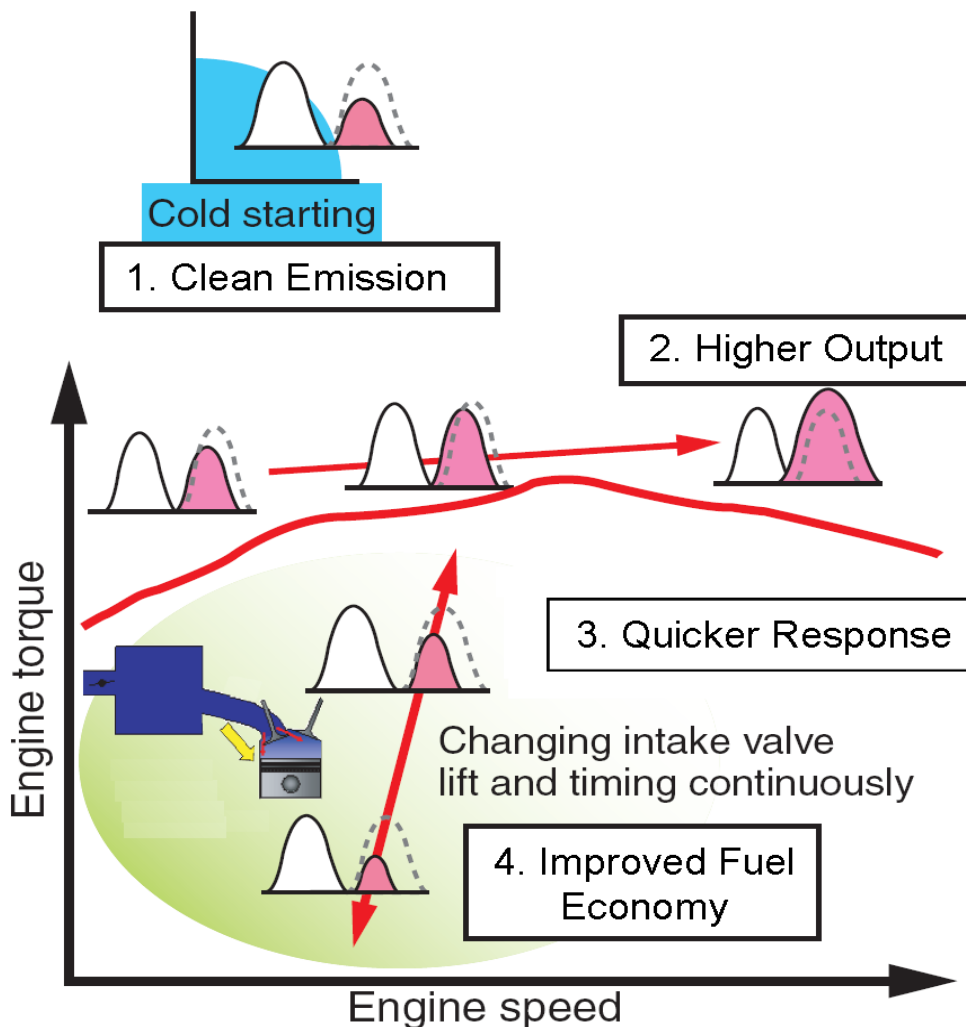
- Reduces pumping losses
- Improves throttle response
- Optimizes fuel economy
- Higher Output

Low engine speed range

The VVEL system suppresses the return of air to the intake manifold by changing the intake valve timing. Optimization of the intake valve closing timing and speed improves the engine torque.

High engine speed range

Increasing intake valve opening time contributes to an increase of the amount of intake air drawn into the combustion chambers, thus increasing torque.



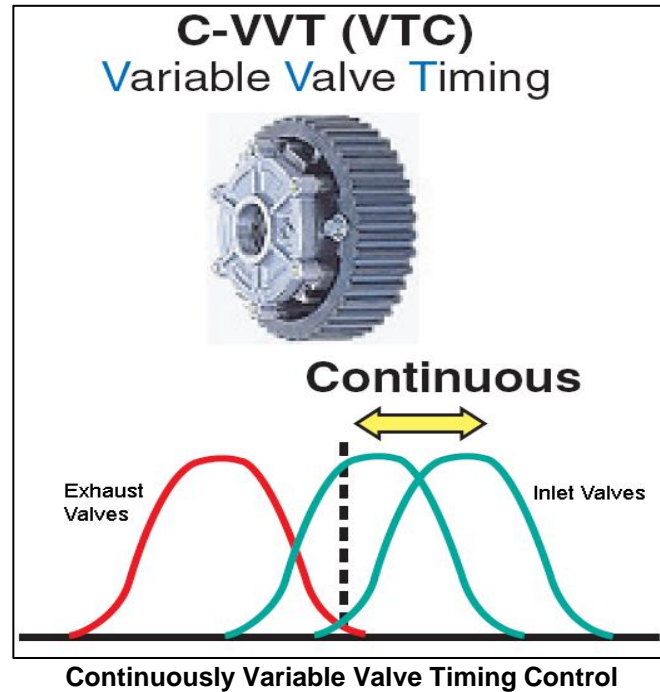


Variable Valve Event & Lift (VVEL)

1. Variable Valve Event (Timing)

All current model Nissan gasoline engines employ a Continuously Variable Valve Timing Control system. On the VVEL equipped engines, this operates in the same way as it does on non VVEL engines.

This applies to the intake camshafts only.



2. Variable Valve Lift

In a conventional engine in the “induction” phase of the combustion process, the throttle butterfly opens to allow air into the induction pipe leading to the cylinder. The intake valve then opens to allow a quantity of air into the combustion chamber.

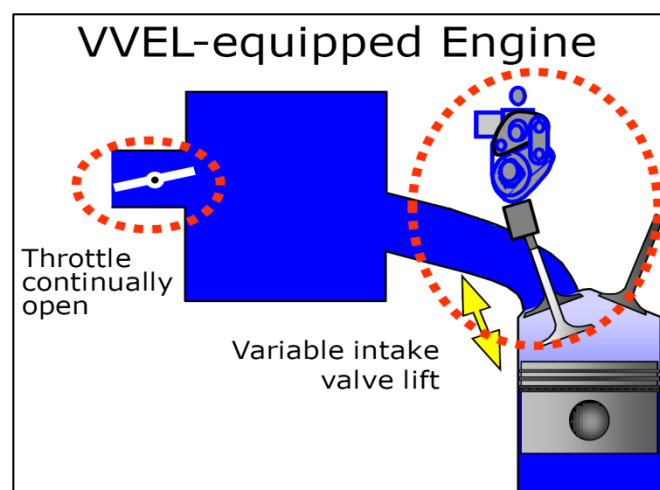
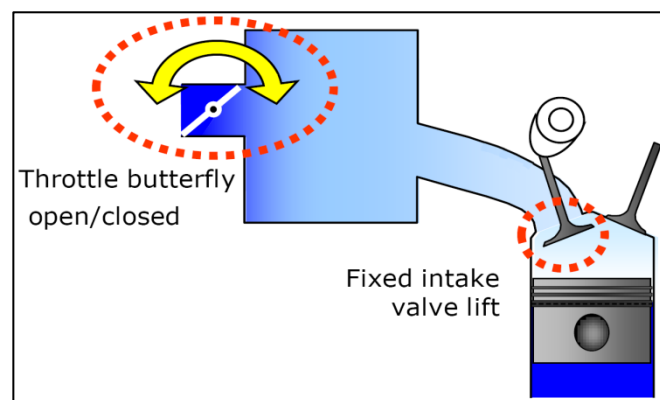
The amount that the intake valve opens or “lifts” is fixed, irrespective of whether you’re in city traffic or accelerating under full throttle to overtake.

This can mean that under partial throttle in town driving, the mix of fuel and air is too rich, and there will be unburned, wasted fuel.

Under full throttle acceleration, there will not be enough air and therefore power will not be optimised.

VVEL can continually change the lift of the valve and therefore the quantity of air entering the combustion chamber. So, at partial throttle – like stop-go traffic city traffic, it will make a small lift – like taking regular breaths as you sit quietly for example.

This means that a more precise fuel / air mix can be achieved with less quantities of both – reducing fuel consumption. At full throttle, the valve lift can be greater, inducting a larger quantity of air into the combustion chamber. This is similar to a runner taking larger breaths.



Variable Valve Lift



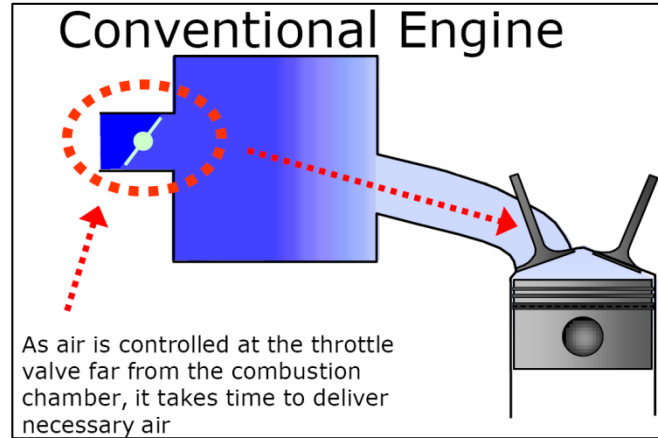
Variable Valve Event & Lift (VVEL)

VVEL Throttle Control

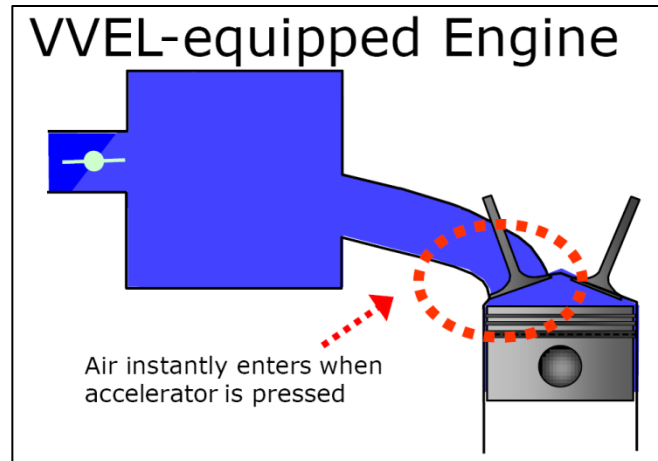
Under certain conditions (usually cruising) VVEL does not use a throttle butterfly to allow air into the combustion chamber – instead, because it is so precisely controlled, it uses the inlet valve to regulate the air entering the combustion chamber for the ignition phase.

With a conventional engine, when the driver depresses the accelerator, the throttle butterfly is opened and the air then has to travel through the induction system before it even reaches the valve. Because the air intake is controlled with the inlet valve on the VVEL engine, the air pressure is available immediately.

The resulting benefit is that because the air pressure is available immediately, there is no delay in creating a powerful ignition phase. This is what gives the accelerator such an immediate and powerful feel.



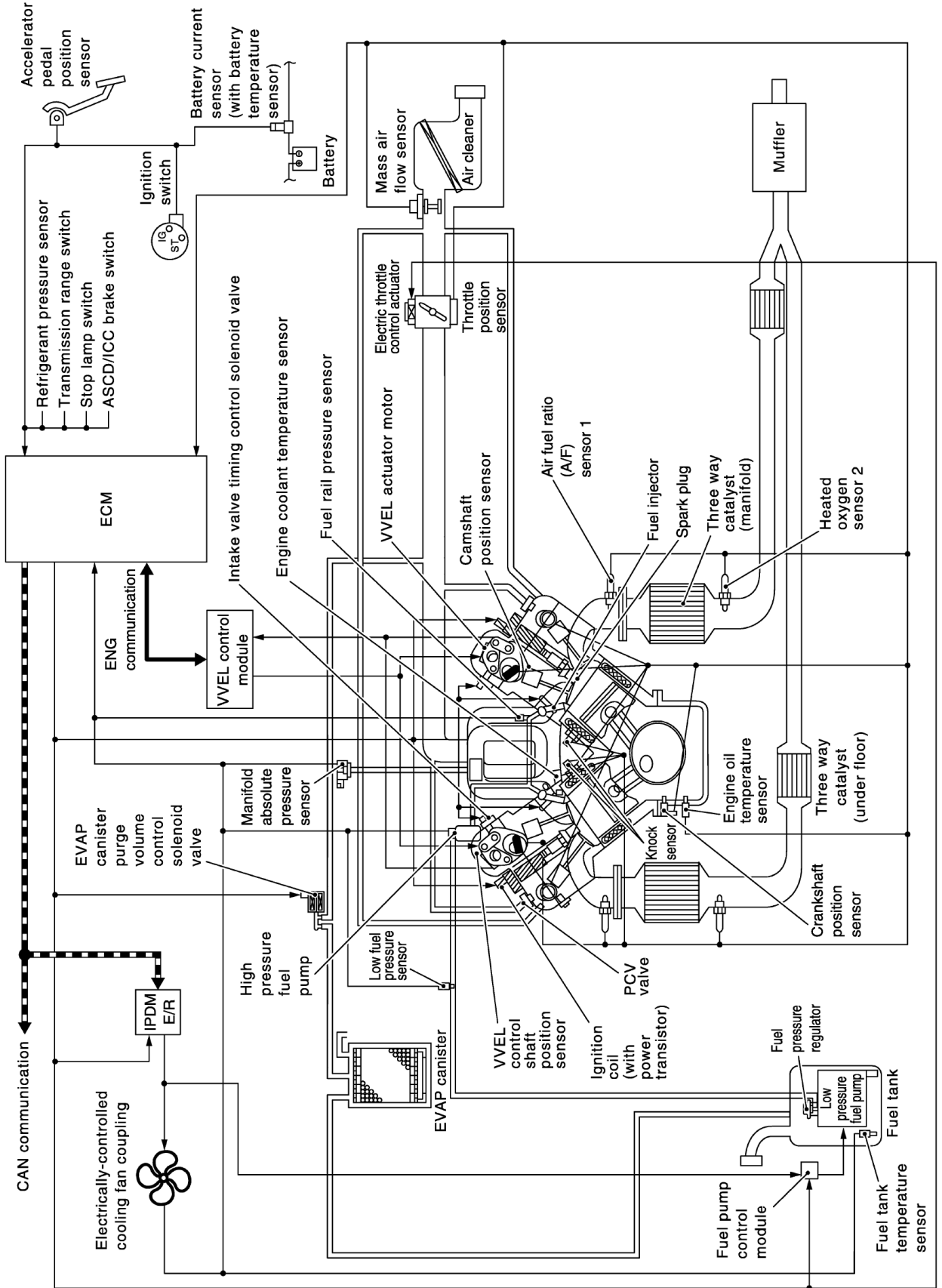
Slower engine response due to the Intake Air's travelling distance to the combustion chamber



Quicker engine response because air is gathered around at the intake valve ready for immediate induction into the combustion chamber



VK56VD ENGINE CONTROL





VK56VD ENGINE CONTROL

INPUT	ECM FUNCTION	OUTPUT (ACTUATOR)
BATTERY VOLTAGE (& GROUND)		
* IGNITION SWITCH ACTIVITY		
ACCELERATOR PEDAL ACTIVITY (POSITION & RATE OF MOVEMENT)	FUEL INJECTION QUANTITY	FUEL INJECTOR
CRANK POSITION & SPEED		
CAMSHAFT POSITION		
ACTIVITY OF THROTTLE VALVE (POSITION)		
VVEL CONTROL SHAFT ACTIVITY	IGNITION COIL CONTROL & IGNITION TIMING	POWER TRANSISTOR (COIL)
FUEL RAIL PRESSURE		
FUEL PRESSURE OF LOW FP SYSTEM		
OXYGEN CONTENT IN EXHAUST GASES	VEHICLE SPEED CONTROL (ASCD) / SYNCHRONISED REV CONTROL	ELECTRIC THROTTLE ACTUATOR
ENGINE COOLANT TEMPERATURE		
ENGINE OIL TEMPERATURE		
MASS AIR FLOW	INTAKE VALVE LIFT CONTROL	VVEL CONTROL UNIT & ACTUATORS
INTAKE AIR TEMPERATURE		
MANIFOLD AIR PRESSURE		
ASCD REQUEST FROM DRIVER	INTAKE VALVE TIMING CONTROL	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
ASCD CANCEL REQUEST (BRAKE & CLUTCH PEDAL)		
4WD SYSTEM (DRIVER REQUEST)		
FUEL TANK TEMPERATURE	FUEL PRESSURE IN LOW PRESSURE FUEL SYSTEM	FUEL PUMP CONTROL MODULE
BRAKE PEDAL ACTIVITY	FUEL PRESSURE IN HIGH PRESSURE FUEL SYSTEM (FUEL RAILS)	HP FUEL PUMP
GEAR POSITION (P/N - M/T or A/T)		
LP FUEL PUMP ACTIVITY	COOLING FAN CONTROL	COOLING FAN HUB
COOLING FAN HUB SPEED		
A/C REFRIGERANT PRESSURE (HIGH SIDE)	AIR CONDITIONER CONTROL	AIR CONDITIONER COMPRESSOR RELAY
POWER STEERING SYSTEM PRESSURE		
ENGINE DETONATION ACTIVITY	O2 SENSOR HEATER CONTROL	O2 SENSOR
BATTERY CURRENT USEAGE		
* VEHICLE SPEED	EVAPORATIVE EMISSIONS CONTROL	EVAP CANISTER PURGE SOLENOID VALVE
* VEHICLE STABILITY SYSTEM (VDC) ACTIVITY		
* QUANTITY OF FUEL IN TANK	ELECTRICAL POWER GENERATION	IPDM / ALTERNATOR
* AIR CONDITIONER REQUEST		
* TRANSMISSION ACTIVITY		
* ELECTRICAL LOAD	ON BOARD DIAGNOSIS	MALFUNCTION INDICATOR LAMP & ECM (SELF DIAGNOSIS – CONSULT)
(* CAN COMMUNICATION)		



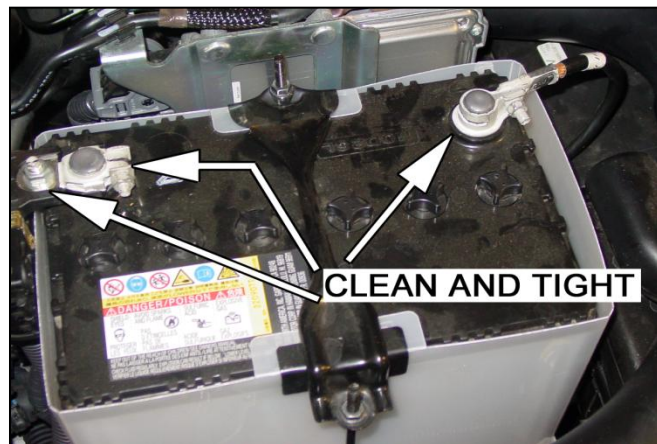
VK56VD ENGINE CONTROL

Inputs to ECM

1a. Battery Voltage

This is an extremely important input to the ECM for engine operation.

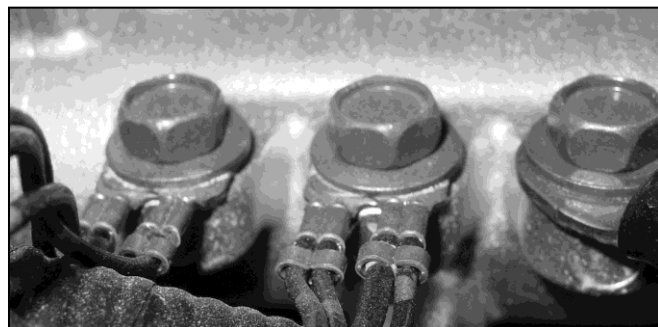
Ensure that the voltage level remains stable, especially during cranking. A situation maybe possible where there is enough battery voltage for cranking, however there maybe an insufficient level for the ECM to operate properly.



1b. ECM Ground

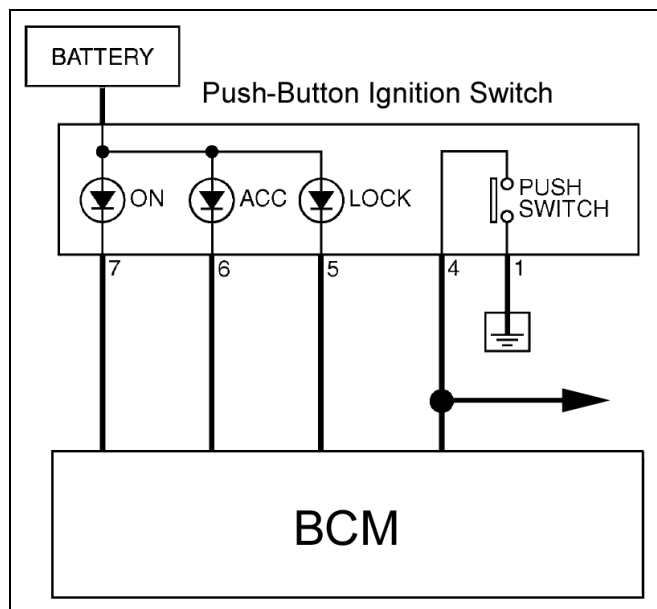
Even though a decent Voltage supply is available to the Engine Control System, if the ECU or major fuel system components do NOT have a decent Ground connection, then correct operation of the Engine System will NOT be possible.

Please ensure any Ground connections as shown here are in good condition (Clean & Tight.)



2. Ignition Switch

The ECM needs to know if the engine is being cranked, if it is simply ON & of course when it is being turned OFF.





VK56VD ENGINE CONTROL

Inputs to ECM

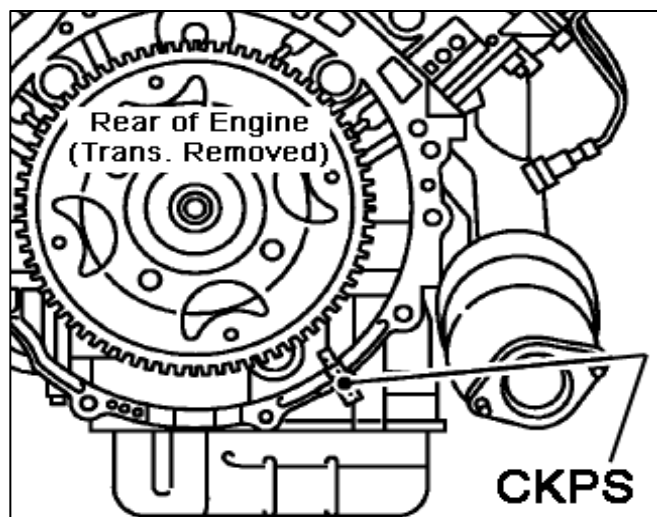
3. Crankshaft Position Sensor (CKPS)

The CKPS is located at the RH rear side of the Engine. It is attached to the Engine Block & protrudes through a hole facing the gear teeth (cogs) of the signal plate on the driveplate.

The CKPS informs the ECM of the following information;

- The position of the crankshaft (is the engine at TDC or elsewhere?)
- If the crank is actually moving & if so, how fast.

2 sections of the signal plate does not have "teeth" cut into it. This is to determine the 180-degree TDC point.



CAUTION

Please ensure that the drive plate is installed in the same position that it was removed from.

If it is installed onto the crankshaft in the wrong position (such as 1 bolt hole out) the engine may not run at all, or if it does run, loss of performance will be experienced & various DTC's will be logged in relation to IVT / CKPS / CMPS faults etc.





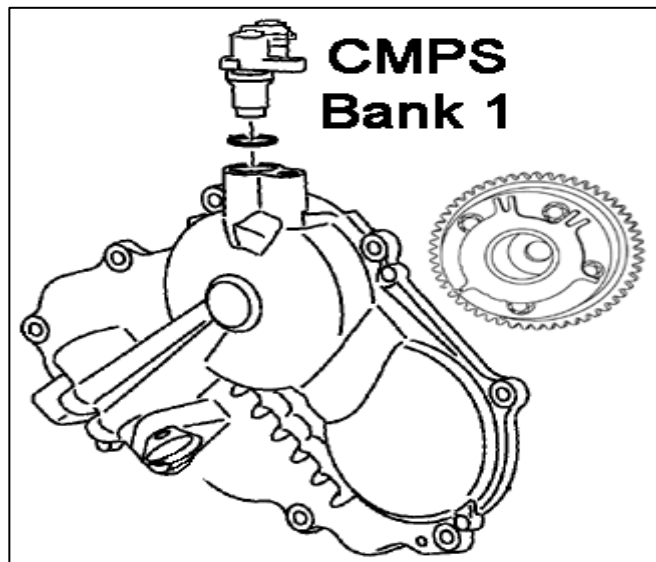
VK56VD ENGINE CONTROL

Inputs to ECM

4. Camshaft Position Sensor (CMPS)

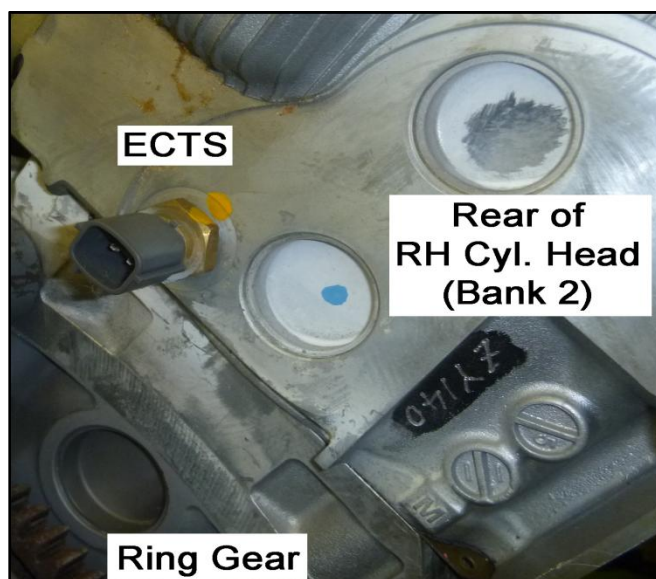
There are 2 x CMPS's. They are located at the front of each cylinder head. It senses the camshaft rotation. The ECM uses this information to identify a particular cylinder's piston position and firing order.

When the CKPS circuit becomes inoperative, the CMPS is able to be used as a back-up signal. This provides some control of the engine management system by utilising the timing of cylinder identification signals.



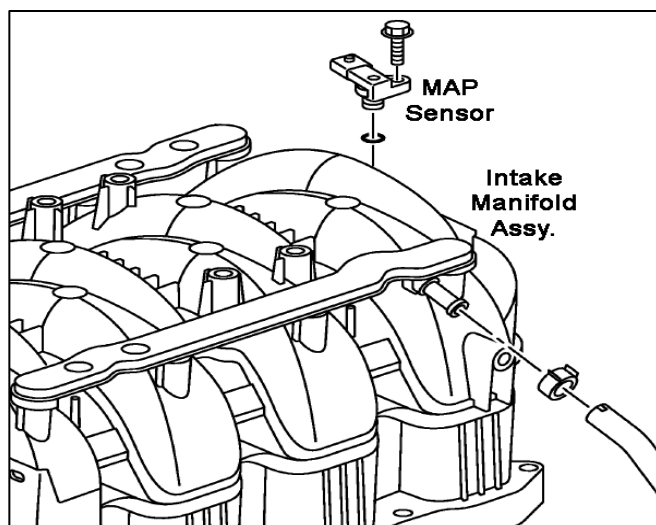
5. Engine Coolant Temperature Sensor (ECTS)

The ECTS is used to detect the engine coolant temperature. The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise. It's design & operation is the same as other ECT sensors utilised by the Nissan engine range.



6. Manifold Air Pressure Sensor (MAPS)

The MAPS works in the traditional manner. It monitors the level of air pressure in the manifold so that ECM can apply throttle in the appropriate manner for the purpose of vacuum supply when required.





VK56VD ENGINE CONTROL

Inputs to ECM

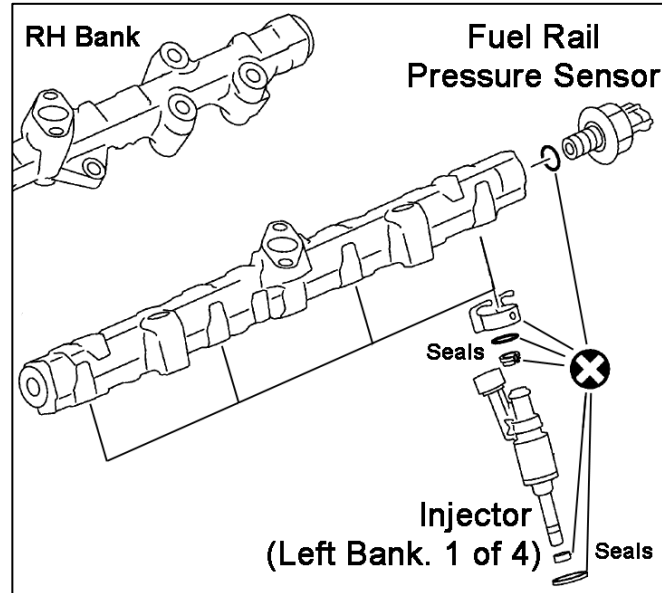
7. Fuel Rail Pressure Sensor

(High Pressure System - HP)

The Fuel Rail arrangement is very similar to that found on Common Rail Diesel Engines. Given that the engine is in a V arrangement, there are 2 banks of cylinders & therefore 2 Fuel Rails.

However there is only 1 Fuel Rail Pressure sensor fitted as the Fuel Pressure is common across the 2 rails. (This is the same as the V9X CRD Engine fitted to D40 / R51 "550" models)

Fuel is pumped into the rail via the mechanically driven High Pressure Fuel Pump



Fuel Pressure Values:

- Fuel Pressure in the Fuel Rails of the Y62 **VK56VD** engine operates up to a max. of **15,000KPa** (150 BAR). Like it does in CRD engines, the Fuel Pressure will vary dependant on load & other conditions.
- Current Nissan Gasoline Engines (K13 **HR12**, Z51 **VQ35** etc.) operate Fuel Pressure in the Fuel Rail at a constant 350 KPa (3.5 BAR).
- The R51 / D40 **YD25** 140Kw CRD operates up to a maximum Fuel Rail Pressure of 2000 BAR.

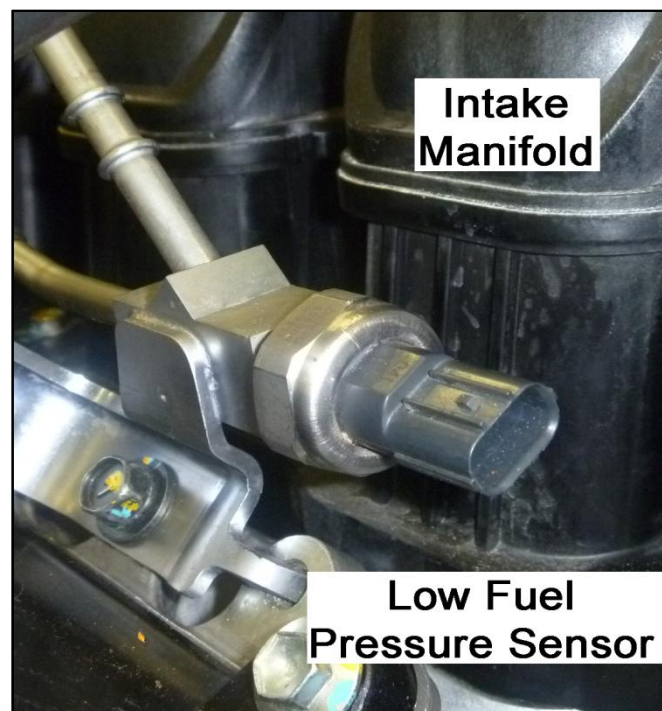
8. Fuel Supply System Pressure Sensor

(Low Pressure System - LP)

The LP Fuel system consists of the Electrically operated Fuel Pump assembly in the Fuel Tank. This pump supplies fuel to the mechanically driven HP Fuel Pump for the above described High Pressure Fuel System.

Fuel Pressure Values:

- The maximum operating Fuel Pressure of the LP fuel system fitted to the Y62 **VK56VD** engine is 450KPa. (LP Fuel System is between the outlet of the fuel tank mounted Electric Fuel Pump up to the Inlet of the mechanically driven HP Fuel Pump)
- The operation of the LP Fuel Pump is controlled via a Fuel Pump Control Module (FPCM). As a result Fuel Pressure in the LP Fuel System will vary





VK56VD ENGINE CONTROL

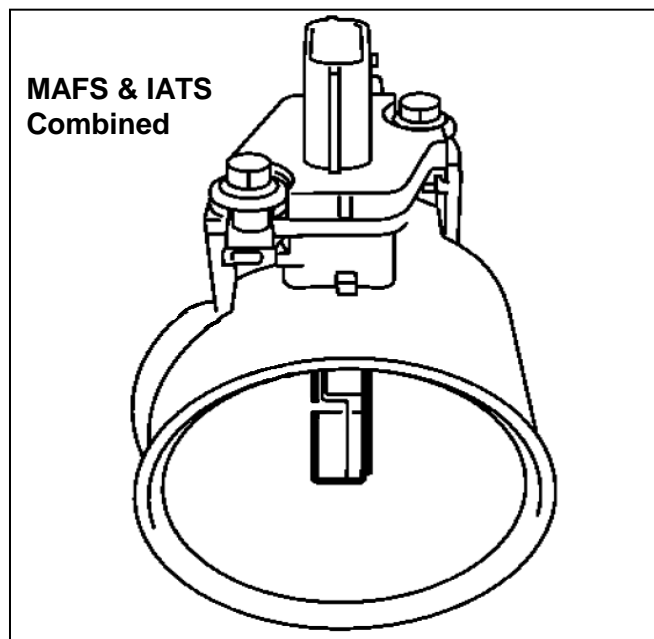
VQ Inputs to ECM

9. Mass Air Flow Sensor (MAFS)

The MAFS is placed in the stream of intake air. The ECM controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss. Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.

10. Intake Air Temperature Sensor (IATS)

The IATS is built into the MAFS. The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



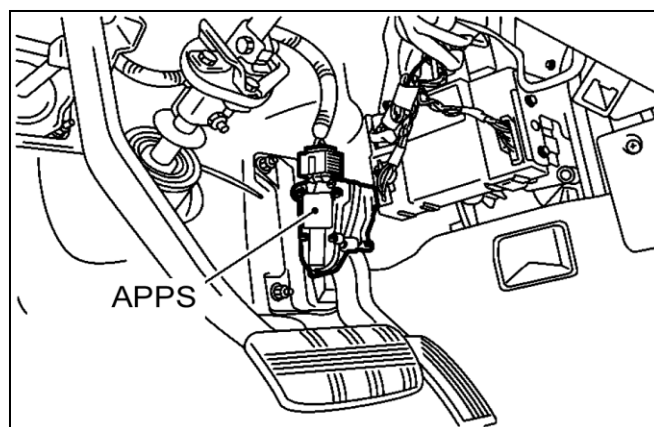
11. Accelerator Pedal Position Sensor (APPS)

The APPS is installed on the upper end of the accelerator pedal assy. The sensor detects the following;

- Actual Accelerator Pedal Position
- If the pedal is actually moving (being pushed by the driver or not) and if it is moving, the rate of movement (rapid movement or gentle / slow movement).

The ECM controls the throttle control motor based on these signals.

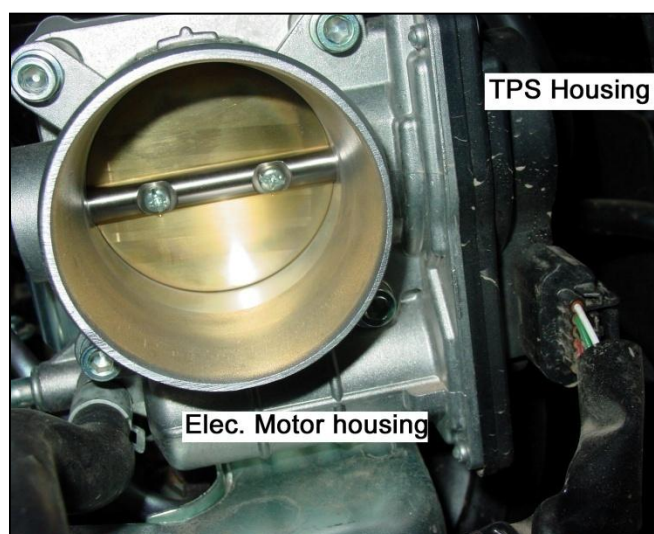
Idle position of the accelerator pedal is determined by the ECM receiving the pre-learned signal from the APPS. The ECM uses this signal for idle control & fuel cut.



12. Throttle (valve) Position Sensor (TPS)

The TPS responds to the throttle valve movement. It has two sensors. These sensors are potentiometers which transform the throttle valve position into an output voltage signal and sends the voltage signal to the ECM. The TPS detects the opening and closing **speed** of the throttle valve as well as the throttle valve **position** and sends the voltage signals to the ECM.

The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle control motor to set the throttle valve opening angle response to the requested driving condition. (Determined from the Accelerator Pedal Position Sensor - APPS).





VK56VD ENGINE CONTROL

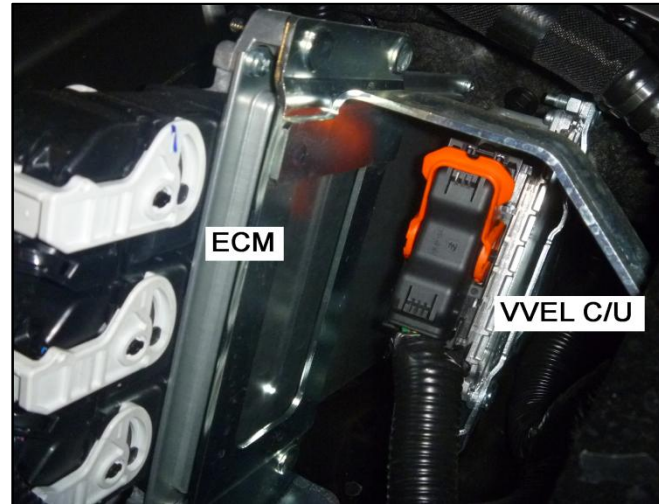
VQ Inputs to ECM

13. VVEL Control Unit

The VVEL C/U drives the actuator motors directly. It also feeds back to the ECM via an individual CAN the movement / position of the VVEL control shaft. The ECM directs driver command signals to the VVEL Control Unit via the same individual CAN.

NOTE:

- The above mentioned CAN is NOT part of the vehicles CAN. The VVEL Control unit does NOT directly communicate with CONSULT III.
- Power from the battery is supplied to the VVEL C/U via a 50A fusible link which is located adjacent to the battery & VVEL C/U.



14. VVEL Control Shaft Position Sensor

The VVEL C/SPS detects the movement & actual position of the VVEL control shaft. This signal is fed back to the VVEL C/U.

The VVEL C/U needs to know if the control shaft is moving or not. If it has moved the C/U needs to know the actual position of the shaft. In turn the C/U knows the actual opening of the inlet valves.

WARNING

Do NOT disassemble the VVEL components unnecessarily. Once any of the following components are separated from each other, none of the below can be re-used;

- VVEL Control Shaft Position Sensor
- VVEL Ladder assembly
- Cylinder head

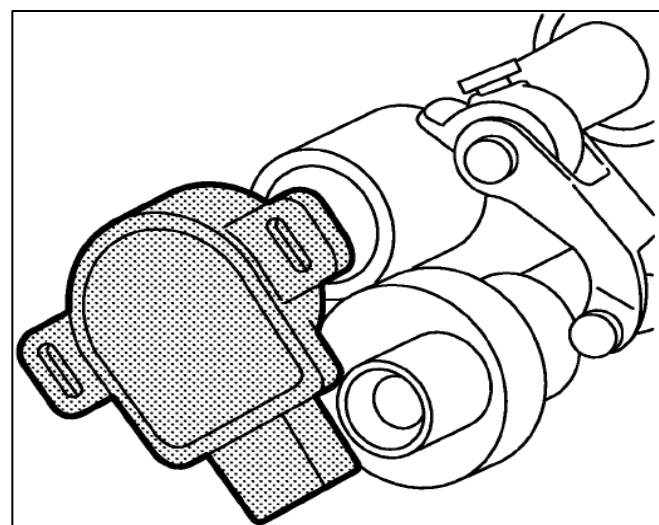
Refer back to the “ENGINE MECHANICAL” section of this document for more details & precautions.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > ENGINE MECHANICAL

Or

B ENGINE > ENGINE CONTROL > BASIC INSPECTION > INSPECTION AND ADJUSTMENT





VK56VD ENGINE CONTROL

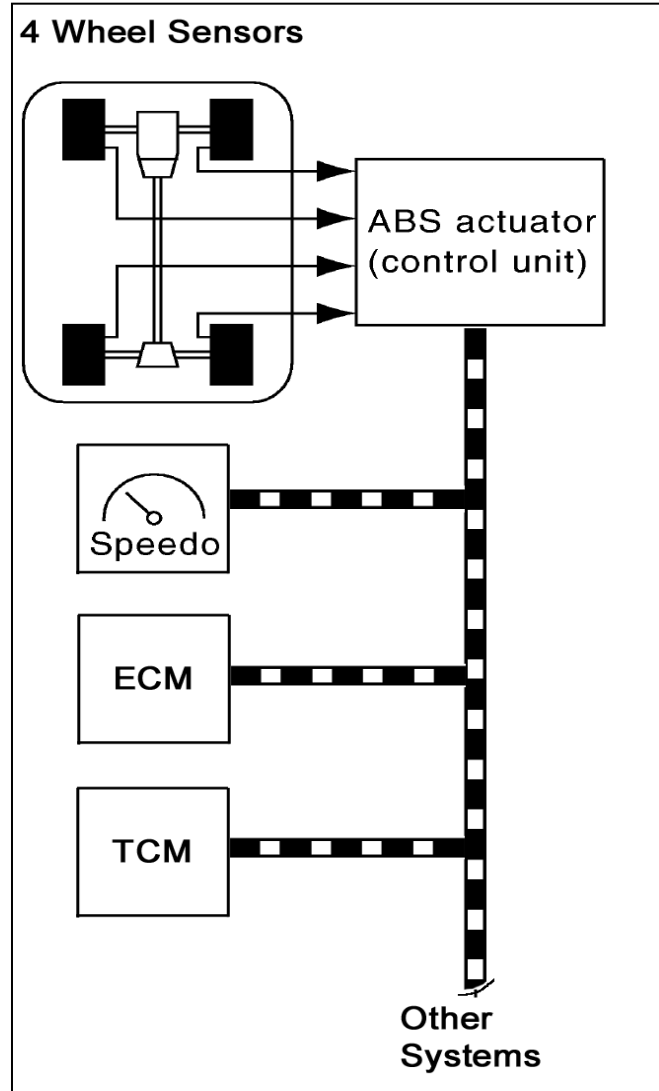
Inputs to ECM

15. Vehicle Speed Signal

The ECM receives vehicle speed sensor signal via CAN communication line. The source of the signal originates from the ABS / VDC system wheel speed sensors. The ECM primarily uses this signal for ASCD control (Cruise Control).

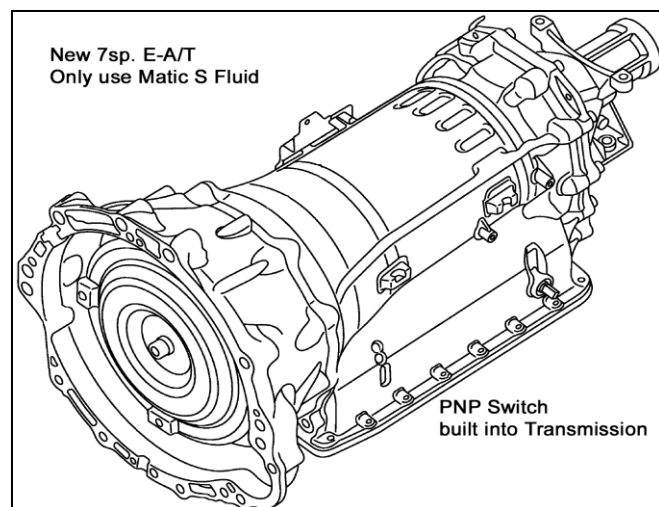
NOTE:

If a Vehicle speed signal is required for the fitment of accessories such as a speed alarm etc., a VSS output can be sourced from the METER to the Power Steering Control Unit (if fitted).



16. Park Neutral Position Switch (PNP)

When the gear position is in P or N, Park / Neutral position is ON. ECM detects the position because the continuity of the line (the ON signal) exists. The PNP switch is internally located & it forms part of the valve body assembly.





VK56VD ENGINE CONTROL

Inputs to ECM

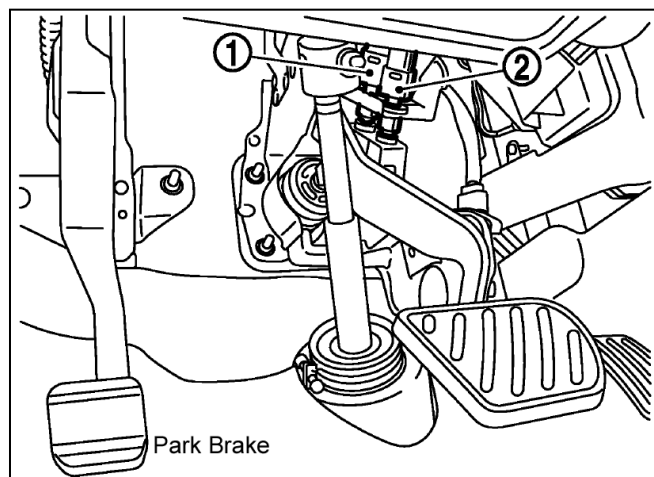
17. Stop Lamp Switch (Normally open)

The stop lamp switch is installed to the brake pedal bracket. The switch senses brake pedal position and sends an ON-OFF signal to the ECM.

This signal is mainly used by the ECM to decrease the engine speed when the vehicle is driving (moving). The switch reverts to a closed position when the pedal is pressed. It supplies power to the Stop Lamps as well as a signal to the ECM.

For CVT / AT models, the switch has a second set of contacts which operate in the same manner. This secondary switch is for the transmission lever Shift Lock function

It is found on the Brake Pedal bracket, adjacent to the ASCD Brake Switch.



1: Stop Lamp Switch
2: ASCD Brake Switch

18. ASCD Brake (pedal) Switch (Normally closed)

When the brake pedal is depressed, ASCD brake switch is turned OFF. (ECM reads ON)

The ECM / BCM detects the state of the brake pedal by these 2 SEPARATE inputs.

NOTE:

The ASCD Brake Switch reverts from a CLOSED position to an OPEN position when the brake pedal is depressed. As a result the ECM receives a 0V signal when the pedal is pressed.

The Stop Lamp switch works in the opposite manner.

19. ASCD Steering (wheel) Switches

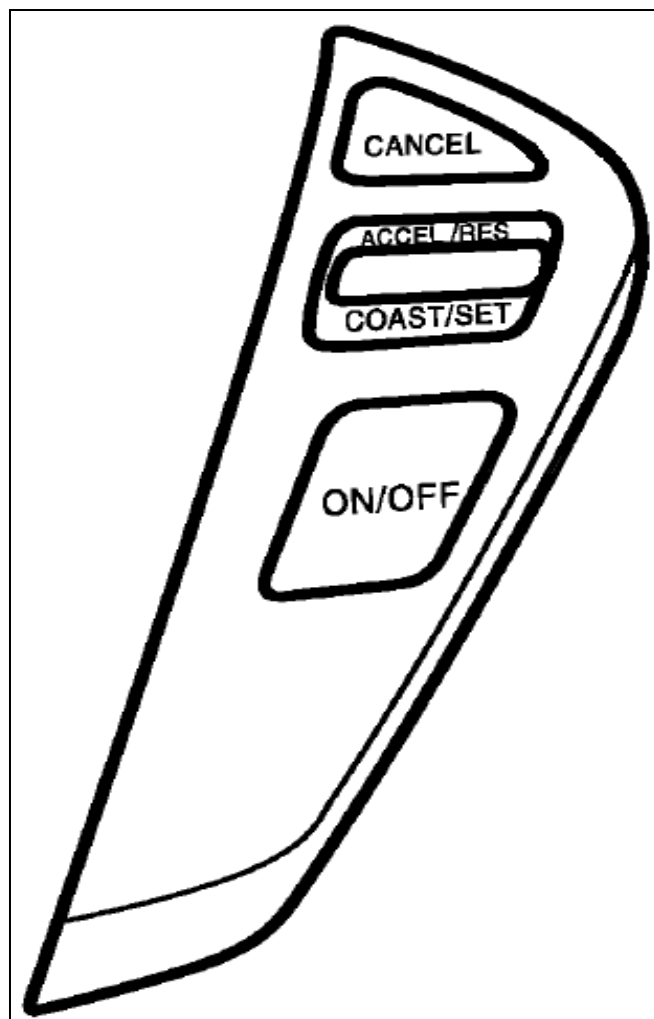
ASCD steering switch has varying values of electrical resistance for each button.

The ECM reads the voltage variation of the switch that is pressed and determines which button is operated.

The switches are mounted on the steering wheel.

NOTE:

ASCD = Automatic Speed Control Device.
(Cruise Control)





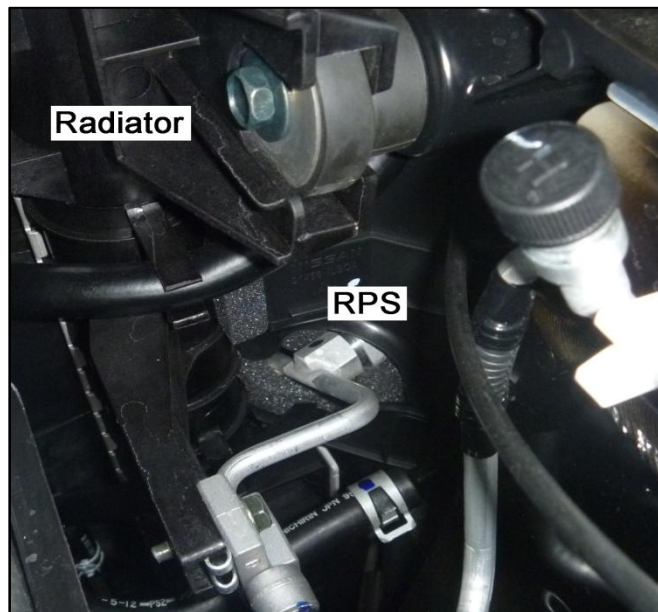
VK56VD ENGINE CONTROL

VQ Inputs to ECM

20. A/C Refrigerant Pressure Sensor (RPS)

The RPS is installed on the high pressure pipe between the condenser & the evaporator on the A/C system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. (The pressure of the liquid **after** it has exited the condenser is measured.)

The voltage signal is sent to the ECM and it controls the cooling fan system, or disengages the compressor in the event of excessively LOW or HIGH system pressure. Due to the input of this sensor it is possible to have Electric Cooling Fan operation due to high A/C system pressure, yet the engine temperature is cool. Input from this sensor can also assist the ECM to set the most ideal idle speed control for the given conditions. Typically on a hot day, the system pressure is high, therefore the compressor load on the engine is high. The ECM will need to set a higher engine idle speed to cope with the higher load.



21. Power Steering Pressure Sensor (PSP)

The PSP Sensor is installed on the power steering high-pressure tube and detects a power steering load (system fluid pressure).

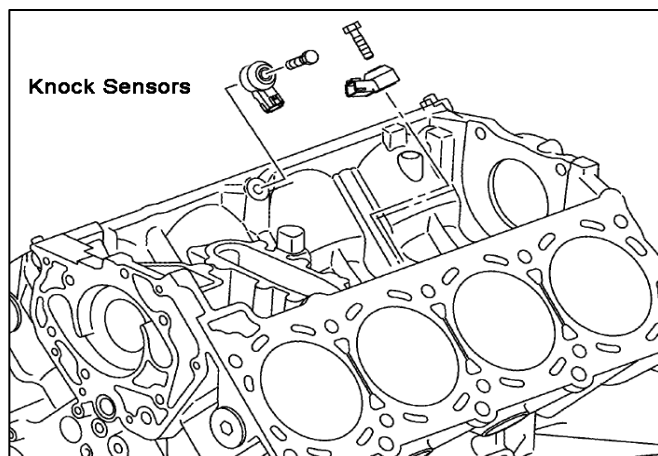
The sensor is a potentiometer which transforms the power steering load into an output voltage. The voltage signal to the ECM. The ECM controls the Electric Throttle Control actuator (ETC) and adjusts the throttle valve opening angle to increase the engine speed (adjusts idle speed) to compensate for the increased load on the engine.



22. Knock Sensors (KS)

The KS's are attached directly to the cylinder block. They sense engine knocking (engine ping) using a piezoelectric element.

A knocking vibration from the cylinder block is sensed as vibration pressure. This pressure is converted into a voltage signal and sent to the ECM.



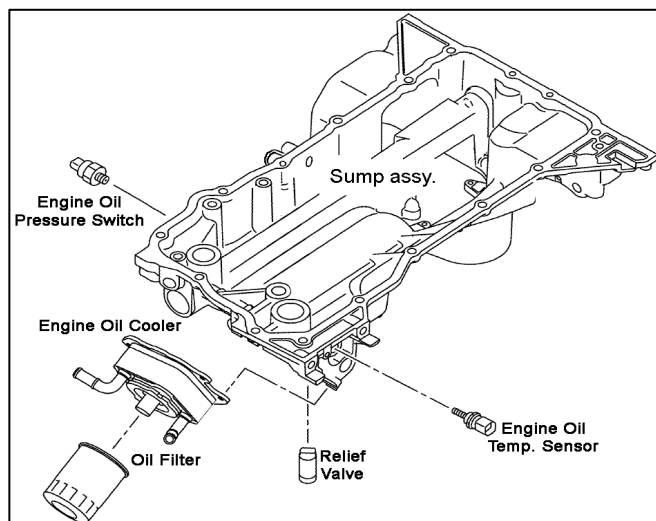


VK56VD ENGINE CONTROL

VQ Inputs to ECM

23. Engine Oil Temp Sensor (EOTS)

The EOTS is used to detect the engine oil temperature. The ECM utilises the signal for protection of the CVTC system. (Continuously Variable valve Timing Control) This is also an important input to the VVEL system. If the Engine Oil Temperature reaches an excessively high level (approximately 140 deg C), the engine will run in a decreased power mode until the temperature stabilises.



24. Transmission Activity.

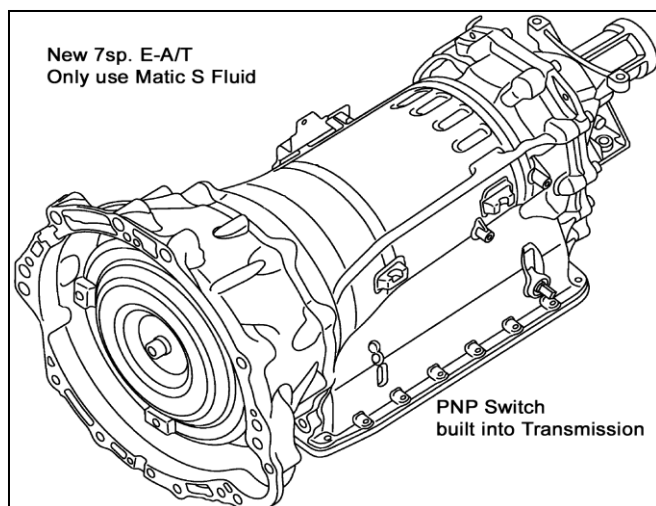
Communication via the CAN network between the ECM & the TCM is constantly taking place.

The Transmission output speeds, gear position etc. is shared with the ECM.

The Engine's activity such as Engine speeds & temperature as well as the drivers commands (Accelerator Pedal activity) is shared with the Transmission.

NOTE:

The Park / Neutral signal is a separate input, refer to ECM input no. 16 for more detail.



25. VDC & TCS Activity.

Communication from the ABS / TCS / VDC Control Unit is sent to the ECM via CAN communication.

When the vehicle is un-stabilised due to excessive wheel slip being detected or the vehicle is sliding sideways etc., the ECM assists with re-stabilising the vehicle by control of the throttle valve (ETC) in order to reduce engine power output.

NOTE:

VDC = Vehicle Dynamic Control



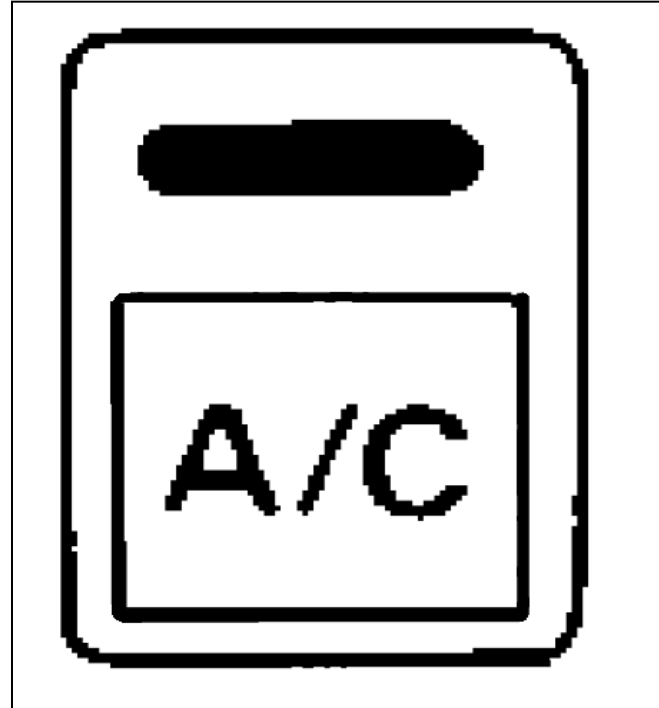


VK56VD ENGINE CONTROL

VQ Inputs to ECM

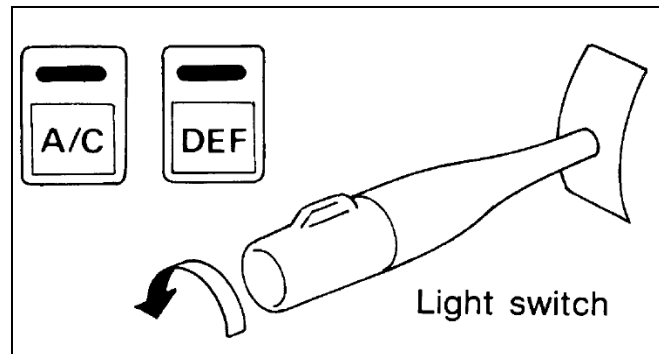
26. Air Conditioner Request.

A request for Air Conditioner operation is sent from the A/C Control Unit to the ECM via CAN. The ECM looks at various inputs of it's own to determine if it is OK to operate the compressor. (E.G; Eng speed, eng temp, eng loads etc as well as A/C system pressure etc.). If the ECM allows compressor operation, a signal is sent via CAN to the IPDM E/R to operate the A/C compressor relay (located within the IPDM E/R).



27. Electrical Loads.

Whenever any electrical loads are switched on, a signal is sent to the ECM (typically via CAN). The ECM will then set a suitable idle speed via control of the ETC to cope with the additional load placed on the engine.

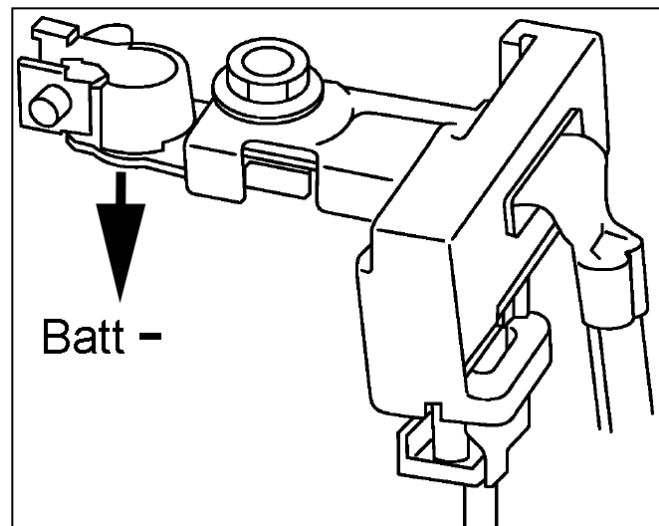


28 Battery Current Sensor

The Battery Current Sensor is installed to the battery cable at the negative terminal. The sensor measures the charging / discharging current of the battery.

29. Battery Temperature Sensor

The Battery Temperature Sensor is integrated in the battery current sensor. The sensor measures ambient temperature around the battery. The electrical resistance of the thermistor decreases as temperature increases.





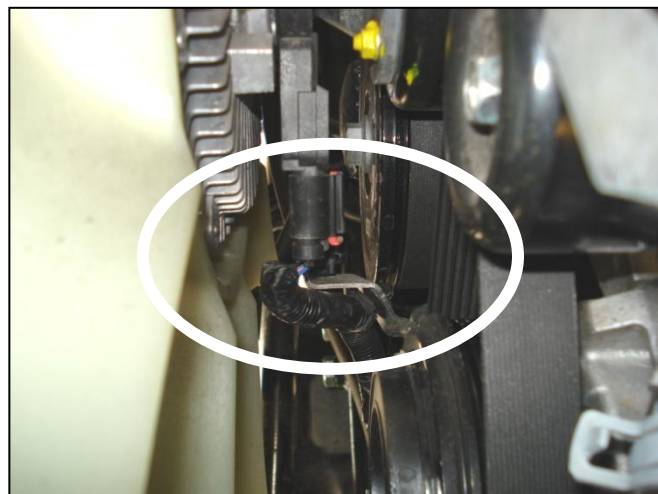
VK56VD ENGINE CONTROL

ECM INPUTS

30. Cooling Fan Speed

Operation of the Cooling Fan Viscous Coupling is controlled by the ECM. The ECM sends an Increase or Decrease request for fan speed to IPDM E/R via the CAN Communication Network. The IPDM E/R will then run the fan controller accordingly.

The Cooling Fan Coupling provides a fan speed feedback signal directly to the ECM.



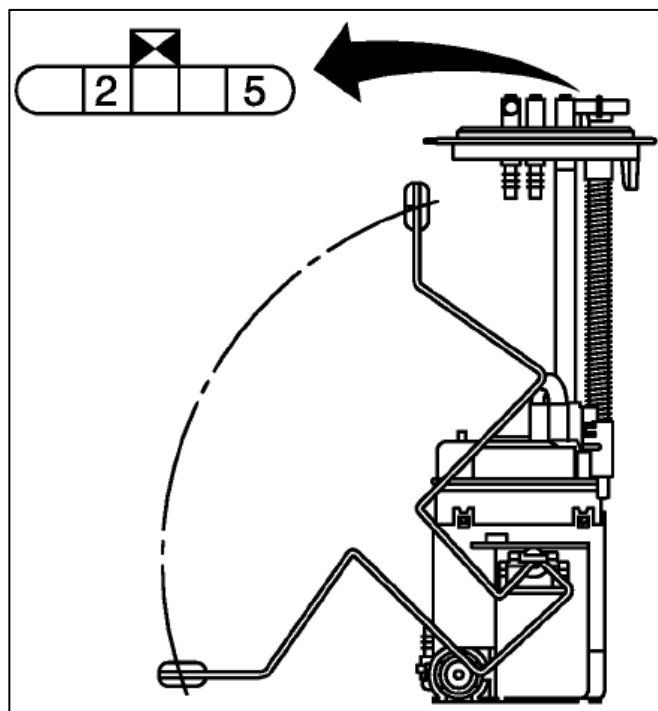
Cooling Fan Coupling wiring connector

31. Fuel Tank Sender Unit

The Fuel Level Sensor is mounted on the Fuel Level Sensor unit.

The sensor detects the fuel level in the fuel tank and transmits a signal to the combination meter in the conventional manner. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.





VK56VD ENGINE CONTROL

VQ Inputs to ECM

32. Oxygen Content in Exhaust Gases.

Like all VQ engines (since the A33) there are 4 x sensors that monitor the Oxygen content in the Exhaust Gases.

Ever since VQ35 in Z50 / 06MY-Z33, VQ40 in R51 / D40, there has been a new type of sensor utilised. The Air Fuel Ratio sensor or it is other wise known as the Wide Band type O2 sensor. In the case of these models it is a 6 wire sensor & the voltage output if the engine is running a 14.7:1 A/F ratio is 1.5V

For Z51 & J32, as well as Z33 VQ35-HR, VQ37-VHR & T31 QR25, the sensors are a 4 wire type & the voltage output if the engine is running a 14.7:1 A/F ratio is 2.1 ~ 2.2V.

Prior to Catalyst – Air Fuel Ratio Sensor.

This is a far more accurate sensor for measuring Oxygen content in the Exhaust gas.

The A/F Ratio Sensor body appearance looks similar to a Zirconia O2 sensor; however it works in a very different manner to a typical HO2S.

The sensor is capable of very precise measurement not only within the ideal A/F ratio range, but also in either the lean or rich range.

Basic operation of the sensor involves the flow of electrical current through an element within the sensor. The amount of Oxygen in the exhaust gases change the resistance of the element. Therefore the ECM will have to increase current output in order to maintain a set voltage. The basic principle of operation is similar to a Mass Air Flow Sensor.

A typical voltage output provided the engine is functioning correctly is approximately 1.4V.

After Catalyst – Heated Oxygen Sensors.

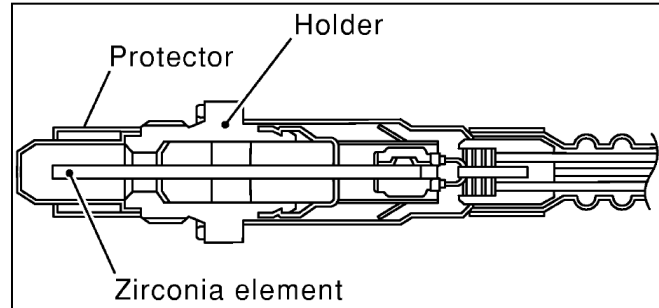
A Conventional Oxygen Sensor is utilised to monitor Exhaust gases **after** the Catalyst.

Under normal conditions the Heated Oxygen Sensor 2 is not used for engine control operation.

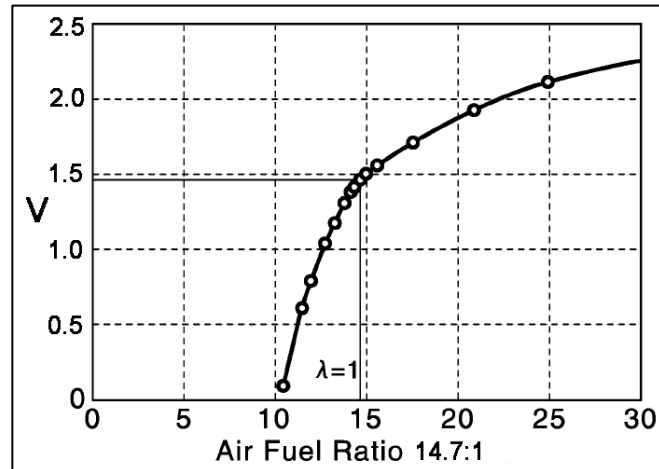
If the Three Way Catalyst (TWC) is malfunctioning the signal from the O2 sensor will alert the ECM of the TWC problem. A DTC will be logged.

NOTE:

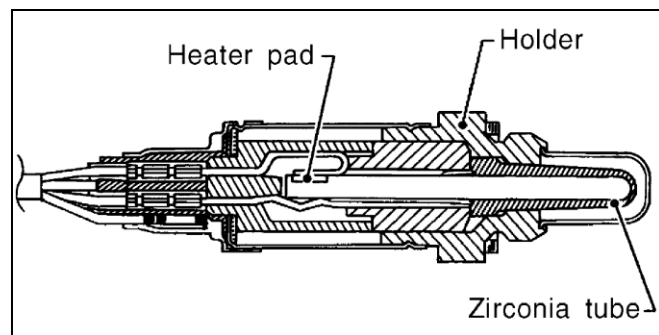
The sensor does NOT switch from rich to lean as it would in a conventional engine when it's installed prior to the catalyst.



AIR FUEL RATIO SENSOR



5 Wire A/F Ratio Sensor = ~1.5V for 14.7:1

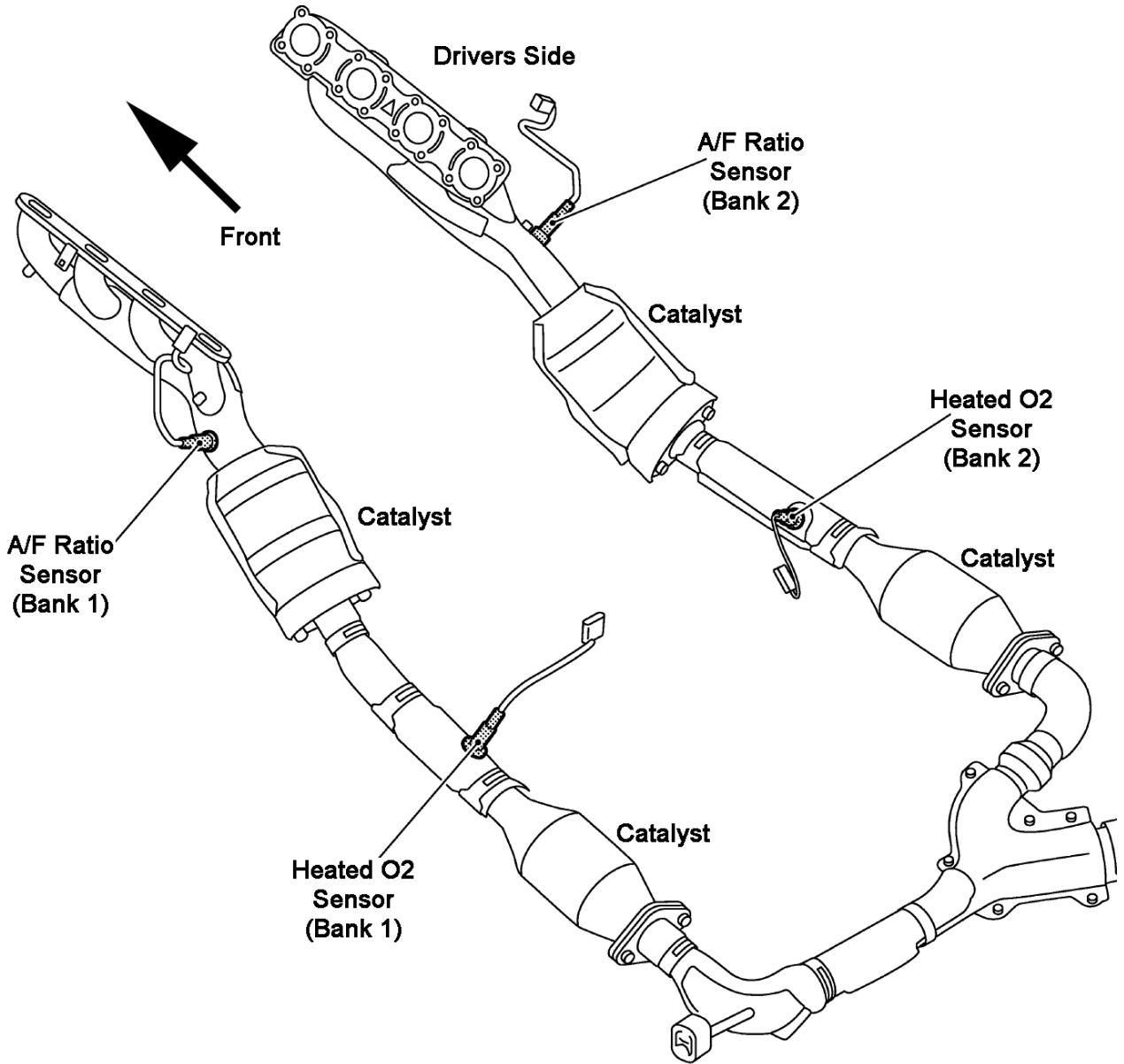


HEATED OXYGEN SENSOR



VK56VD ENGINE CONTROL

VK56VD Measurement of Oxygen Content in Exhaust Gases



**THE EXHAUST SYSTEM MUST ALWAYS BE PERFECTLY SEALED! (NO LEAKS)
OTHERWISE THE O2 SENSORS WILL DETECT O2 & THE ECM WILL ASSUME
THAT THE ENGINE IS RUNNING LEAN.
IN TURN THIS WILL DAMAGE THE CATALYSTS!**



VK56VD ENGINE CONTROL

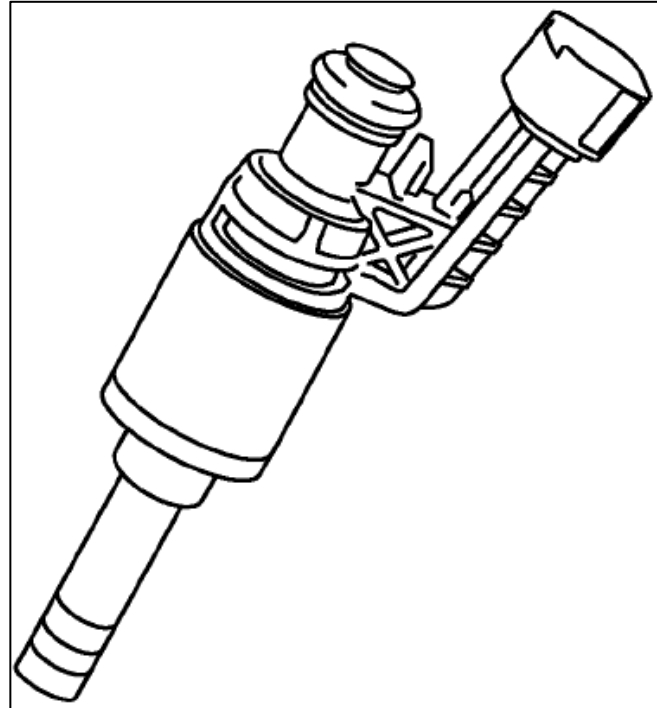
Outputs from ECM

1. Fuel Injector

The fuel injector is a small & precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls a ball valve back and allows fuel to flow through the injector into the intake manifold port, directly above the inlet valves.

The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

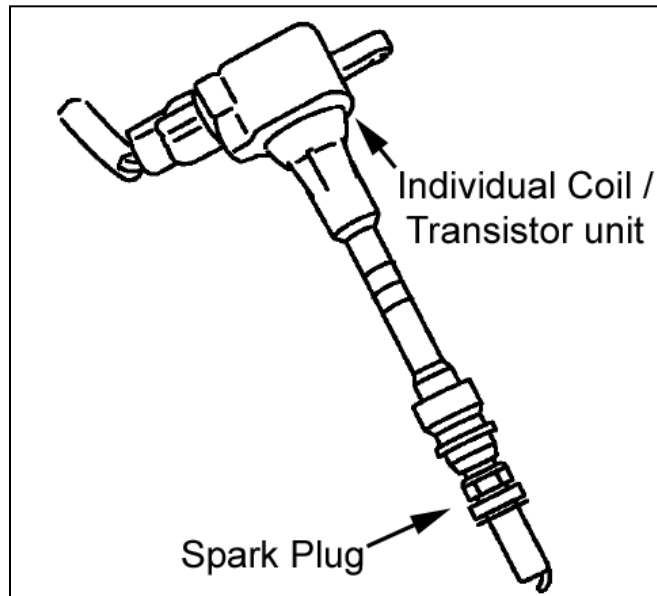
The Fuse for the Injectors is located within the IPDM E/R. The Ground is the main ECM ground .



2. Ignition Coil & Power Transistor

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the necessary high voltage in the coil secondary circuit.

The Fuse for the Ignition Coils is the 20A main fuse for the ECM which is located within the IPDM E/R. The Ignition Coil Ground connection is located typically on the front of the engine.





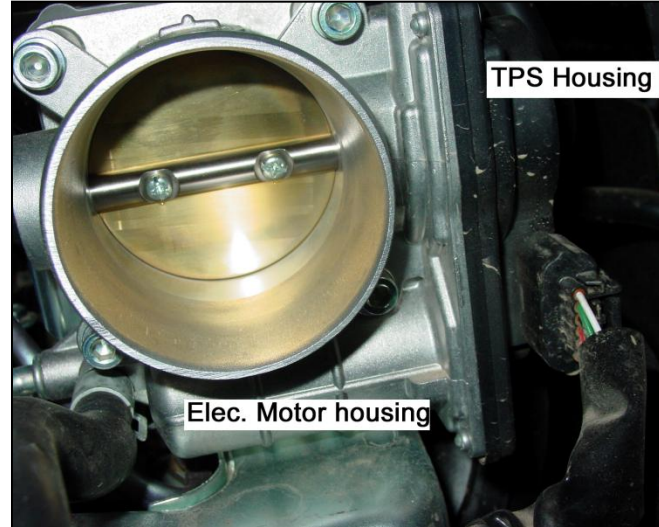
VK56VD ENGINE CONTROL

Outputs from ECM

3. Electric Throttle Actuator

Electric throttle control actuator consists of throttle control motor & throttle position sensor (TPS). The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The throttle position sensor detects the throttle valve position and the opening and closing speed of the throttle valve and sends the voltage signal to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

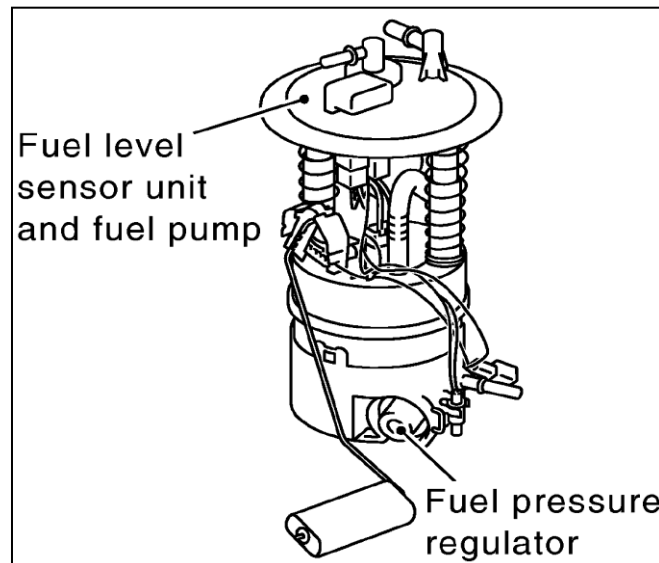
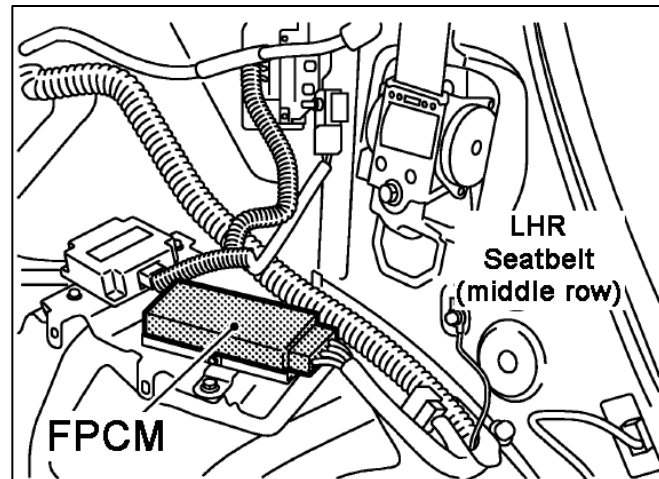
The Fuse & Relay for the ETC is located within the IPDM E/R. The Ground is the main ECM ground .



2 x ETC units fitted to VQ35-HR & VQ37-VHR

4. Fuel Pump Control Module (FPCM)

The Fuel Pump Control Module (FPCM) takes place of a conventional Fuel Pump Relay. The FPCM is signaled by the ECM to control the volume of Fuel output by the Fuel Pump which is mounted inside the Fuel Tank. The FPCM regulates the voltage to the Fuel Pump in 3 stages: Low / Mid / High (depending on driving conditions)





VK56VD ENGINE CONTROL

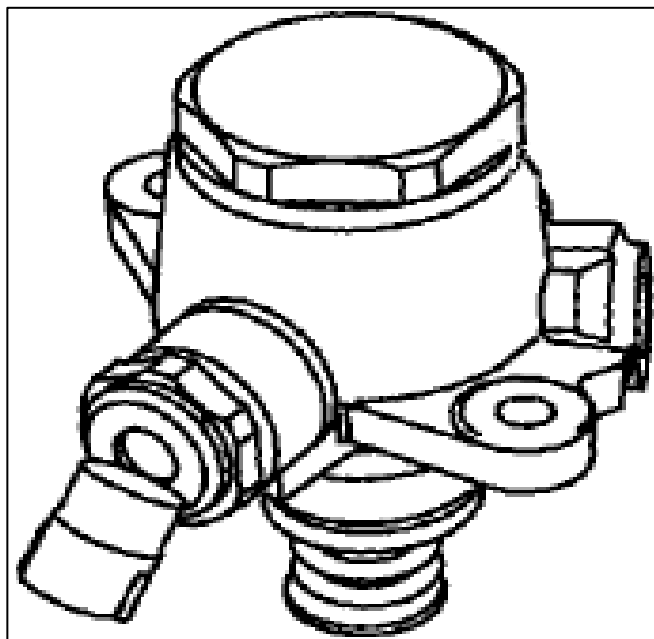
Outputs from ECM

5. HP Fuel Pump

The mechanically driven HP Fuel Pump is installed at the front of the engine (Bank 2) and it is activated by a Cam which is driven by the Timing Chain. The ECM controls the HP Fuel Pump Control Solenoid valve built into the HP Fuel Pump and adjusts the amount of discharge by changing the suction timing of fuel from the low pressure fuel system.

NOTE:

The SCV solenoid does not operate in the same way as it does on the Denso CRD system. The SCV on the CRD system has a variable current applied to it. The SCV on the DiG engine is simply switched "ON & OFF"



6. Intake Valve Timing (IVT)

Control Solenoid Valve

The ECM receives signals such as crankshaft position, camshaft position, engine speed and engine coolant temperature. The ECM then sends ON/OFF pulse duty signals to the intake valve timing control solenoid valve depending on the driving status.

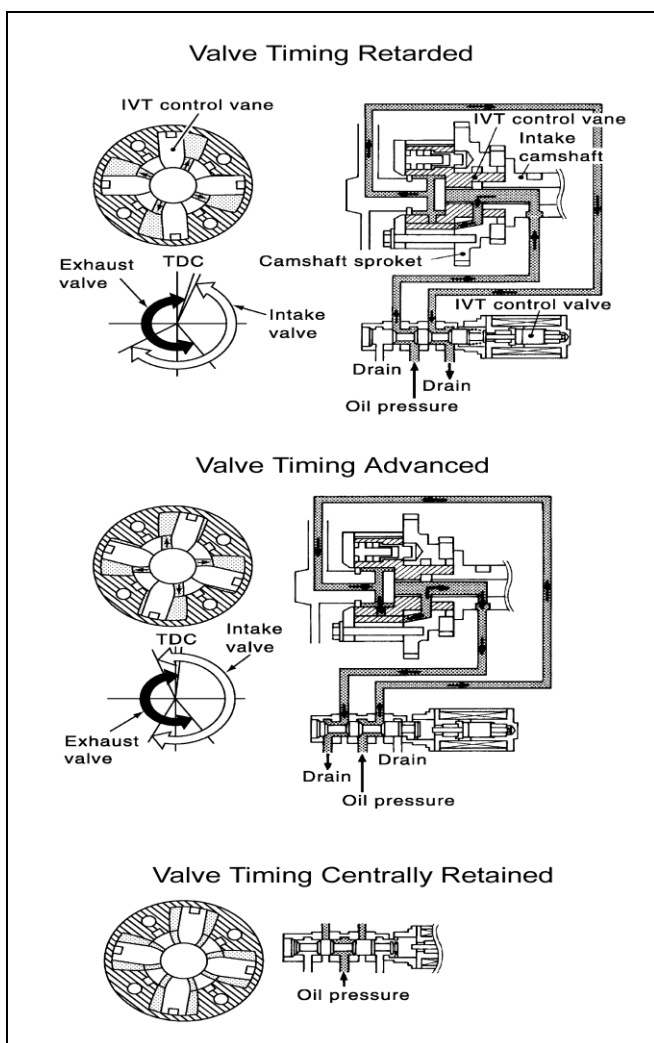
This makes it possible to control the shut / open timing of the intake valve to increase engine torque in low / mid speed range and output in high-speed range.

There is 2 x IVT Control Solenoid Valves (1 per bank of cylinders) & they are located at the front of each rocker cover.

SPECIAL NOTE:

If the wrong type of Engine Oil is used or the Engine Oil is LONG OVERDUE for changing, this mechanism can jam in the one position & malfunction. Typically a DTC in relation to a fault with the CMPS / CKPS / IVT maybe logged.

Ensure engines with such systems installed on them are PROPERLY SERVICED WITH THE CORRECT ENGINE OILS.





VK56VD ENGINE CONTROL

Outputs from ECM

7. VVEL Control Unit

The VVEL C/U drives the actuator motors directly. The VVEL C/U feeds back to the ECM via an individual CAN the movement / position of the VVEL control shaft. The ECM directs driver command signals to the VVEL C/U via the same individual CAN.

NOTE:

The above mentioned CAN is NOT part of the vehicles CAN. The VVEL Control unit does NOT directly communicate with CONSULT III plus.

8. VVEL Control Actuator

The VVEL Control Shaft Actuator is connected directly to the VVEL control shaft. The Actuator Shaft rotates the cams connected to each inlet valve.

WARNING

Do NOT disassemble the VVEL components unnecessarily. Once any of the following components are separated from each other, none of the below can be re-used;

- VVEL Control Shaft Position Sensor
- VVEL Ladder assembly
- Cylinder head

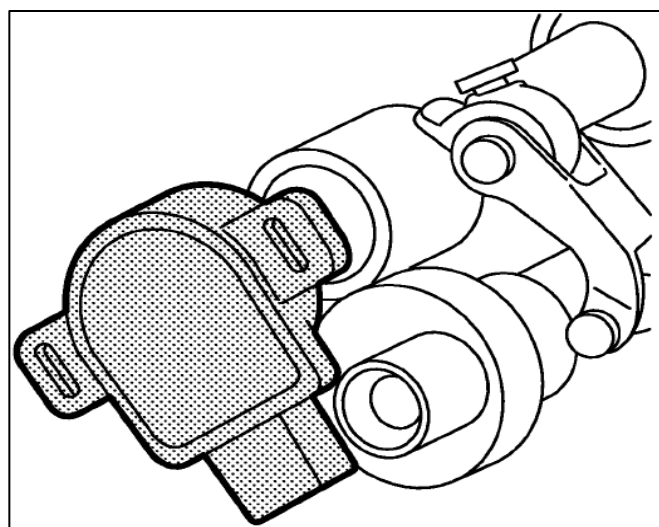
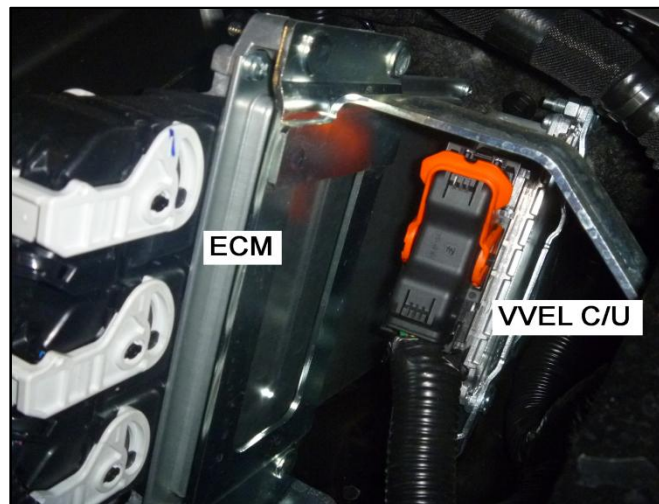
Refer back to the “ENGINE MECHANICAL” section of this document for more details & precautions.

Further detail & precautions regarding the components shown right can be found in the ESM as follows;

B ENGINE > ENGINE MECHANICAL

Or

B ENGINE > ENGINE CONTROL > BASIC INSPECTION > INSPECTION AND ADJUSTMENT





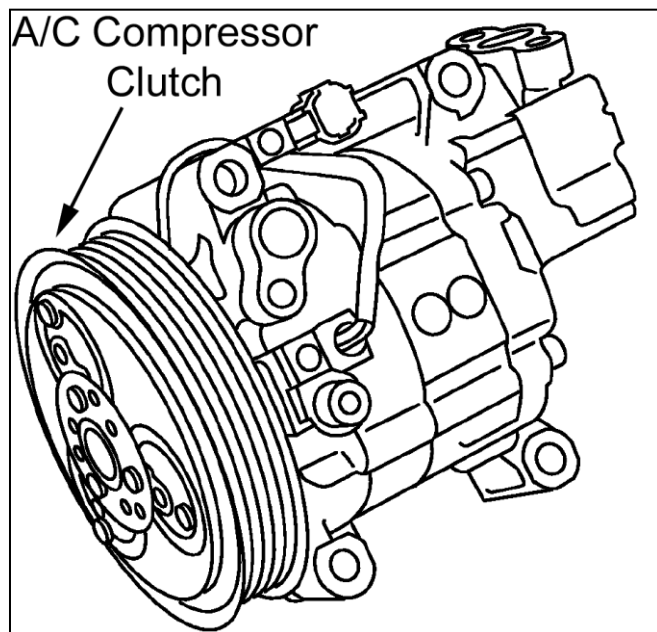
VK56VD ENGINE CONTROL

Outputs from ECM

9. Air Conditioner Control

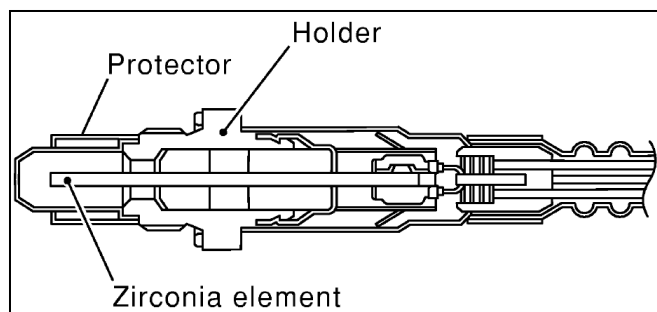
The ECM has the final control over the A/C compressor operation (Compressor **relay**). Air Conditioning is typically required due to a driver request coming from the A/C Amplifier / Control Panel on the dash via CAN.

If conditions such as a demand for rapid acceleration, excessive engine temperature, excessive A/C system pressure or lack of A/C system pressure (no gas) are **not** evident, the ECM will send a signal via the CAN to the IPDM E/R to switch ON the A/C relay. The A/C relay is located within the IPDM E/R unit.



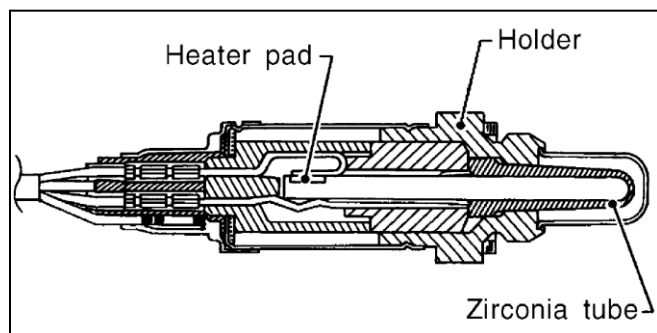
10. Air Fuel Ratio Sensor Heater Control

The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor element at the specified range.



11. O2 Sensor Heater control

The ECM performs ON/OFF control of the heated oxygen sensor heater corresponding to the engine speed, amount of intake air and engine coolant temperature.





VK56VD ENGINE CONTROL

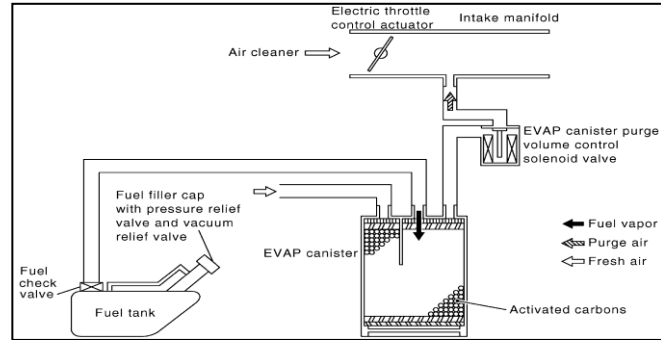
Outputs from ECM

12. EVAP Canister Purge Volume Control Solenoid Valve

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapour from the EVAP canister.

The EVAP canister purge volume control solenoid valve is operated by ON/OFF pulses from the ECM. (rapidly opened & closed).

The longer the ON pulse, (opened for a longer period than closed) the greater the amount of fuel vapour that will flow through the valve.

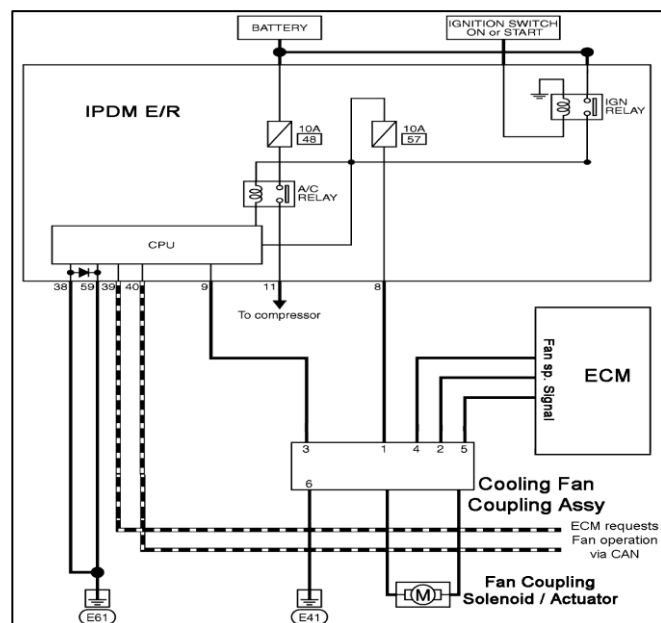
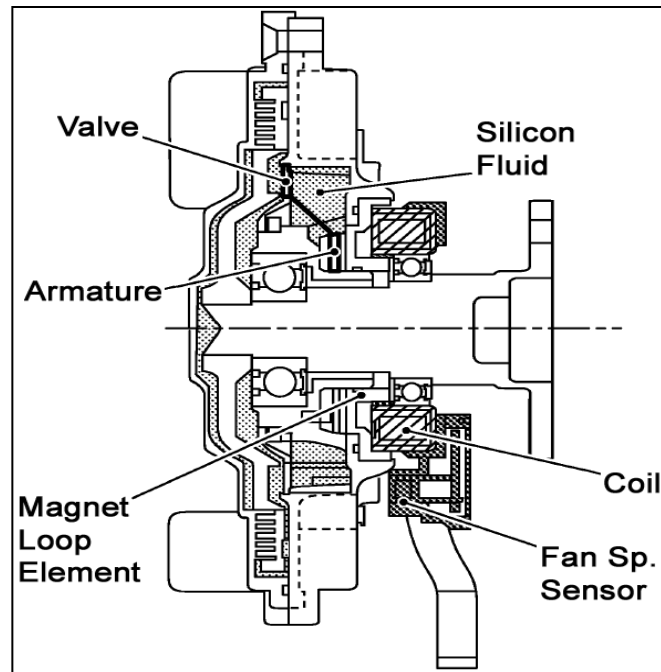


13. Cooling Fan Controller

The Cooling Fan Controller is integral with the Viscous Fan Hub assembly.

Following inputs such as A/C operation, A/C refrigerant pressure & engine temperature, the ECM will request the IPDM E/R to operate the Cooling Fan Controller.

The IPDM E/R will send a command signal to the Fan Controller to provide the appropriate Cooling Fan speed.





VK56VD ENGINE CONTROL

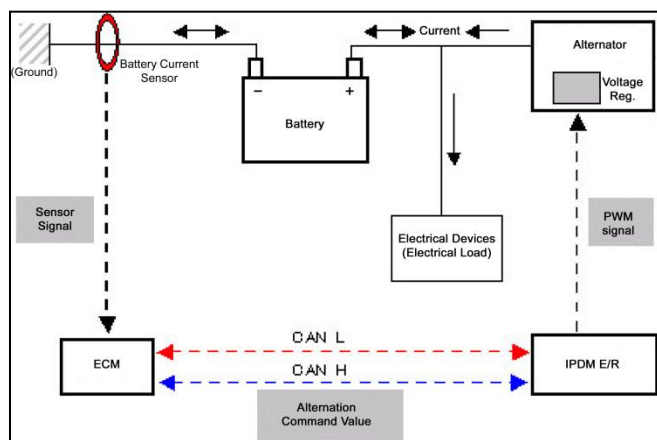
Outputs from ECM

14. Variable Charging System

This system improves fuel economy by reducing unnecessary battery charging.

The induction type current sensor is installed between the battery negative terminal and the body ground. With the current sensor, ECM can detect whether the current flow direction is charging or discharging. The alternator generation voltage is controlled according to this information.

When the charging is sufficient, the generation voltage is decreased to 12~13V from the normal regulated voltage, which is approximately 14V.



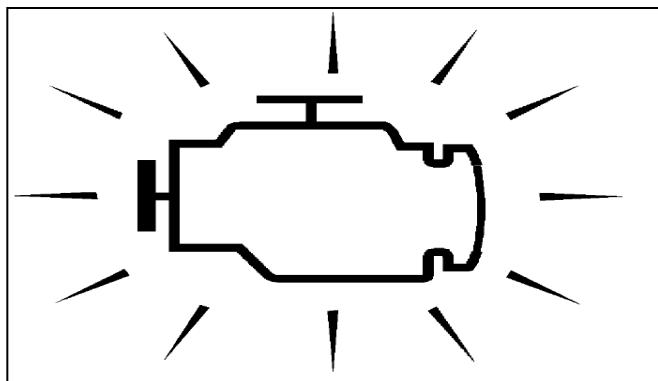
15. Malfunction Indicator Lamp

(MIL, Orange in Colour) & Self Diagnosis

If a fault within the Engine System is detected, the ECM will log a Diagnostic Trouble Code (DTC). CONSULT III is required to read these codes.

NOTE:

There will be many cases where a DTC is logged due to the ECM detecting a fault, yet the MIL will **not** illuminate. This indicates that the fault is not a serious issue.



16. CRUISE & SET Lamps

The CRUISE lamp will illuminate when the Cruise Control Main Switch on the steering wheel is pressed. (If the ignition is ON) Once the necessary conditions are met, the green coloured SET lamp will illuminate when the ASCD is actually functioning.

SPECIAL NOTE REGARDING A BLINKING CRUISE or SET LAMP CONDITION:

When the ECM detects any of the following conditions, cruise control operation is cancelled and the CRUISE or SET lamp will blink;

- If the engine coolant temperature is slightly higher than the normal operating temperature, the CRUISE lamp may blink slowly. (But DTC's may not be logged unless the temperature becomes excessive)
- If a malfunction with one of the inputs for ASCD control occurs, the CRUISE or SET lamp will blink quickly. DTC's will be logged.





VK56VD ENGINE CONTROL

APPS / ETC Failsafe

1. Accelerator Pedal Stuck

If the Accelerator Pedal was to jam (stuck on a floor mat etc.) the ECM would see this stuck pedal condition as a request for more engine power, even if the driver does not want an increase in engine power. To counteract the situation, the driver will naturally apply the brake pedal in order to stop the vehicle.

Therefore if the following 2 pedal conditions are present at the same time, the ECM will see this as an “emergency” situation. In turn the ECM will IGNORE the input from the Accelerator Pedal & request the ETC to close the throttle valve in the ETC unit.

- The Accelerator Pedal is applied (more than 1/3) and
- The Brake Pedal is applied (Stop Lamp switch closed, therefore Stop Lamps illuminated)

In this case, DTC's will **not** be logged & the Engine MIL will **not** be illuminated.

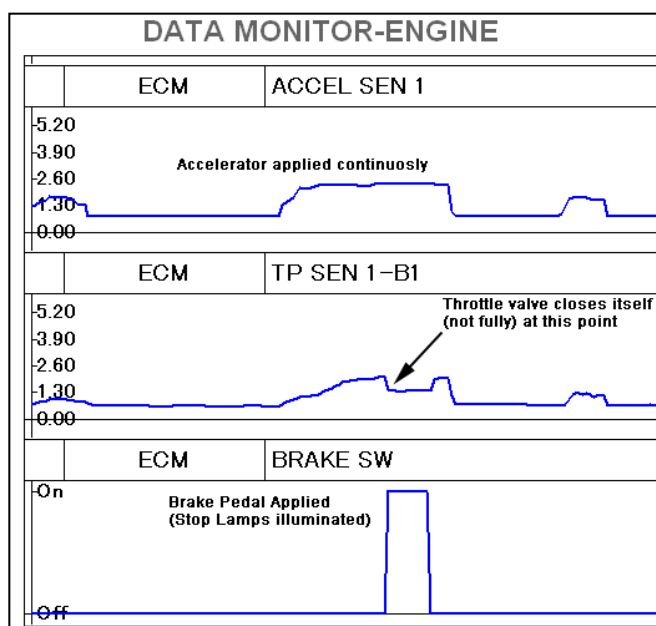
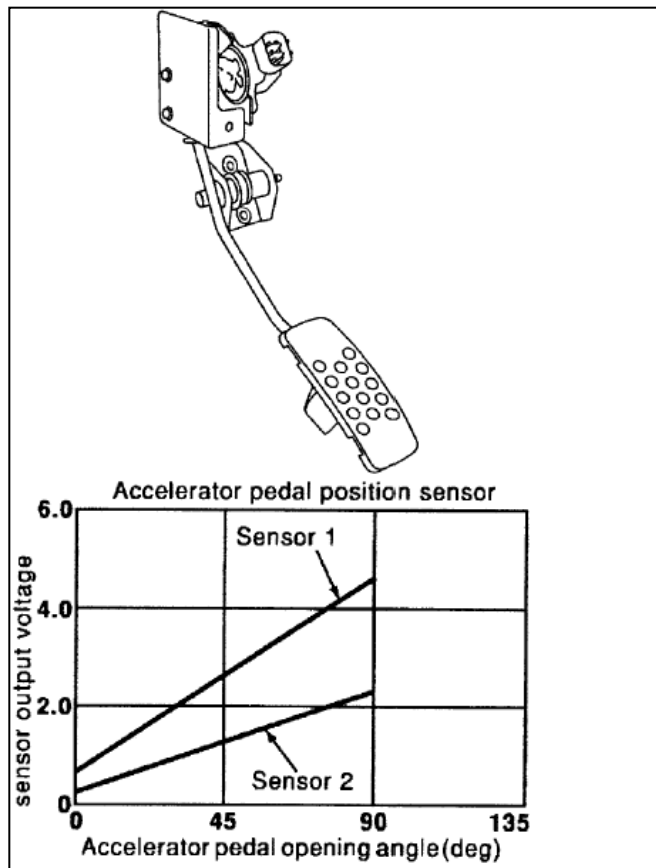
2. Short / Fault in Accelerator Pedal Sensor or Wiring

The APPS has 2 x sensors in it. If there was a fault with this dual track potentiometer (or associated wiring) in the Accelerator Pedal assembly, the fault would have to be such that the voltage signal output from Sensor no. 1 is exactly double that of the voltage signal out of Sensor no. 2. If these 2 voltage output conditions are **not** met, the ECM will place the ETC / Engine operation into failsafe mode.

In addition to this, if the voltage signal output from Sensor no. 1 reaches 5.0V (the reference voltage supplied by the ECM to the APPS is a total of 5.0V) the ECM will immediately recognise this as a fault & cancel ETC operation. (Even with the pedal pressed to the maximum position, the maximum voltage output from sensor no. 1 will be **less** than 5.0V, but more than 4.0V) The same condition would be applied if the voltage signal output from Sensor no. 2 reaches / exceeds 2.5V.

The 2 x sensors that form the Accelerator Pedal assembly are designed so that sensor 2 outputs exactly ½ the voltage of sensor 1 at any given time – and vice versa.

If the slightest discrepancy between the 2 sensors is seen by the ECM, ETC operation is cancelled. The appropriate DTC's will be logged in the ECM & the Engine MIL is illuminated.



The above screen shot from CONSULT III shows the ECM's response to the ON signal from the Brake Pedal. The Throttle Valve is partially closed with Brake ON.

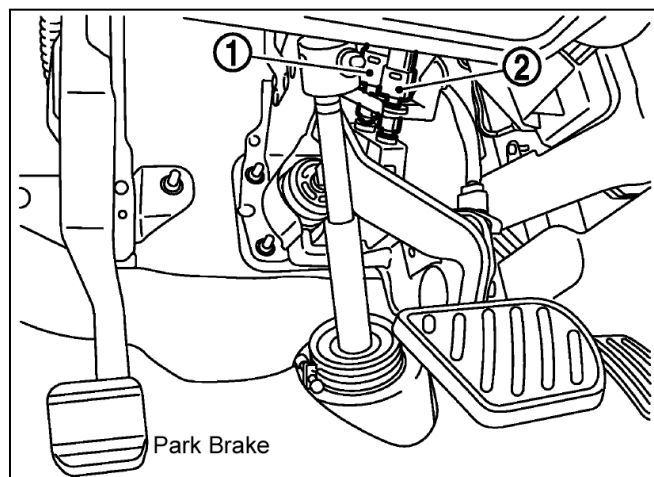


VK56VD ENGINE CONTROL

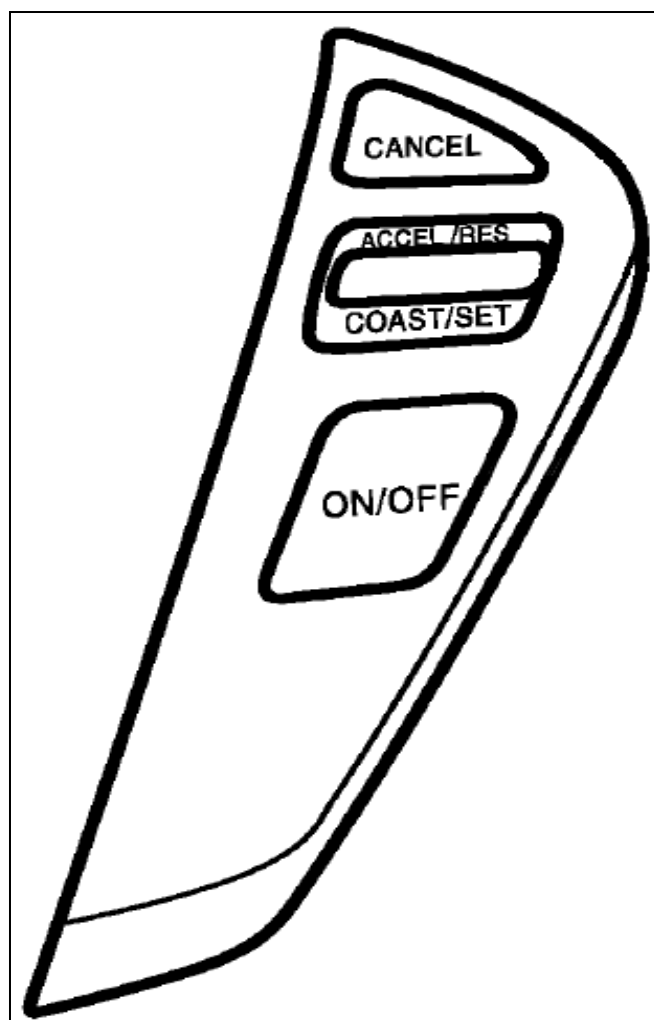
ASC / Brake Pedal Failsafe

Vehicles fitted with ASCD (Cruise Control) have mechanisms in place to avoid un-intended acceleration. Therefore ASCD is cancelled under the following situations;

- Application of the Brake Pedal. This will simultaneously operate 2 different switches;
 - The Stop Lamp Switch becomes **closed circuit**. Power is fed to the Brake Lights & a 12V signal is fed to the ECM as well.
 - The ASCD Brake Switch becomes **open circuit**. As a result the permanent 12V signal sent to the ECM is interrupted. (0V)
 - If **both** of the above mentioned switches send 12V to the ECM at the same time, or they **both** send 0V to the ECM at the same time, the ASCD will not operate. (a Stop Lamp related DTC may eventually be logged in the ECM)
- The Cancel button on the steering wheel is pressed
- More than 2 switches on the ASCD steering switch assembly are pressed at the same time (Set speed will also be cleared)
- Clutch pedal is depressed or gear position is changed to neutral position. (M/T models)
- Selector lever is in the N, P or R position (A/T models)
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed (such as climbing a steep hill etc.)
- TCS / VDC system is operated
- Ignition switch is turned to the OFF position.



1: Stop Lamp Switch
2: ASCD Brake Switch



SPECIAL NOTE REGARDING A BLINKING GREEN COLOURED CRUISE or SET LAMP CONDITION:

When the ECM detects any of the following conditions, cruise control operation is cancelled and the green coloured CRUISE or SET lamp will blink;

- If the Engine coolant temperature is slightly higher than the normal operating temperature, the GREEN CRUISE lamp may blink slowly. (But DTC's may not be logged unless the temperature becomes excessive)
- If a malfunction with one of the inputs for ASCD control occurs, the CRUISE or SET lamp will blink quickly. DTC's will be logged.



AUTOMATIC TRANSMISSION

7sp E-A/T – RE7R01B

An all new 7 speed Electronically controlled Automatic Transmission produced by JATCO has been applied to the new Y62.

This transmission is the same as the unit fitted to V9X equipped R51 & D40. Also, it is very similar to the RE7R01A transmission fitted to the current model Z34 370Z.

General Specification

Engine models		VK56VD
Transmission model code number		1.93 : 1
Stall torque ratio		2.03 : 1
Transmission gear ratio	1st	4.887
	2nd	3.170
	3rd	2.027
	4th	1.412
	5th	1.000
	6th	0.864
	7th	0.775
	Reverse	4.041
Recommended fluid		Genuine NISSAN Matic S ATF
Fluid capacity		10.0L



SPECIAL PRECAUTIONS

- **ONLY USE GENUINE NISSAN MATIC S TRANSMISSION FLUID IN THIS TRANSMISSION.**
- Do **not** use any other fluid in this transmission such as NISSAN MATIC J or other Non Nissan brand of fluids.
- Do **not** Blend or mix Matic S fluid with any other Automatic Transmission Fluid (Including Matic J).
- Do **not** reuse transmission fluid once it has been drained.
- The Fluid level inspection as well as the replacement of the fluid will require a special process to be followed. Strictly adhere to the process outlined in this Training Manual or the ESM.

SPECIAL NOTE REGARDING ANY TRANSMISSION REPAIRS:

- Do **not** attempt to disassemble the Transmission unless the directed to do so by TechLine. If the ESM directs you to replace the transmission – CONTACT TECHLINE 1ST.



AUTOMATIC TRANSMISSION

Adaptive Shift Control (ASC)

The Transmission is able to automatically select the appropriate shift pattern suitable for the various situations (such as road environment and driving style) so as to allow the vehicle to be driven efficiently and smoothly.

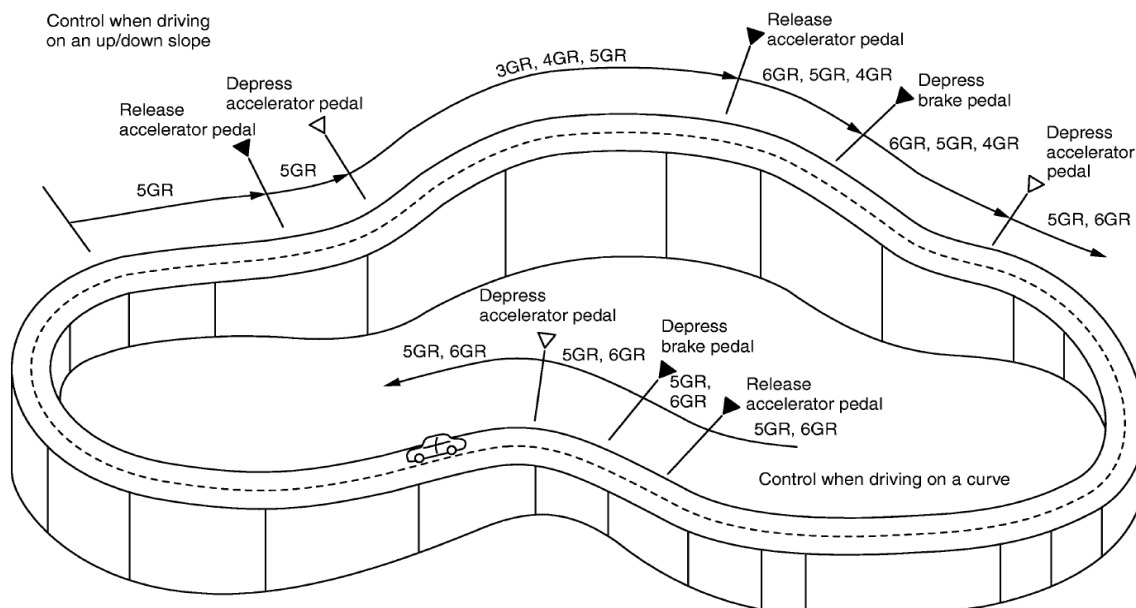
When driving up / down a slope

The ASC judges the degree of slope (up/down) according to engine torque data transmitted from the ECM and vehicle speed.

Fixing at 4GR, 5GR or 6GR on an up-slope prevents shift hunting and controls the vehicle to gain optimum driving force. On a down-slope, shift-down to 4GR, 5GR or 6GR occurs automatically so that optimum engine braking is utilised.

When driving on a curve

TCM receives the side G sensor signal from the ABS actuator and electric unit (control unit). It locks to 4GR, 5GR or 6GR position in moderate cornering or to 3GR position in sharp cornering based on this signal. This prevents any up shift and kick-down during cornering, maintaining smooth vehicle travel.



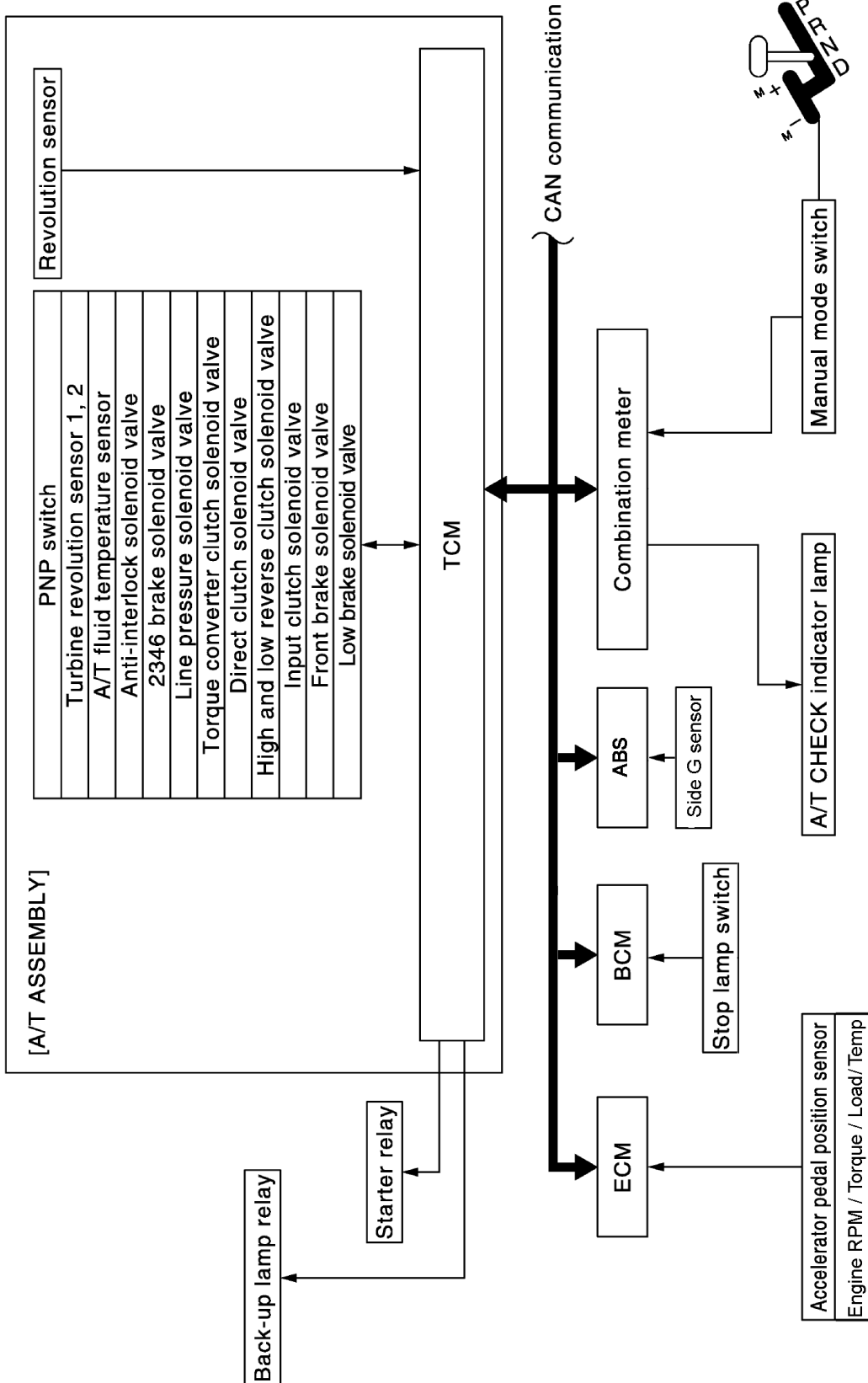
'M' Mode

From the gear lever position described above (moved to the left in 'Ds' mode) a simple movement forward '+' or movement rearward '-' will change the Transmission into 'M' Mode (Manual). The transmission will remain in the one gear & up-shifts / downshifts will only occur when the gear lever is moved towards the '+' or the '-'.

The TCM receives the manual mode signal, non-manual mode signal, manual shift up signal and Manual shift down signal from combination meter via CAN. The TCM controls the shift pattern of the manual mode and then shifts the A/T by operating each solenoid valve according to the shift operation of the driver.



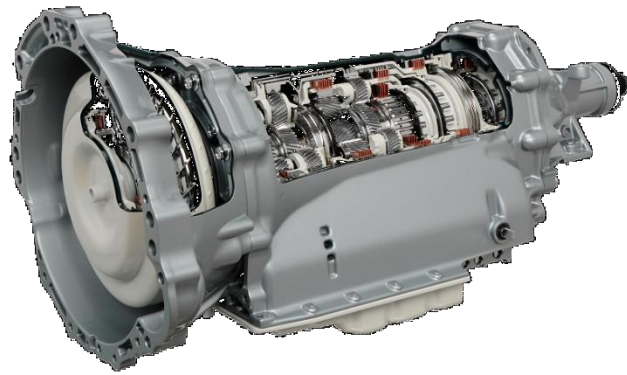
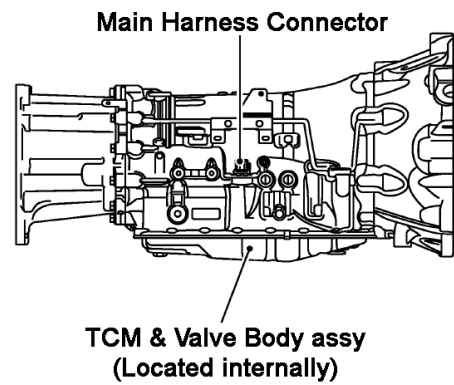
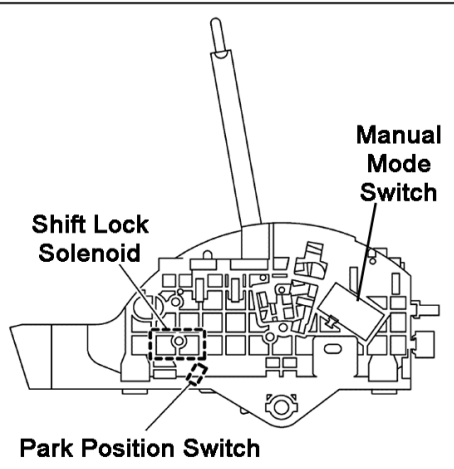
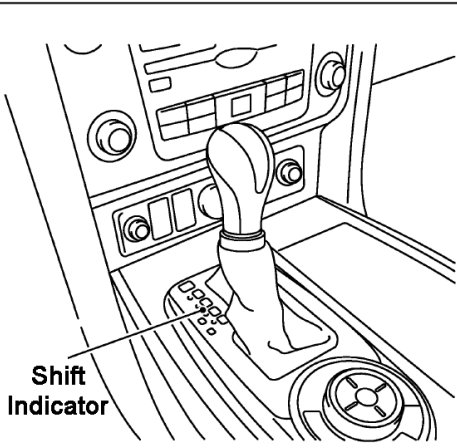
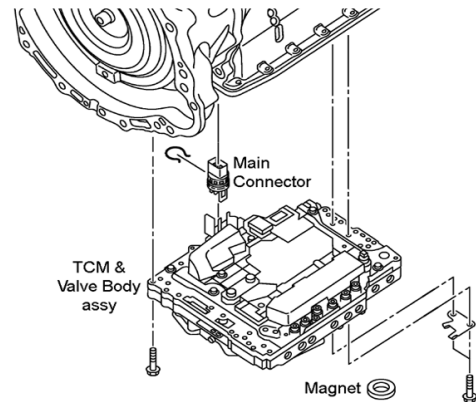
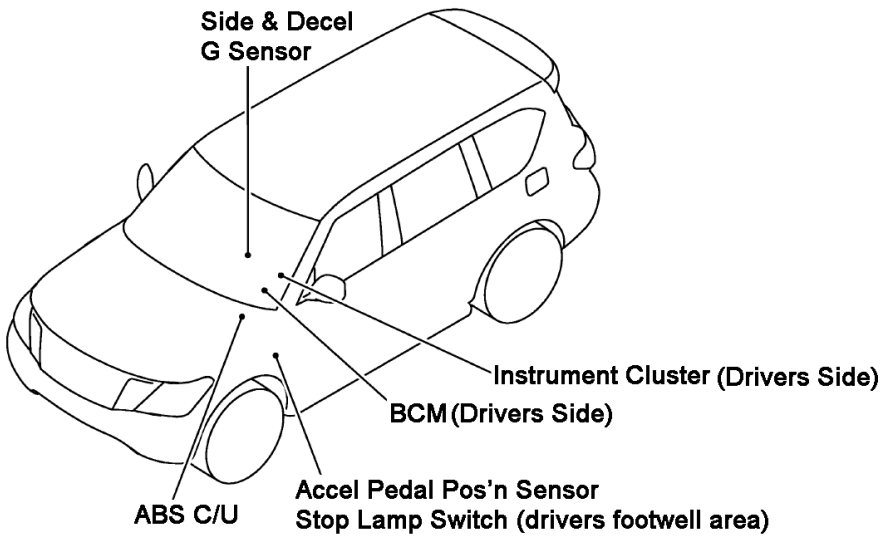
AUTOMATIC TRANSMISSION





AUTOMATIC TRANSMISSION

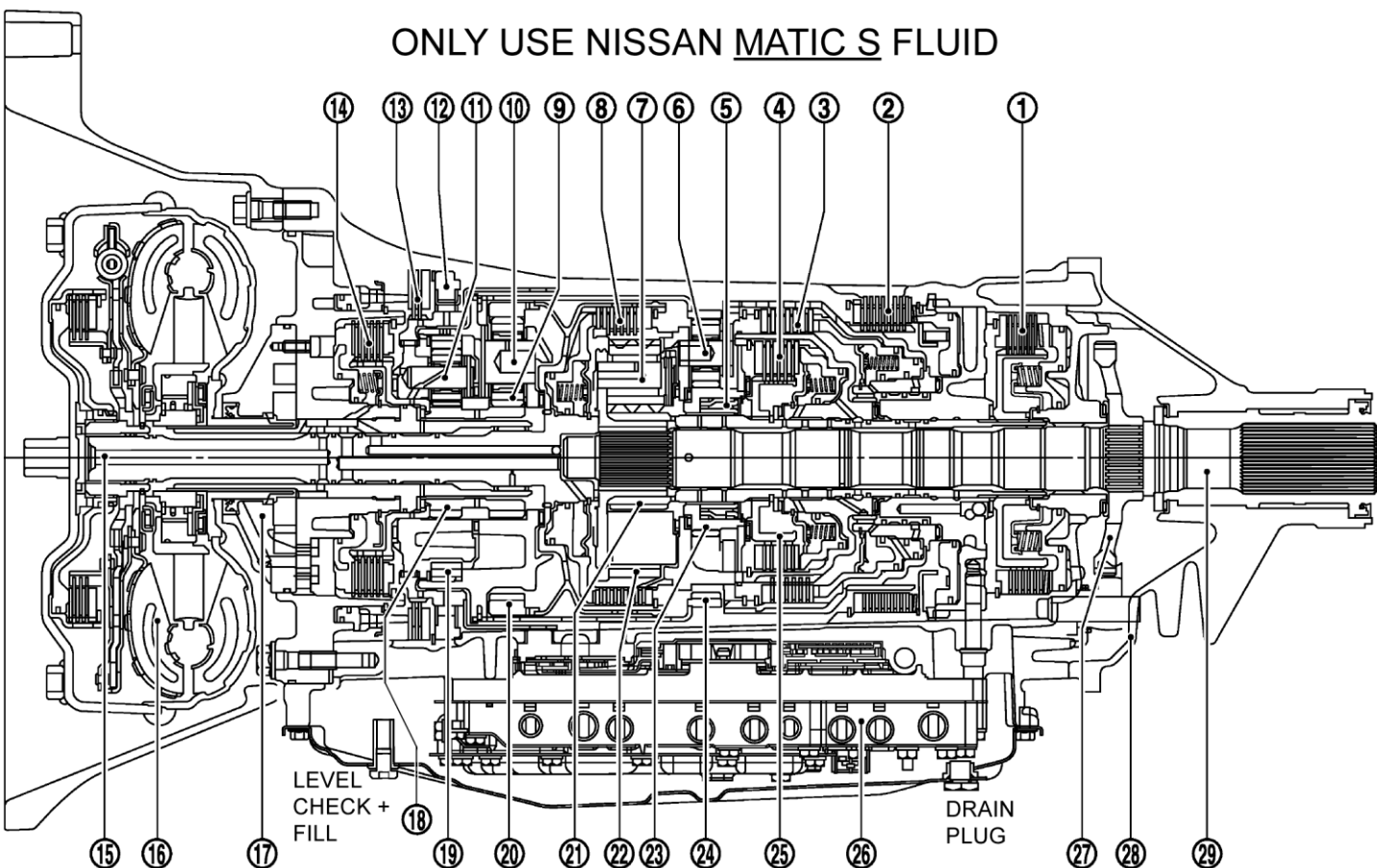
RE7R01B Component Location





AUTOMATIC TRANSMISSION

ONLY USE NISSAN MATIC S FLUID



- | | | |
|---|---------------------------------------|--|
| 1. Low brake | 2. Reverse brake | 3. Direct clutch |
| 4. High and low reverse clutch | 5. 2nd one-way clutch | 6.* ¹ Rear carrier |
| 7. Mid carrier | 8. Input clutch | 9.* ² Front sun gear |
| 10.* ³ Front carrier | 11. Under drive carrier | 12. 1st one-way clutch |
| 13. Front brake | 14. 2346 brake | 15.* ⁴ Input shaft |
| 16. Torque converter | 17. Oil pump | 18.* ² Under drive sun gear |
| 19.* ³ Under drive internal gear | 20.* ⁴ Front internal gear | 21. Mid sun gear |
| 22.* ¹ Mid internal gear | 23. Rear sun gear | 24. Rear internal gear |
| 25. High and low reverse clutch hub | 26. Control valve with TCM | 27. Parking gear |
| 28. Rear extension | 29. Output shaft | |

*1: 6 and 22 are one unit.

*3: 10 and 19 are one unit.

*2: 9 and 18 are one unit.

*4: 15 and 20 are one unit.

RE7R01B



AUTOMATIC TRANSMISSION

A/T Fluid Level Check

1. Check for A/T fluid leakage. Ensure that there are no leaks & if a leak is detected – confirm what fluid it is that appears to be leaking.

2. Park vehicle on level surface and set parking brake.

3. Start engine.

4. Move selector lever through each gear position & then return the gear lever to the “P” position.

5. Ensure that the A/T fluid temperature is **exactly 40°C**.

- Connect CONSULT-III
- Select “TRANSMISSION”
- Select “DATA MONITOR”.
- Read out the value of “ATF TEMP SE 1”.
- A/T fluid temperature reaches 30°C in approximately five minutes after idling and 40°C after approximately ten minutes of idling. The level checking operation must be performed quickly.

6. Remove Fill plug. (Plug towards front of vehicle)

7. Check A/T fluid level as follows;

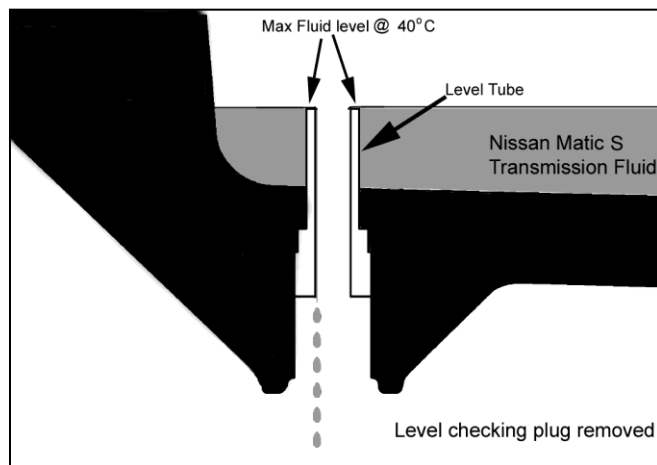
- If ATF overflows from the drain hole, adjust A/T fluid level to the correct level by allowing the fluid to continue draining until the fluid is slowly dripping.
- If ATF does not overflow from the drain hole & fluid is not consistently dripping, more fluid will need to be added. Refer to the Changing Fluid instructions for information on how to add fluid.

WARNING

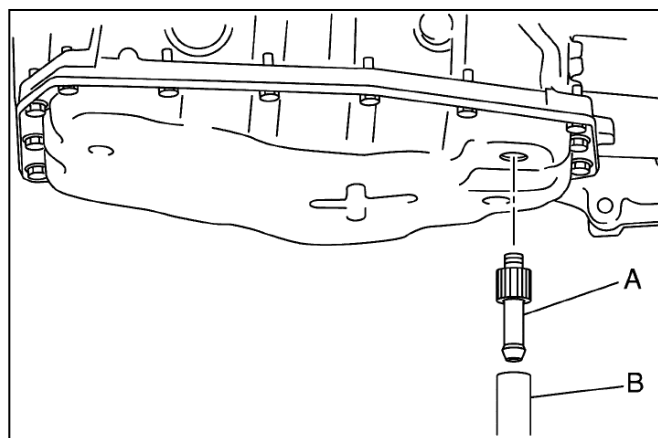
This operation must be carried out with the fluid temp set at **40°C**

- If the fluid is too **COLD** at the time – the level will appear to be too **LOW**.
- If the fluid is too **HOT** at the time – the fluid level will appear to be too **HIGH**.

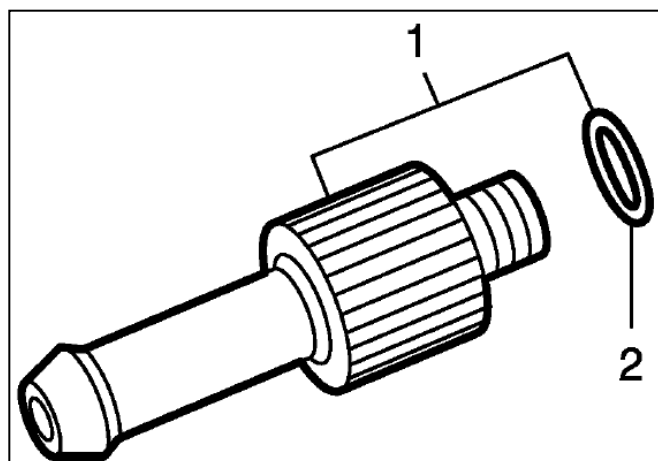
For additional detail, refer to ESM section;
> D TRANSMISSION & DRIVELINE > TM Transmission > BASIC INSPECTION



Engine must be idling in P whilst checking fluid level



A: SST # 310811EA5A
B: Fluid Charging Hose / Pipe



SST # 310811EA5A & 315268E000 (O-ring)



AUTOMATIC TRANSMISSION

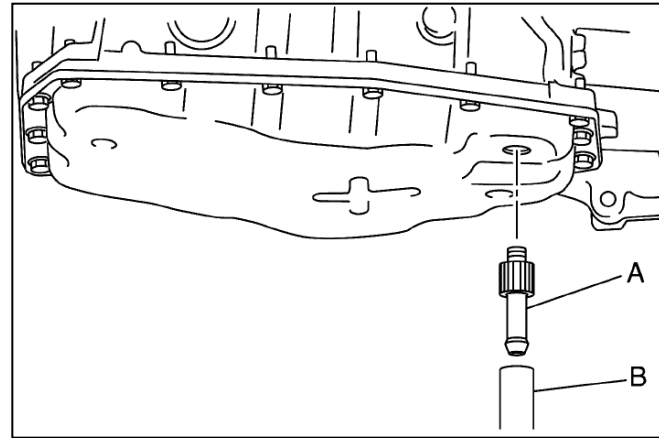
A/T Fluid Changing

1. Warm up ATF by running the engine & then stop the engine.
2. Remove drain plug & drain fluid & the re-fit drain plug. (Plug towards rear of vehicle. Not shown)
3. Remove Fill plug. (Plug towards front of vehicle)
4. Inject ATF via the fill tube hole located in the transmission pan.
5. Refer to the “Fluid Level Check” (previous page) to ensure that the level is correct. Ensure to warm the transmission up to **40°C**. Use CONSULT III to confirm.

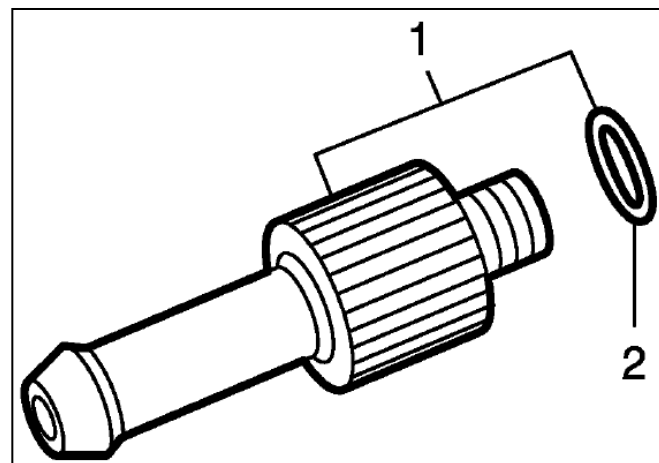
NOTES:

- If whole quantity of ATF has been discharged, add 500ml of ATF to total fluid capacity and inject the whole amount via the fill tube in the base of the pan.
- Since the ATF in the A/T assembly cannot be fully drained in a single operation, the steps (from 3 to 5) may need to be performed up to 3 times or so.
- Replace O-ring of the filler plug with a new one. Apply ATF to O-rings. Replace the drain plug gasket as well.
- If the special procedure for Checking the A/T Fluid is not followed then the risk of over filling the transmission can occur. Fluid leakage will occur if the Transmission is overfilled.
- It will **not** be necessary to replace the Transmission Fluid Filter when changing the A/T fluid. The filter is **not** available as a separate part, it comes complete with the Control Valve (valve body) assembly.
- Only use **Nissan Matic S** Transmission Fluid

For additional detail, refer to ESM section;
> D TRANSMISSION & DRIVELINE > TM Transmission > BASIC INSPECTION



A: SST # 310811EA5A
B: Fluid Charging Hose / Pipe



SST # 310811EA5A & 315268E000 (O-ring)



AUTOMATIC TRANSMISSION

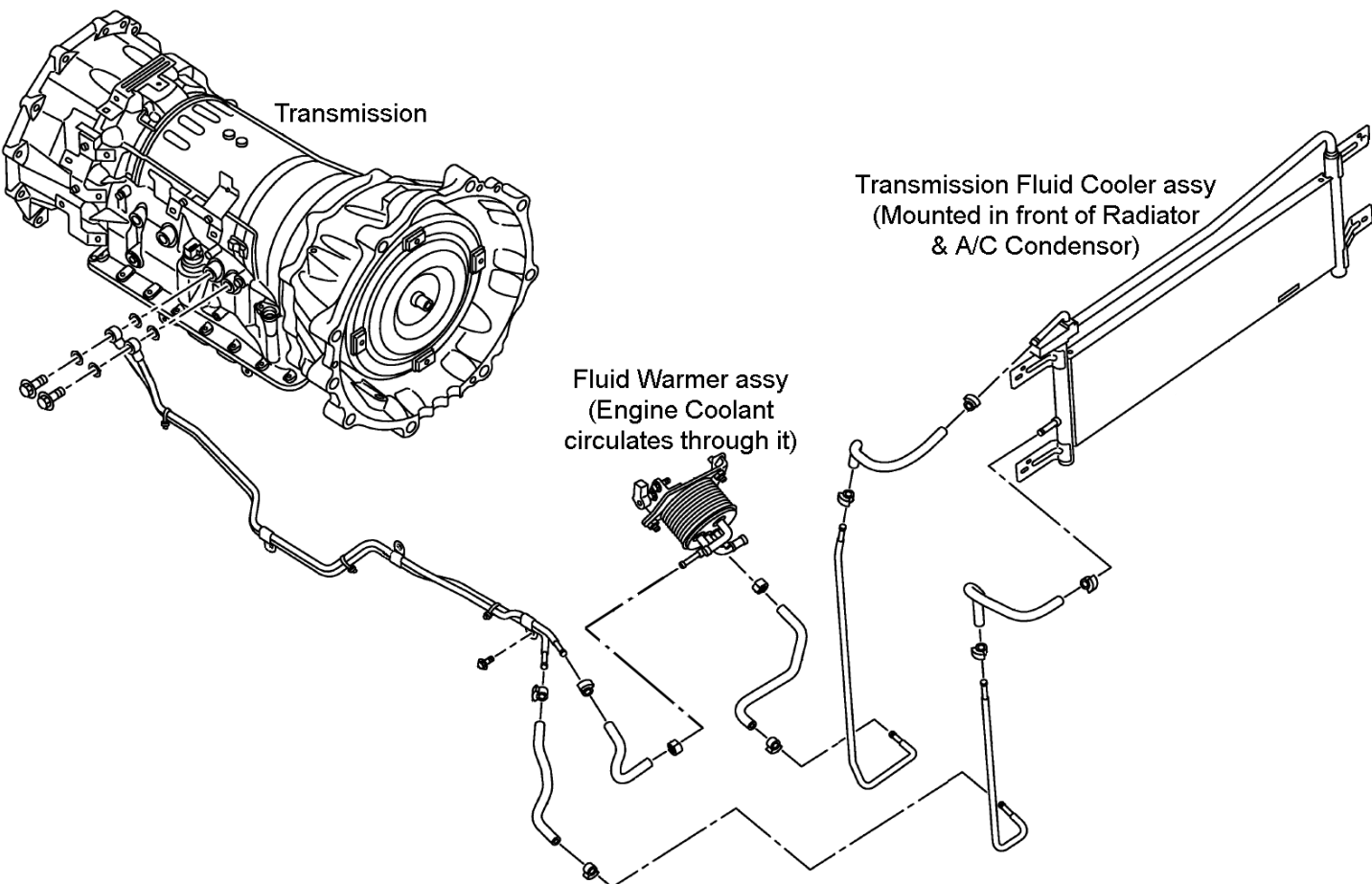
A/T Fluid Cooling Arrangement

The A/T fluid cooler system is unique from other Nissan models. The A/T fluid cooler is an air-cooling type only & it is installed in the front of the radiator and condenser.

Also – the fluid passes through a Fluid Warmer device. Engine coolant circulates through this assembly which in turn assist with warming up the A/T fluid at the earliest opportunity.

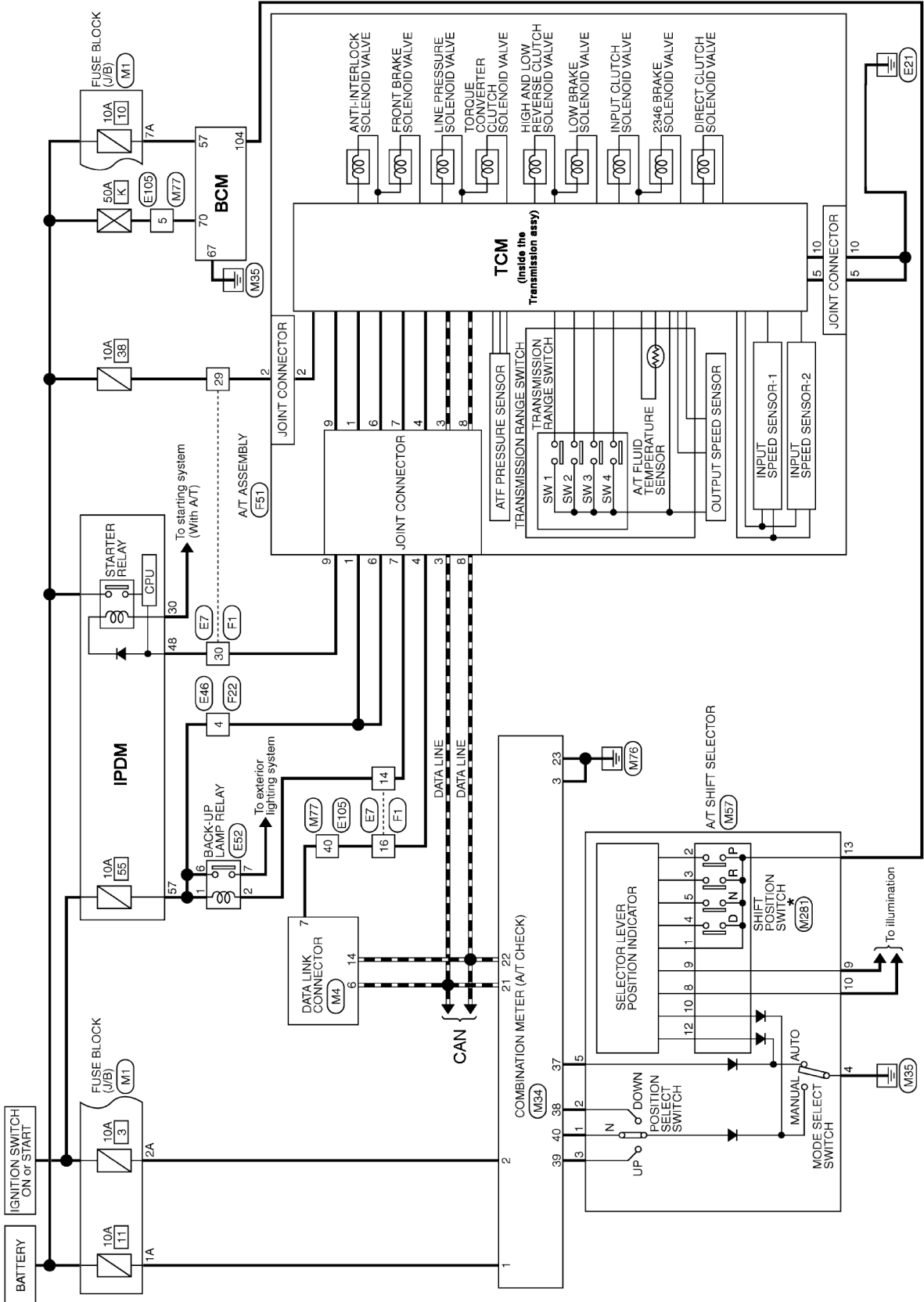
NOTE:

AT fluid is **not** circulated through a cooler in the bottom Radiator tank like other Nissan models.





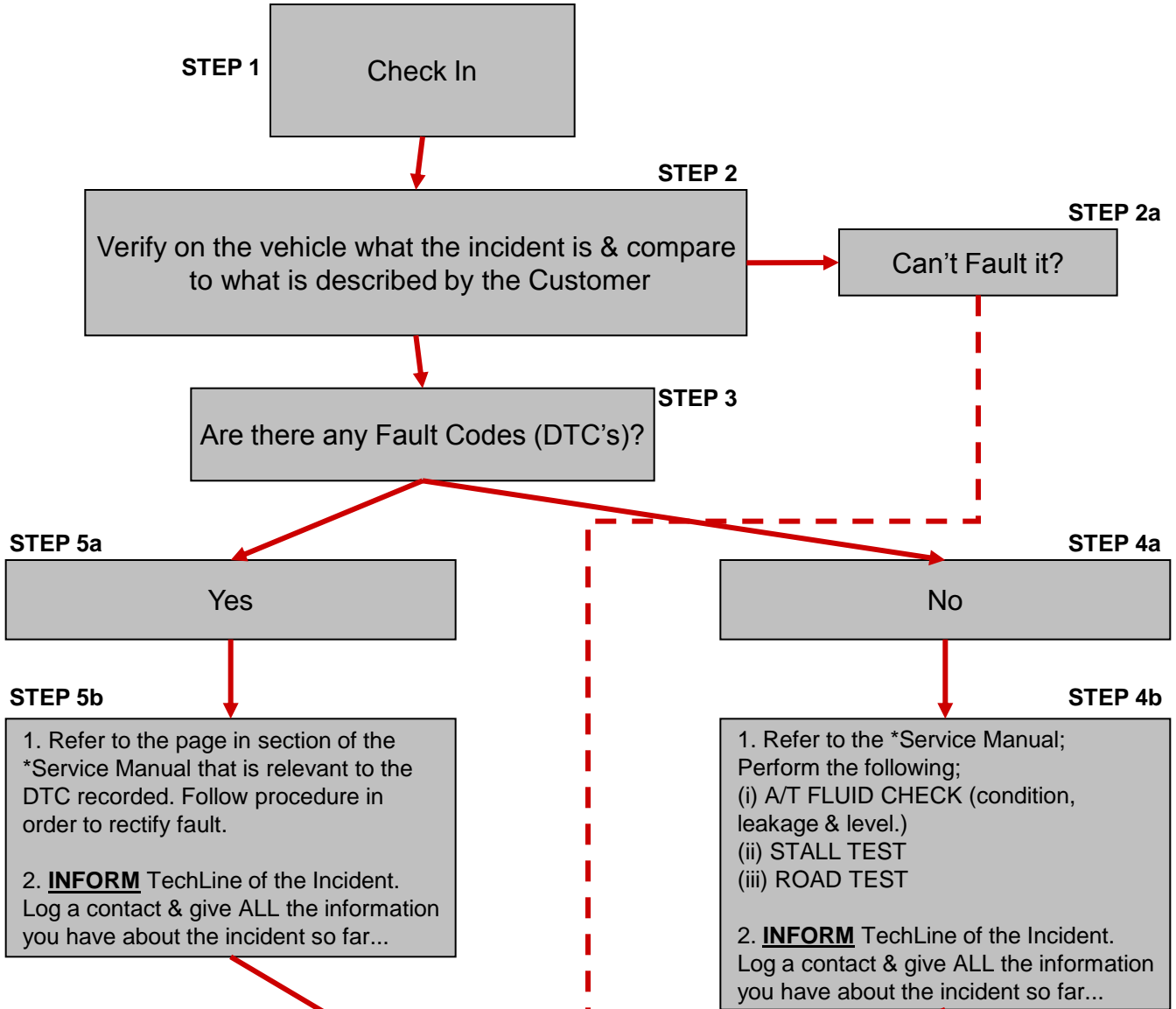
AUTOMATIC TRANSMISSION





RE7R01B Transmission Trouble Diagnosis

Basic Work Flow Chart



* ESM Reference;
> D TRANSMISSION & DRIVELINE >
TM Transmission > DTC/CIRCUIT
DIAGNOSIS

* ESM Reference;
> D TRANSMISSION & DRIVELINE >
TM Transmission > BASIC
INSPECTION

STEP 6

PRIOR TO COMPLETION OF REPAIR AND HANDING BACK TO THE CUSTOMER

1. Always carry out the below checks as follows;
 - (i) A/T FLUID CHECK (condition, leakage & level.)
 - (ii) CHECK / CLEAN GROUND F7
 - (iii) STALL TEST
 - (iv) ROAD TEST
 - (v) FINAL DTC CHECK WITH CONSULT III
2. **PLEASE UPDATE** the TechLine contact



Automatic Transmission Fluid

Transmission				
FLUID TYPE	3 & 4sp A/T's. *4x4 Transfers K11-K12 Micra, All Pulsar, All Tiida, T30 X-TRAIL, All Maxima to end 05MY, All Patrol except TB48.	5sp A/T RWD (RE5R05A) 6sp A/T FWD (RE6F01A) Patrol TB48, 350Z, R51 Pathfinder D40 Navara T31 X-TRAIL Diesel	New CVT (RE0F09A/10A) 06~08MY J31+J32 Maxima Z50+Z51 Murano T31 X-TRAIL Petrol J10 Dualis	7sp A/T RWD (RE7R01A/B) Z34 370Z, R51 / D40 V9X & 10MY> YD25 Y62 Patrol 4sp A/T FWD (RE4F03C) K13 Micra N17 Almera
MATIC D	YES	NEVER	NEVER	NEVER
MATIC J	NEVER	YES	NEVER	NEVER
NS-2	NEVER	NEVER	YES	NEVER
MATIC S	NEVER	NEVER	NEVER	YES

* Use Matic D in Part Time / All-mode Transfer units on Y61, D22, D40, R50 & R51. Do NOT use Matic D however in R51 V9X. Only use Gen. Oil KLD22-00001.

GL-5 Gear Oil must be used in the Transfer unit attached to the Transaxle unit on "AWD only" type systems fitted to T30, Z50, Z51, T31 & J10. These models do not have a "4Lo" function. The transfer (electric) coupling unit attached to the Rear Final Drive is a sealed unit.



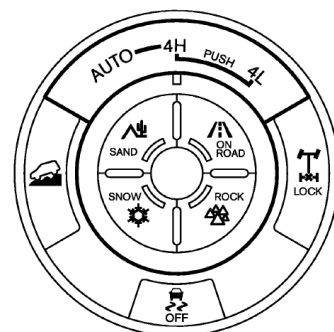
TRANSFER

ATX90A

An all new Transfer unit has been applied to Y62 variants. This is the same unit that is fitted to R51 Pathfinder Ti 550 (V9X engine)

General Specifications

Applied model	4WD	
	Y62 with the VK56VD engine	
	A/T	
Transfer model	ATX90A	
Fluid capacity (Approx.)	1.5 L Genuine Nissan Oil only (Part # KLD22-00001)	
Gear ratio	4H	1.000:1
	4L	2.679:1



SPECIAL PRECAUTIONS

- **ONLY USE GENUINE NISSAN TRANSFER OIL (Nissan Part #: KLD22-00001)**
- Do **not** use any other fluid or oil in this transmission such as Matic D or other Non Nissan brand of oils / fluids.
- Do **not** reuse the Transfer Oil once it has been drained.
- Do **not** ever replace the Transfer Oil as part of a service. The oil level inspection should be carried out periodically.
- If for any reason the Transfer Oil needs to be drained & then replaced, special procedures using CONSULT III plus need to be carried out.
- If any major components of the Transfer system need to be replaced (or swapped) etc., special procedures using CONSULT III plus need to be carried out.
- Replace all tyres at the same time. Always use tires of the proper size and the same brand / tread pattern. Fitting improper sized and unusually worn tyres applies excessive force to vehicle drive mechanism and can cause longitudinal vibration.

SPECIAL NOTE REGARDING ANY TRANSFER REPAIRS:

- It is **not** possible to overhaul the transfer unit. Do **not** disassemble it. If the ESM directs you to replace the transfer – **contact TechLine** 1st.



TRANSFER

4WD Shift Switch / 4WD Shift Indicator Operation

4WD Shift Switch	Wheels Driven	4WD Shift Indicator		Conditions of Use	4WD Shift Procedure
		Type A	Type B		
 AUTO	Rear wheels or 4 wheels	AUTO		For driving on paved or slippery roads	Move the 4WD shift switch between AUTO and 4H. The 4WD shift indicator light will indicate that the transfer shift position is engaged. • IT IS NOT NECESSARY TO SHIFT THE TRANSMISSION SELECTOR LEVER TO THE "N" (NEUTRAL) POSITION IN THIS OPERATION. • PERFORM THIS OPERATION WHEN DRIVING STRAIGHT.
 4H	4 wheels	▲ 4HI		For driving on rocky, sandy or snow-covered roads	<ol style="list-style-type: none"> 1. Stop the vehicle. 2. Shift the transmission selector/shift lever to the "N" (Neutral) position. 3. Depress and turn the 4WD shift switch between 4H and 4L with the foot brake pedal depressed. <p>YOU CANNOT MOVE THE 4WD SHIFT SWITCH BETWEEN 4H AND 4L UNLESS YOU FIRST STOP THE VEHICLE, DEPRESS THE FOOT BRAKE PEDAL AND SHIFT THE TRANSMISSION SELECTOR LEVER TO THE "N" (NEUTRAL) POSITION. THEN DEPRESS AND TURN THE 4WD SHIFT SWITCH BETWEEN 4H AND 4L. (*3)</p>
 Neutral	Neutral	▼ 4LO ▲ 4HI (flashing) (*1)	 4LO (4LO flashing) (*1)	Neutral disengages the automatic transmission mechanical parking lock, which will allow the vehicle to roll. Do not leave the transfer shift position in Neutral. (*2)	
 4L	4 wheels	▼ 4LO (4LO illuminated)	 4LO (4LO illuminated)	For use when the maximum power and traction is required (for example, on steep grades or rocky, sandy or muddy roads).	

4WD Warning Lamp Operation (Orange coloured '4WD' light on the instrument cluster)

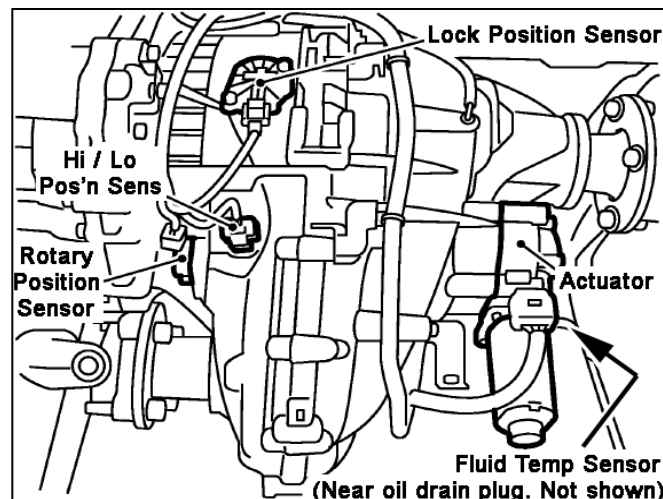
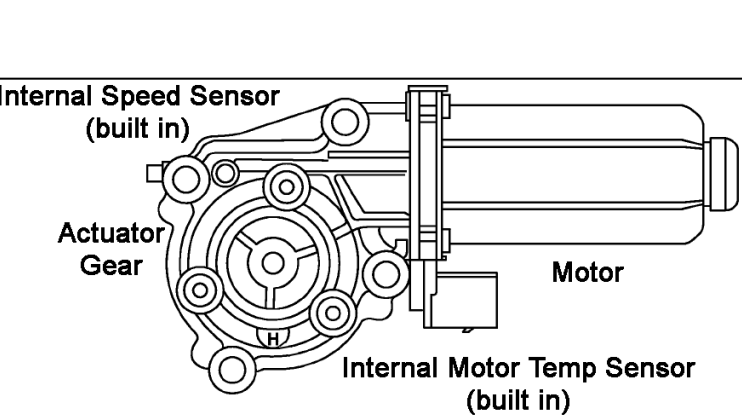
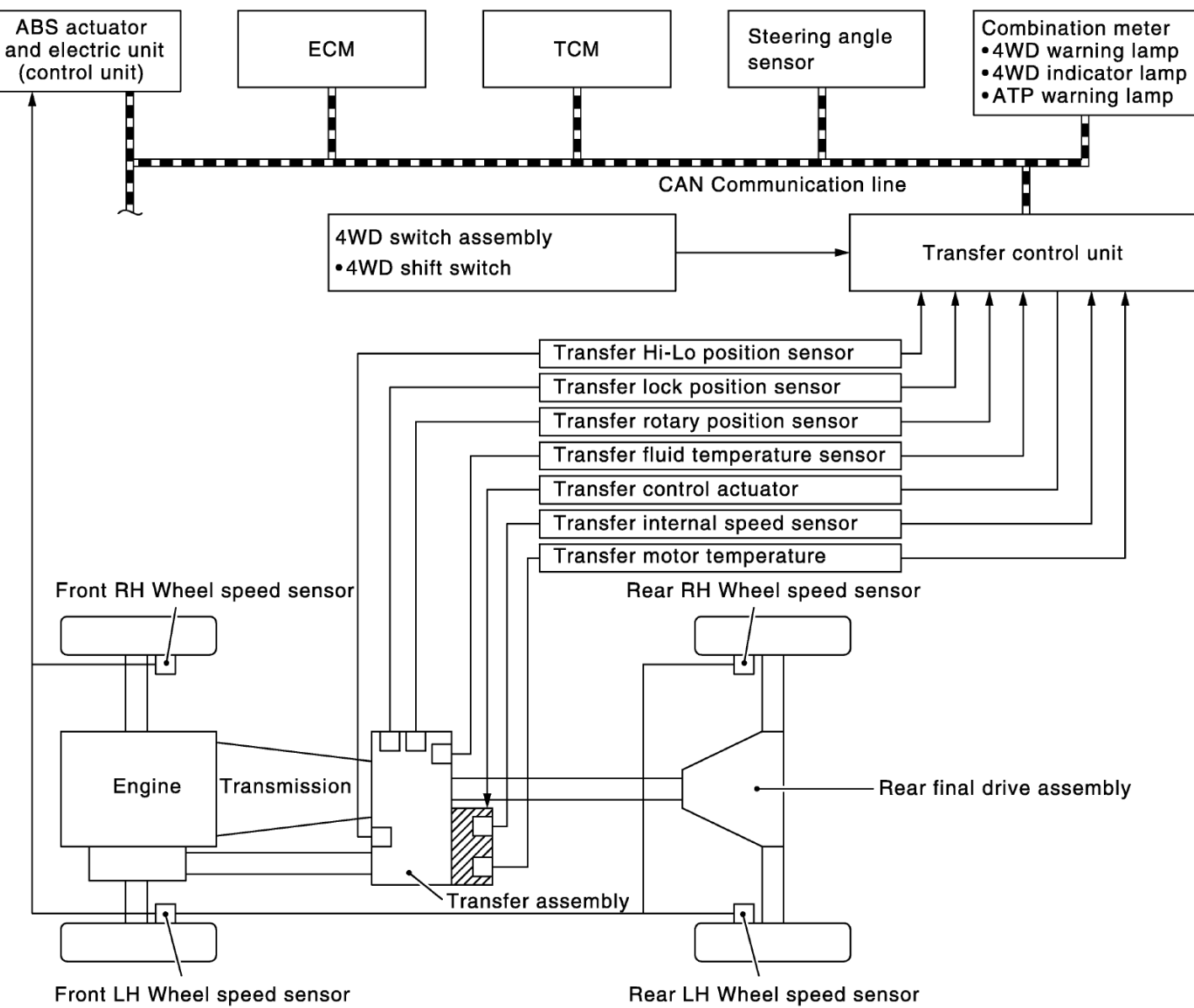
Condition	4WD warning lamp
Lamp check	Turns ON when ignition switch is turned ON. Turns OFF approx. 1 second after the engine start.
4WD system malfunction	ON
Protection function is activated due to heavy load to transfer assembly. (4WD system is not malfunctioning.)	Quick blinking: 2 times/second (Blinking in approx. 1 minute and then turning OFF)
Large difference in diameter of front/rear tires	Slow blinking: 1 time/2 seconds (Continuing to blink until turning ignition switch OFF)
Other than above (system normal)	OFF

4WD Warning Buzzer Operation (Sound emits from the Transfer Control Unit which is located under the dash)

Condition			Warning buzzer
4WD shift status	A/T shift selector	Engine speed	
4H↔4L	N range	350 – 1600 rpm	OFF
		Under 350 rpm or over 1600 rpm	ON
	Except N range	Always	



TRANSFER





TRANSFER

4WD Mode Selection System

The 4WD Mode selection system is an all new feature for Nissan 4x4 vehicles. The system allows the driver to select a vehicle control strategy that better suits the type of driving environments the vehicle is subject to.

Regardless of which 4WD position the 4WD Shift Dial is in (Auto, 4H or 4Lo), any of the 4WD Modes can be selected at any time.

In basic terms, each of the modes will send a signal to the Engine & ABS Control Units when the corresponding button is pressed. In turn the;

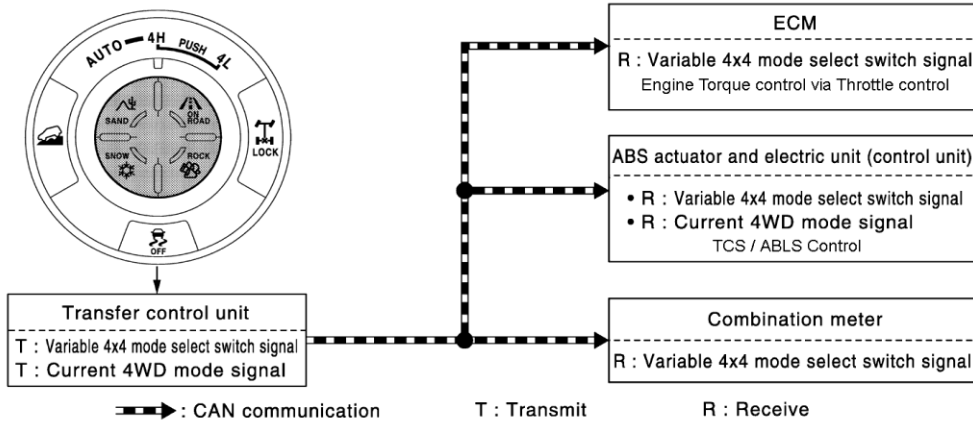
- Engine Control Unit will modify the engine torque (via control of the Electric Throttle) for the given condition (torque is reduced in Snow Ice conditions etc.)
- ABS C/U will apply the most appropriate TCS / ABLs strategy for any of the given conditions.

Variable 4x4 mode select switch	LCD Display		Operation of Variable 4WD Mode Select Switch	Use / Condition
<p>ON ROAD</p>			Switching can be done while driving in any 4WD mode. The indicator changes when the mode is changed	For Driving on Paved or Slippery roads
<p>ROCK</p>				For Driving on Deep Rutted Gravel, Moguls or Rocky Roads
<p>SNOW</p>				For Driving on Snow covered or Icy roads
<p>SAND</p>				For driving on Sandy roads or Sand Dunes



TRANSFER

4WD Mode Selection System



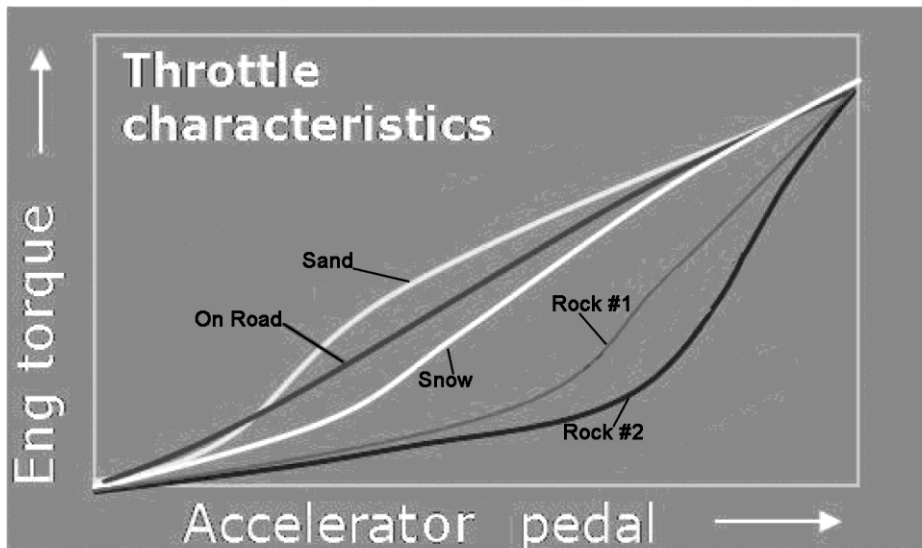
T/F Mode*	Rear Diff. Lock*	4WD Mode SW	Driving scene	VDC**	TCS**	ABLS	Engine throttle
AUTO & 4H	AUTO: N/A	On road	Daily use	Normal	Normal	Normal	Normal
		Snow	Normal snow	Normal	Normal	Normal	Snow
	4H: Available	Sand	Normal sand	Normal	Sand	Normal	Sand
		Rock	Small rocks	Normal	Normal	Normal	Rock#1
4L	Available	On road	Trailer towing	Off	Off	Off-road	Snow
		Snow	Severe snow (easy to get stuck)	Off	Off	Off-road	Rock#1
		Sand	Severe sand (easy to get stuck)	Off	Off	Normal	Snow
		Rock	Big rocks, bumps	Off	Off	Off-road	Rock#2

*Selectable at any 4WD mode

**VDC / TCS are automatically OFF when the rear differential is locked.

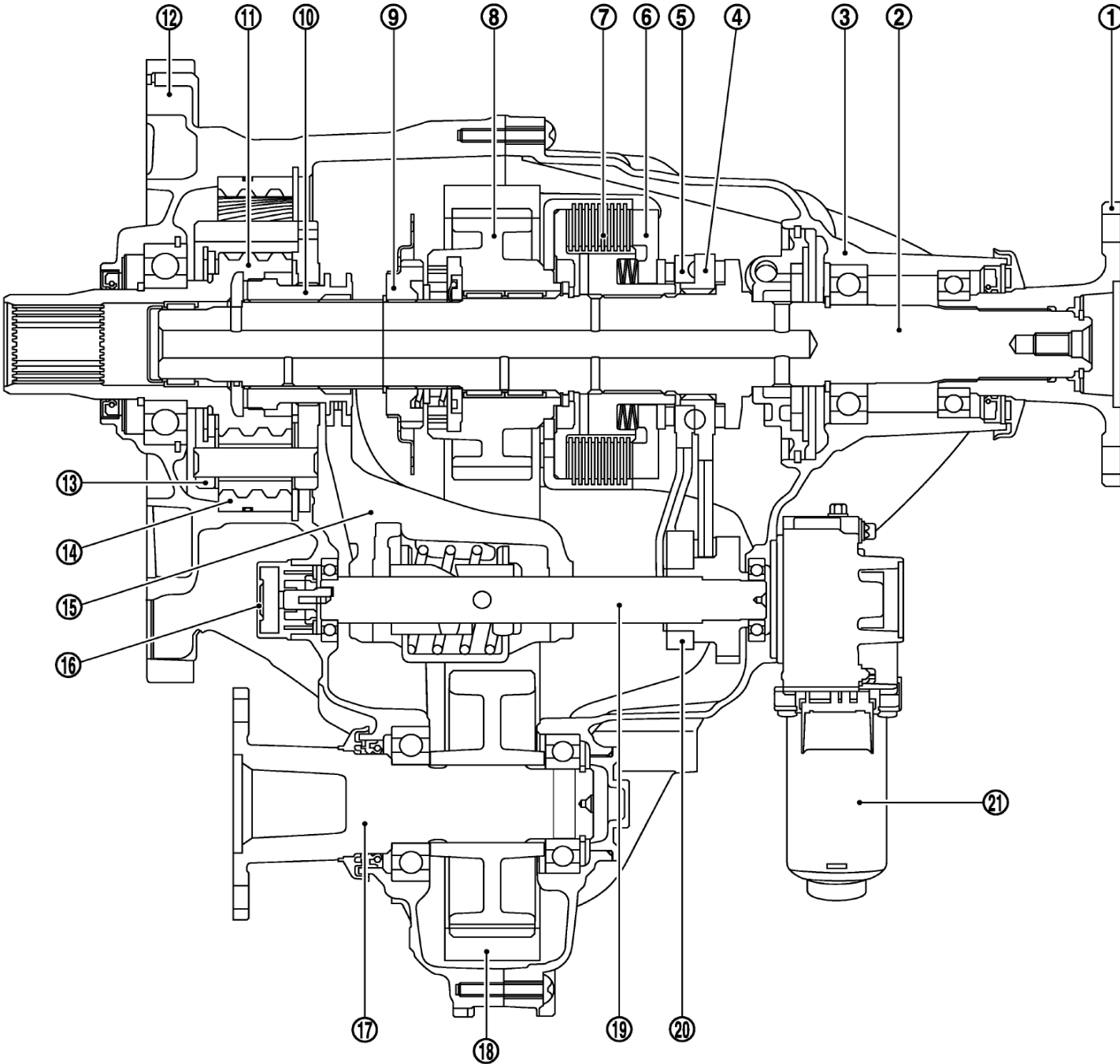
Rock # 1 difference vs Rock # 2 difference is automatically detected via wheel slip behaviour

When 4L is selected, a "low engine torque" throttle strategy is automatically applied





TRANSFER

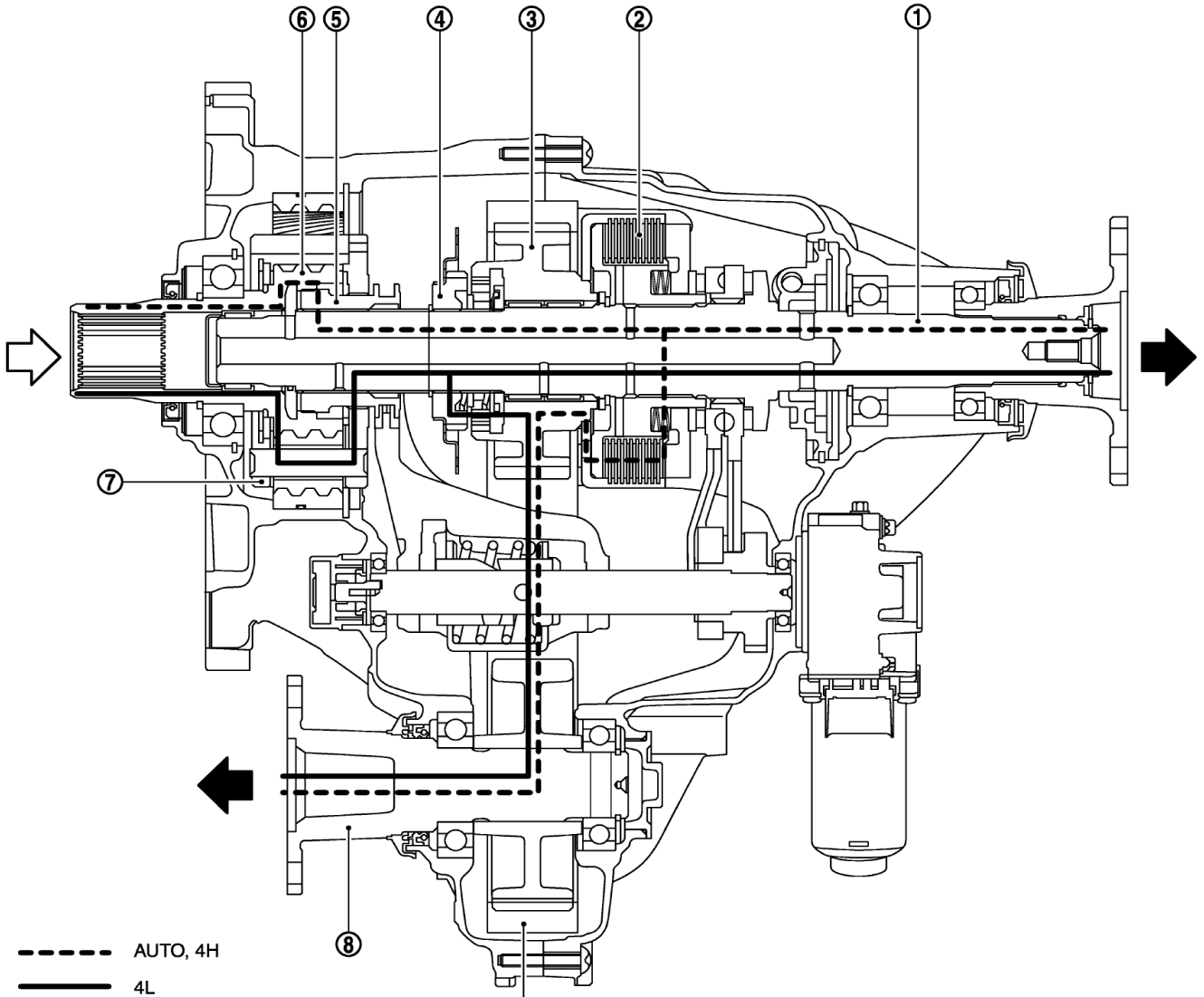


- | | | |
|-------------------------------------|------------------------|-------------------------------|
| 1. Rear companion flange | 2. Main shaft | 3. Rear case |
| 4. Ball ramp lever | 5. Ball ramp lever | 6. Piston |
| 7. Clutch | 8. Sprocket | 9. Lock sleeve |
| 10. Hi-Lo sleeve | 11. Sun gear | 12. Front case |
| 13. Planetary carrier assembly | 14. Internal gear | 15. Shift fork |
| 16. Transfer rotary position sensor | 17. Front shaft flange | 18. Drive chain |
| 19. Actuator shaft | 20. Cam | 21. Transfer control actuator |



TRANSFER

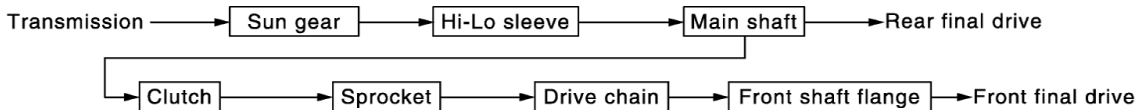
4WD Transfer Power Flow Diagram



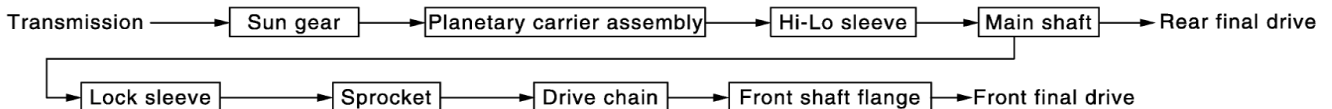
--- AUTO, 4H
— 4L

- | | | |
|-------------------------------|-----------------------|----------------|
| 1. Main shaft | 2. Clutch | 3. Sprocket |
| 4. Lock sleeve | 5. Hi-Lo sleeve | 6. Sun gear |
| 7. Planetary carrier assembly | 8. Front shaft flange | 9. Drive chain |

AUTO, 4H



4L





TRANSFER

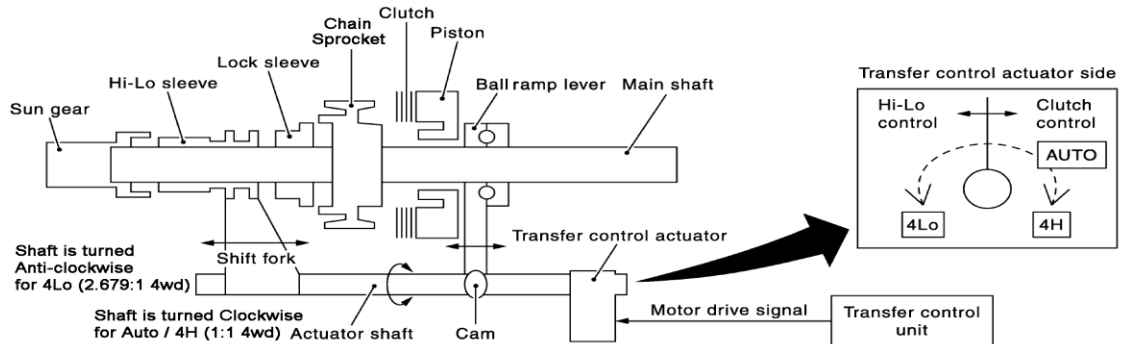
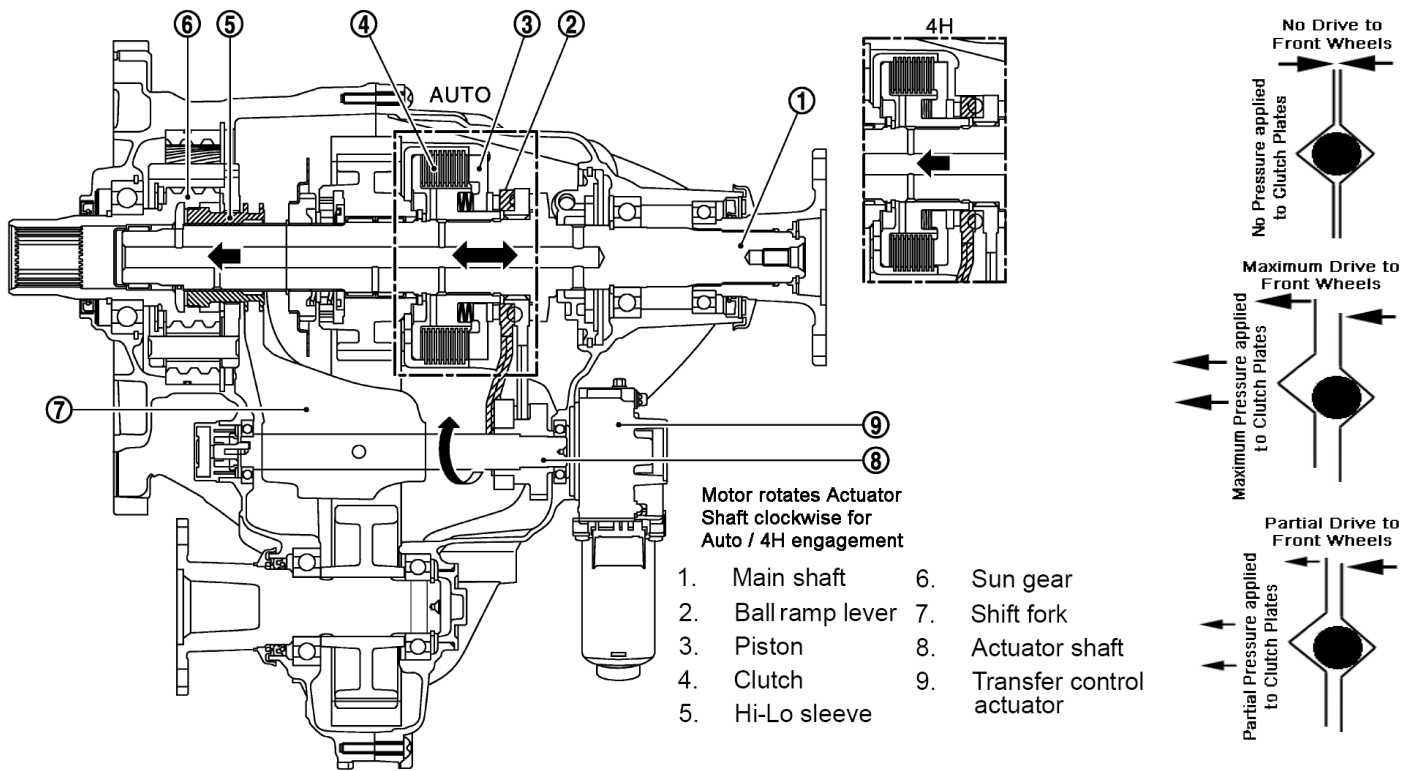
Auto / 4H Operation

The Motor / Actuator (9) rotates the Actuator shaft (8) in a clockwise direction. This causes the Shift Fork (7) to move forward & engage the Hi-Lo Sleeve (5) to the Sun Gear (6). This outputs is a normal 1:1 ratio.

When the 4WD Switch is in the "AUTO" position, the Motor / Actuator can vary the amount of Clutch (4) pressure via a slight rotation of the Actuator shaft which in turn operates a lever on a "Ball Ramp" arrangement. The action of the Ball Ramp Lever (2) rotating causes 2 aligned V grooves to be un-aligned which in turn causes the ball bearings to ride up out of the groove which in turns pushes the Piston (3) away from the lever. This action forces the clutch plates to compress. The engagement of the Clutch causes the Transfer Sprocket / Chain to apply drive to the Front Wheels.

The amount of drive to the front wheels can be varied (clutches allowed slippage) via the partial rotation of the Actuator Shaft > Ball Ramp Lever by the Transfer Control Unit.

When the 4WD Switch is in the 4H position, the Ball Ramp Lever (2) is turned to the Maximum position to fully compress the clutch plates





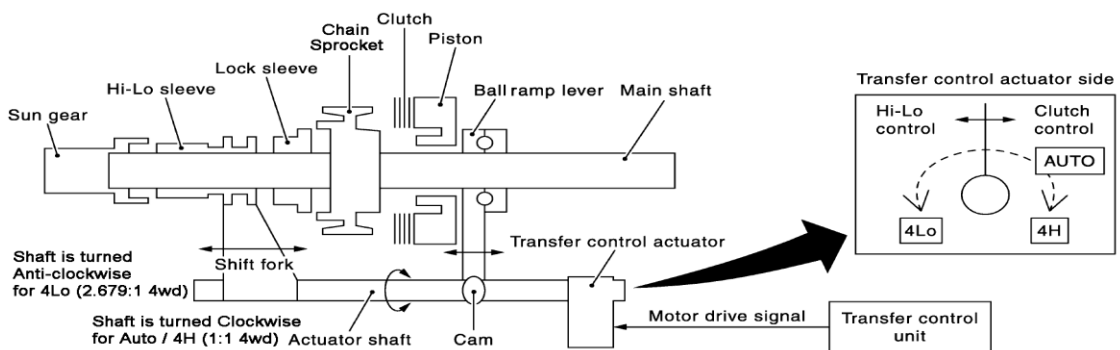
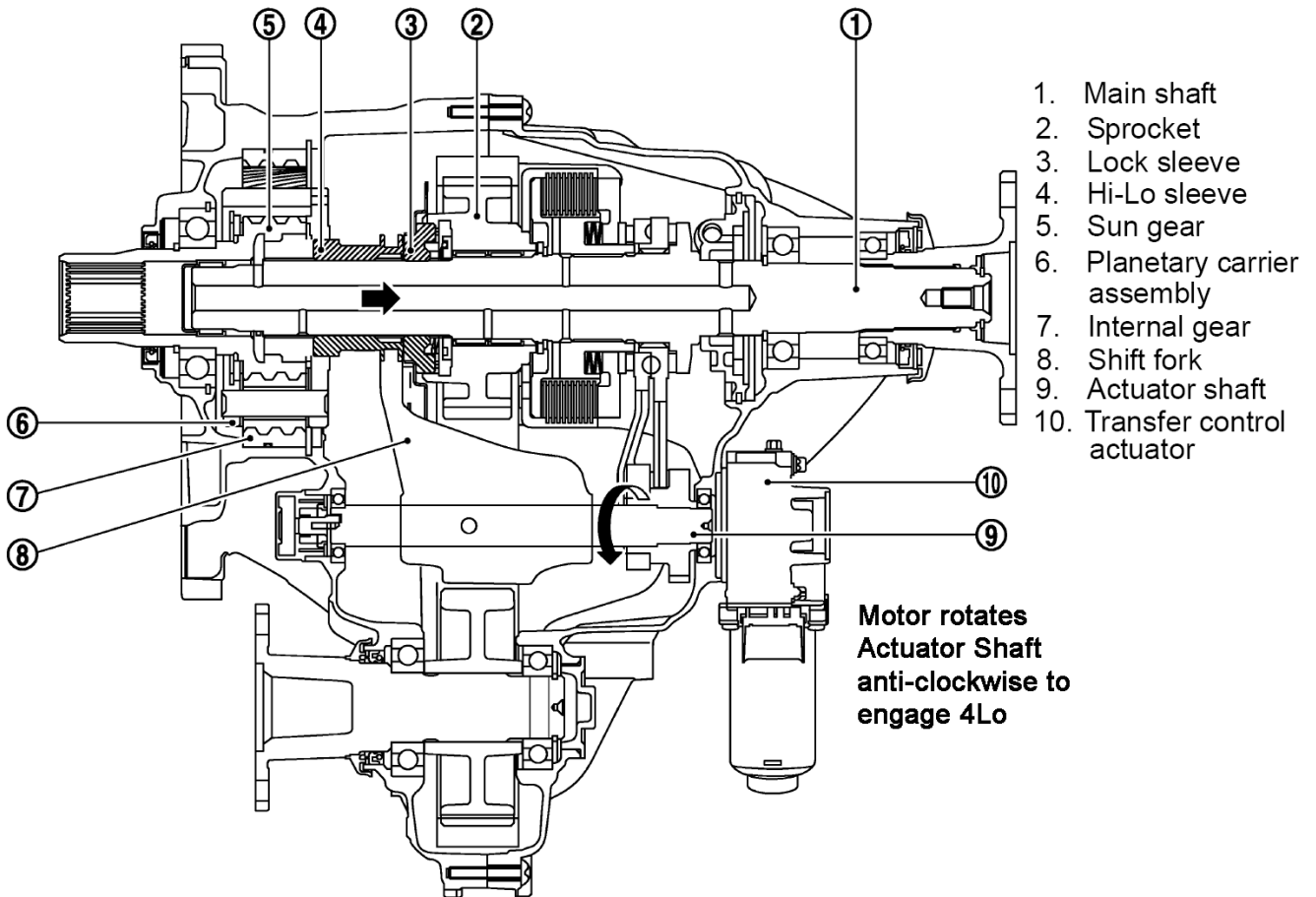
TRANSFER

4Lo Operation

The Motor / Actuator (10) rotates the Actuator shaft (9) in an anti-clockwise direction. This causes the Shift Fork (8) to move rear-ward & engage the Hi-Lo Sleeve (4) to the Planetary Carrier Assembly (6). This directs drive from the transmission through the Planetary Gear Set and then directly to the Transfer Sprocket / chain to drive the front wheels. Due to the planetary gear set a Low Range ratio of 2.679:1 is achieved.

NOTE:

The Clutch assembly is not activated when in 4Lo





TRANSFER

Transfer Oil Level Check

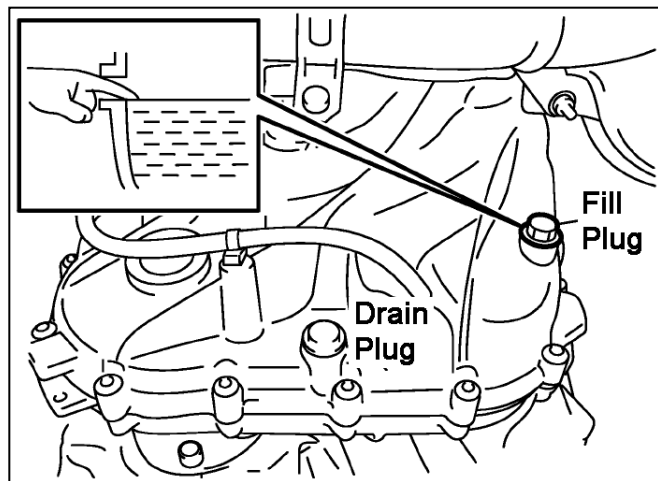
1. Check for Oil leakage. Ensure that there are no leaks & if a leak is detected – confirm what fluid it is that appears to be leaking.
2. Park the vehicle on a level surface and set the parking brake. Stop the engine.
3. Remove the fill plug & confirm the oil level as per the diagram shown right.

WARNING

The Transfer Oil is **not** to be replaced as part of a normal service.

If the Oil is drained & needs to be replaced, only ever use Genuine Nissan Oil, part #; **KLD22-00001**. Once new oil has been added, a special procedure using CONSULT III must be carried out.

Refer to the ESM for more details;
> D – TRANSMISSION & DRIVELINE > DLN Driveline > PERIODIC MAINTENANCE



Only check the Oil Level. Never drain / Replace the Oil as part of a Normal Service

Special Procedures for Component Replacement

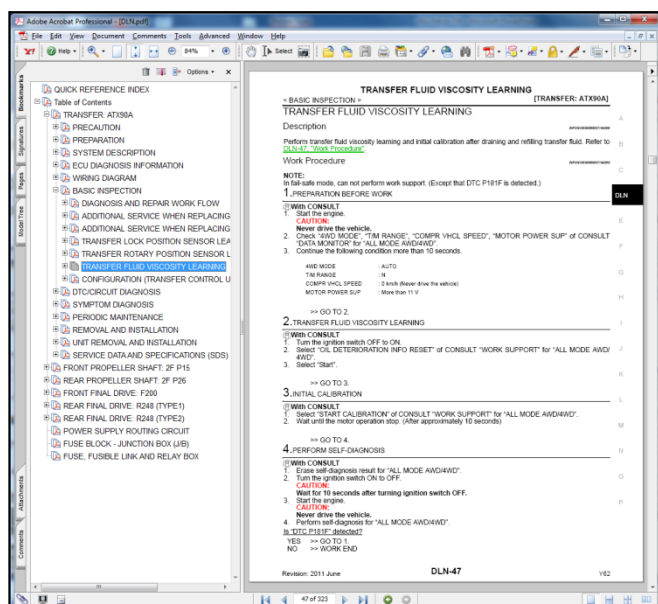
If any of the following items are replaced (or swapped from another vehicle), special procedures using CONSULT III need to be carried out.

- Complete Transfer assembly
- Transfer C/U
- Transfer Control Actuator (elec .motor) assembly
- Transfer Lock Position Sensor
- Transfer Rotary Position Sensor
- Transfer Oil

Procedure

Specific instructions are detailed in the ESM. There are up to 6 different procedures that will require carrying out depending on the component that was replaced.

> D – TRANSMISSION & DRIVELINE > DLN Driveline > BASIC INSPECTION



Section D – DLN of the ESM



TRANSFER

Manual Selection of 4Lo (Emergency situations only)

If there is an urgent need to select 4Lo at a time when the electrical system has failed, a procedure is outlined in the Owners Manual which instructs on how to select 4Lo manually.

Step 1:

Via the use of the Torx T40 tool that is supplied with each vehicle, remove the 4 bolts that attached the Transfer Actuator Motor to the Transfer Unit

Step 2:

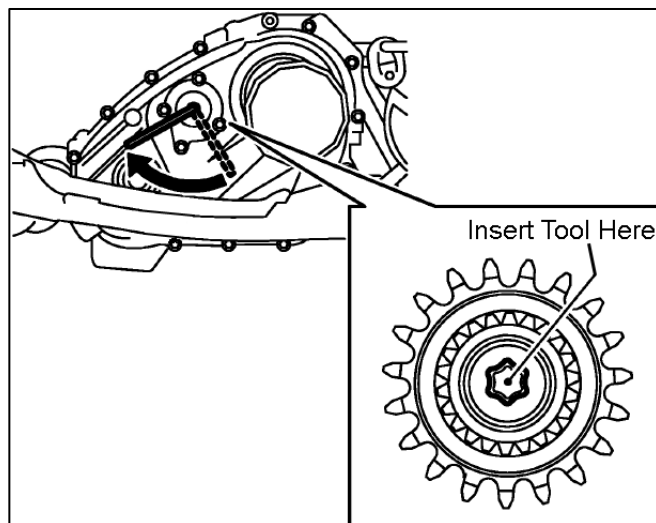
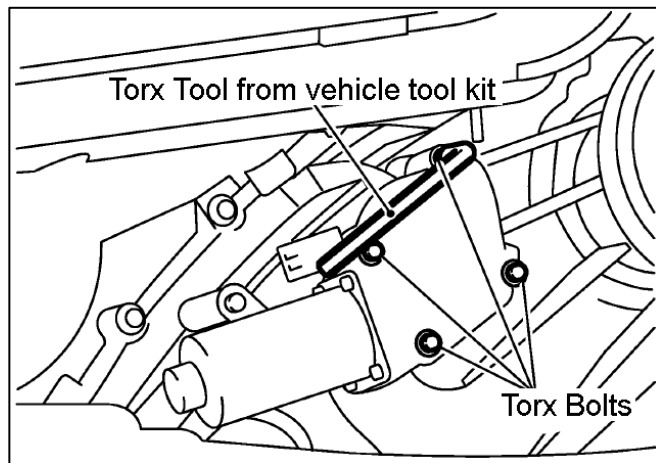
Once the actuator assembly has been removed, insert the same T40 tool into the actuator drive & turn the tool in a clockwise direction.

Step 3:

Once 4Lo has been selected, the vehicle should be able to be driven & freed from it's stuck position.

- Do not drive the vehicle unnecessarily in 4Lo.
- Do not drive the vehicle in sandy, dusty or muddy conditions with the actuator removed. Otherwise dirt etc can enter the transfer case & cause damage.

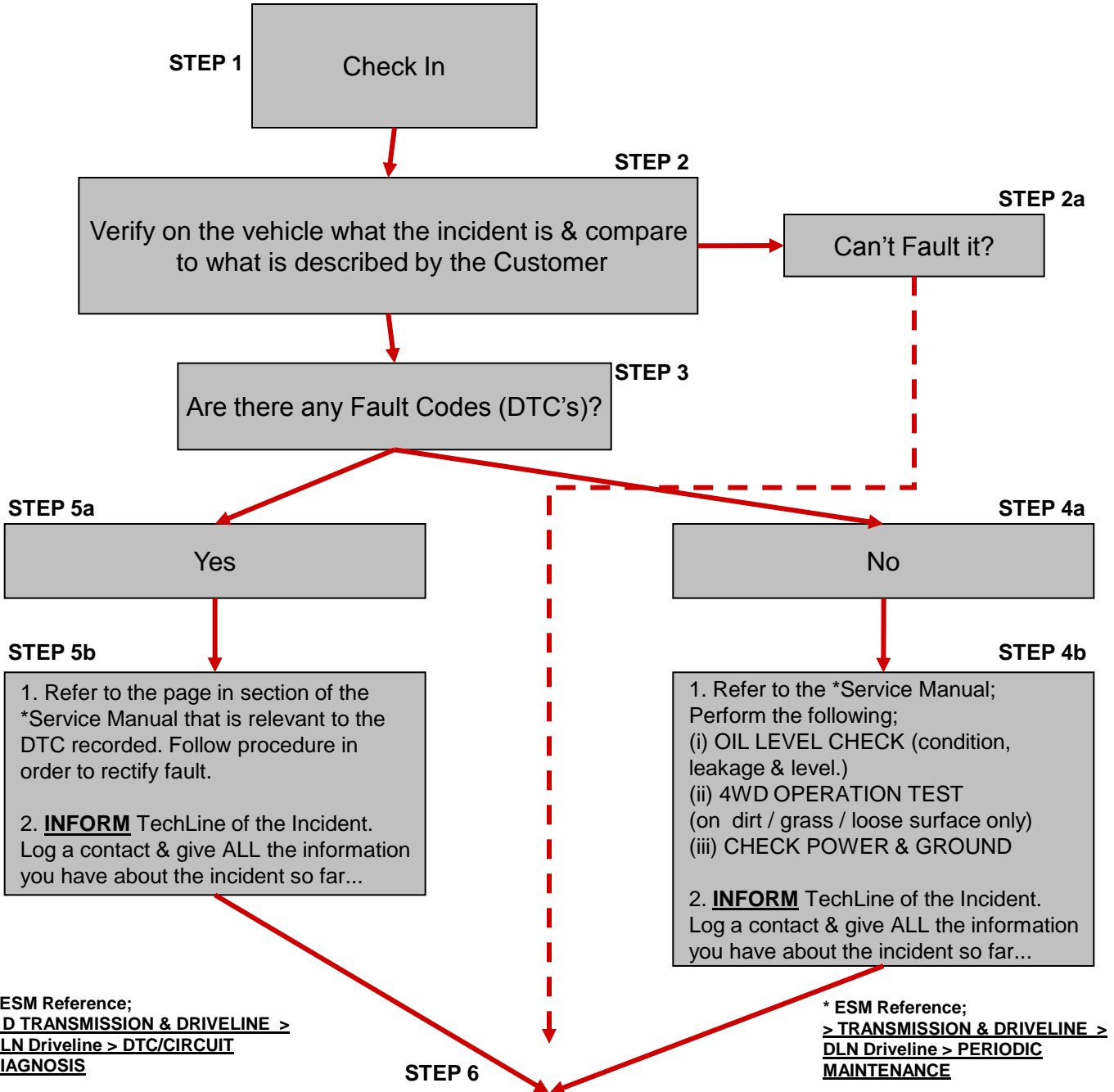
For more details, refer to section 6 of the Owners Manual.



Torx T40 tool that is supplied with all vehicles



ATX90A Transfer Trouble Diagnosis Basic Work Flow Chart



* ESM Reference;
> D TRANSMISSION & DRIVELINE >
DLN Driveline > DTC/CIRCUIT
DIAGNOSIS

* ESM Reference;
> TRANSMISSION & DRIVELINE >
DLN Driveline > PERIODIC
MAINTENANCE

STEP 6 PRIOR TO COMPLETION OF REPAIR AND HANDING BACK TO THE CUSTOMER

1. Always carry out the below checks as follows;
 - (i) OIL LEVEL CHECK (oil condition, leakage & level.)
 - (ii) CHECK POWER & GROUND
 - (iii) 4WD OPERATION TEST / OBSERVE OPERATION OF 4WD SHIFT INDICATOR & WARNING LIGHT
(only do this on dirt / grass / loose surface. Never on a hard surface)
 - (iii) CHECK ONCE AGAIN FOR ANY DTC's WITH CONSULT III
2. **PLEASE UPDATE** the TechLine contact



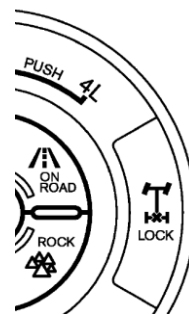
REAR FINAL DRIVE

R248 Helical LSD with Electric Diff lock

An all new Rear Final Drive has been applied to all Y62 variants. The Final Drive features a “Helical” type LSD & an Electrically operated DIFF LOCK feature has also been applied to all variants.

General Specification

Applied model	4WD
	VK56VD
	A/T
Final drive model	R248
Gear ratio	3.357
Number of teeth (Drive gear/Drive pinion)	47/14
Oil capacity & Oil specification	2.3Lt / GL-5 synthetic 75W-90
Drive pinion adjustment spacer type	Collapsible



Functionality

The rear differential lock (DIFF-LOCK) is designed to transmit engine power to the left and right rear wheels equally.

To lock the rear differential gear, reduce the vehicle speed below 7 km/h and turn the 4WD shift switch to the 4H or 4L position. After this, press the DIFF LOCK button which forms part of the 4WD switch assembly. The button is a “momentary contact” type of switch.

The orange coloured DIFF-LOCK indicator light on the instrument cluster will blink and then stay on when the differential gear is completely locked. After using the DIFF-LOCK, or during normal driving, push the differential lock mode switch to the “OFF” position. The DIFF-LOCK indicator light will turn off after the differential lock has released itself.

NOTES:

- When the 4H position is selected, turn off the Vehicle Dynamic Control (VDC) system to activate the rear differential lock mode. Then push the differential lock mode switch to the “ON” position
- While DIFF-LOCK is on, the Anti-lock Braking System (ABS) warning light illuminates. This indicates that anti-lock function may not fully operate
- The operation of the DIFF-LOCK system will **severely limit** the steering capability of the vehicle (both rear wheels are locked together & will rotate at exactly the same speed). As a result, this will make turning corners very difficult to achieve
- The DIFF LOCK warning buzzer will sound if the DIFF LOCK mode switch is ON & the vehicle speed is 20 km/h or more.

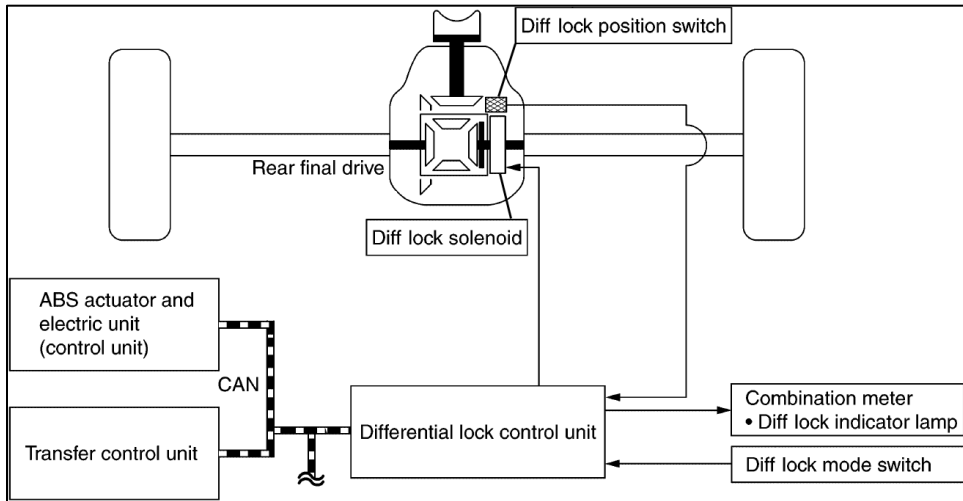
D/L Switch	4WD mode	ABS or VDC operation	Vehicle speed	D/L Operation
ON	AUTO <small>(D/L operation not possible in AUTO)</small>	ON / Normal	Any	OFF
	4H or 4L <small>Turn OFF VDC when D/L in 4H is required. VDC is automatically OFF in 4L</small>	ON / Normal	Any	OFF
		OFF	7 km/h or more	OFF
			7 km/h or less	ON

Condition	DIFF LOCK Indicator Lamp
Lamp check	Turns ON when ignition switch is turned ON. Turns OFF after the engine start.
Differential lock/unlock	ON/OFF
Differential lock standby condition	Blinking: 1 time every 2 seconds (D/L is not yet locked)
Differential lock system malfunction	OFF (Light does not act as a Malfunction Warning Light)





REAR FINAL DRIVE

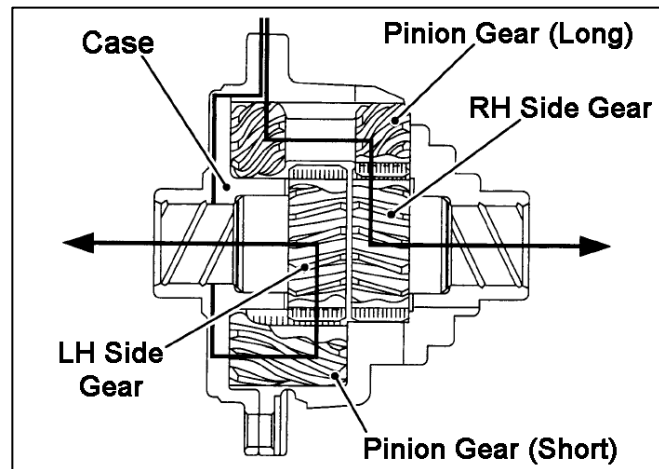


Helical Differential - Functionality

When Driving Straight Ahead:

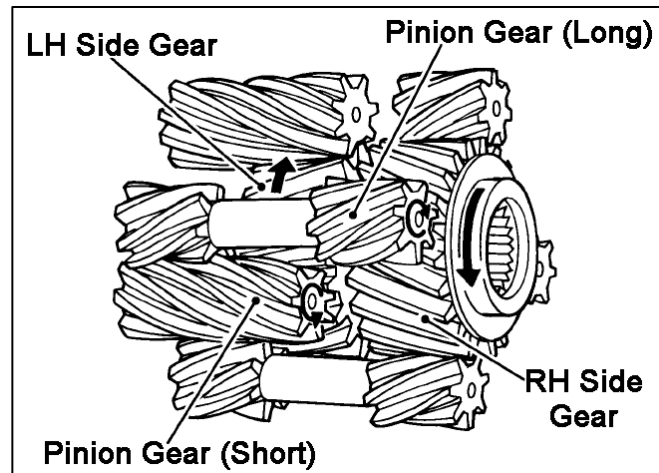
The Differential case, pinion gear, and side gear rotate together as a unit.

Given that the wheel speed of LH and RH wheels are equal, the traction force transmitted from the drive pinion is transferred directly to LH and RH wheels in the conventional manner.



During Differential Operation (Cornering):

Differential mechanism operates automatically according to the auto-rotation of the short & long pinion gear when difference of wheel speed is generated between LH and RH wheels during cornering.





REAR FINAL DRIVE

Helical Differential - Functionality

During Limited Slip Differential Operation:

LSD mechanism operates when one-sided wheel spin is generated during cornering or when driving on a slippery surface (snow / mud / etc.).

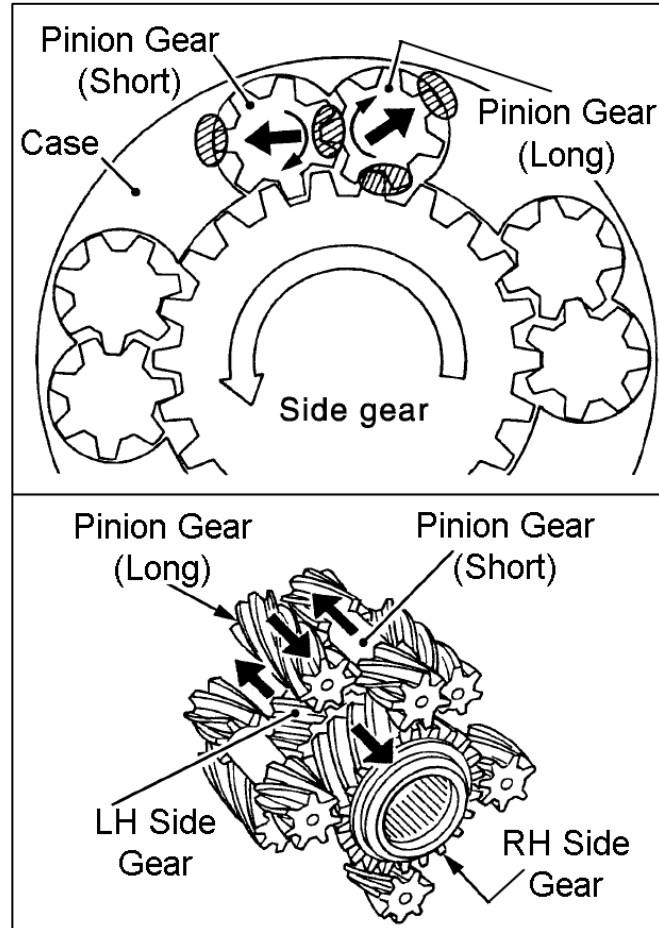
LSD operation is performed according to frictional forces that are generated between the teeth of the pinion gears and the teeth of the pinion gear on the inner perimeter portion of differential case, pinion gear end and differential case inner wall, as well as the side gear end and differential case inner wall.

Frictional forces are generated as per the following status according to traction torque:

- Status that pinion gear is pressed to differential case according to engagement reaction force.
- Status that pinion gear end is pressed to differential case according to axial directional force by helical angle of gear.

The generated frictional force slows down the self-rotation of the pinion gear and performs the LSD operation.

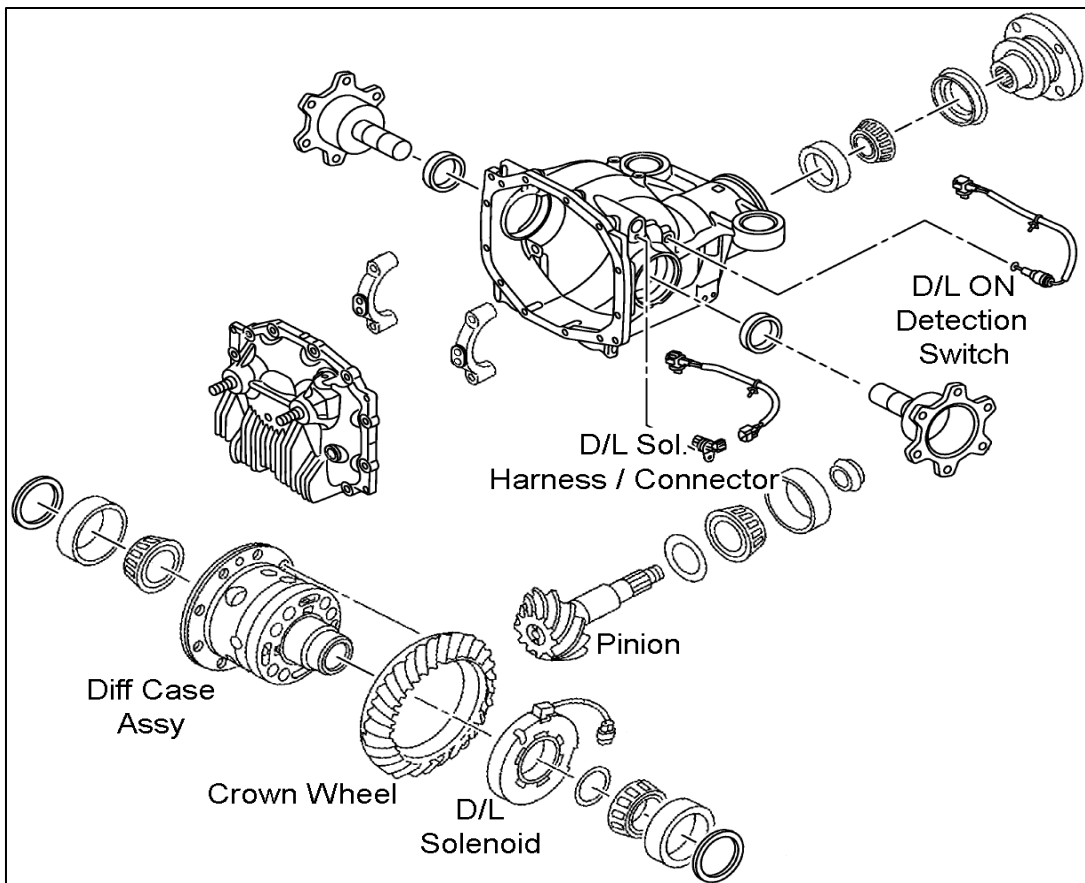
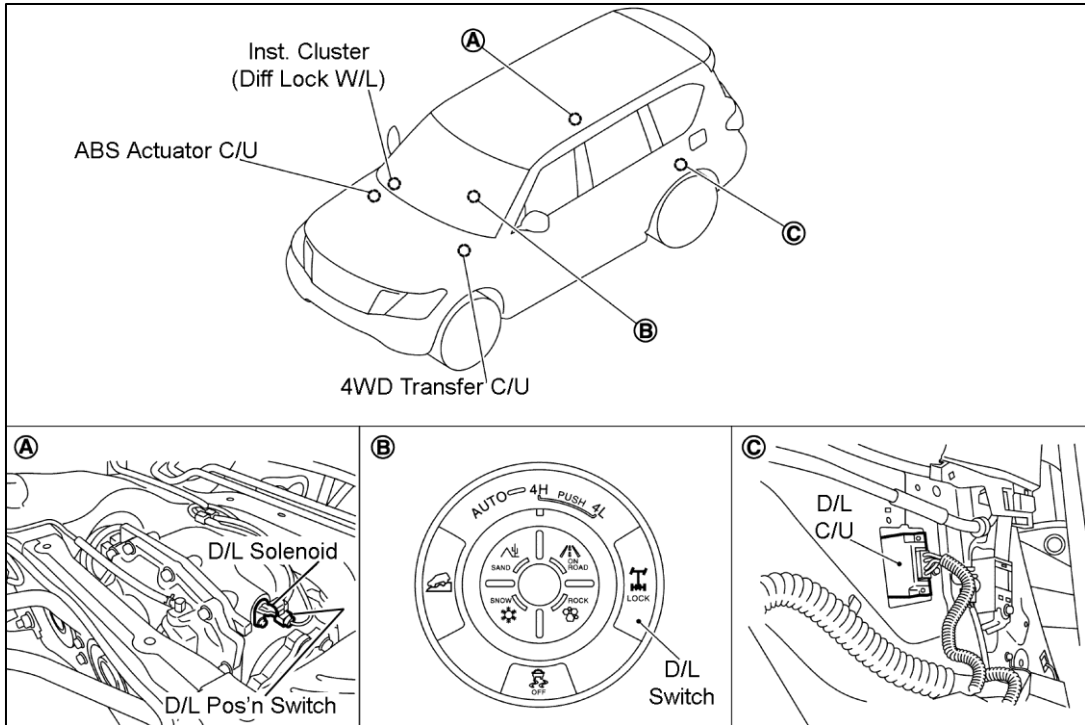
LSD operation decreases the traction force of the higher rotation side. This in turn increases traction force of lower rotation side.





REAR FINAL DRIVE

Y62 Component Location





REAR FINAL DRIVE

Trouble Diagnosis

Step 1;

Confirm the operation of the system via the instruction from section 5 of the Owners Manual (Is the system operating correctly & as it was designed to do so?)

Step 2;

If it is found there is a fault, connect CONSULT III plus to the vehicle & access DIFF LOCK.

- Check for any DTC's. If there are any, refer to the ESM as follows;

> D TRANSMISSION & DRIVELINE > DLN > REAR FINAL DRIVE > DTC/CIRCUIT DIAGNOSIS

More detail & the Diagnosis Procedure for the DTC is located here.

- If there are no DTC's yet the fault is clearly evident, refer to the ESM as follows;

> D TRANSMISSION & DRIVELINE > DLN > REAR FINAL DRIVE > SYMPTOM DIAGNOSIS

Various processes are discussed dependant on the fault at hand.

Wiring Diagrams

Refer to the ESM as follows for a wiring diagram of the TPMS system;

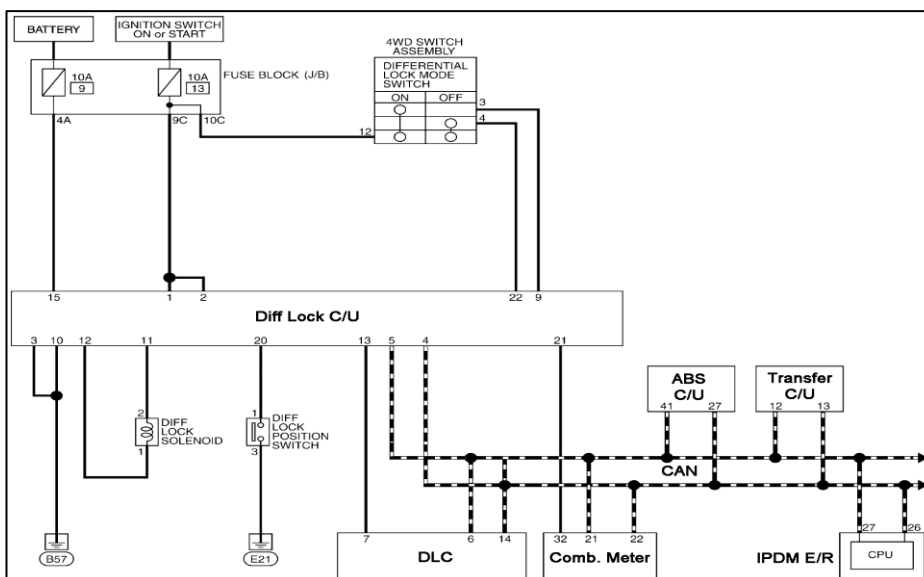
> E SUSPENSION > WT > WIRING DIAGRAM

Here you will find Power & Ground supplies as well as the appropriate locations of the fuses and ground connections.

Access to the DIFF LOCK system with CONSULT III plus

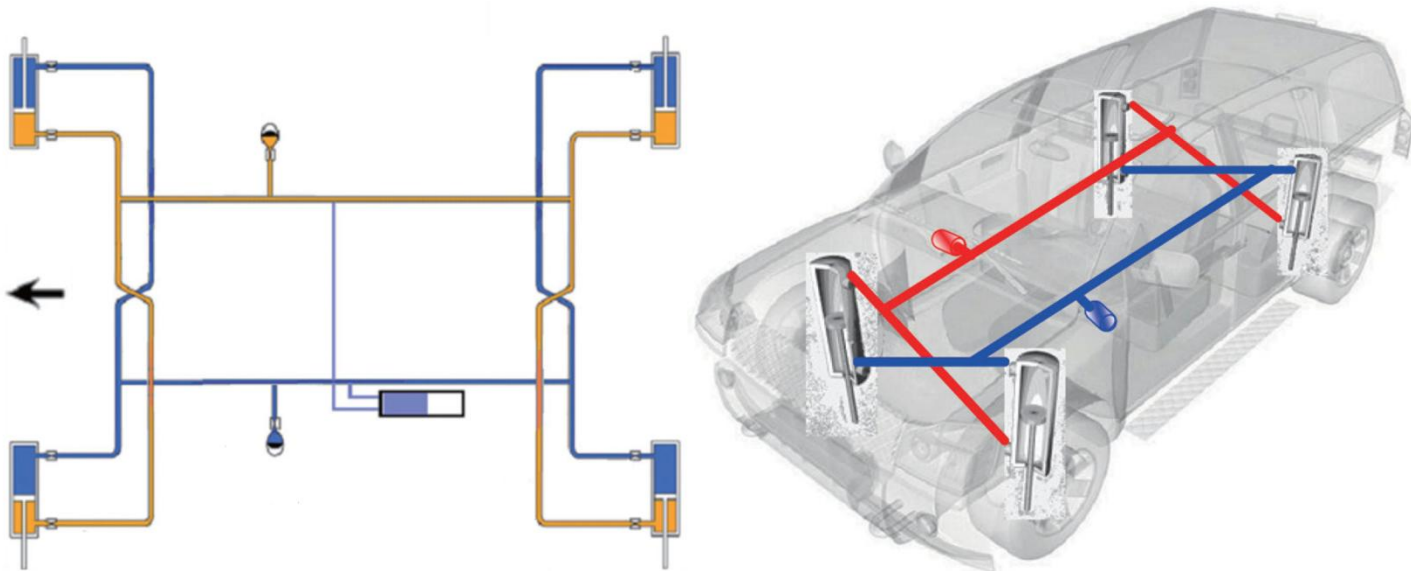
Full interaction with the system for setting customer preferences, checking for any system DTC's, checking for input & output activity & checking component operation is available with CONSULT III plus. See below a description of each diagnosis mode available;

ECU Identification	Differential control unit part number can be read.
Self Diagnostic Result	Self-diagnostic results can be read and erased quickly.*
Data Monitor	Input/Output data in the differential control unit can be read.





SUSPENSION



Hydraulic Body Motion Control system (HBMC)

HBMC is a new suspension control system. The system consists of 4 “shock absorbers” (oil cylinders), 2 accumulators and cross-linked hydraulic pipes. It performs the roles of both the conventional shock absorbers and stabilizer bars.

The advantages of this system is to minimise the body roll angle when cornering on normal roads, yet allows for smooth & level ride and ground clearance when driving off-road.

HBMC is typically used in Off Road racing vehicles. The system allows them to drive at high speeds over rough terrain. The system is incredibly effective for providing an outstandingly smooth ride & stability.

The new Y62 Patrol is the first vehicle in the world that introduces this system to the main stream vehicle market.

Unique Features

1. Anti roll / Roll stiffness control system. The roll stiffness is controlled according to the road conditions. The system also achieves both passenger vehicle-like riding comfort and a high level of drivability.
2. Full axle articulation. The system does not employ anti sway bars. Therefore full wheel travel is possible when driving over uneven surfaces / moguls etc.

Coil Springs

Coil Springs are utilised to support the weight of the vehicle & they provide for the basic ride height of the vehicle.

HBMC does not in anyway alter the ride height of the vehicle. The ride height is preset via the use of the Coil Springs.

WARNING

The HBMC system contains oil which is under HIGH PRESSURE at all times. Extreme care must be taken to avoid injury when working on this system. ALWAYS REFER TO THE ESM PRIOR TO CARRYING OUT ANY WORK ON THE SYSTEM.



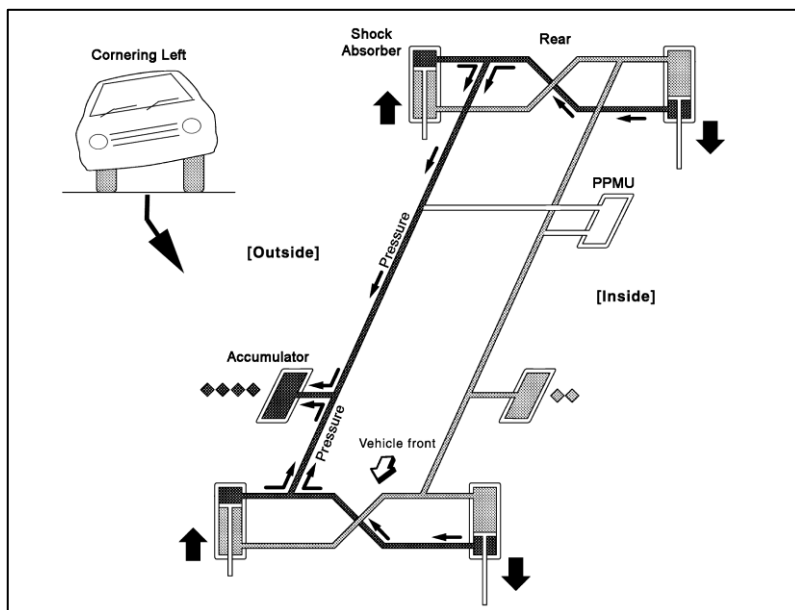
SUSPENSION

HBMC Operation

Mode 1 - On-road cornering

When the same side of the vehicle is experiencing the same level of load on the axle, pressure will build on that same side & it is forced towards the accumulator. Therefore, if cornering left, the vehicle body leans over onto the right side of the axle front & rear, as a result, the lean is not possible because the system hydraulically stops the body roll.

The same occurs if the vehicle corners to the right (load on the left side).



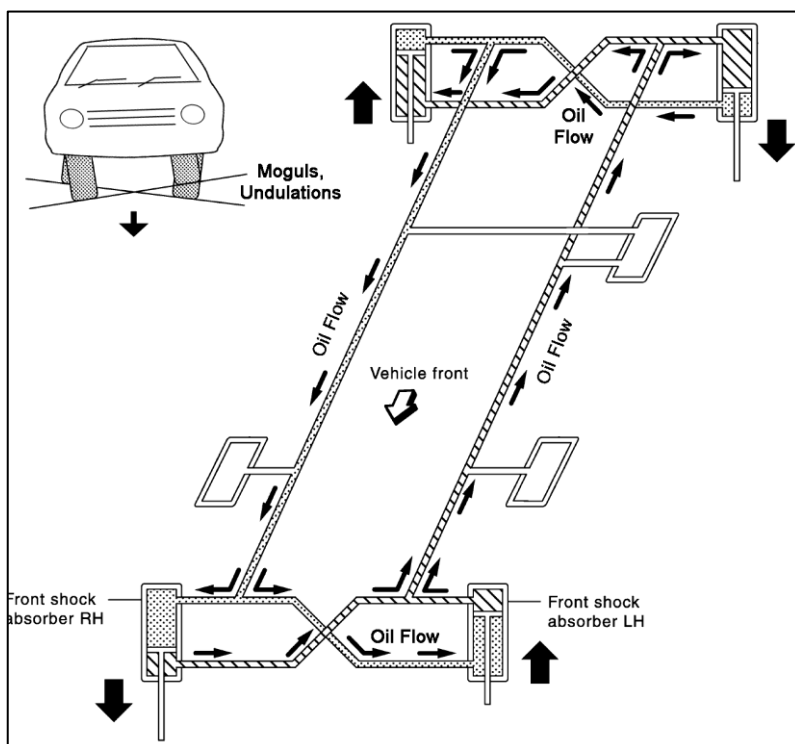
Even sided axle movement (body leaning on same side) will mean that the 2 hydraulic circuits “lock” themselves (minimises body roll)

Mode 2 - Off-road Undulations

As the vehicle negotiates over un-even surfaces, rocks, moguls etc. the axles are allowed to drop down or raise up due to an exceptionally long wheel travel (axle articulation) design.

The oil in the cylinders adjacent to each wheel fills & exits the cylinder at the same time (the cylinder is 2 sided, if one side empties, the other automatically will fill with oil as it is connected to the other circuit). Given that the axles are moving up & down, as long as the rear axle is moving in a different direction to the front axle (Front RH wheel is being forced up / Rear RH wheel is not being forced up or perhaps is dropping down), the system will not pressurise & limit the axles movement.

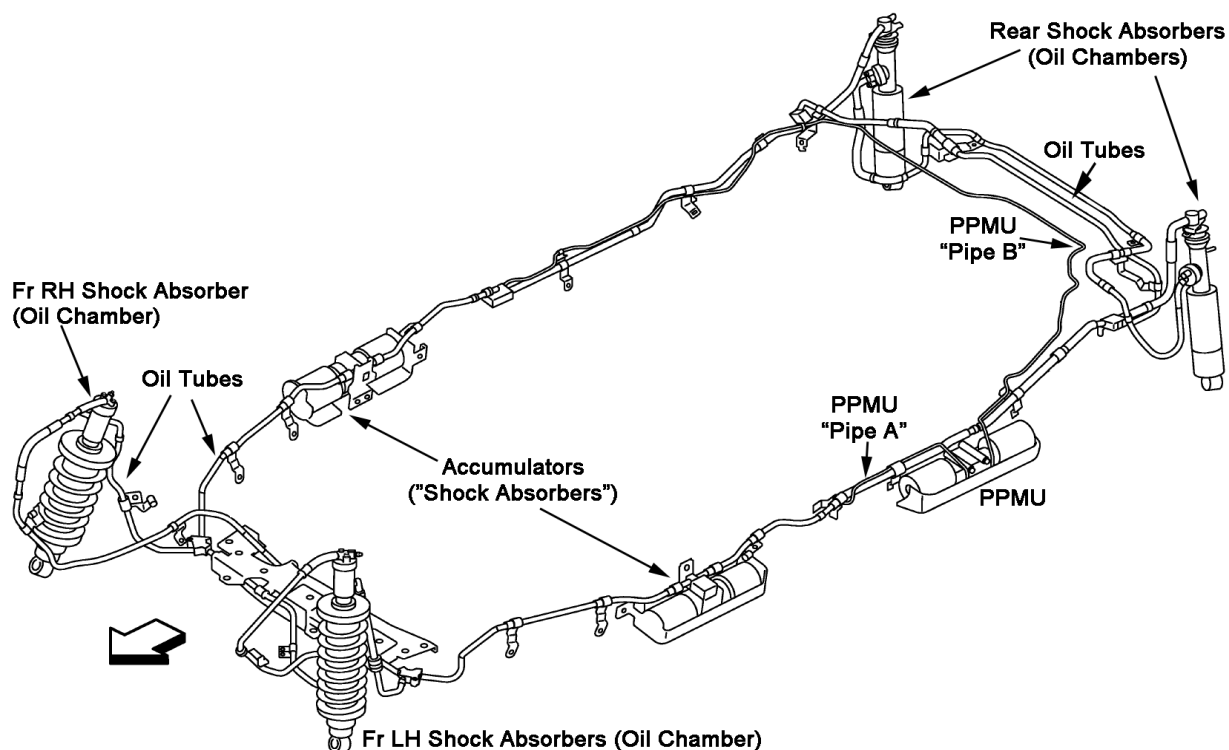
Effectively, this opposing axle movement allows for a place to go for the oil flowing around the circuits.



Opposing wheel / axle “up & down” movement allows for the oil to freely move around. (Oil fills & empties the oil chambers located at each wheel. The system does not “lock” itself as described above)



SUSPENSION



Component Description

1. Shock Absorbers (Oil Chambers at each wheel)

- Changes the hydraulic pressure to the force that controls the roll counterforce and bounce reducing force.

2. Accumulators

- Gas filled cylinders that counteract the Body Roll force. The amount of hydraulic oil that charges and discharges to / from the accumulator changes the hydraulic pressure in the system.

The system generates the roll reducing force according to the amount of hydraulic oil that charges and discharges to/from the accumulator.

3. PPMU (Passive Pressure Maintenance Unit)

Reduces the hydraulic pressure change due to the hydraulic oil temperature change. As the oil temperature increases, the pressure in the system will increase. Therefore the PPMU maintains a stable system pressure regardless of temperature.

The PPMU also acts as a pressure diagnosis point & oil drain / re-fill point.

4. Hydraulic Pipes / Hoses

Transfers the accumulator pressure to the cylinders. The system controls the amount of oil so that the "shock absorbers" (oil chamber located at each wheel) can operate.

WARNING

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ALWAYS REFER TO THE ESM PRIOR TO CARRYING OUT ANY WORK ON THE SYSTEM

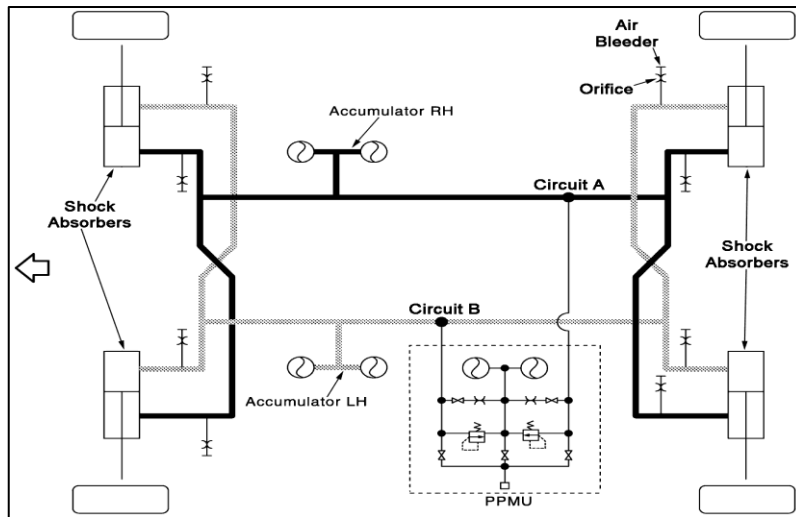
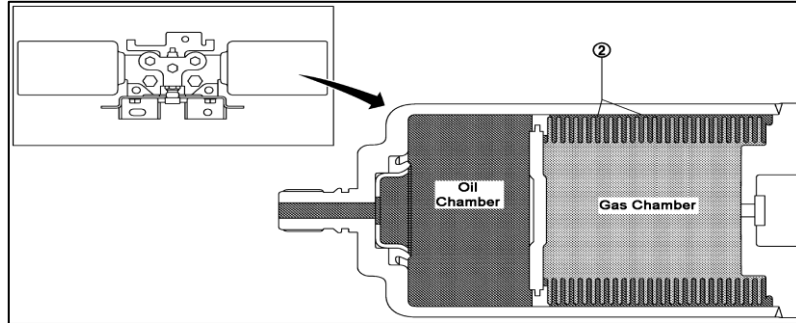


SUSPENSION

PPMU (“Passive Pressure Maintenance Unit”)

As the temperature rises due to a combination of excessive oil flow & ambient temperature, the PPMU is able to absorb this increasing pressure.

The oil forces itself via the oil tubes into the PPMU. There are 2 x normally open needle valves which allow the oil to flow past them & then it has to flow through an orifice (restrictor) into the nitrogen gas pressured chamber. (Accumulator located within the PPMU).



Servicing & Diagnosis

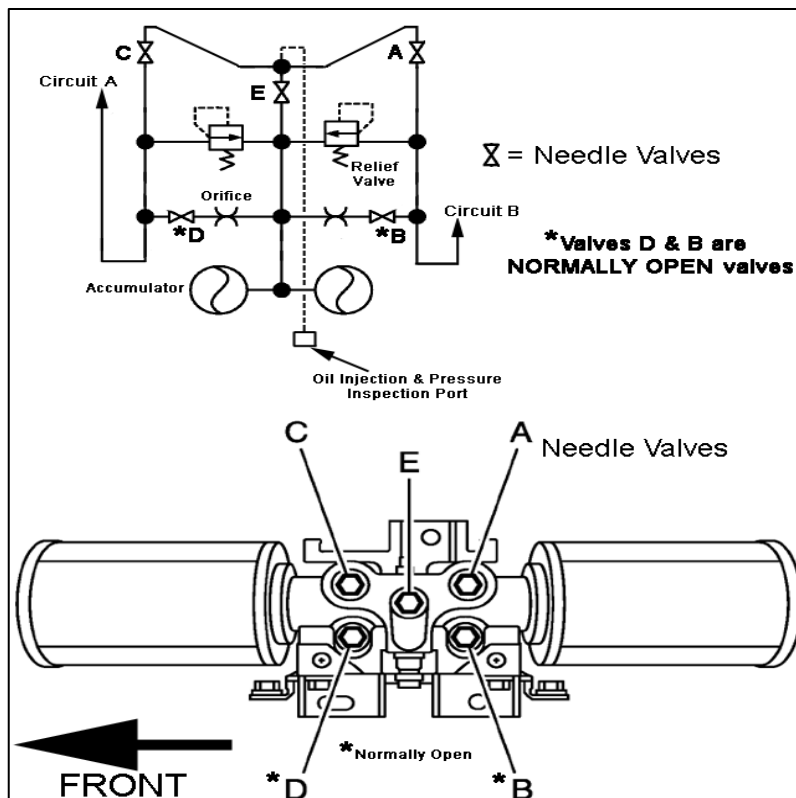
The PPMU acts as a Service & Diagnosis port if the system pressure needs to be checked or new fluid needs to be added after any diagnosis or component replacement activities.

Needle Valves A, C & E:

These are always kept CLOSED. These should only be opened when carrying out pressure inspections, bleeding operations & diagnosis of internal leakage activities.

Needle Valves B & D:

These valves should always remain OPEN. These should only be closed in a specific sequence when internal leakage diagnosis activities are being carried out. They remain open so that excessive oil pressure build up due to increased temperatures can escape into the gas pressure chambers.





SUSPENSION

Accumulators

(Anti Sway & Shock absorber function)

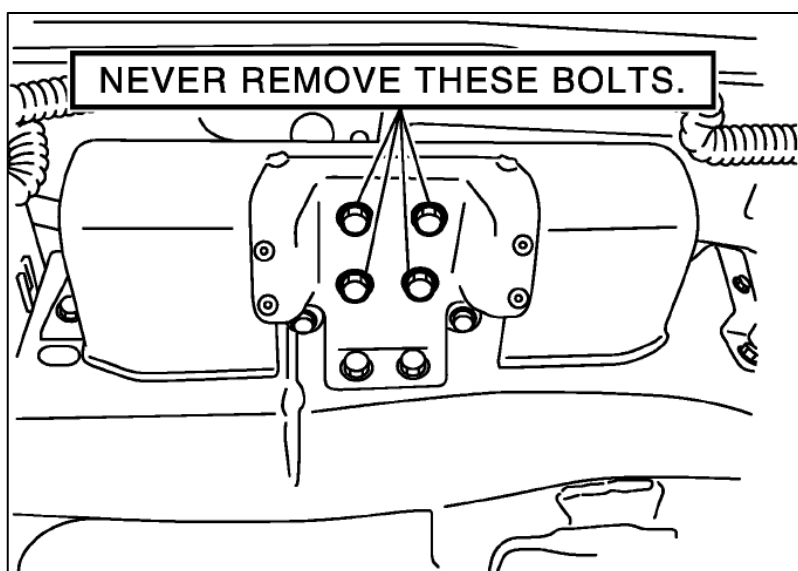
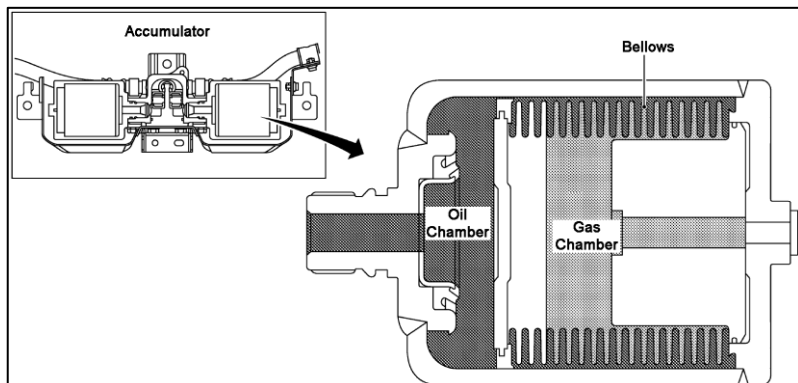
When the vehicle is driven on a normal road & it is cornering, oil from both the front and rear “shock absorbers” (oil chambers at each wheel) enters the oil chamber of the Accumulator.

The pressure of oil entering the Accumulator increases due to the pressure of the Nitrogen Gas force which is working against the oil. In turn this effectively causes a “hydraulic lock” like condition in the suspension. As a result the lean to one side as the vehicle corners is limited.

The Accumulator has no role to play if the vehicle is being driven over rough - uneven surfaces, moguls etc. In these conditions, the oil is displaced into other oil chambers of wheels that are lifting / lowering over the uneven surfaces

WARNING:

Never remove the 4 bolts that can be seen on the base of the accumulator. Refer to the picture shown right.



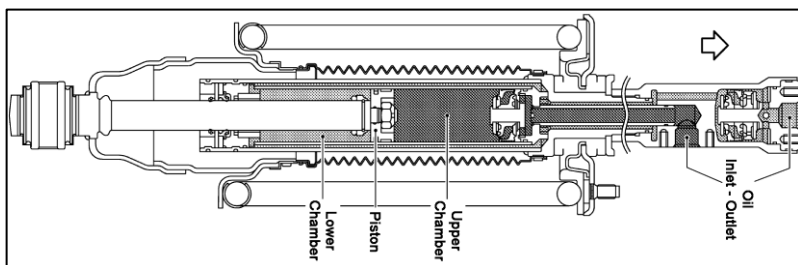
Shock Absorbers

(Oil Chambers at each wheel)

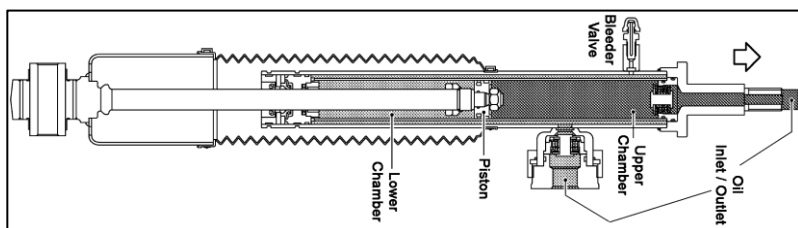
Oil enters either the upper or lower chambers via the Oil Inlet / Outlet ports.

Although they are called “shock absorbers” they do not actually have a damping ability. The piston is able to move freely inside the chamber if the oil pressure on the travel of direction side allows the movement.

Constant suspension oscillation is not possible as the “bouncing effect” of the wheel is arrested due to the shock absorber not being able to constantly push / suck oil in / out of the Suspension system.



Front Unit



Rear Unit



SUSPENSION

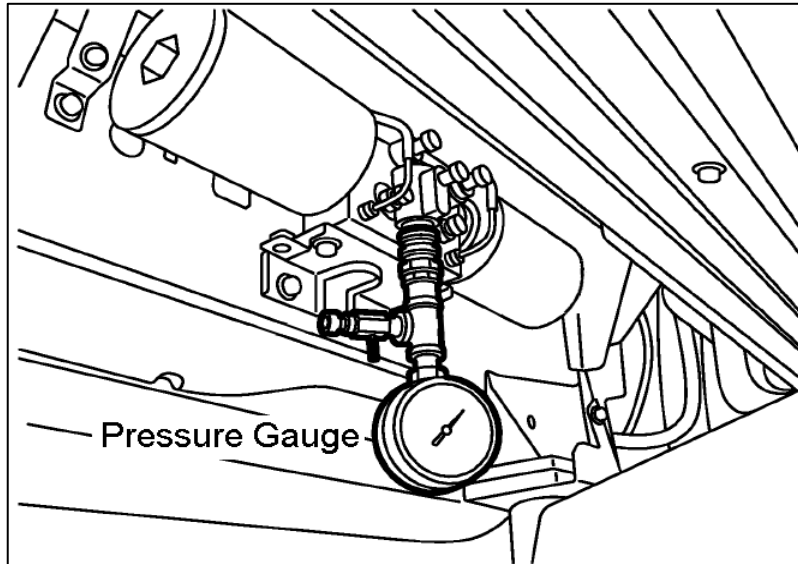
System Pressure

With the use of the appropriate SST, the oil pressure within the suspension system can be checked.

This should be carried out with the vehicle lifted with a 2 post hoist (wheels off the ground)

Refer to the ESM as follows for the specific details of the pressure check procedure:

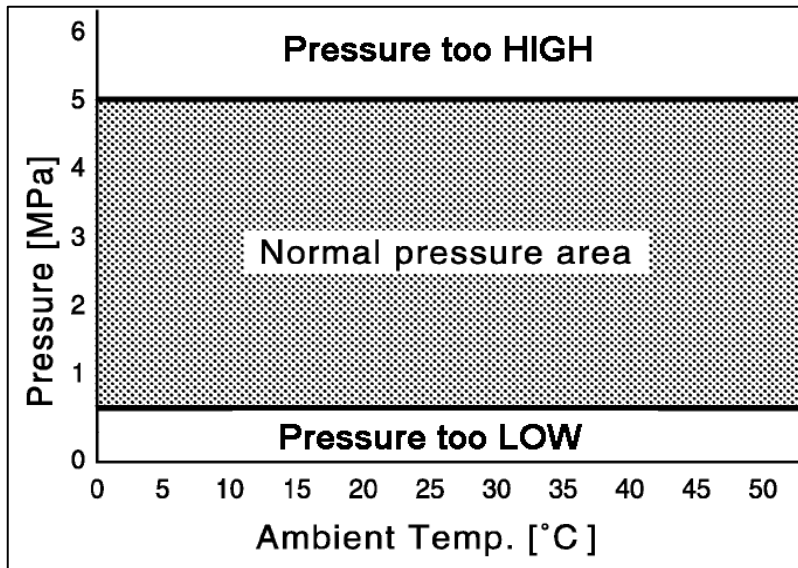
> E SUSPENSION > SCS Suspension Control System > BASIC INSPECTION



The chart shown right indicates the overall pressure range the system works within.

WARNING

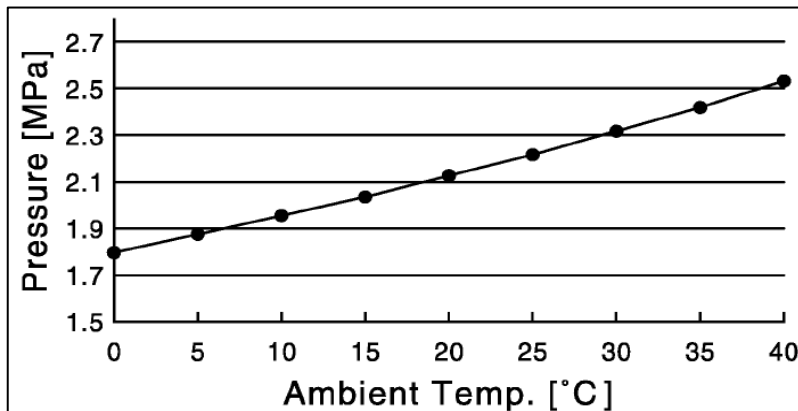
The HBMC system contains oil which is under **HIGH PRESSURE** at all times. Extreme care must be taken to avoid injury when working on this system. **ALWAYS REFER TO THE ESM PRIOR TO CARRYING OUT ANY WORK ON THE SYSTEM**



This chart shown right details the pressure difference due to ambient temperature changes. This is used as a reference for when new oil is being pumped into the system & the system is then bled.

Refer to the ESM as follows for the specific details of the oil filling & system bleeding procedure:

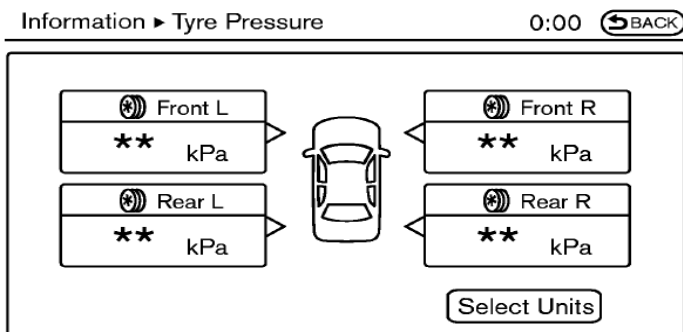
> E SUSPENSION > SCS Suspension Control System > BASIC INSPECTION





WHEELS & TYRES

Tyre Pressure Monitoring System - Functionality



The Tyre Pressure Monitoring System (TPMS) is a system which is able to inform the driver of the tyre pressures in all 4 tyres fitted to the vehicle. The system can also warn the driver of an excessively Low Tyre Pressure situation.

The TPMS C/U illuminates a Low Tyre Pressure Warning Light (LTP-W/L) when one or more tyres are significantly under-inflated. Accordingly, when the LTP-W/L illuminates, the driver should stop and check all 4 tyres as soon as possible and inflate them to the correct tyre pressure.



















Otherwise, the driver can select the appropriate option on the central display screen for the current tyre pressures. Before viewing the readings, the vehicle needs to be driven at speeds above 25km/h for 30 seconds or more before the tyre pressures readings can be noted.

IMPORTANT NOTES:

- The TPMS is not a substitute for proper tyre maintenance. It is the driver's responsibility to maintain correct tyre pressures, even if under-inflation has not reached the level to trigger illumination of the TPMS LTP-W/L activation
- The TPMS does not monitor the tyre pressure of the spare tyre
- The TPMS will activate only when the vehicle is driven at speeds above 25 km/h. Also, this system may not detect a sudden drop in tyre pressure (for example a burst tyre while driving)
- The LTP-W/L does not automatically turn off when the tyre pressure is adjusted. After the tyre is inflated to the recommended pressure, the vehicle must be driven at speeds above 25 km/h to activate the TPMS and turn off the LTP-W/L.
- For accurate Tyre Pressure readings, a tyre pressure gauge should be used to check the Tyre Pressures
- Tyre Pressures will rise and fall depending on the heat caused by the vehicle's operation and the outside temperature. Low outside temperature can lower the temperature of the air inside the tyre which can cause a lower tyre inflation pressure. This may cause the LTP-W/L to illuminate. If the warning light illuminates in low ambient temperature, check the tyre pressure of all four (4) tyres
- The Tyre Pressures can be checked (except the spare tyre) on the display screen, although the use of a Tyre Pressure Gauge is recommended. The order of the tyre pressure figures displayed on the screen may not correspond with the actual order of the tyre position on the vehicle. **Ensure that the Tyre Pressure Sensor "ID Registration" procedure as per the ESM is carried out correctly**
- When the spare tyre is fitted or a wheel is replaced, the TPMS will not function and the LTP-W/L will flash for approximately 1 minute. The light will remain on after 1 minute. System resetting will be required if the new wheel remains fitted to the vehicle. Otherwise the original tyre should be repaired & refitted to the vehicle so that the system can automatically resume normal operation
- Replacing tyres with those that differ from the original specification could affect the proper operation of the TPMS
- **Do NOT inject any tyre inflation / puncture repair liquid or aerosol tyre sealant into the tyres, as this may cause a malfunction with the tyre pressure sensors**



WHEELS & TYRES

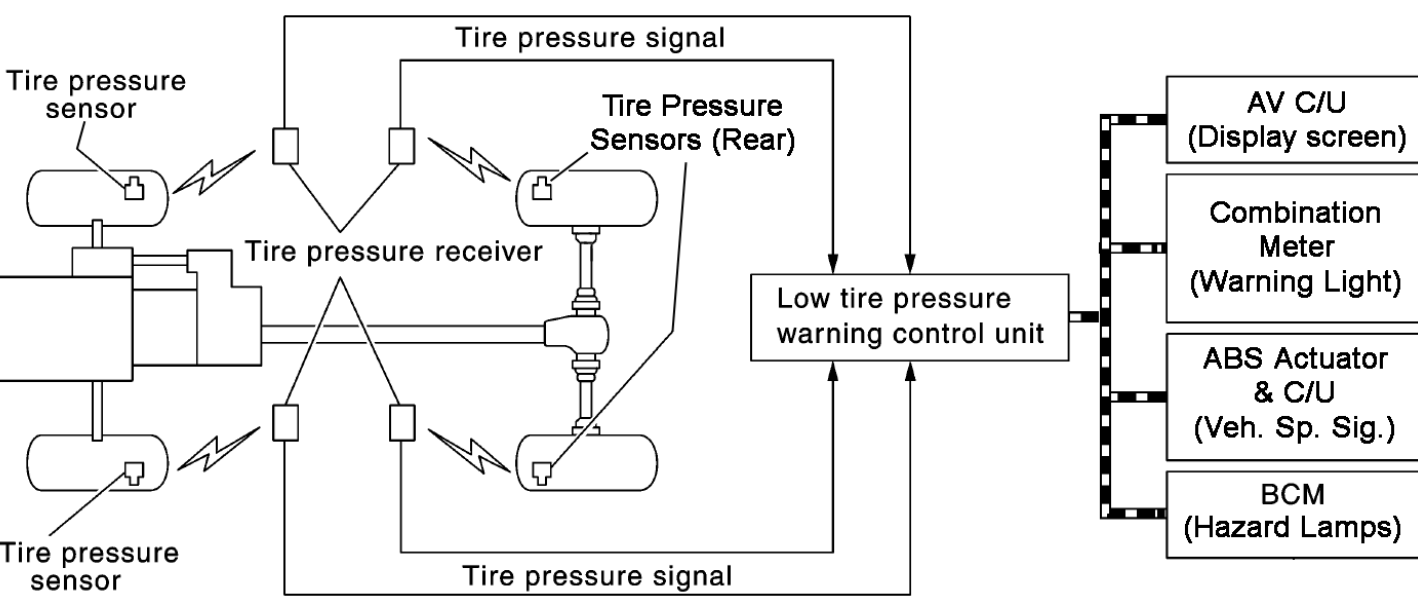
Symptom (Ignition switch ON)	Low tire pressure warning lamp	Cause	Action
The low tire pressure warning lamp illuminates for 1 second, then turns OFF.	  ON 1 sec > stays OFF <small>SEIA0592E</small>	Wake-up operation for all tire pressure sensors at wheels is completed.	No procedure. (No system malfunctions)
The low tire pressure warning lamp repeats blinking ON for 2 seconds and OFF for 0.2 seconds.	 Blinks:  ON 2 sec > OFF 0.2 sec	Wake-up operation for all tire pressure sensors at wheels is not completed.	Perform the wake-up operation for all tire pressure sensors at wheels.
The low tire pressure warning lamp blinks once.	 Blinks 1 time ON 0.3 sec > OFF 1.0 sec	The front LH wheel tire pressure sensor is not activated.	Perform the wake-up operation for the tire pressure sensor at front LH wheel.
The low tire pressure warning lamp repeats blinking twice.	  Blinks 2 times ON 0.3 sec > OFF 0.3 sec	The front right wheel tire pressure sensor is not activated.	Perform the wake-up operation for the tire pressure sensor at front right wheel.
The low tire pressure warning lamp repeats blinking for 3 times.	   Blinks 3 times ON 0.3 sec > OFF 0.3 sec	The rear right wheel tire pressure sensor is not activated.	Perform the wake-up operation for the tire pressure sensor at rear right wheel.
The low tire pressure warning lamp repeats blinking for 4 times.	    Blinks 4 times ON 0.3 sec > OFF 0.3 sec	The rear LH wheel tire pressure sensor is not activated.	Perform the wake-up operation for the tire pressure sensor at rear LH wheel.
The low tire pressure warning lamp turns ON and stays illuminated.	 Comes ON and stays ON	Low tire pressure	Check the tire pressure for all wheels and adjust to the specified value.
The low tire pressure warning lamp repeats blinking at 0.5-second intervals for 1 minute, and then stays illuminated.	   Blinks 1 min ON 0.5 sec > OFF 0.5 sec and stays ON <small>SEIA0788E</small>	The combination meter fuse is open or removed (or pulled out).	Check and install the combination meter fuse. If necessary, replace the fuse.
		The low tire pressure warning control unit harness connector is removed.	Check the connection conditions of the low tire pressure warning control unit harness connector, and repair if necessary.
		Tire Pressure Monitoring System (TPMS) malfunction.	<ul style="list-style-type: none"> Perform self-diagnosis. If necessary, perform tire pressure sensor ID registration.



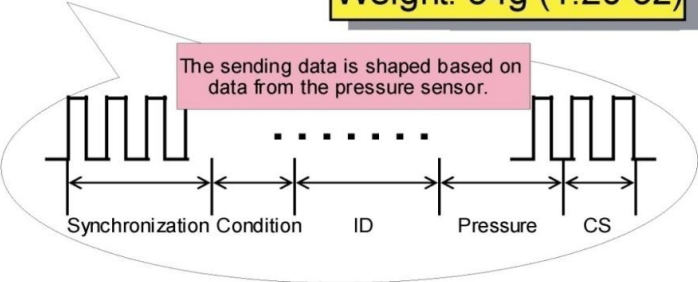
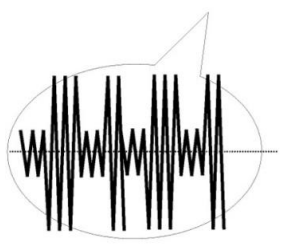
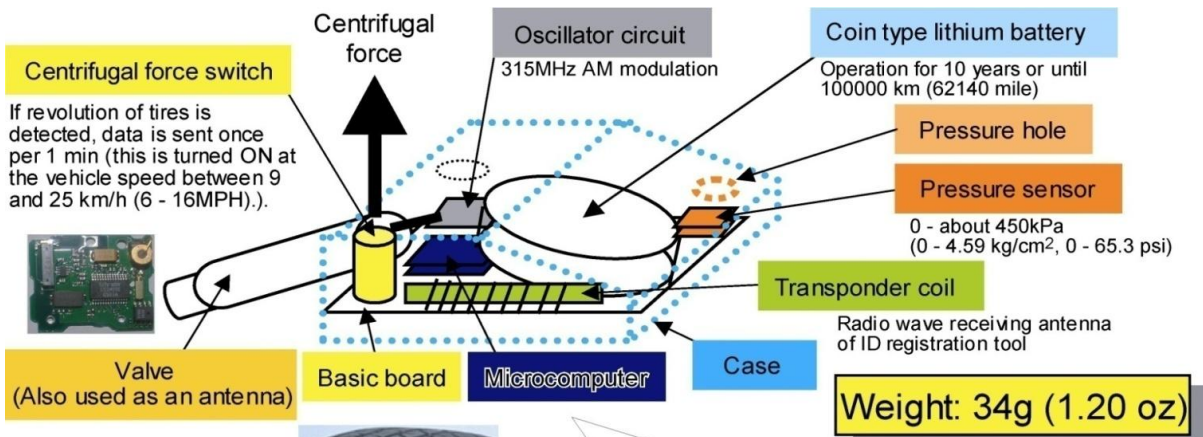
WHEELS & TYRES

Control System Operation

The Low Tyre Pressure Control Unit (LTP C/U) controls the operation of the Tyre Pressure Monitoring System. Radio Frequency signals are sent from each wheel to the corresponding Tyre Pressure Receiver units. From there the tyre pressure information is sent to the LTP C/U via a wiring harness.



Detailed Explanation of Tyre Pressure Sensor





WHEELS & TYRES

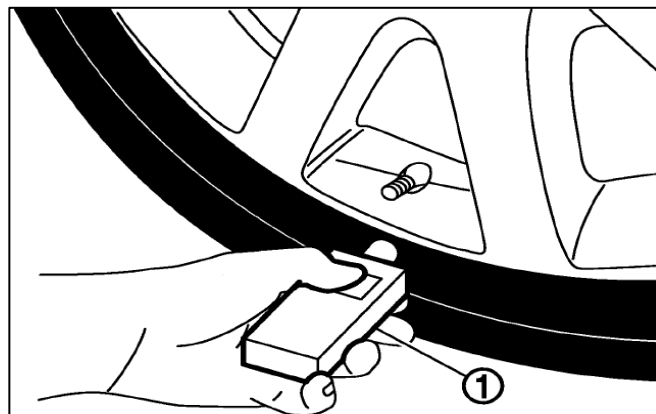
ID Registration (of Tyre Pressure Sensors)

When the following actions have occurred, the "ID Registration" procedure will need to be carried out:

- Wheels have been rotated or replaced
- The Tyre Pressure Sensor has been replaced
- The Low Tyre Pressure Warning C/U has been replaced

Refer to the ESM as follows for the specific details of the ID Registration procedure:

> E SUSPENSION > WT Wheels & Tires > BASIC INSPECTION



SPECIAL NOTES:

- This operation can **only** be carried out via a Nissan Dealership along with the use of CONSULT III plus & Special Service Tool: KV48105500 (1)

- Do NOT carry out the operation close to another TPMS equipped vehicle or where other radio waves are present

- Perform the wake-up procedure in the following order:

- (i) front left wheel
- (ii) front right wheel
- (iii) rear right wheel
- (iv) rear left wheel

- NEVER CHANGE THIS SEQUENCE -

Low tire pressure warning lamp blinking timing		Activation tire position
ON	a : 0.3 sec. b : 1.0 sec.	Front LH
OFF	a : 0.3 sec. b : 1.0 sec.	Front RH
ON	a : 0.3 sec. b : 1.0 sec.	Rear RH
OFF	a : 0.3 sec. b : 1.0 sec.	Rear LH
ON	a : 2 sec. b : 0.2 sec.	All tires

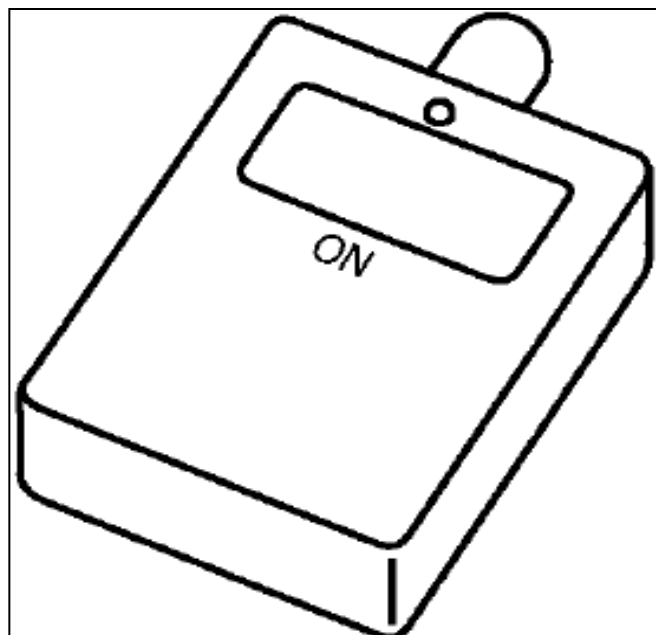
Sequence	ID registration position	Hazard Lamps	CONSULT
1	Front left wheel	2 blinks	"Red" ↓ "Green"
2	Front right wheel		
3	Rear right wheel		
4	Rear left wheel		

Tyre Pressure Sensor Activation SST

Precautions

1. If the tool has not been used for a long period of time, (6 months or more) the battery inside the tool may require replacement

2. The wheel may have to be rotated on the vehicle if the activation process does not work for a specific wheel. Rotate the wheel until the valve stem is close as possible to the Receiver Unit which is installed in the wheel arch. (In the vicinity of the 12 O'clock ~ 3 O' clock position)

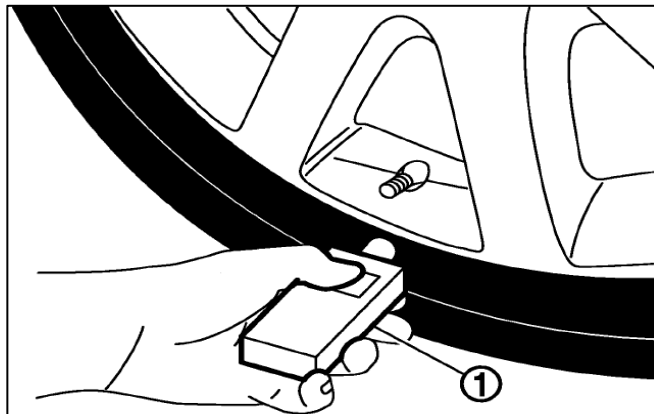




WHEELS & TYRES

Tyre Pressure Sensor Precautions

1. When using the Tyre Pressure Sensor Activation SST, always hold it firmly against the surface of the tyre where the sensor is located. (In line with the valve stem)

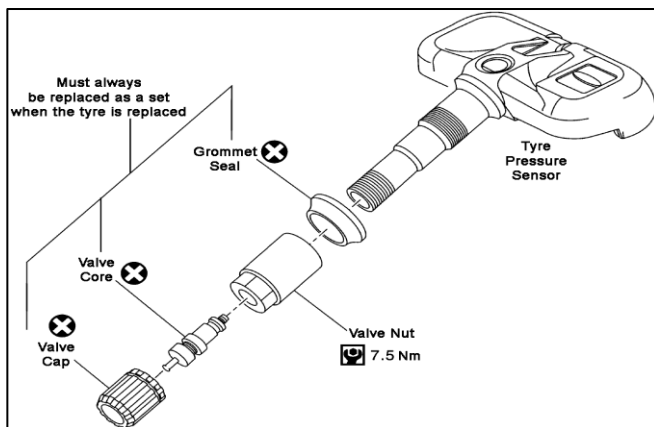


2. Take careful note of the components which cannot be re-used after disassembly or when new tyres are fitted:

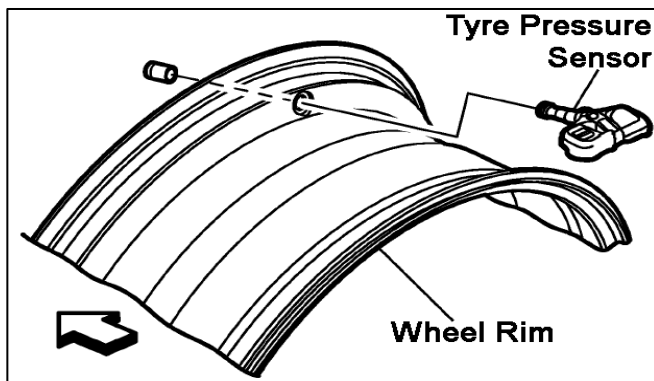
- (i) Grommet seal
- (ii) Valve Core
- (iii) Valve Cap

3. When tightening the valve nut, the tightening speed must only ever be 10 rpm or less.

- Do **not** over tighten
- Do **not** use a power operated tool. Turn by hand & tighten to a maximum torque of 7.5Nm



4. Take special note of the Tyre Pressure Sensors orientation when it is installed onto the rim

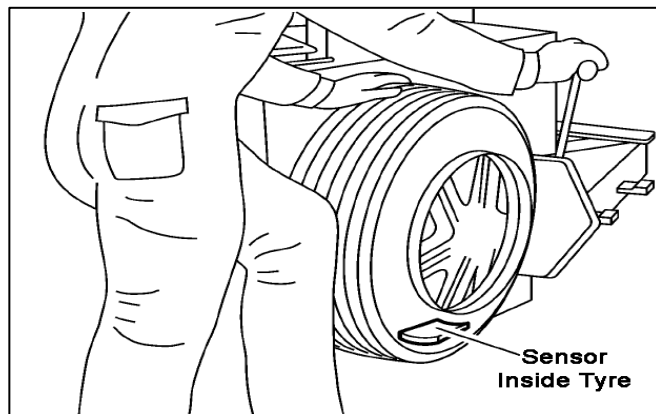




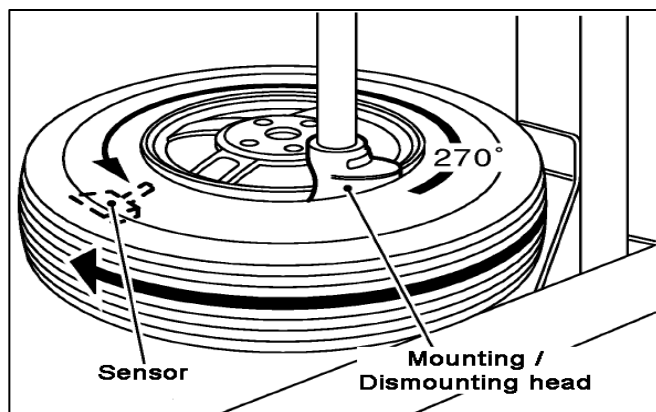
WHEELS & TYRES

Tyre Pressure Sensor Precautions (cont'd..)

5. Take special care when the Tyre is mounted on a tyre changing machine. Keep the sensor at the lowest position (6 O'clock position)

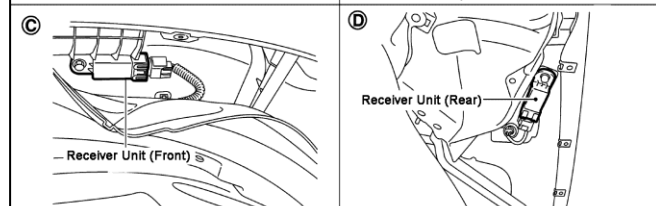
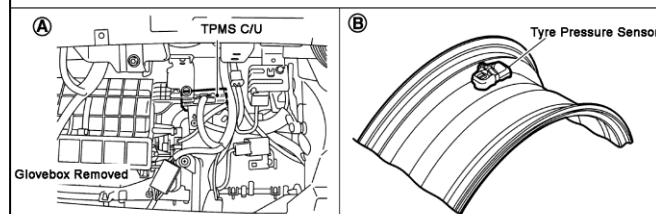
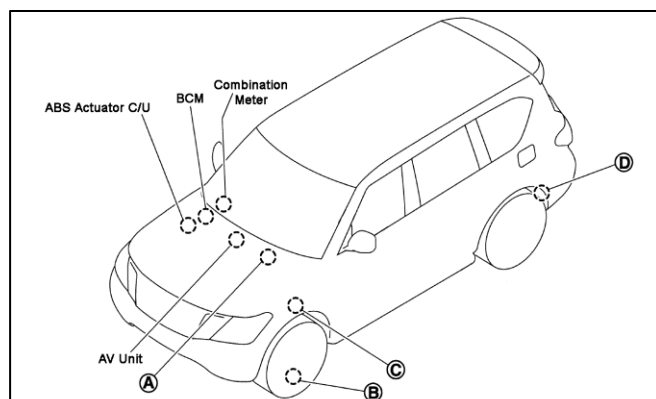


6. The tyre mounting / dismounting head must not make contact to the sensor or it will be damaged. When commencing the tyre removal / refitting process, keep the head 270 deg away from the sensor



Y62 Patrol TPMS Component Location

- The TPMS C/U is located behind the Glovebox
- The Tyre Pressure Receiver units are located in each of the wheel arches behind the plastic wheel arch lining





WHEELS & TYRES

Trouble Diagnosis

Step 1;

Confirm the operation of the system via the instruction from section 4 of the Owners Manual (Is the system operating correctly & as it was designed to do so?)

Step 2;

If it is found there is a fault, connect CONSULT III plus to the vehicle & access AIR PRESSURE MONITOR.

- Check for any DTC's. If there are any, refer to the ESM as follows;

> E SUSPENSION > WT > DTC/CIRCUIT DIAGNOSIS

More detail & the Diagnosis Procedure for the DTC is located here.

- If there are no DTC's yet the fault is clearly evident, refer to the ESM as follows;

> E SUSPENSION > WT > SYMPTOM DIAGNOSIS

Various processes are discussed dependant on the fault at hand.

Wiring Diagrams

Refer to the ESM as follows for a wiring diagram of the TPMS system;

> E SUSPENSION > WT > WIRING DIAGRAM

Here you will find Power & Ground supplies as well as the appropriate locations of the fuses & ground connections.

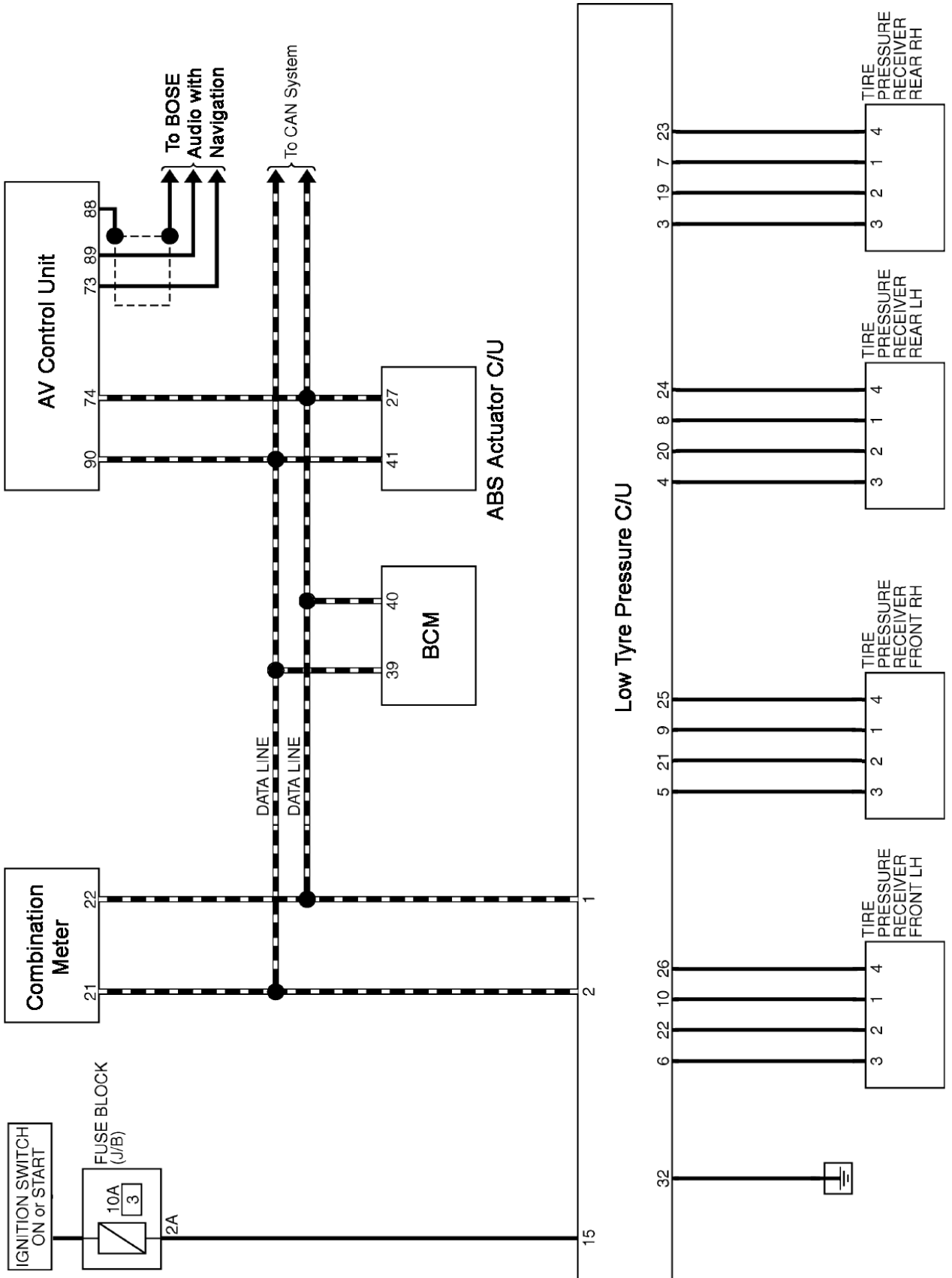
Access to the AIR PRESSURE MONITOR system with CONSULT III plus

Full interaction with the system for setting customer preferences, checking for any system DTC's, checking for input & output activity & checking component operation is available with CONSULT III plus. See below a description of each diagnosis mode available;

Mode	FUNCTION DESCRIPTION
ECU IDENTIFICATION	Displays the part number of low tire pressure warning control unit.
SELF-DIAGNOSIS RESULTS	Self-diagnosis result can be quickly read.*
DATA MONITOR	Input and output data of low tire pressure warning control unit can be read.
ACTIVE TEST	Sends command to the low tire pressure warning control unit to change output signals and check operation of output system.
WORK SUPPORT	Components can be quickly and accurately adjusted.



WHEELS & TYRES





BRAKES

Hydraulic Brake Booster

An all new Hydraulic Brake Booster has been adopted.

There is an Electric Motor which drives a pump which in turn pressurises an Accumulator. This pressure is utilised to assist the driver with braking pressure at the wheels.

The Motor & Pump assemblies are attached to the Brake Master Cylinder assembly. The same Motor & Pump unit is also utilised by the ABS / VDC system when the ABS / VDC system has been activated.

ABS Actuator C/U

The ABS Actuator & Control Unit is also attached to the Brake Master cylinder assembly. The operation of the ABS /VDC system is otherwise the same as other models.

Brake Master Cylinder

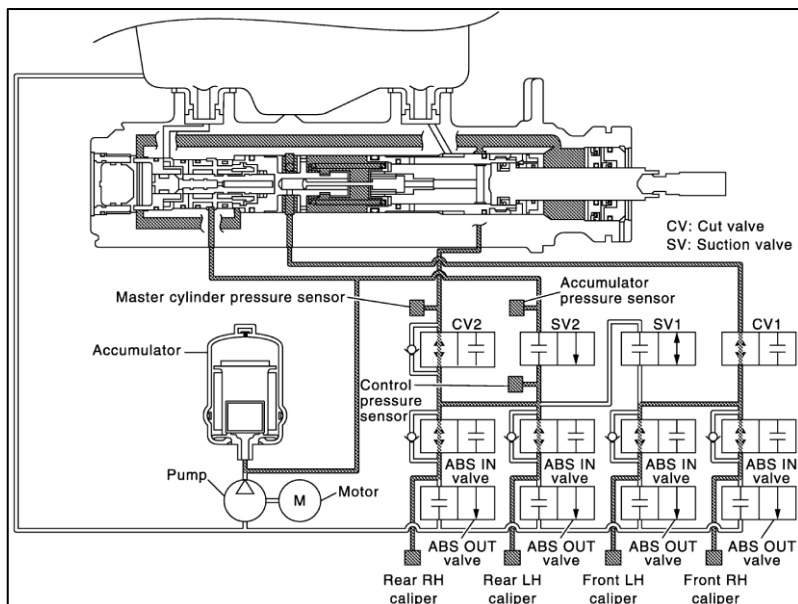
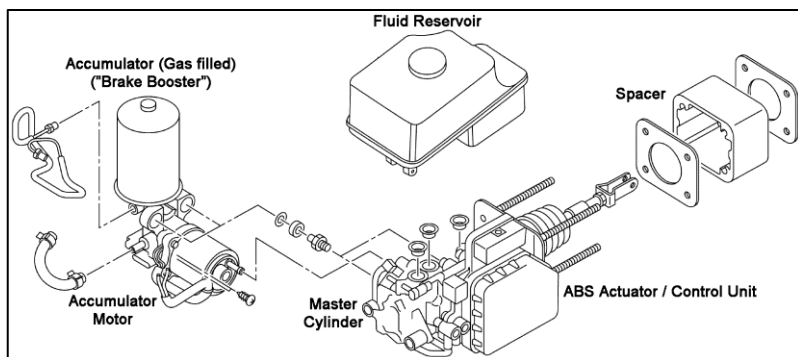
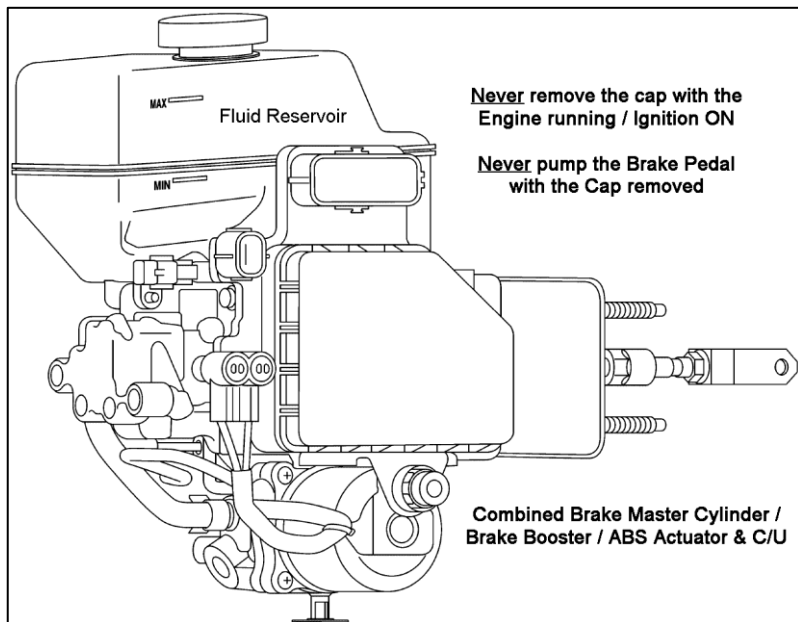
Apart from the ABS & Brake Booster systems forming part of the Brake Master Cylinder assembly, the operation of the Brake Master Cylinder is mostly the same as other models.

WARNING

Be sure to follow the directions in the ESM &/or Owners Manual in regards to Brake Fluid level inspection.

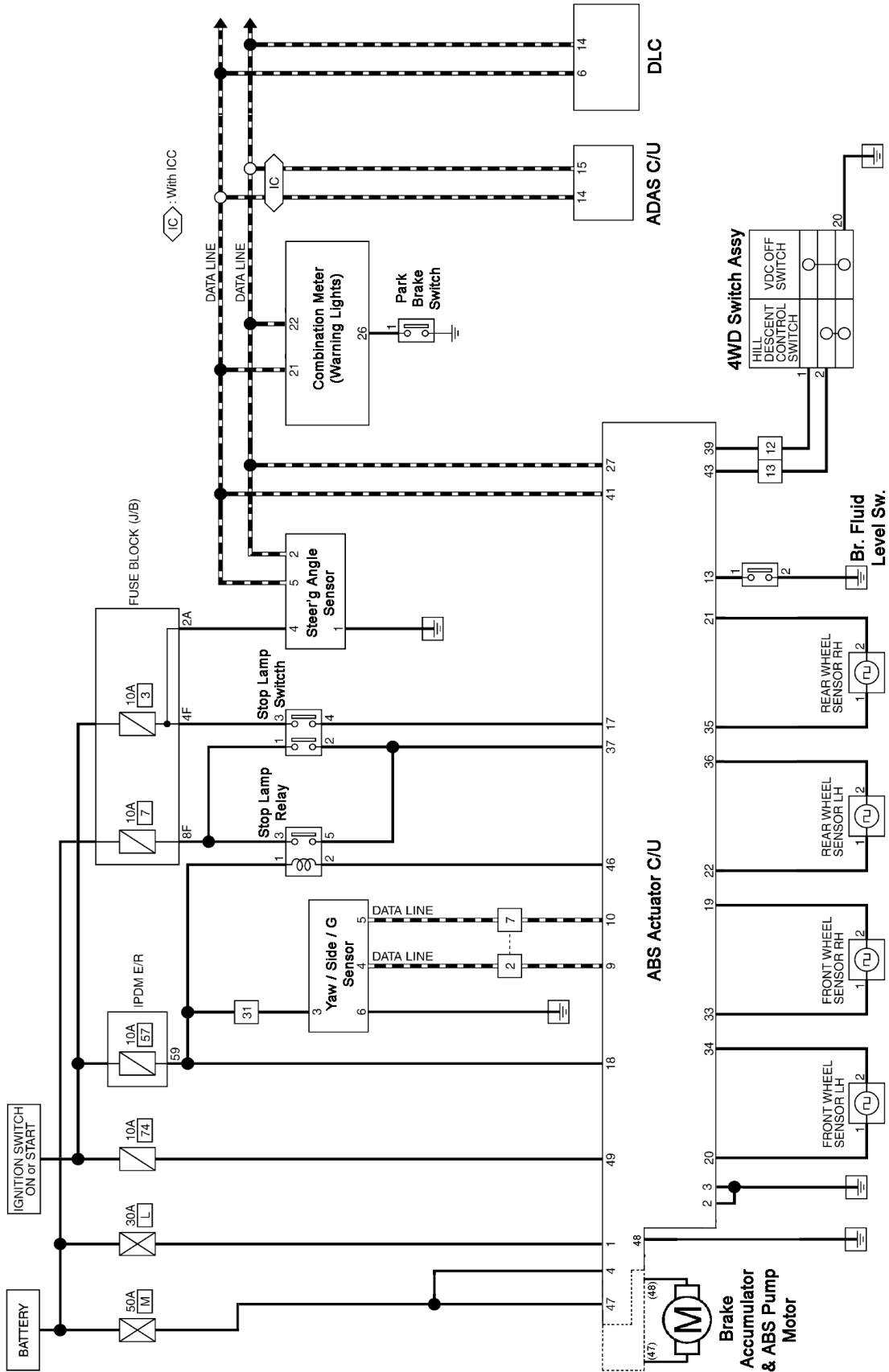
There are times when the level of the Brake Fluid is to be kept well below the Full Line of the Reservoir.

Follow the directions in the ESM &/or OM for more details on Brake Fluid Level inspection.





BRAKES





BRAKES

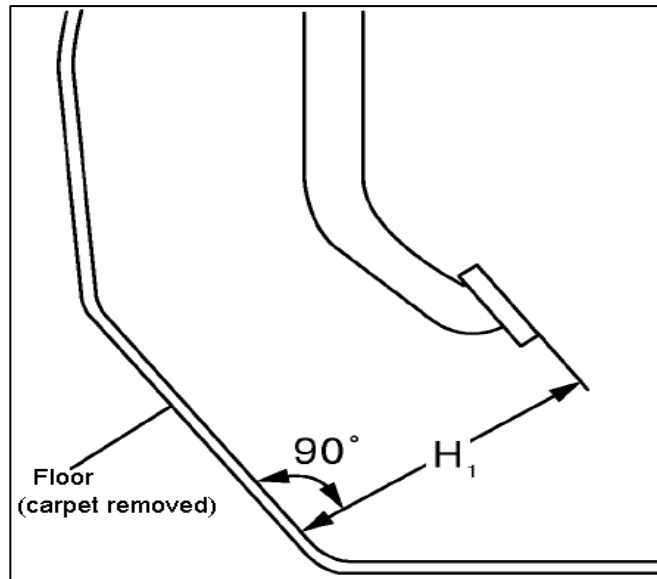
Brake System Maintenance

Brake Pedal Height

Always ensure that the Brake Pedal Height is correct.

Refer to the ESM for directions on how to check the height as well as the most current specifications as follows:

[F > BRAKES > PERIODIC MAINTENANCE > BRAKE PEDAL](#)
[F > BRAKES > SERVICE DATA AND SPECIFICATIONS](#)

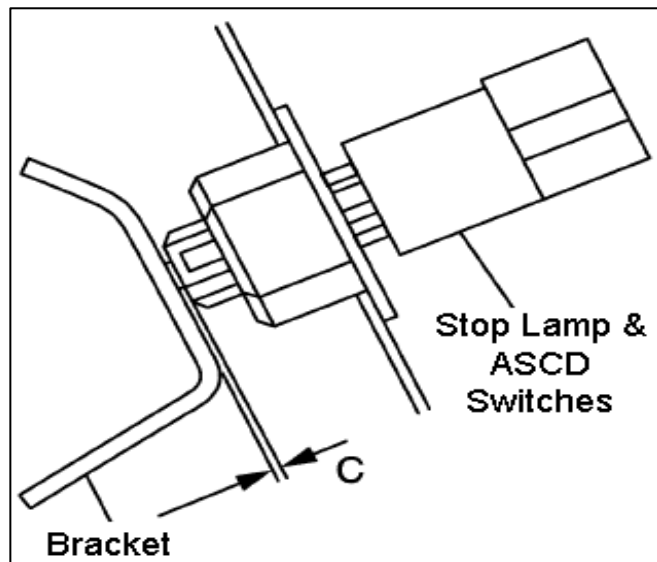


Stop Lamp Switch / ASCD Brake Switch

Always ensure that **both** of the Switches mounted on the Brake Pedal bracket are correctly adjusted.

Refer to the ESM for directions on how to check the switch clearances as well as the most current specifications as follows:

[F > BRAKES > PERIODIC MAINTENANCE > BRAKE PEDAL](#)
[F > BRAKES > SERVICE DATA AND SPECIFICATIONS](#)

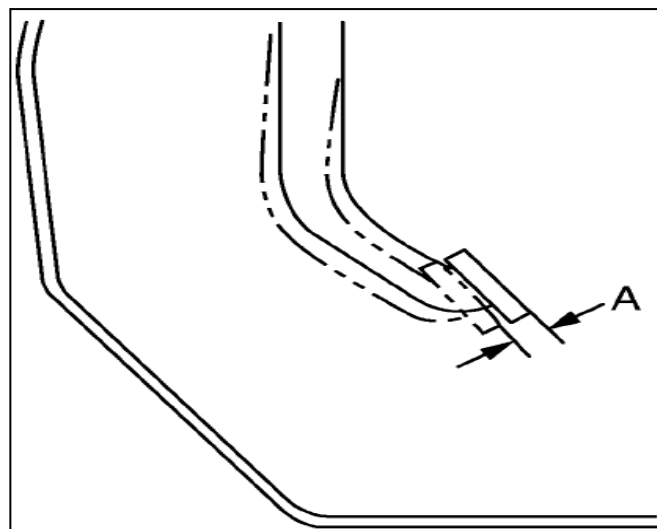


Brake Pedal Free Play

Ensure that the brake pedal has the correct Free Play.

Refer to the ESM for directions on how to check the Free Play as well as the most current specifications as follows:

[F > BRAKES > PERIODIC MAINTENANCE > BRAKE PEDAL](#)
[F > BRAKES > SERVICE DATA AND SPECIFICATIONS](#)





BRAKES

Brake System Maintenance

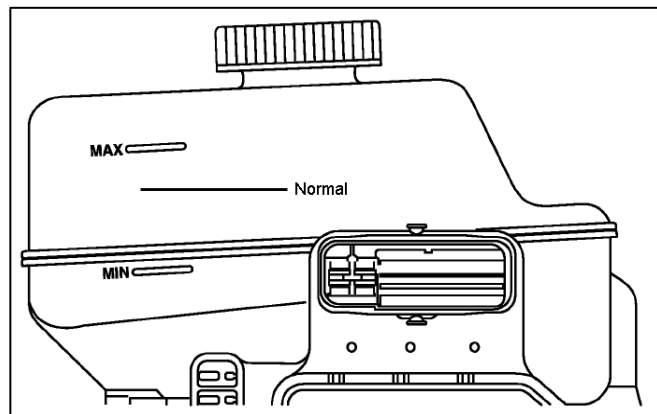
Brake Fluid Level

When carrying out the Inspection for Brake Fluid Level – follow the directions as outlined in the Owners Manual or ESM

Do **not** overfill the Fluid Reservoir. Although the Fluid Level appears to be **below** the MAX. Line, this is most likely **normal**

Refer to the ESM for directions on how to check the Fluid Level as well as the most current specifications as follows:

F > BRAKES > PERIODIC MAINTENANCE > BRAKE FLUID



Brake Fluid Bleeding / Changing Brake Fluid

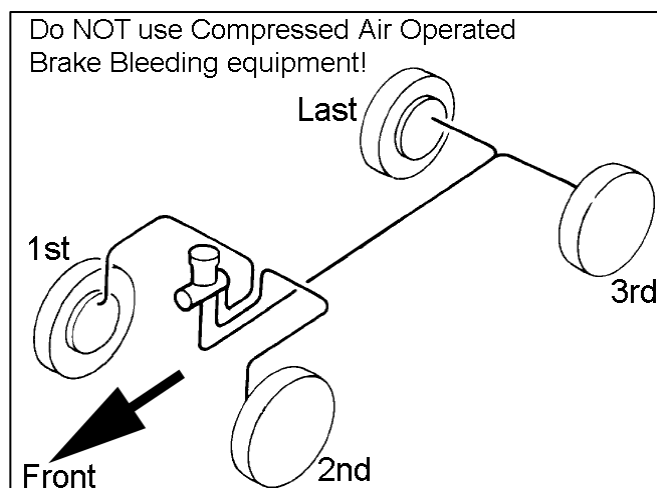
When carrying out a Brake System Bleeding procedure or when the Brake Fluid is being changed as part of a service, take note of the following points / precautions:

- Do NOT use Compressed Air or other automated Brake Bleeding Equipment. A 2nd person must be on hand to operate the Brake Pedal

- When bleeding the Rear Brake, the Accumulator Pump will pump the Fluid through the circuits without the need for the Brake Pedal to be pumped

- For the Front Brakes, the bleeding method is via the traditional method of Pumping the Brake Pedal.

- At the completion of the operation, it will be necessary to clear the DTC C118E with the use of CONSULT III plus.



Refer to the ESM for directions on how to change / bleed the Brake Fluid as follows:

F > BRAKES > PERIODIC MAINTENANCE > BRAKE FLUID

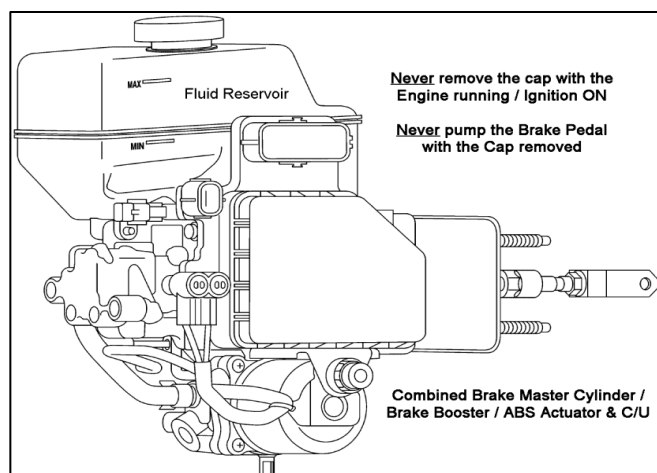
Electric / Hydraulic Brake Booster Inspection

For conventional brake systems, a vacuum supply check & leak test is necessary.

For models with Electric / Hydraulic Brake Boosters, a different procedure is necessary.

Refer to the ESM for directions on how to Inspect the Brake Booster as well as the most current specifications as follows:

F > BRAKES > PERIODIC MAINTENANCE > HYDRAULIC BOOSTER ASSEMBLY





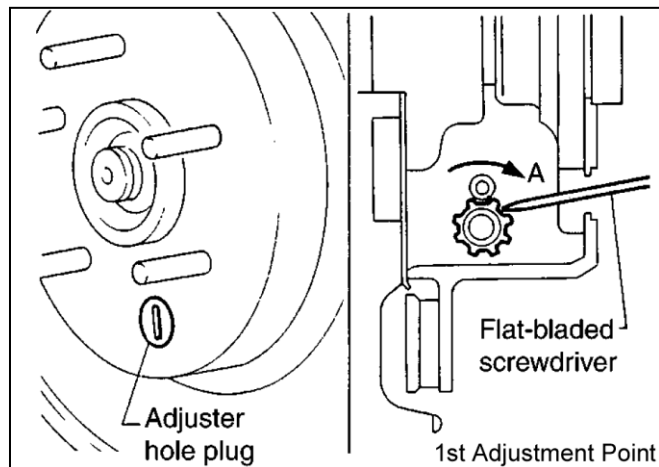
BRAKES

Parking Brake

All Y62 variants have the same type of “Drum in Disc” Parking Brake system. Construction is basically the same as R51 & Y61 TB48 variants.

For more detail regarding repairs or adjustment please refer to the ESM as follows;

F BRAKES > PB PARKING BRAKE SYSTEM

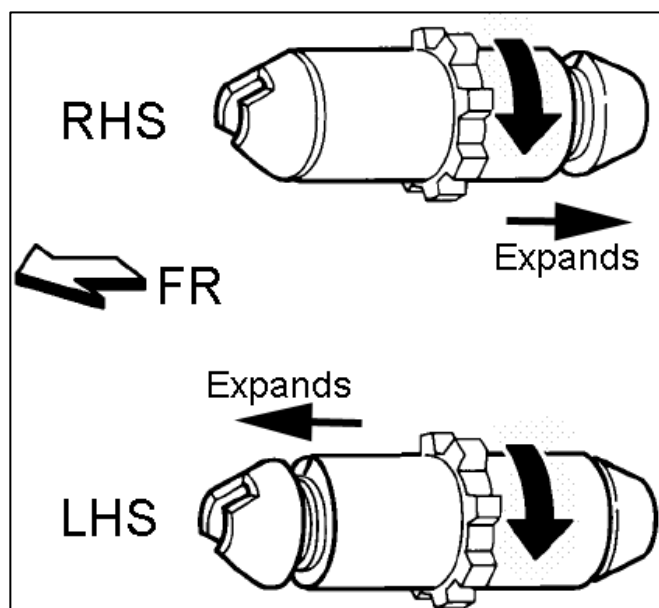


Adjustment Precautions

Handbrake adjustment (as is the case with ALL Nissan Models) is not a simple case of simply tightening the adjuster nut at the Handbrake Lever. In principle you must **loosen** the adjuster nut at the Handbrake Lever 1st, then adjust the brake shoe to Drum clearance 2nd & finally re-tighten the cable adjustment at the Handbrake Lever last until the right setting is achieved as per the directions in the Service Manual. Ensure there is a small but notable amount of free-play evident in the Park Brake Lever.

PLEASE NOTE: If the Park Brake is over adjusted or incorrectly adjusted, **SEVERE DRIVELINE VIBRATION** may result.

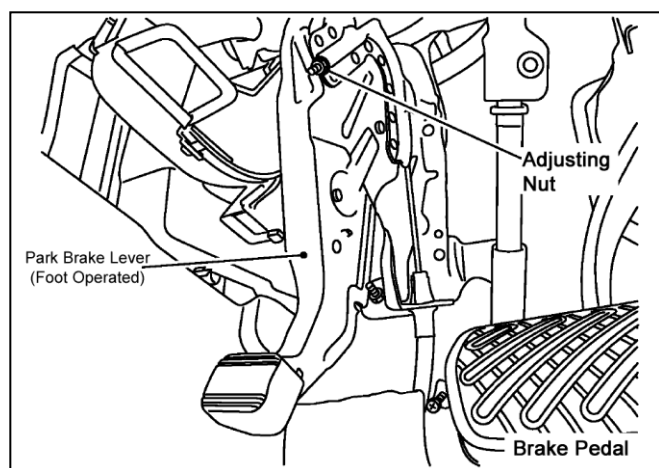
Ensure the correct procedure is carried out when adjusting the Park Brake.



NOTE:

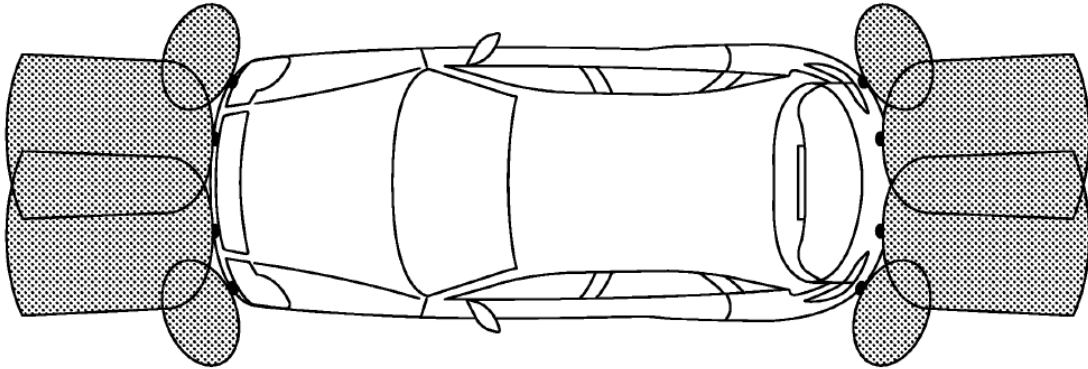
If the Handbrake requires adjustment, follow the procedure as advised above. **DO NOT ADJUST THE HANDBRAKE BY TIGHTENING THE CABLE AT THE LEVER UNTIL IT APPEARS TO “FEEL BETTER!”**

Severe **Driveline Vibration** will otherwise result!





DRIVER INFORMATION & MULTIMEDIA



Sonar System - Functionality (Front & Rear Parking Sensors; Factory Fitted)

The Parking Sensor system sounds a tone to warn the driver of obstacles near the bumper. A Parking Sensor indicator will also appear in the center display screen.

- The system detects front obstacles when the selector / shift lever is in the "D" (Drive) & other gear positions except the P (Park) position.
- The system detects both front and rear obstacles when the selector/shift lever is in the "R" (Reverse) position.

The system may not detect objects at speeds above 10 km/h and may not detect certain angular or moving objects.

The Parking Sensor system detects obstacles up to 1.2 m from the bumper with a decreased coverage area at the outer corners of the bumper.

NOTES:

- Keep the Sonar Sensors (located in the Front & Rear bumper fascia) free from snow, ice and large accumulations of dirt (do not clean the sensors with sharp objects). If the sensors are covered, it will affect the accuracy of the Sonar System.
- A clear understanding of the limitations of the Sonar System as outlined in the OM (section 5) should be obtained. Inclement weather may affect the function of the sonar system; this may include reduced performance or a false activation.
- This system is **not** designed to prevent contact with small or moving objects.
- The system is designed as an aid to the driver in detecting large stationary objects to help avoid damaging the vehicle.
- The system will **not** detect small objects below the bumper, and may not detect objects close to the bumper or on the ground.
- If your vehicle sustains damage to the rear bumper fascia, leaving it misaligned or bent, the sensing zone may be altered causing inaccurate measurement of obstacles or false alarms.
- If the sonar system malfunctions, the beep sounds for 3 seconds when the selector lever is moved to the "R" (Reverse) position. The system will require diagnosis with CONSULT III plus to determine the fault.
- If a Tow Bar is to be fitted to the vehicle, ensure that the kit (tow bar & wiring) is **Genuine Nissan**. The kit has been designed so that when a trailer is connected, the Sonar System alarm sound is disabled.



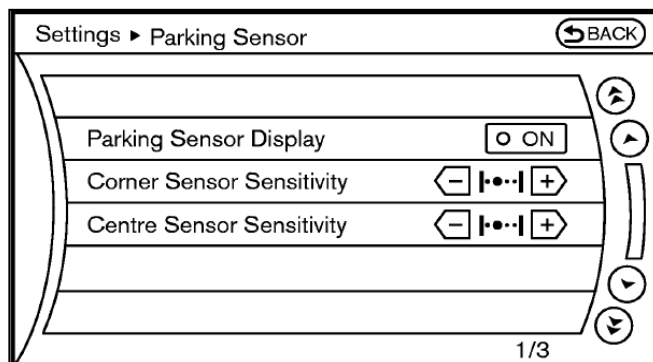
DRIVER INFORMATION & MULTIMEDIA

Sonar System - Operation

Master Control & Driver Preferences

Via the Centre Display Screen, the Parking Sensor System can be switched ON or OFF.

Sensitivity settings can also be changed by the driver if so desired.

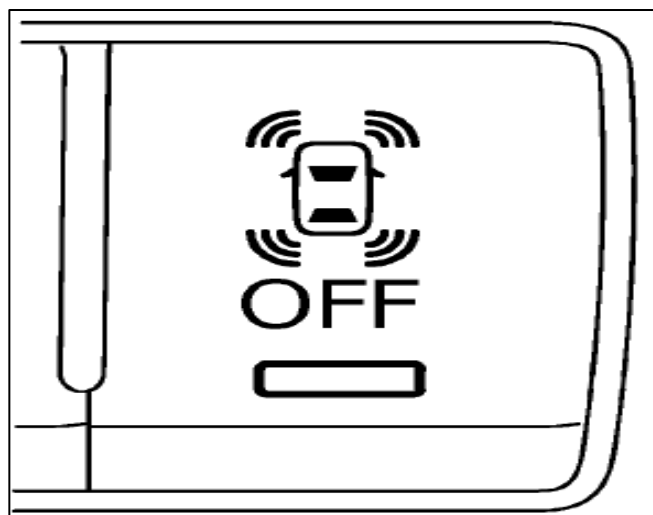


Parking Sensor Off Switch

If so desired by the driver, the system can be switched OFF.

NOTES:

- The illumination of the small indicator light = OFF
- If the system has been switched OFF (via the button shown right) & then the Ignition is switched OFF & then back ON again, the system will automatically revert to ON again. (Small indicator light = OFF)
- The Alarm sound will be disabled automatically when a trailer is connected via the taillight electrical connector. The Towbar & Wiring Kit fitted must only be Genuine Nissan however.



Warning Alarm / Buzzer Frequency

- The warning buzzer output frequency changes 4 levels (for center) and 3 levels (for corner) according to the detection distance.

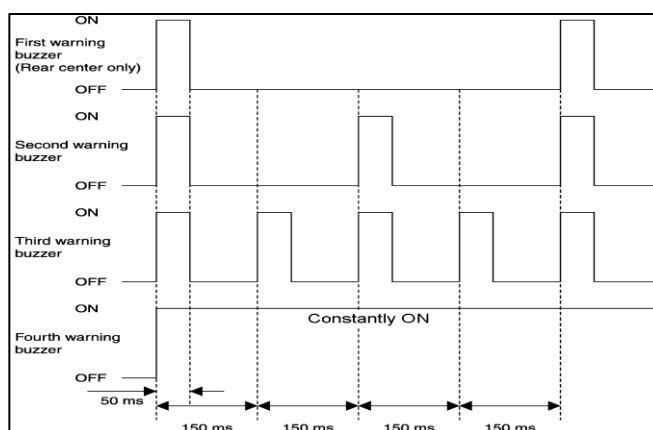
- The nearest sensor from the detected obstacle applies the buzzer output frequency if plural sensors detect any obstacle simultaneously.

Models with Navigation:

- The Alarm Sound is output through the Audio System speakers

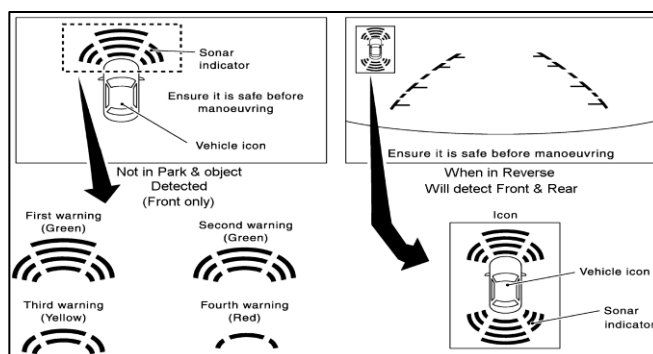
Models without Navigation:

- The alarm sound for objects detected at the rear is output through a speaker in the rear of the vehicle
- The alarm sound for objects detected at the front of the vehicle is output through a speaker at the front of the cabin (built into the Sonar C/U)



Parking Sensor Display Screen

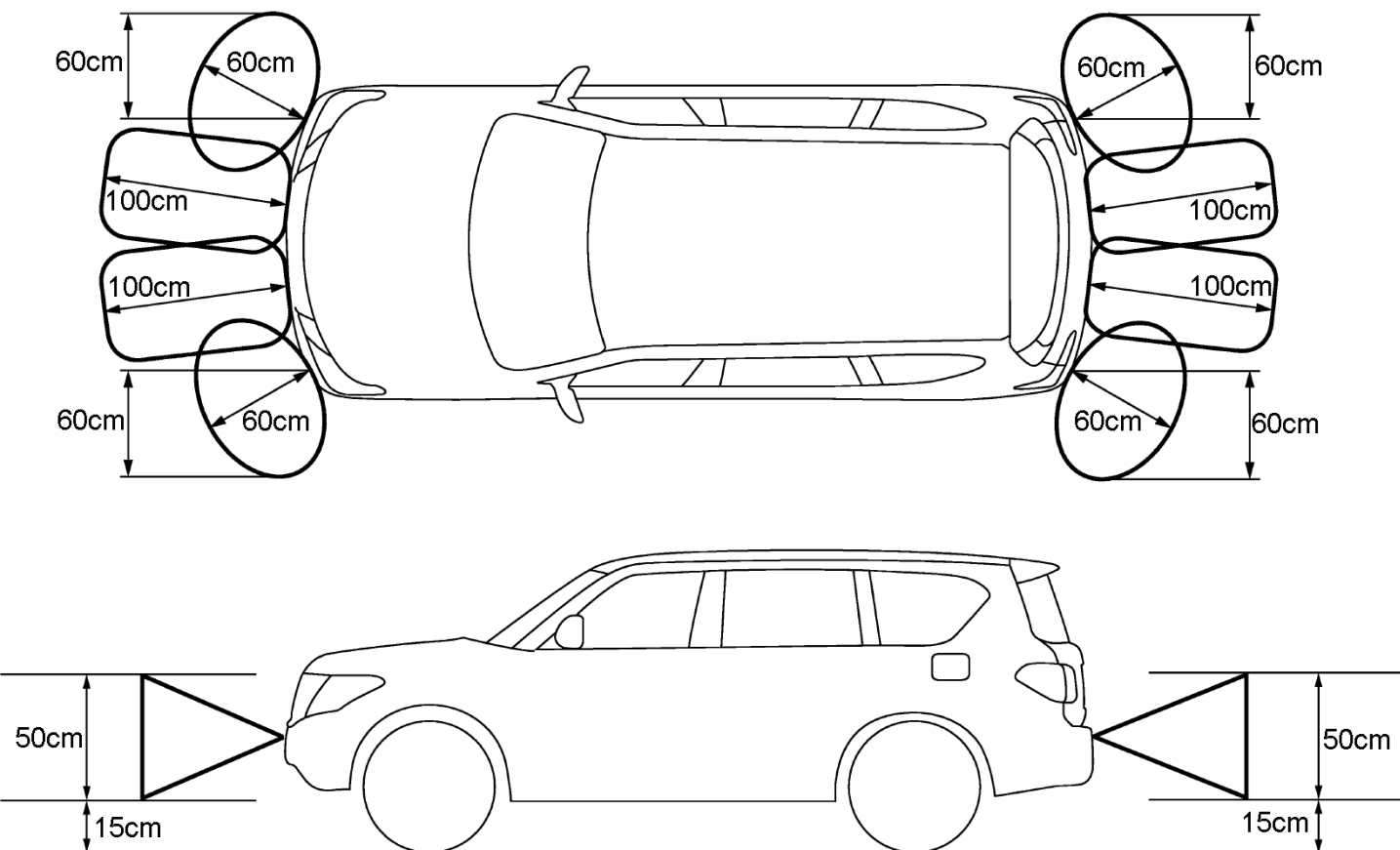
When the Parking Sensor system is operational, the screen shown right will appear in conjunction with the above described alarm operation.





DRIVER INFORMATION & MULTIMEDIA

Sonar System - Operation Operating Distances



Customer Preference Settings

It is possible to vary the detection distances via the SONAR system "Work Support" function of CONSULT III plus. Specific measurements & other important details can be found in the ESM as follows:

> N DRIVER INFORMATION & MULTIMEDIA > SN > SYSTEM DESCRIPTION > DIAGNOSIS SYSTEM (SONAR CONTROL UNIT)

Take note of the "TRAILER HITCH MODE". This should not be necessary to change if the Genuine Nissan Parts Accessory wiring harness adapter is fitted (alarm function will shut OFF if a trailer is connected). However, this feature maybe of use if a customer requires that the Tow Hitch needs to remain in place.

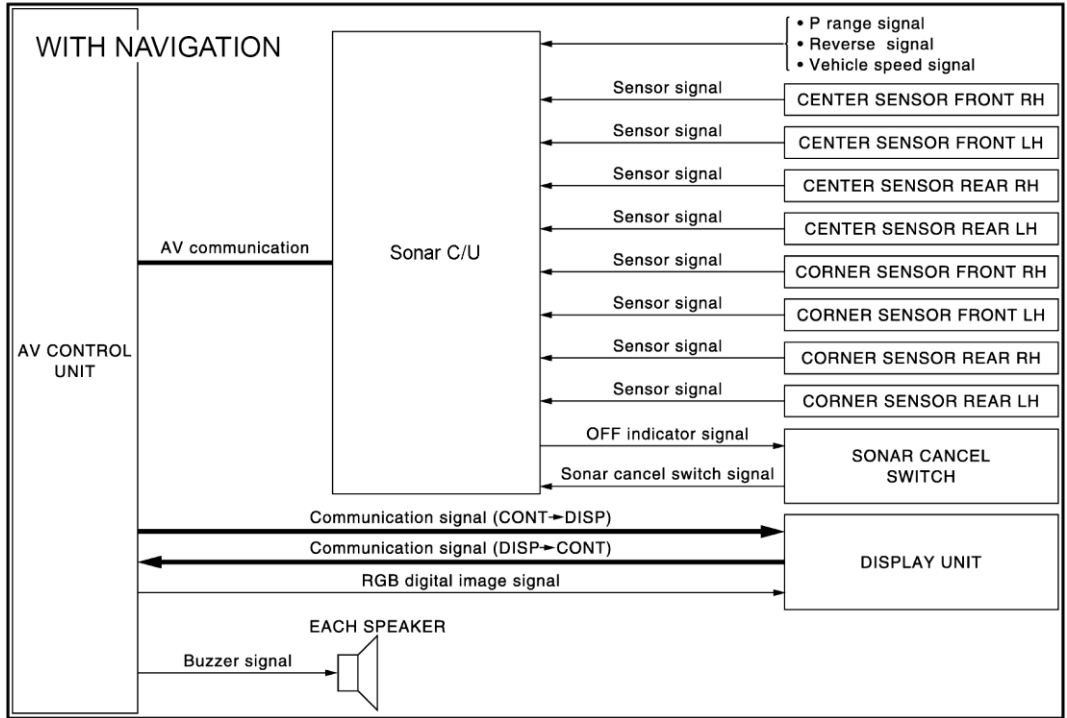
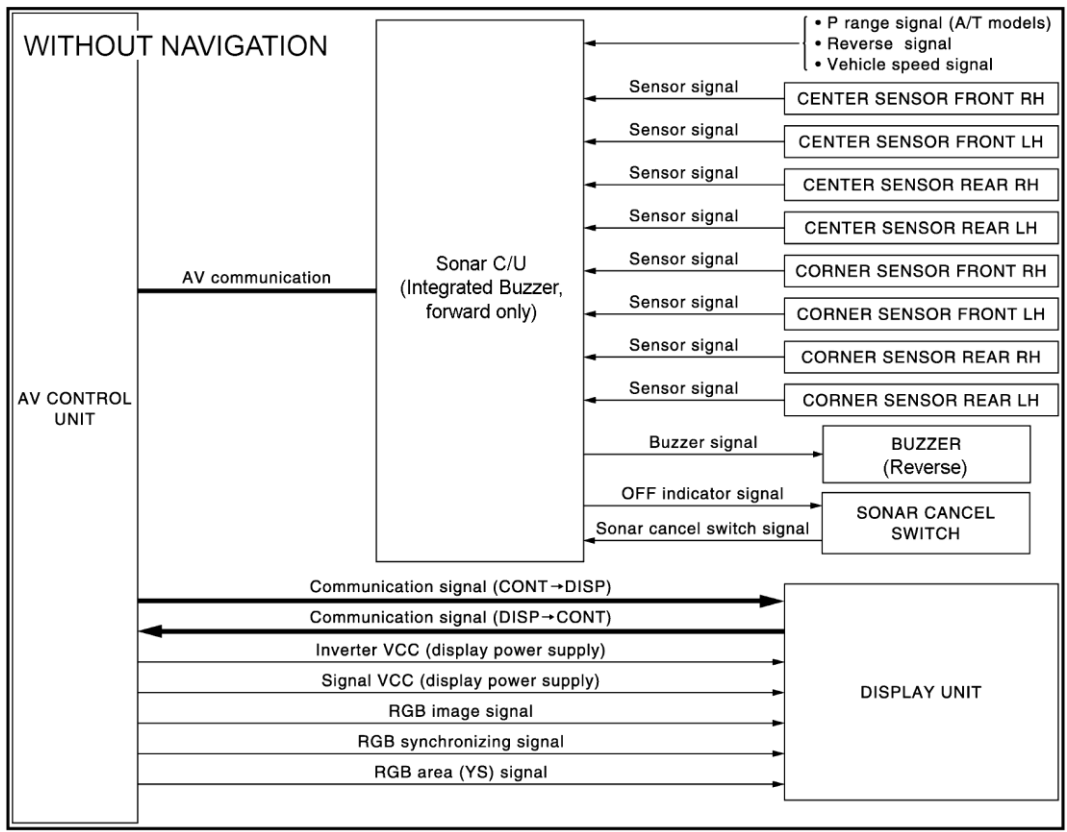
Work support item	Function
CORNER SEN DISTANCE SET	Corner sensor warning buzzer distance is adjustable to 4 phases.
CENTER SEN DISTANCE SET	Center sensor warning buzzer distance is adjustable to 4 phases.
VOLUME SETTING (Non Navi only)	Warning buzzer volume can set it 2 phases.
TRAILER HITCH MODE (Not necessary to use if Genuine Nissan Tow Bar & Wiring is fitted)	Center sensor (RR, RL) only is adjustable not to detect the distance less than 40 cm NOTE: This adjustment is for preventing to miss detect the distance when installing the trailer hitch.



DRIVER INFORMATION & MULTIMEDIA

Control System Operation

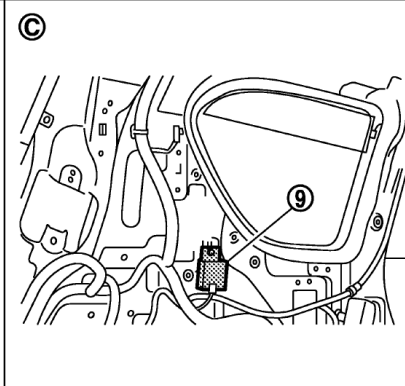
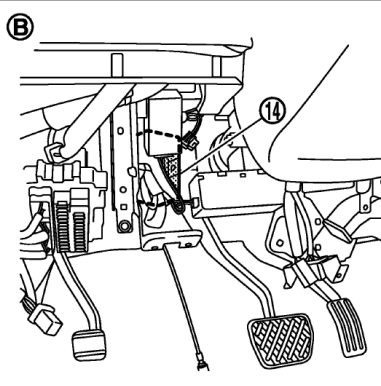
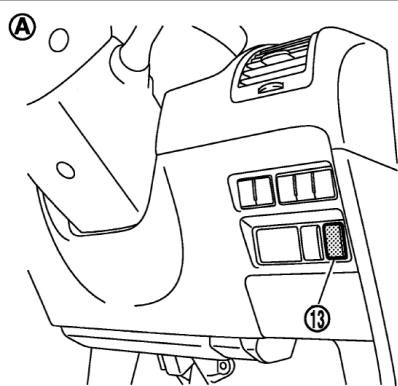
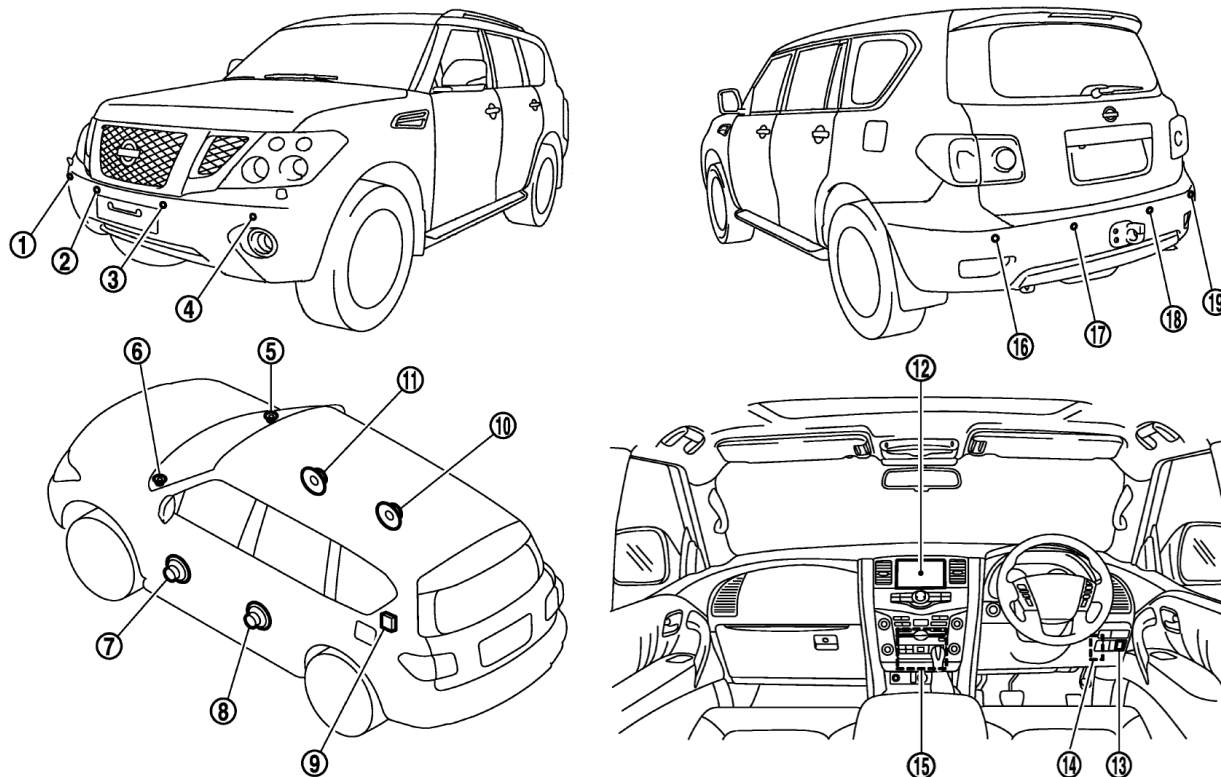
The Sonar Control Unit controls the operation of the Parking Sensor System





DRIVER INFORMATION & MULTIMEDIA

Y62 Component Location



- | | | |
|------------------------------|--|---|
| 1. Corner sensor front RH | 2. Center sensor front RH | 3. Center sensor front LH |
| 4. Corner sensor front LH | 5. Squawker RH | 6. Squawker LH |
| 7. Front door speaker LH | 8. Rear door speaker LH | 9. Buzzer (backward) ^{*1} |
| 10. Rear door speaker RH | 11. Front door speaker RH | 12. Front display unit ^{*2} |
| 13. Sonar cancel switch | 14. Sonar control unit | 15. AV control unit |
| 16. Corner sensor rear LH | 17. Center sensor rear LH | 18. Center sensor rear RH |
| 19. Corner sensor rear RH | | |
| A. Instrument lower panel LH | B. Instrument lower panel LH removed condition | C. Back pillar garnish LH removed condition |

*1: Models without navigation.

*2: Models with front display unit.



DRIVER INFORMATION & MULTIMEDIA

Trouble Diagnosis

Step 1;

Confirm the operation of the system via the instruction from section 5 of the Owners Manual (Is the system being operated correctly?)

Step 2;

If it is found there is a fault, connect CONSULT III plus to the vehicle & access SONAR.

- Check for any DTC's. If there are any, refer to the ESM as follows;

> N DRIVER INFORMATION & MULTIMEDIA > SN > DTC/CIRCUIT DIAGNOSIS

More detail & the Diagnosis Procedure for the DTC is located here.

- If there are no DTC's yet the fault is clearly evident, refer to the ESM as follows;

> N DRIVER INFORMATION & MULTIMEDIA > SN > SYMPTOM DIAGNOSIS

Various processes are discussed dependant on the fault at hand.

Wiring Diagrams

Refer to the ESM as follows for a wiring diagram of the SONAR system;

> N DRIVER INFORMATION & MULTIMEDIA > SN > WIRING DIAGRAM

Here you will find Power & Ground supplies as well as the appropriated locations of the fuses & ground connections.

Access to the SONAR system with CONSULT III plus

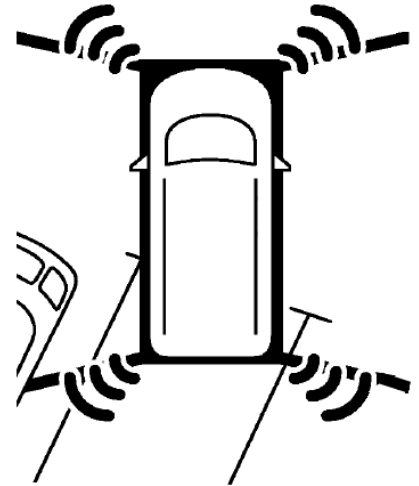
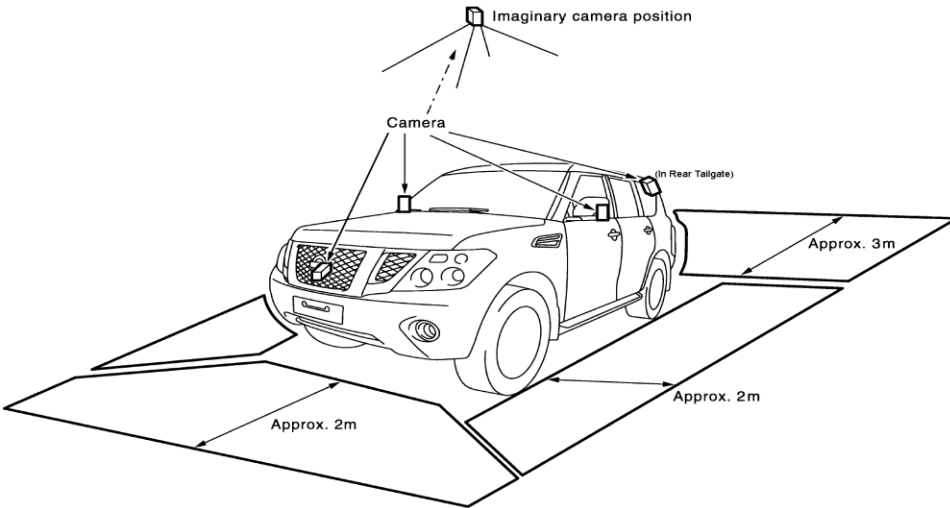
Full interaction with the system for setting customer preferences, checking for any system DTC's, checking for input & output activity & checking component operation is available with CONSULT III plus. See below a description of each diagnosis mode available;

Test mode	Function
Ecu Identification	Sonar control unit part number can be read.
Self Diagnostic Results	Sonar control unit checks the conditions and displays memorized error.
Data Monitor	Sonar control unit input/output data in real time.
Work support	Changes setting of each function.
Active Test	Gives a drive signal to a load to check the operation.



DRIVER INFORMATION & MULTIMEDIA

Around View Monitor (AVM) – Functionality



The AVM system is equipped with wide-angle high-resolution cameras on the front and rear of the vehicle and on the right and left door exterior mirrors. The images from the front, rear & both sides view provides for a “Birds-Eye” like view from the top of the vehicle are displayed on the Navi Screen .

The Sonar Indicator is also displayed (superimposed on the camera image) in combination with the camera images to warn of approaching obstacles.

When in the front & rear view mode, the vehicle width, distance lines and predictive course lines are superimposed onto the centre screen

The Birds-Eye view converts the images from 4 cameras into the overhead view and displays the status of the vehicle on display. The vehicle icon and sonar indicator that are displayed on the Birds-Eye view display are rendered by the AVM C/U.

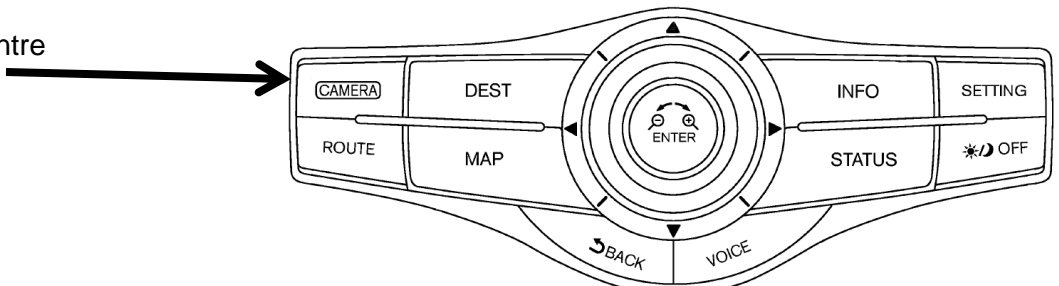
AVM Operation

When the CAMERA button is pressed or the gear shift lever is moved to the Reverse position (Ign-ON), the AVM operates. The monitor displays various views of the position of the vehicle as follows:

Available views:

- Bird-Eye View :** The surrounding view of the vehicle
- Front-Side View:** The view around and ahead of the front passenger’s side wheel
- Front View:** The view to the front of the vehicle
- Rear View:** The view to the rear of the vehicle (appears when Reverse is selected)
- Rear-Wide View:** The approximately 180-degree view to the rear of the vehicle

Camera Switch on Centre Switch Panel

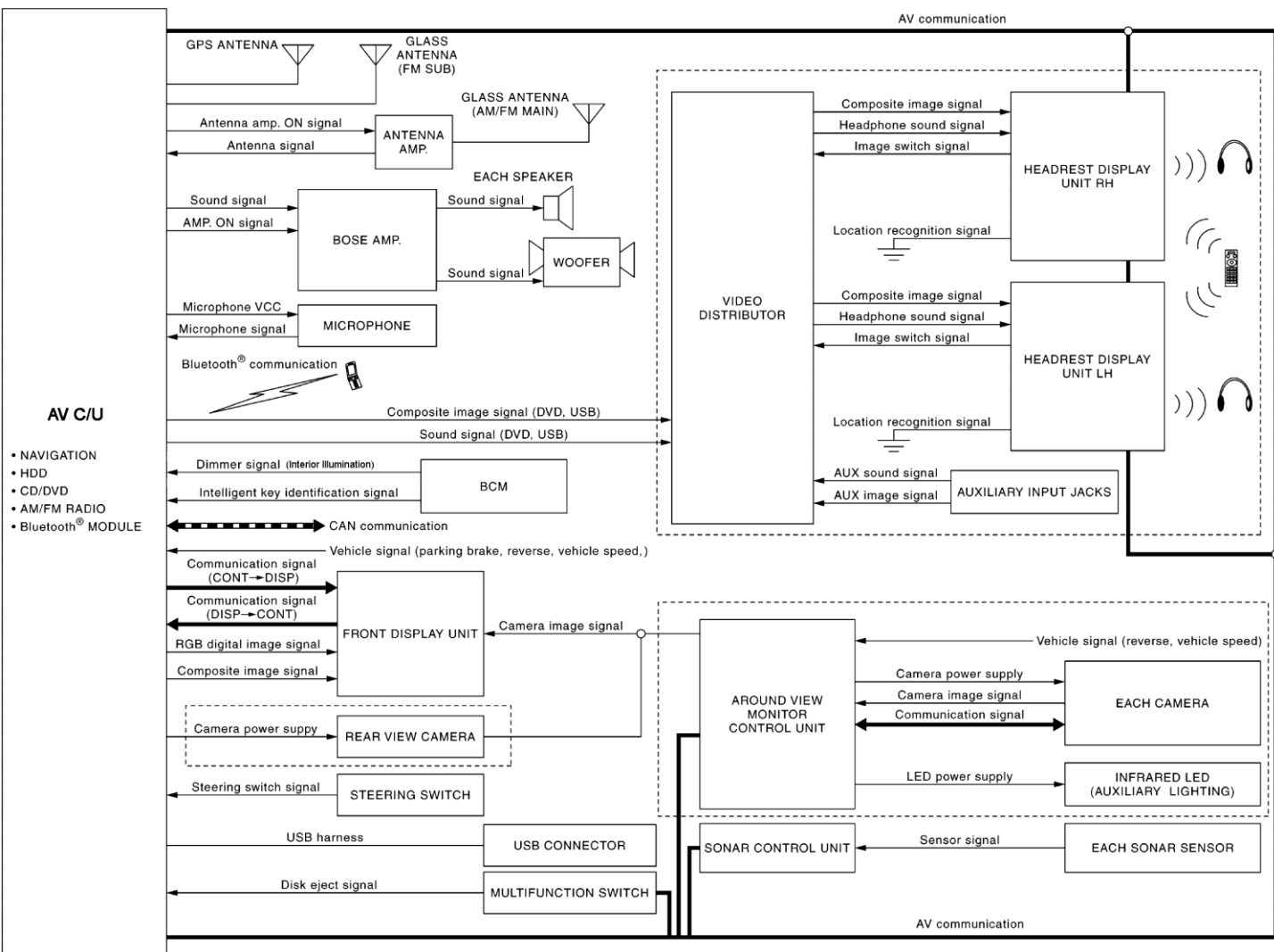




DRIVER INFORMATION & MULTIMEDIA

Control System Operation

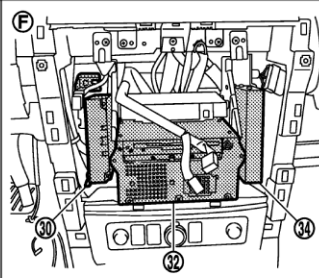
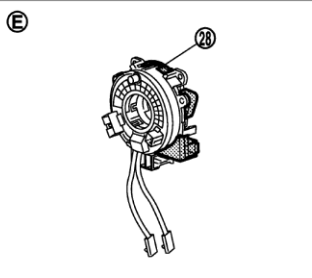
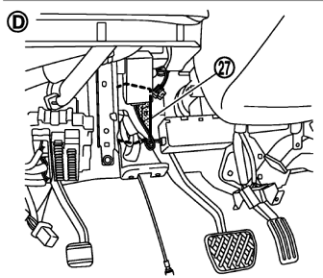
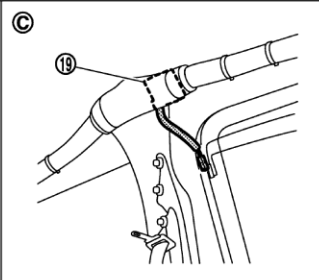
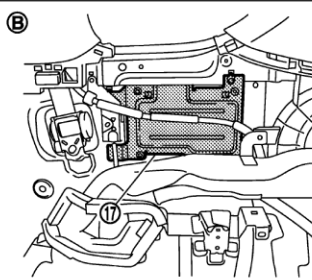
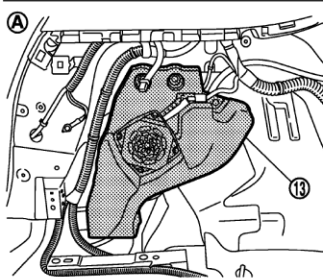
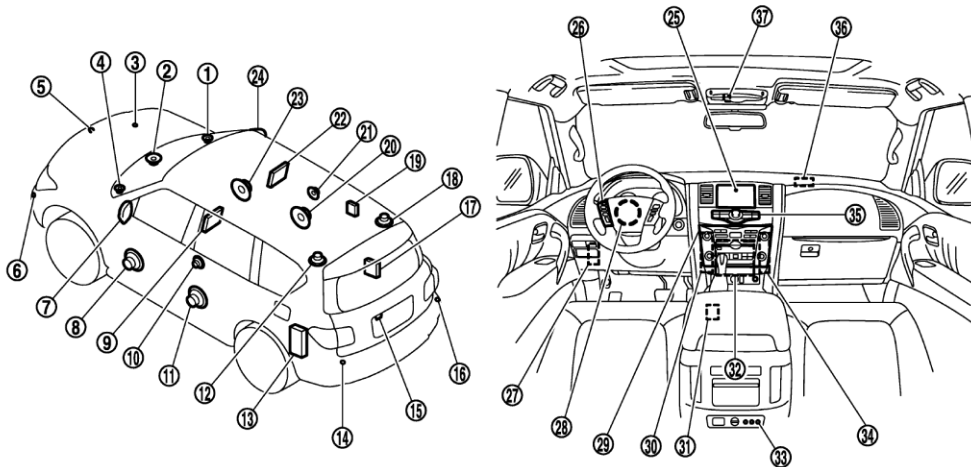
The Around View Monitor C/U controls the operation of the AVM System .





DRIVER INFORMATION & MULTIMEDIA

Y62 Component Location



- | | | |
|---|---|--|
| 1. Squawker RH | 2. Center speaker | 3. Corner sensor front RH |
| 4. Squawker LH | 5. Front camera | 6. Corner sensor front LH |
| 7. Side camera LH & Infrared LED (auxiliary lighting) | 8. Front door speaker LH | 9. Headrest display unit LH |
| 10. Rear door tweeter LH | 11. Rear door speaker LH | 12. Roof speaker LH |
| 13. Woofer | 14. Corner sensor rear LH | 15. Rear camera |
| 16. Corner sensor rear RH | 17. BOSE amp. | 18. Roof speaker RH |
| 19. Antenna amp. | 20. Rear door speaker RH | 21. Rear door tweeter RH |
| 22. Headrest display unit RH | 23. Front door speaker RH | 24. Side camera RH |
| 25. Front display unit | 26. Steering switch | 27. Sonar control unit |
| 28. Steering angle sensor | 29. Preset switch | 30. Around view monitor control unit |
| 31. USB connector | 32. AV control unit | 33. Auxiliary input jacks |
| 34. Video distributor | 35. Multifunction switch | 36. GPS antenna |
| 37. Microphone | | |
| A. Luggage side lower finisher LH removed condition | B. Luggage side lower finisher RH removed condition | C. Headlining assembly removed condition |
| D. Instrument lower panel LH removed condition | E. Spiral cable part | F. Cluster lid C removed condition |



DRIVER INFORMATION & MULTIMEDIA

Trouble Diagnosis

Step 1;

Confirm the operation of the system via the instruction from section 4 of the Owners Manual (Is the system being operated correctly?)

Step 2;

If it is found there is a fault, connect CONSULT III plus to the vehicle & access SONAR.

- Check for any DTC's. If there are any, refer to the ESM as follows;

> N DRIVER INFORMATION & MULTIMEDIA > AV > DTC/CIRCUIT DIAGNOSIS

More detail & the Diagnosis Procedure for the DTC is located here (AV C/U only).

> N DRIVER INFORMATION & MULTIMEDIA > AV > SYSTEM DESCRIPTION >

DIAGNOSIS SYSTEM > AROUND VIEW MONITOR

The AVM C/U does not have direct C-III plus access. It has it's own Self Diagnosis ability

- If there are no DTC's yet the fault is clearly evident, refer to the ESM as follows;

> N DRIVER INFORMATION & MULTIMEDIA > AV > SYMPTOM DIAGNOSIS

Various processes are discussed dependant on the fault at hand.

Wiring Diagrams

Refer to the ESM as follows for a wiring diagram of the SONAR system;

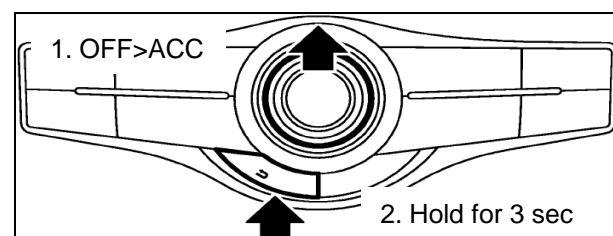
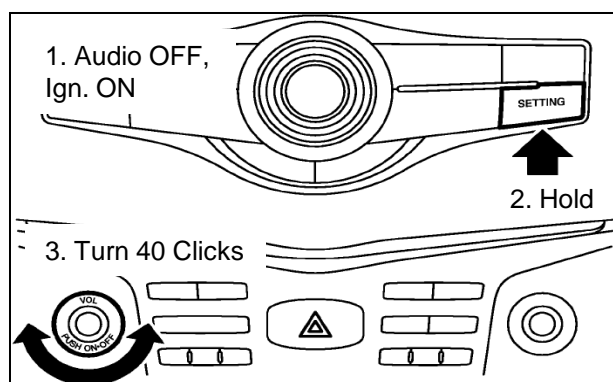
> N DRIVER INFORMATION & MULTIMEDIA > AV > WIRING DIAGRAM

Here you will find Power & Ground supplies as well as the appropriated locations of the fuses & ground connections.

Access to the MULTI AV system with CONSULT III plus

Full interaction with the system for setting customer preferences, checking for any system DTC's, checking for input & output activity & checking component operation is available with CONSULT III plus. See below a description of each diagnosis mode available;

Diagnosis mode	Description
Ecu Identification	The part number of AV control unit can be checked.
Self Diagnostic Result	Performs a diagnosis on the AV control unit and a connection diagnosis for the communication circuit of the Multi AV system, and displays the current and past malfunctions collectively.
Data Monitor	The diagnosis of vehicle signal that is input to the AV control unit can be performed.
Work Support	Steering angle sensor can be adjusted.
Configuration	<ul style="list-style-type: none"> • Read and save the vehicle specification. • Write the vehicle specification when replacing AV control unit.



An additional On-board Self Diagnosis feature. This allows for a button continuity check for the entire AV system

On-board Self Diagnosis can be access for the entire AV system. Use this feature for a check of the internal communication network.

CONSULT III plus is unable to check the system to this level

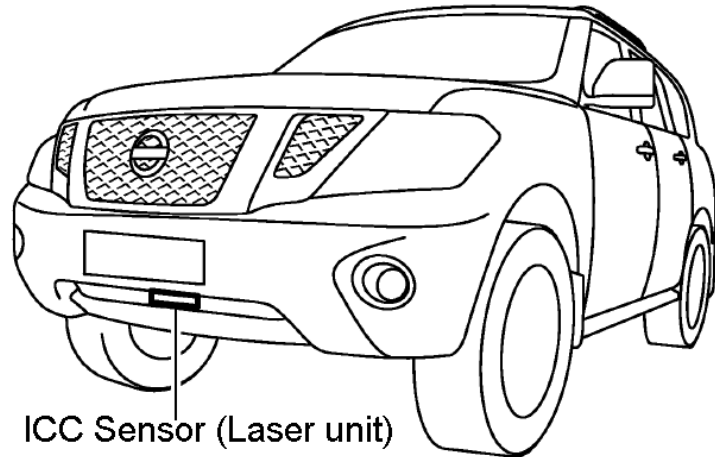
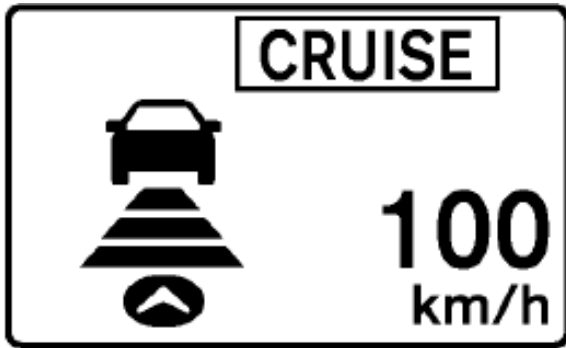
> N DRIVER INFORMATION & MULTIMEDIA > AV > SYSTEM DESCRIPTION > DIAGNOSIS SYSTEM > AV CONTROL UNIT



ADVANCED DRIVER ASSISTANCE SYSTEMS

1. LASER

Intelligent Cruise Control (ICC) - Functionality



ICC Sensor (Laser unit)

- THE DRIVER OF THE VEHICLE MUST ALWAYS REFER TO SECTION 5 OF THE OWNERS MANUAL FOR SPECIFIC DETAILS ON HOW TO OPERATE THE SYSTEM & THE SYSTEMS LIMITATIONS -

With the use of the front mounted ICC Sensor unit (Laser), the Intelligent Cruise Control (ICC) system automatically maintains a selected distance from the vehicle travelling in front according to that vehicle's speed (up to the driven vehicles set speed), or at the set speed when the road ahead is clear.

The detection range of the sensor is approximately 120M ahead.

The ICC function can be set to one of two cruise control modes:

(i) Vehicle-to-vehicle distance control mode: For maintaining a selected distance between your vehicle and the vehicle in front of you up to the preset speed. Press & release the "CRUISE ON/OFF" Switch once (less than 1.5 seconds).

(ii) Conventional (fixed speed) cruise control mode: For cruising at a preset speed like any non ICC equipped vehicle with Cruise Control.

To activate this mode, press & hold the "CRUISE ON/OFF" Switch for longer than 1.5 seconds & then release.

WARNING

The ICC system will not automatically adapt to road conditions. It is not advisable to use the system in city traffic, congested areas, steep, hilly &/or windy roads.

The ICC system is primarily intended for use on straight, dry, open roads with light, evenly flowing traffic.

The use of Conventional Cruise Control Mode should also be avoided in such conditions.



ADVANCED DRIVER ASSISTANCE SYSTEMS

ICC Operation (Laser Unit)

Fitted to the front of all ICC equipped vehicles is a Sensor unit which is effectively a Laser Unit.
If the Distance Sensor (ICC Sensor) detects a slower moving vehicle ahead, the system will reduce the vehicle speed so that your vehicle follows the vehicle in front at the selected distance.
The system automatically controls the Electronic Throttle and applies the brakes (up to 25% of vehicle braking power) if necessary.
The detection range of the sensor is approximately 120M ahead.

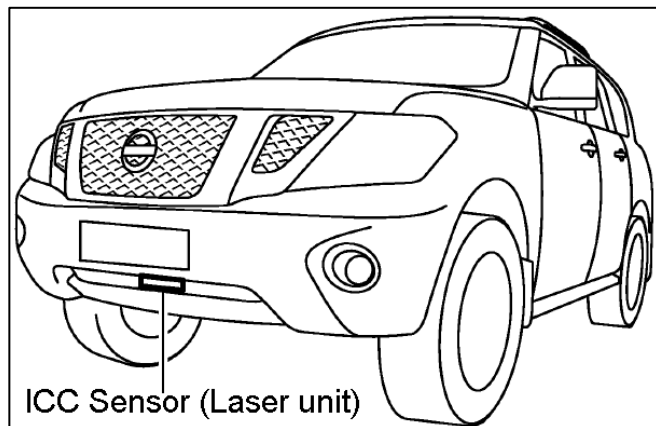
The ICC Sensors Laser is completely dependant on reflectors being fitted to the rear of the vehicle in front.
If the vehicle / object ahead does not have reflectors fitted to it, then the ICC sensor will not be able to detect anything in front & as a result, the ICC system will not function properly.

The same issue will occur if the vehicle in front does have reflectors fitted to it, but they are:

- Covered in heavy dust / mud / snow
- Deformed, bent, broken or mounted on a deformed bracket etc.
- Attached to a stationary or very slow moving vehicle.
(The system is designed to ignore "cats eyes" along the road etc.)

Vehicle in Front with Modifications

If a malfunction occurs with the ICC operation (it doesn't appear to have "seen" the vehicle in front for example), it may have been due to modifications that can impair the reflectors operation.
Modifications such as a vinyl coating or wrap ("smoked lens" appearance) may not allow the ICC Sensor to detect a vehicle in front with such modifications.



ICC Sensor (Laser unit)

The sensor will require cleaning with a soft cloth from time to time



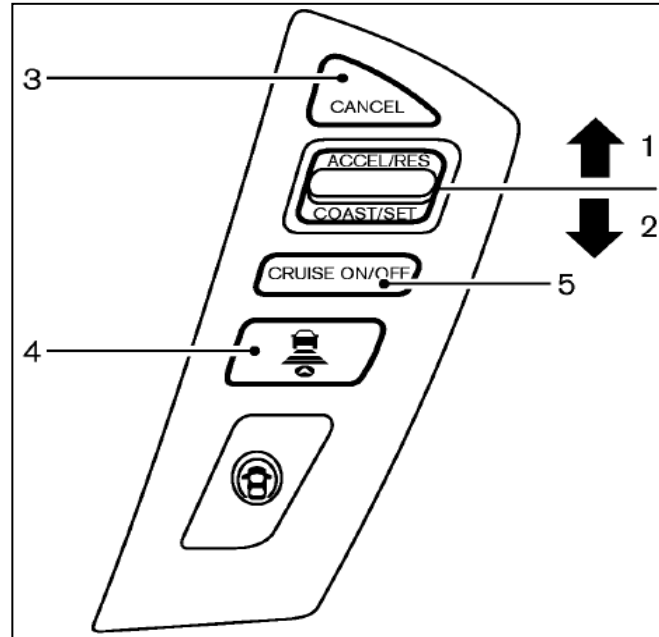


ADVANCED DRIVER ASSISTANCE SYSTEMS

ICC Operation (Switch & Display Screen)

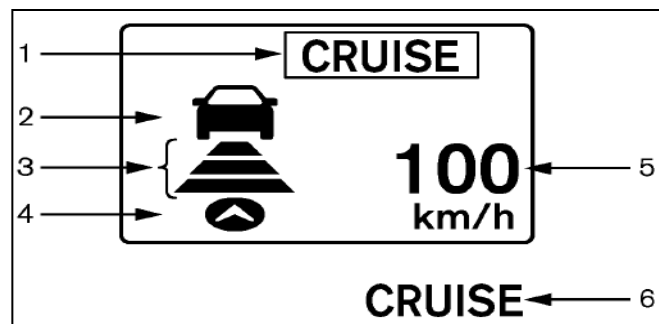
The system is operated by a MAIN switch and four control switches mounted on the steering wheel.

- 1. ACCELERATE/RESUME switch:** Resumes set speed or increases speed incrementally.
- 2. COAST/SET switch:** Sets desired cruise speed, reduces speed incrementally.
- 3. CANCEL switch:** Deactivates the system without erasing the set speed.
- 4. DISTANCE switch:** Changes the vehicle's following distance:
 - Long (60m)
 - Middle (45m)
 - Short (30m)
- 5. MAIN switch:** Master switch to activate the system



Small Display on the Instrument Cluster

- 1. MAIN switch indicator:** Indicates that the MAIN switch is ON.
- 2. Vehicle ahead detection indicator:** Indicates whether it detects a vehicle in front. (symbol disappears if there is no / unable to detect a vehicle in front)
- 3. Set distance indicator:** Displays the selected distance between vehicles set with the DISTANCE switch (3 bars = long, 1 bar = short etc.)
- 4. Indicates the driven vehicle**
- 5. Set vehicle speed indicator:** Indicates the set vehicle speed
- 6. Intelligent Cruise Control (ICC) system warning light (orange):** The light comes on if there is a malfunction in the ICC system.



When the "Distance Switch" is operated (see switch 4 described above), the display will change to indicate how close the driven vehicle is able to travel behind the vehicle in front.

Continually press the switch to change the distance between Long, Middle & Short.

Distance	Display
Long (60m behind)	
Middle (45m behind)	
Short (30m behind)	



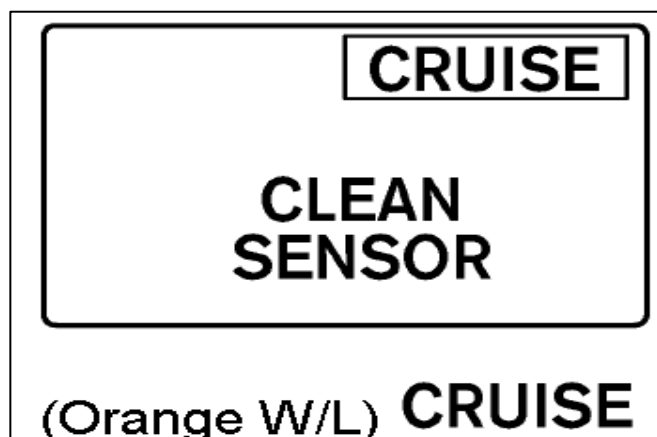
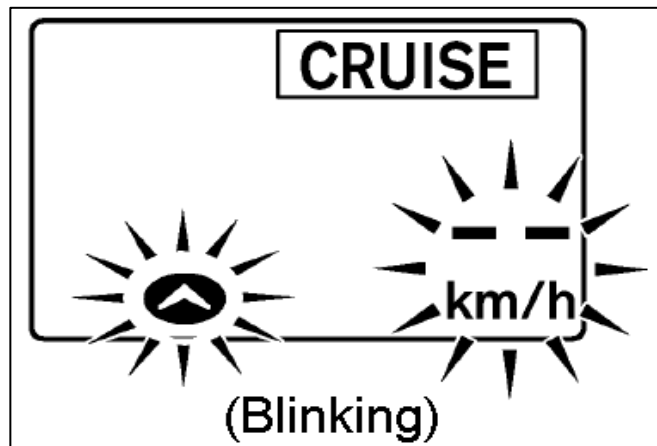
ADVANCED DRIVER ASSISTANCE SYSTEMS

ICC Operation

Automatic Cancellation Conditions

A chime sounds & the display will Blink under the following conditions and the control is automatically cancelled.

- When the vehicle speed falls below approximately 24 km/h
- When the system judges the vehicle is at standstill
- When the shift lever is shifted to the "N" (Neutral) position
- When the windshield wipers are operating at high speed. The system may cancel when the wipers are set to the "INT" or "AUTO" position.
- When the VDC is turned off
- When the ABS or VDC operates
- When a wheel slips / spins
- When the Park Brake is applied
- When the ROCK, SAND or SNOW mode is selected via the variable 4 x 4 mode select switch
- When the 4WD shift switch is in the 4H or 4L position
- When driving into a strong light (for example, sunlight)
- When distance measurement becomes impaired due to adhesion of dirt or obstruction to the sensor



The ICC sensor will require cleaning

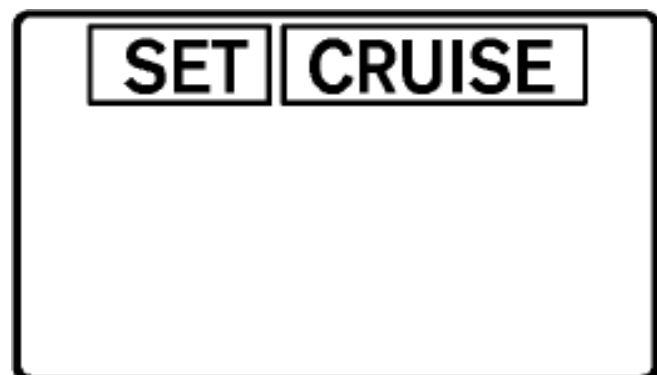
Conventional Cruise Control Operation

If the MAIN Switch button (switch No. 5 described on the previous page) is pressed & held for more than 1.5 seconds (& then released), the system will operate in the Conventional Cruise Control mode.

It is entirely up to the driver to ensure the vehicle is operated safely & at the appropriate speeds.

NOTE:

The DCA system will not function when the vehicle is operated in this mode.





ADVANCED DRIVER ASSISTANCE SYSTEMS

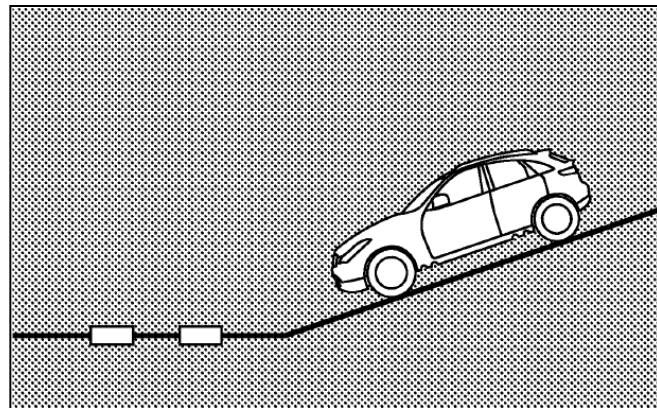
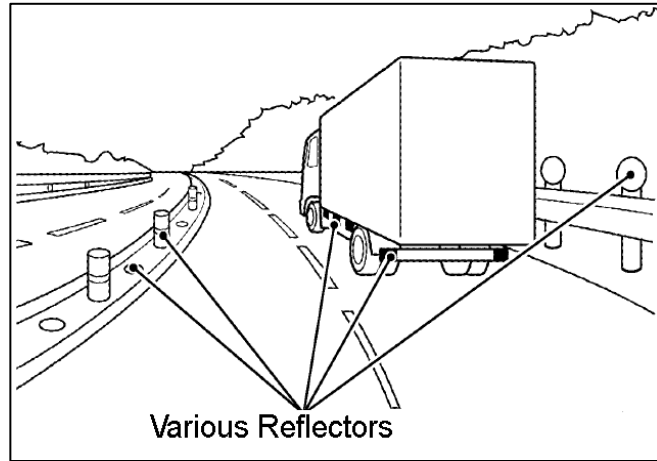
ICC Operation - System Limitations

Multiple Reflectors being Detected:

The approach warning chime may sound and the system display may blink when the sensor detects some reflectors which are fitted on vehicles in other lanes or on the side of the road.

This may cause the Distance Control Assist (DCA) &/or Intelligent Braking System (IBA) systems to operate inappropriately. The sensor may detect these reflectors when the vehicle is driven on winding roads, hilly roads or when entering or exiting a curve. The sensor may also detect reflectors on narrow roads or in road construction zones.

In these cases you will have to manually control the proper distance ahead of your vehicle.

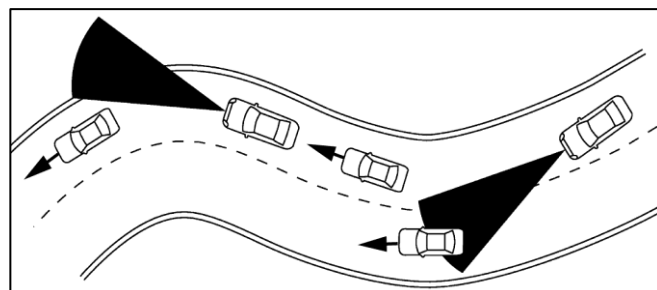
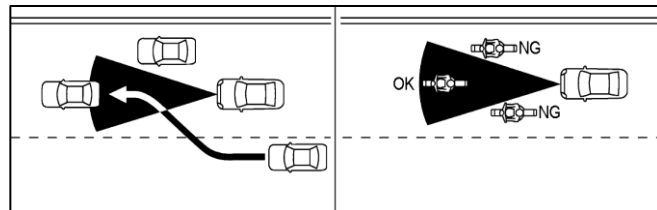


Detection Zone:

The detection zone of the sensor is limited. A vehicle ahead must be in the detection zone for the system to operate.

A vehicle ahead may move outside of the detection zone due to its position within the same lane of travel.

Motorcycles may not be detected in the same lane ahead if they are travelling offset from the centreline of the lane. A vehicle that is entering the lane ahead may not be detected until the vehicle has completely moved into the lane.





ADVANCED DRIVER ASSISTANCE SYSTEMS

Intelligent Cruise Control (ICC) – System Limitations

- THE DRIVER OF THE VEHICLE MUST ALWAYS REFER TO SECTION 5 OF THE OWNERS MANUAL FOR SPECIFIC DETAILS ON HOW TO OPERATE THE SYSTEM & THE SYSTEMS LIMITATIONS -

- 1. The distance sensor will not detect the following objects:**
 - Stationary and slow moving vehicles - even if it has reflectors fitted. The systems built in logic will assume that the stationary vehicle is a road side reflector or “cats eye”
 - Pedestrians or objects in the roadway
 - Oncoming vehicles in the same lane
 - Motorcycles traveling offset in the travel lane
- 2. As there is a performance limit to the distance control function, never rely solely on the Intelligent Cruise Control (ICC) system.**

This system does not correct careless, inattentive or absent-minded driving, or overcome poor visibility in rain, fog, or other bad weather.
- 3. If the vehicle ahead comes to a stop, the vehicle decelerates to a standstill within the limitations of the system. The system will cancel once it judges that the vehicle has come to a standstill and sound a warning chime. To prevent the vehicle from moving, the driver must depress the brake pedal.**
- 4. The system may not function properly under the following conditions. To avoid accidents, never use the ICC system under the following conditions:**
 - On roads where the traffic is heavy &/or the road has a lot of curves / bends &/or if there are sharp curves
 - On slippery road surfaces such as on mud, ice or snow, etc.
 - On off-road surfaces such as on sand or rock, etc.
 - During bad weather (rain, fog, snow, etc.)
 - When the windshield wipers are operating at high speed. The system may cancel when the wipers are set to the “INT” or “AUTO” position.
 - When strong light (for example, at sunrise or sunset) is directly shining on the front of the vehicle
 - When rain, snow or dirt / mud adheres to the ICC Sensor
 - On steep downhill roads (the vehicle may go beyond the set vehicle speed and frequent braking may result in overheating the brakes)
 - On repeated uphill and downhill roads
 - When traffic conditions make it difficult to keep a proper distance between vehicles because of frequent acceleration or deceleration
 - When towing a trailer with an excessive Towball download weight or there is excessive weight loaded into the rear of the vehicle
 - When the Sensor is subject to heavy Smoke, Snow, Mud &/or Water (heavy rain / road water spray from vehicle in front etc.)
 - If the Sensor is covered by a plastic bag or translucent object



ADVANCED DRIVER ASSISTANCE SYSTEMS

ICC Sensor Cleaning & Pre-cautions

From time to time the ICC sensor which is mounted at the front of the vehicle will require cleaning. Ideally it should be cleaned with a soft cloth (1st with a wet cloth if necessary & then dry it with a soft clean cloth)

Take extreme caution with the sensor when cleaning it.

Do NOT:

- Spray it directly with a High Pressure Water Cleaner / Steam Cleaner
- Spray it with harsh chemicals / solvents



Ensure the sensor is kept **CLEAN**

Licence Plate Installations

Ensure that the Licence Plate does not overhang excessively when it is installed to the front of the vehicle.

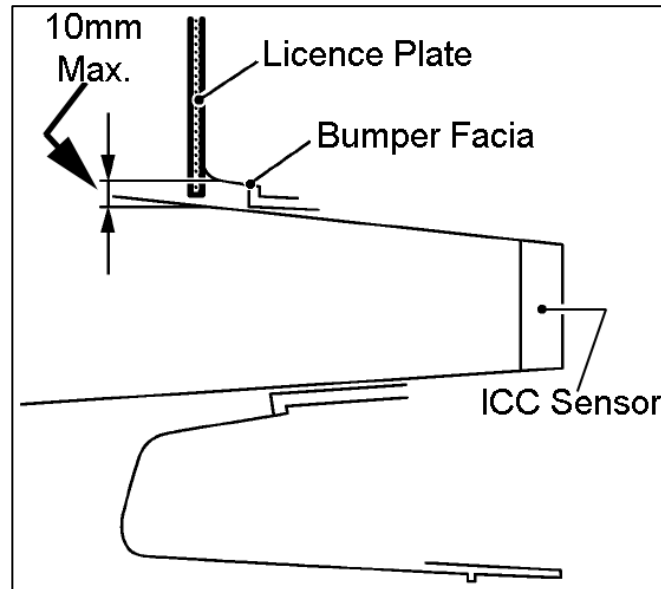
Other Accessories

It is NOT possible to install any non Nissan approved accessories (Bull-bars, Nudge-bars etc.) to the front of the vehicle as these will interfere with the ICC Sensors operation.

Also to note that insect screens / gauze etc. fitted to the front of the vehicle will also cause a system malfunction.

Frontal Damage

If the vehicle has been involved in any kind of Frontal Collision incident, the ICC sensor may not function correctly or it will not function at all. Ensure that a very close inspection has been carried out as the collision incident may only have been a very minor one - but enough to cause a system malfunction.

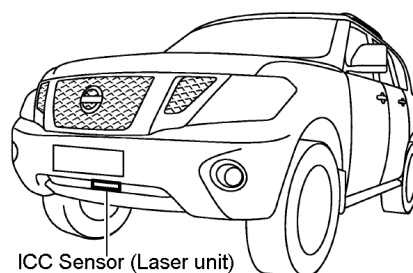
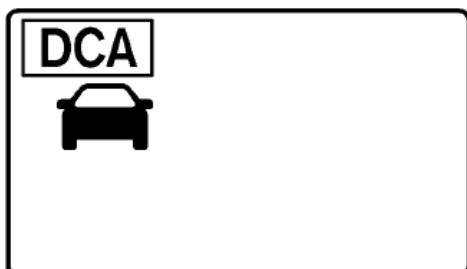


Take care with Licence Plate installations



ADVANCED DRIVER ASSISTANCE SYSTEMS

Distance Control Assist (DCA) - Functionality



- THE DRIVER OF THE VEHICLE MUST ALWAYS REFER TO SECTION 5 OF THE OWNERS MANUAL FOR SPECIFIC DETAILS ON HOW TO OPERATE THE SYSTEM & THE SYSTEMS LIMITATIONS -

With the use of the front mounted ICC Sensor unit (Laser), the Distance Control Assist (DCA) system brakes and moves the accelerator pedal upward according to the distance from and the relative speed of the vehicle ahead to help assist the driver to maintain a following distance.

The system is intended to assist the driver to keep a following distance from the vehicle ahead traveling in the same lane and direction. If the distance sensor (ICC Sensor) detects a slower moving vehicle ahead, the system will reduce the vehicle speed to help assist the driver to maintain a following distance.

The system automatically controls the Accelerator Pedal (pushes back against the drivers foot) & Electronic Throttle and if necessary - apply the brakes (up to 25% of vehicle braking power) .

The detection range of the sensor is approximately 120m

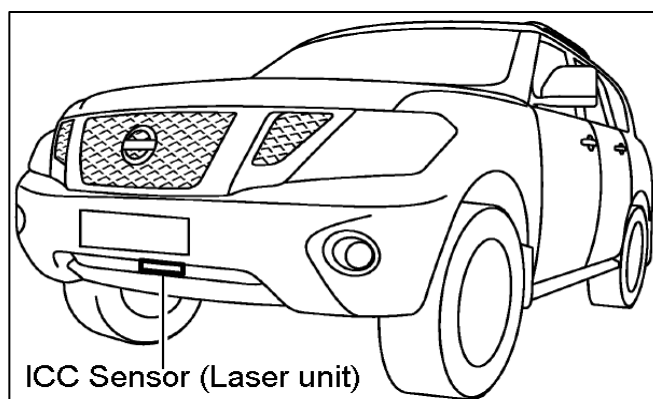
NOTE:

When the Intelligent Cruise Control (ICC) system is set, the DCA systems operation will be cancelled.

ICC Operation (Laser Unit)

Fitted to the front of all DCA equipped vehicles is a Sensor unit which is effectively a Laser Unit.

This has already been described in the ICC section of this Training Manual



As previously mentioned, the ICC Sensors Laser is completely dependant on reflectors being fitted to the rear of the vehicle in front.





ADVANCED DRIVER ASSISTANCE SYSTEMS

DCA Operation (Switch & Display Screen)

The DCA system turns on when the Dynamic Driver Assistance Switch (DDAS) on the steering wheel is pressed.

When active - the Distance Control Assist (DCA) system indicator in the dot matrix liquid crystal display will illuminate.

The system will start to operate after the vehicle speed becomes above approximately 5 km/h.

NOTE:

Ensure that the “Distance Control Assist” system is enabled in the settings menu on the center display.

1. “System Active”: Indicates that the DCA system is ON.

2. Vehicle ahead detection indicator: Indicates whether it detects a vehicle in front. (symbol disappears if there is no / unable to detect a vehicle in front)

3. Intelligent Cruise Control (ICC) system warning light (orange): The light comes on if there is a malfunction in the DCA system.

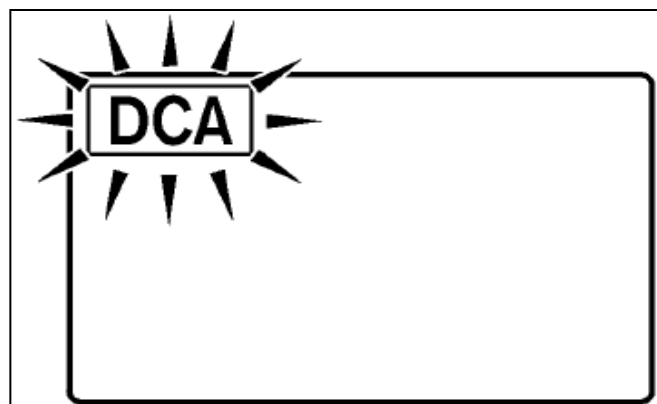
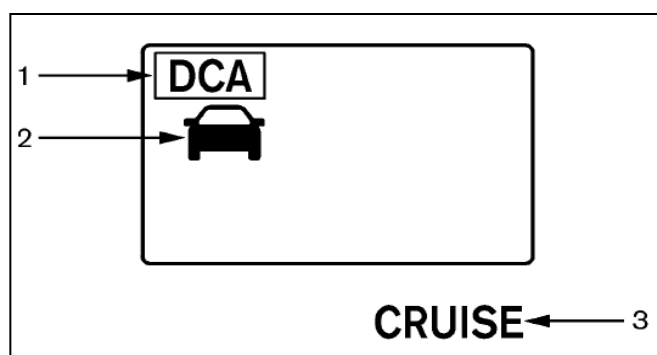
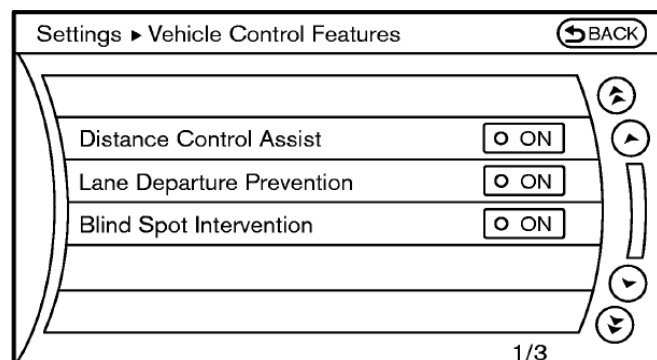
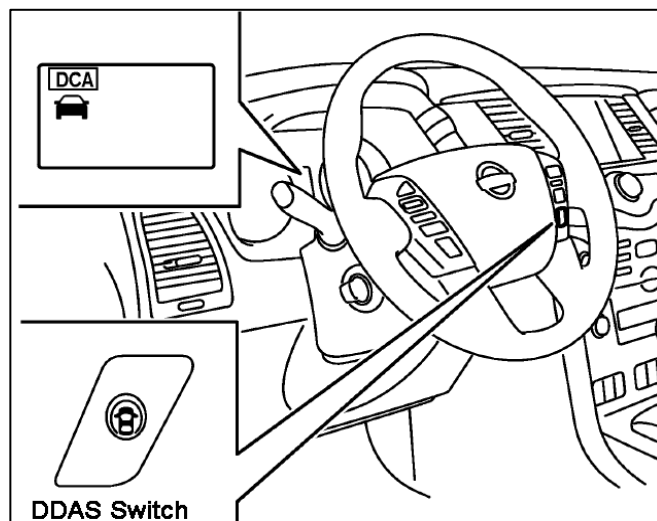
NOTE:

The “CLEAN SENSOR” message may also appear if the ICC sensor is dirty (described in the ICC section)

Automatic Cancellation Conditions

A chime sounds & the display will Blink under the following conditions and the control is automatically cancelled.

- When the VDC is turned off
- When the ABS or VDC operates
- When a wheel slips / spins
- When the Park Brake is applied
- When the Conventional Cruise Control Mode is being operated
- When the ROCK, SAND or SNOW mode is selected via the variable 4 x 4 mode select switch
- When the 4WD shift switch is in the 4H or 4L position
- When driving into a strong light (for example, sunlight)
- When distance measurement becomes impaired due to adhesion of dirt or obstruction to the sensor





ADVANCED DRIVER ASSISTANCE SYSTEMS

<p>When driven vehicle approaches slower vehicle ahead</p>	<p>If the driver is not depressing the accelerator pedal, the system activates the brakes to decelerate smoothly as necessary</p>	
<p>When brake operation by driver is required</p>	<p>If the driver is depressing the accelerator pedal, the system moves the accelerator pedal upward to assist the driver to release the accelerator pedal</p>	
<p>When brake operation by driver is required</p>	<p>The system alerts the driver by a warning chime and blinking the vehicle ahead detection indicator. If the driver is depressing the accelerator pedal after the warning, the system moves the accelerator pedal upward to assist the driver to switch to the brake pedal</p>	

WARNING:

When the DCA system is not necessary, it is advisable to turn off the DDAS system via the steering wheel mounted switch. Using the system when it is not necessary may result in an accident.

The ICC / DCA system is primarily intended for use on straight, dry, open roads with light traffic. It is not advisable to use the system in city traffic, congested areas, steep, hilly &/or windy roads.

Precautions & Limitations

Refer to those described in the ICC section of the training manual for details on ICC sensor precautions & ICC limitations as these also apply to the DCA system.



ADVANCED DRIVER ASSISTANCE SYSTEMS

DCA Operation (Accelerator Pedal)

The Accelerator Pedal assembly fitted to DCA equipped vehicles is unique in its construction.

The pedal unit includes an electric solenoid which effectively pushes the pedal back to the "Pedal Released" condition against the pressure of the drivers foot.

This action will prompt a possibly distracted driver to react to a slow moving vehicle ahead at an earlier time than would otherwise potentially occur.

Also included as part of the assembly is an Accelerator Pedal Position Sensor. The action of the pedal being operated by the driver is sent to the ECM via a variable voltage signal as it does in non DCA equipped vehicle models.

When vehicle approaches a vehicle ahead:

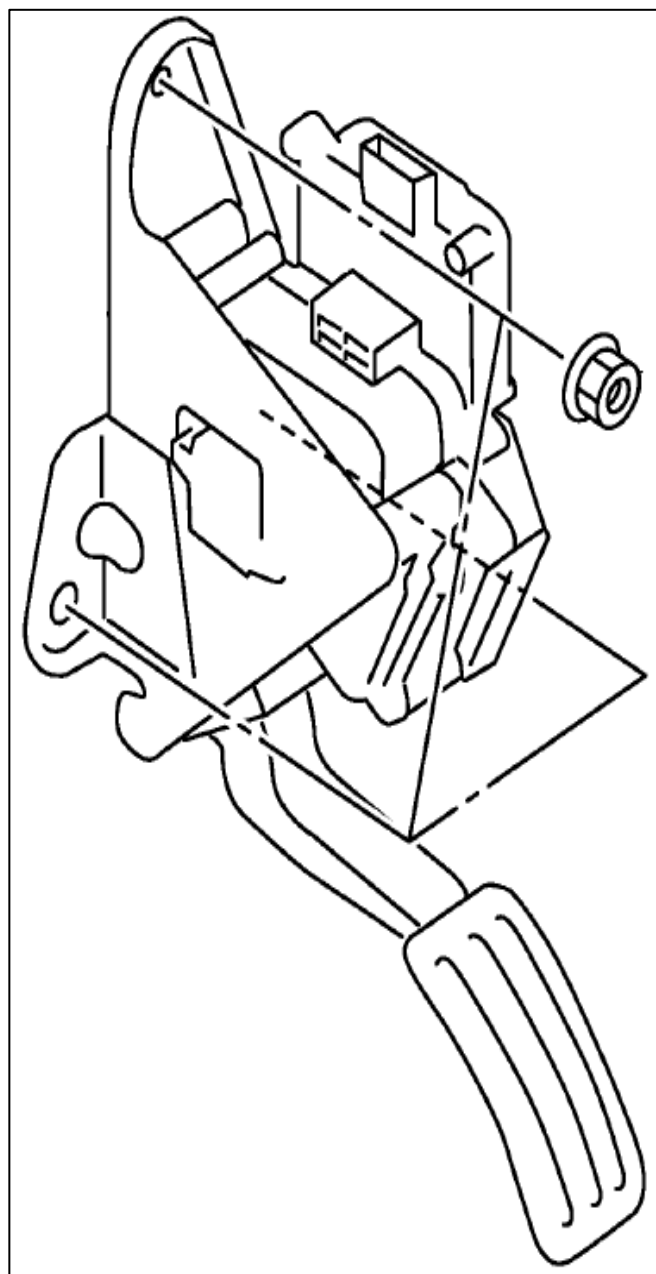
1. If the driver's foot is not on the accelerator pedal, the system activates the brakes to decelerate smoothly as necessary. If the vehicle ahead comes to a stop, the driven vehicle decelerates to a standstill within the limitations of the system.
2. If the driver's foot is on the accelerator pedal, the system moves the accelerator pedal upward to assist the driver to release the accelerator pedal.

When brake operation by driver is required:

3. The system alerts the driver by a warning chime and blinking of the "Vehicle Ahead" detection indicator. If the driver's foot is on the accelerator pedal after the warning, the system moves the accelerator pedal upward to assist the driver to switch to the brake pedal.

NOTE:

The DCA system will operate the stoplights of the vehicle automatically as well as the brakes (via the ABS / VDC system).

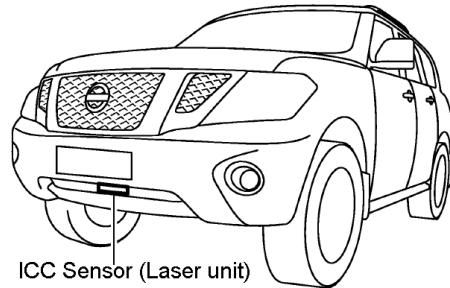
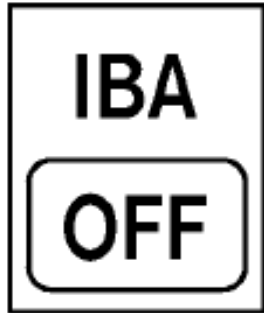


Overriding of the DCA system:
When the driver depresses the accelerator pedal even further while the system is moving the accelerator pedal upward, the DCA system control of the accelerator pedal as well as braking is cancelled



ADVANCED DRIVER ASSISTANCE SYSTEMS

Forward Collision Warning (FCW) & Intelligent Brake Assist (IBA) - Functionality



- THE DRIVER OF THE VEHICLE MUST ALWAYS REFER TO SECTION 5 OF THE OWNERS MANUAL FOR SPECIFIC DETAILS ON HOW TO OPERATE THE SYSTEM & THE SYSTEMS LIMITATIONS -

With the use of the front mounted ICC Sensor unit (Laser), the Forward Collision Warning (FCW) system will warn the driver by a warning light and chime when the driven vehicle is getting close to the vehicle ahead in the travelling lane.

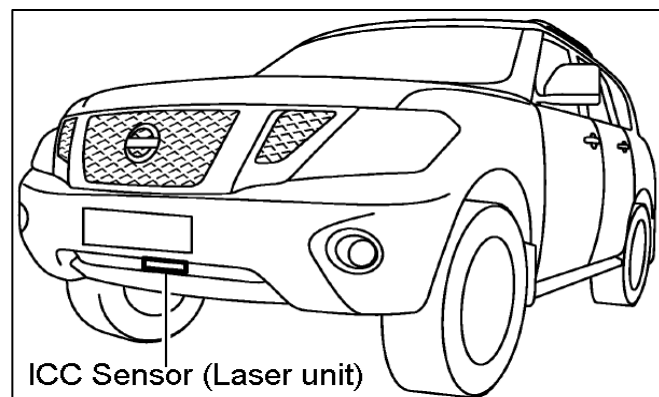
The IBA system will function if the driven vehicle continues to get closer to the slower vehicle ahead. The system helps reduce the rear-end collision speed by applying the brakes when the system judges that a collision cannot be prevented.

The FCW / IBA system will function when your vehicle is driven at speeds of approximately 15 km/h and above.

The FCW / IBA system uses the distance sensor (ICC Sensor) located below the front bumper to measure the distance to the vehicle ahead. When the system judges that the driven vehicle is getting close to the vehicle ahead in the travel lane, the vehicle ahead detection indicator blinks and a warning chime sounds.

ICC Operation (Laser Unit)

Fitted to the front of all DCA equipped vehicles is a Sensor unit which is effectively a Laser Unit. This has already been described in the ICC section of this Training Manual



As previously mentioned, the ICC Sensors Laser is completely dependant on reflectors being fitted to the rear of the vehicle in front.



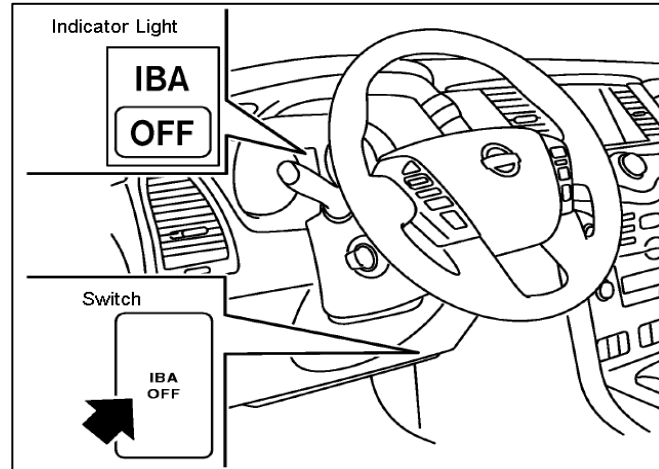


ADVANCED DRIVER ASSISTANCE SYSTEMS

FCW / IBA Operation (Switches & Warning Light)

The IBA system turns ON via the lower dash mounted switch marked "IBA OFF"

- NOTE:**
- The IBA OFF switch is located adjacent to the DLC for CONSULT III plus
 - It is not clearly visible when seated in the drivers seat
 - The switch must be held for more than 1 second (with engine running) to either activate or deactivate the IBA system.
 - The IBA will remain activated / deactivated until the switch is **again** operated.



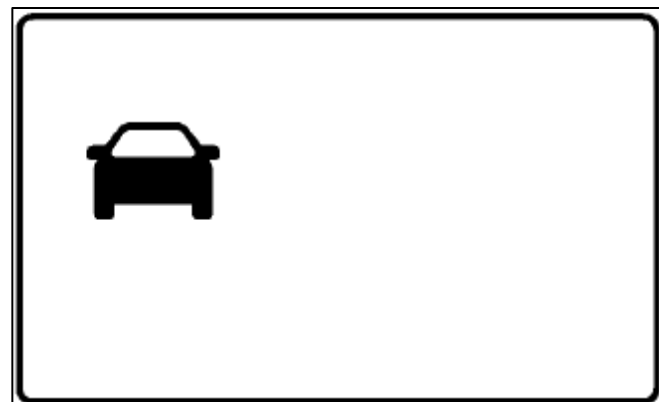
IBA OFF Warning Light if Switch is OFF

The FCW system turns on when the "Warning Systems Switch" is switched to the ON position. This switch is located on the lower dash fascia RHS.

The FCW / IBA systems will start to operate after the vehicle speed becomes above approximately 15 km/h.



"WARNING SYSTEMS" Switch (FCW / LDW / BSW Systems)



FCW Warning Indicator on LCD screen

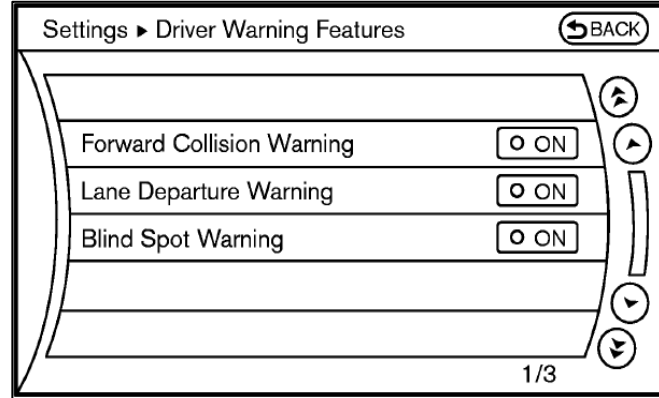


ADVANCED DRIVER ASSISTANCE SYSTEMS

NOTE:
Ensure that the “Forward Collision Warning” system is enabled in the settings menu on the center display.

Precautions & Limitations

Refer to those described in the ICC section of the training manual for details on ICC sensor precautions & ICC limitations as these also apply to the FCW / IBA system.





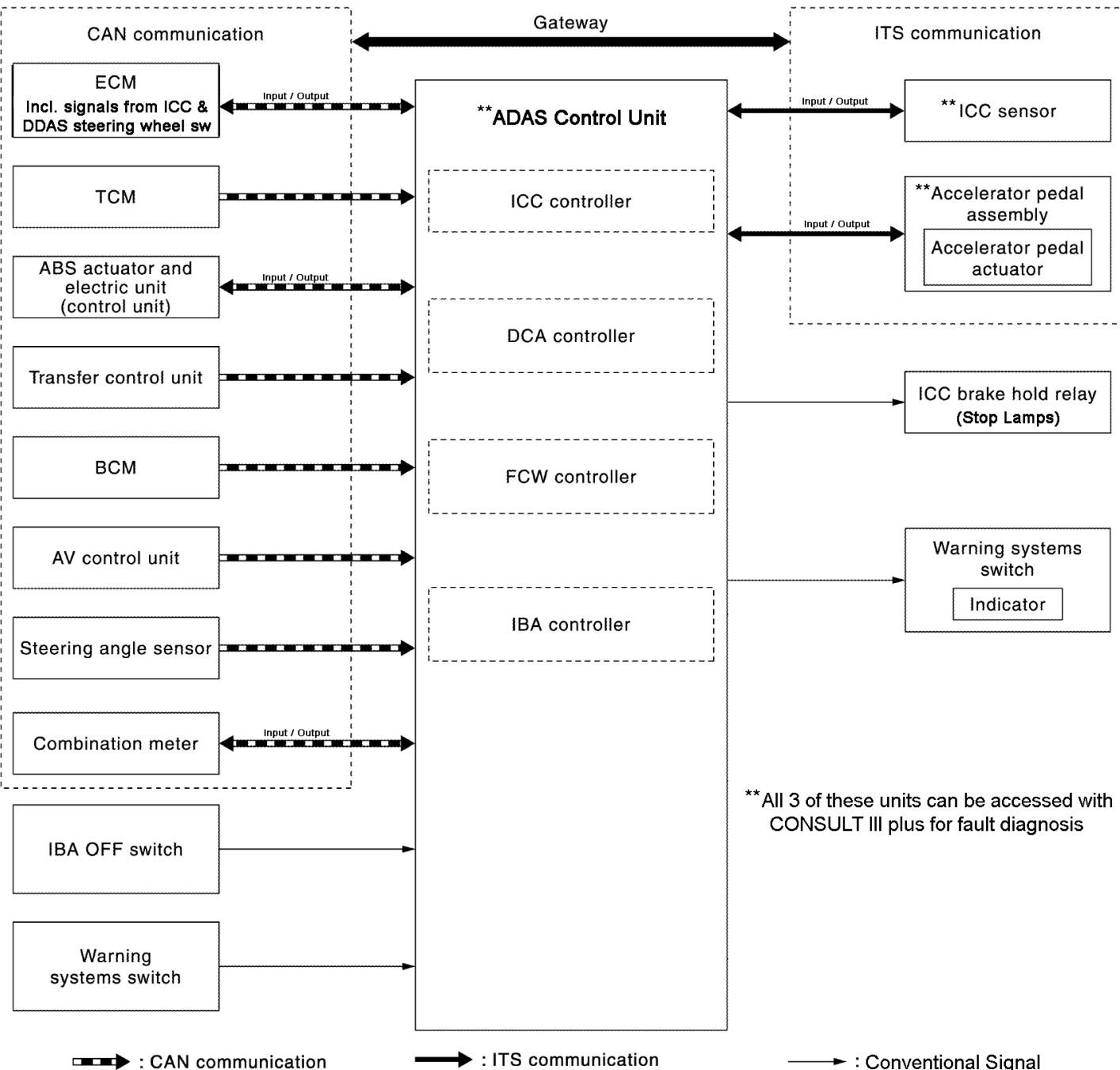
ADVANCED DRIVER ASSISTANCE SYSTEMS

Control System Operation

The entire operation of the Advanced Driver Assistance System is controlled by the ADAS Control Unit.

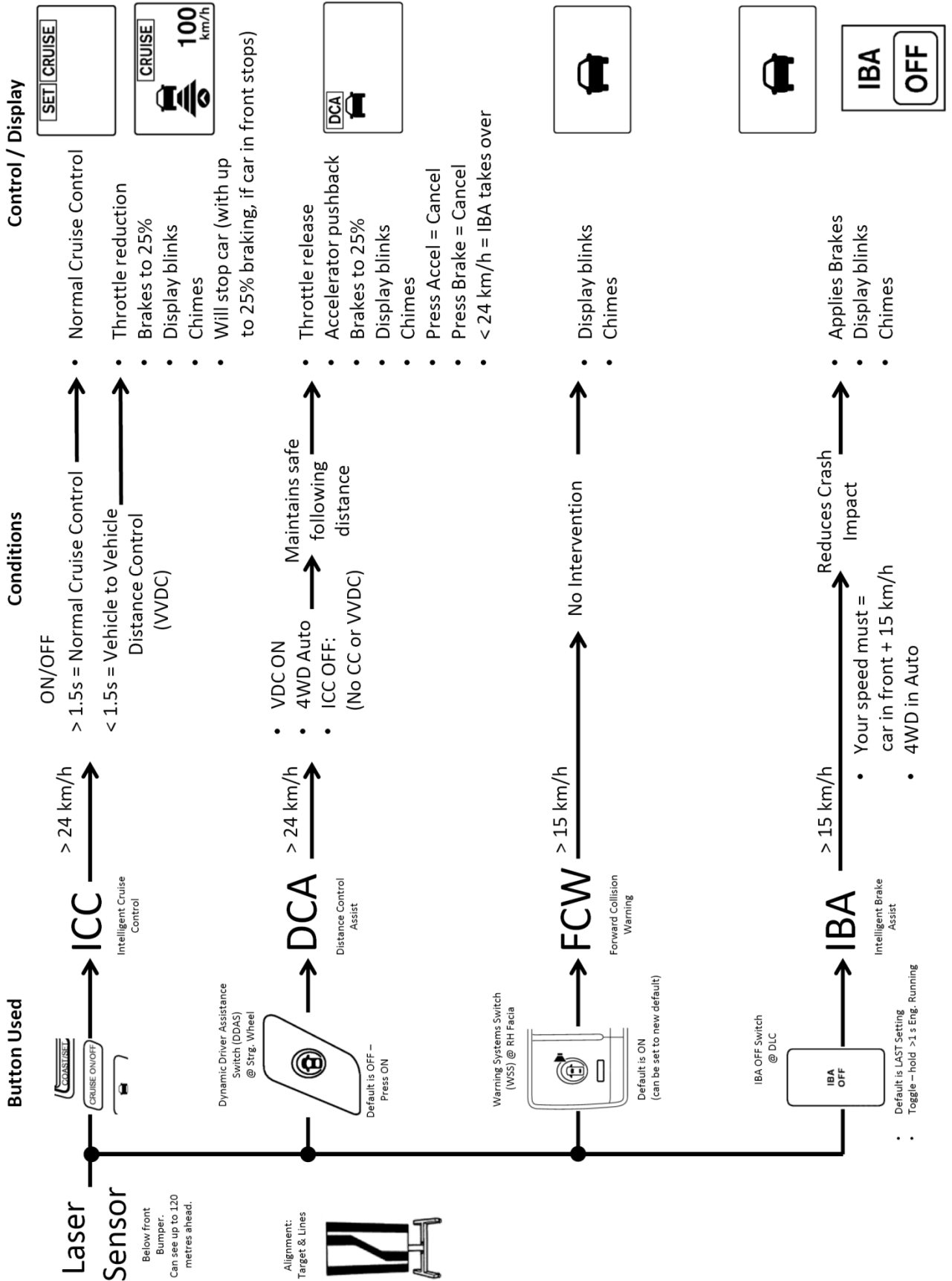
The diagram below details the Inputs / Outputs of the LDW / LDP system.

See over page for specific details of each component involved in the ADAS system .





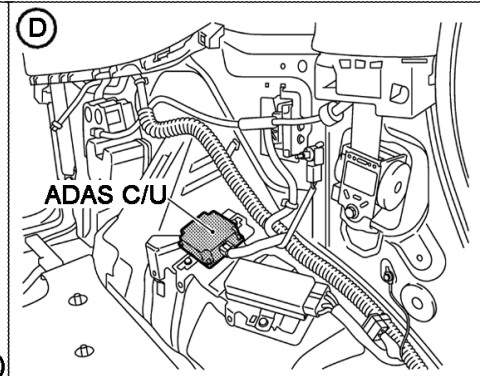
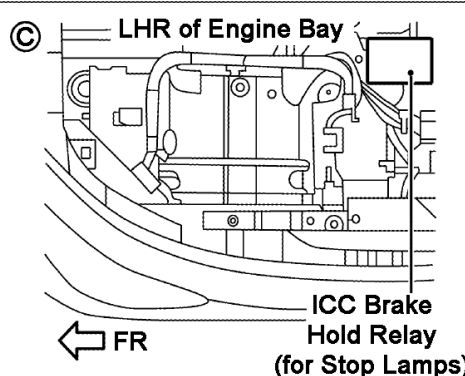
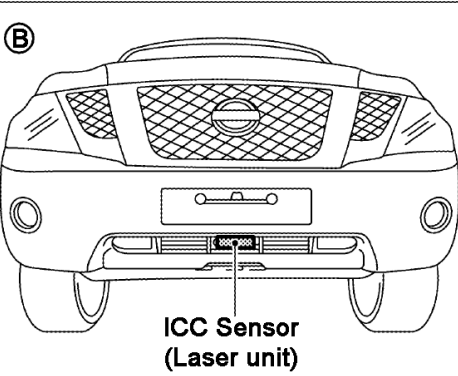
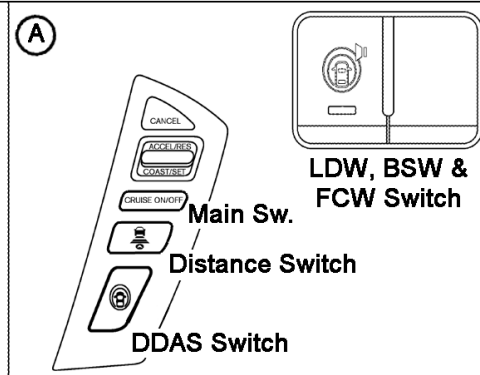
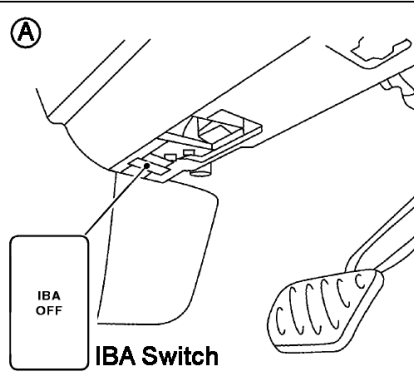
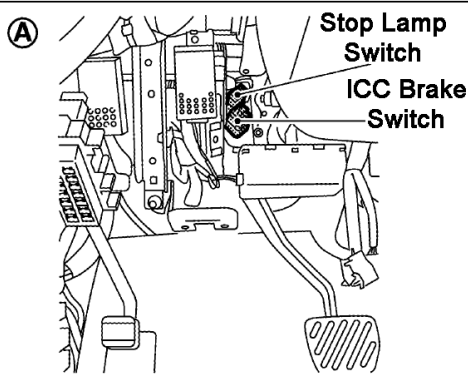
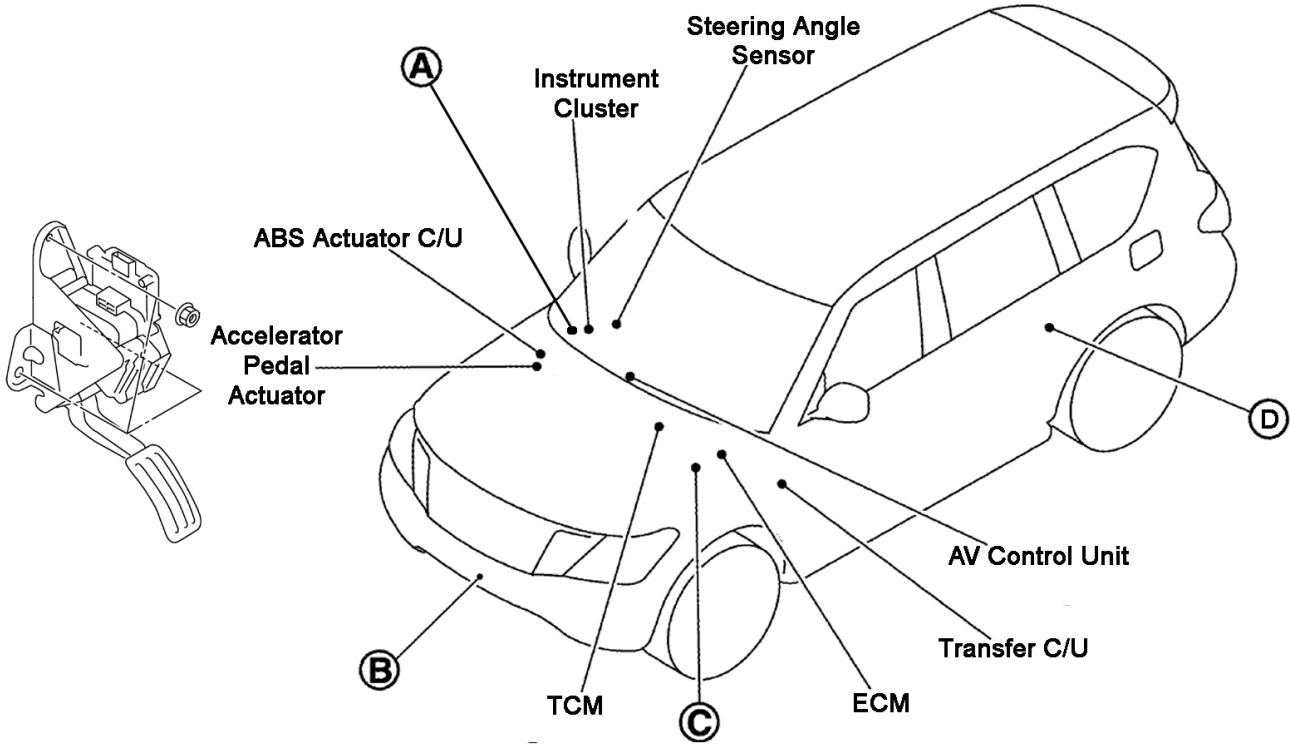
ADAS Summary - 1 (Laser)





ADVANCED DRIVER ASSISTANCE SYSTEMS

ADAS (ICC / DCA / FCW / IBA) Component Location (Y62 Patrol)





ADVANCED DRIVER ASSISTANCE SYSTEMS

Trouble Diagnosis

Step 1;

Confirm the operation of the system via the instruction from section 5 of the Owners Manual (Is the system operating correctly & as it was designed to do so?)

Step 2;

If it is found there is a fault, connect CONSULT III plus to the vehicle & access ICC/ADAS, LASER &/or ACCELE PEDAL ACT.

- Check for any DTC's. If there are any, refer to the ESM as follows;

> O CRUISE CONTROL & DRIVER ASSISTANCE > CCS > ICC > DTC/CIRCUIT DIAGNOSIS
> O CRUISE CONTROL & DRIVER ASSISTANCE > DAS > DCA > DTC/CIRCUIT DIAGNOSIS

More detail & the Diagnosis Procedure for the DTC is located here.

- If there are no DTC's yet the fault is clearly evident, refer to the ESM as follows;

> O CRUISE CONTROL & DRIVER ASSISTANCE > CCS > ICC > SYMPTOM DIAGNOSIS
> O CRUISE CONTROL & DRIVER ASSISTANCE > DAS > DCA or FCW > SYMPTOM DIAGNOSIS

Various processes are discussed dependant on the fault at hand.

Wiring Diagrams

Refer to the ESM as follows for a wiring diagram of the ICC &/or ADAS system;

> O CRUISE CONTROL & DRIVER ASSISTANCE > CCS > ICC > WIRING DIAGRAM
> O CRUISE CONTROL & DRIVER ASSISTANCE > DAS > ADAS C/U > WIRING DIAGRAM

Here you will find Power & Ground supplies as well as the appropriate locations of the fuses & ground connections.

Access to the ICC/ADAS, LASER or ACCELE PEDAL ACT systems with C-III plus

Full interaction with the system for setting customer preferences, checking for any system DTC's, checking for input & output activity & checking component operation is available with CONSULT III plus. See below a description of each diagnosis mode available;

ICC/ADAS C/U:

Diagnosis mode	Description
Work Support	Displays causes of automatic system cancellation occurred during system control
Self Diagnostic Result	Displays the name of a malfunctioning system stored in the ADAS control unit
Data Monitor	Displays ADAS control unit input/output data in real time
Active Test	Enables an operational check of a load by transmitting a driving signal from the ADAS control unit to the load
Ecu Identification	Displays ADAS control unit part number
CAN Diag Support Monitor	Displays a reception/transmission state of CAN communication and ITS communication

LASER:

Diagnosis mode	Description
Work Support	It can monitor the adjustment direction indication in order to perform the laser beam aiming operation smoothly
Self Diagnostic Result	Displays malfunctioning system memorized in ICC sensor
Data Monitor	Displays real-time input/output data of ICC sensor
Ecu Identification	Displays ICC sensor part number
CAN Diag Support Monitor	The results of transmit/receive diagnosis of ITS communication can be read

ACCELE PEDAL ACT:

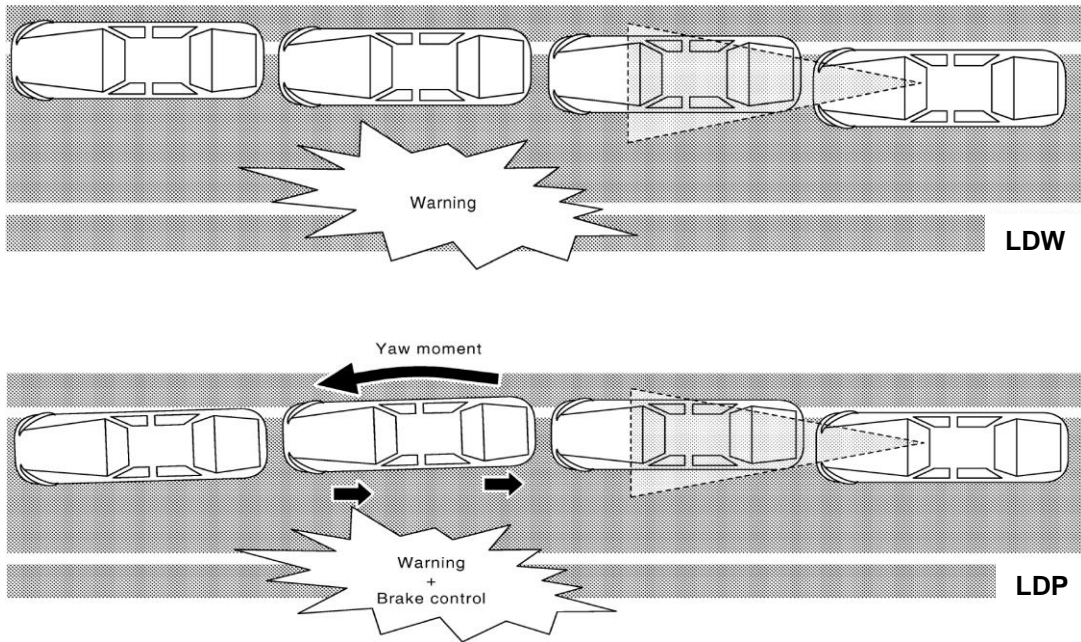
Test mode	Function
Self Diagnostic Result	<ul style="list-style-type: none"> Displays malfunctioning system memorized in accelerator pedal actuator Displays the Freeze Frame Data when the malfunction is detected
DATA MONITOR	Displays real-time input/output data of accelerator pedal actuator
ACTIVE TEST	Enables operation check of electrical loads by sending driving signal to them
ECU Identification	Displays accelerator pedal actuator parts number
CAN Diag Support Monitor	The results of transmit/receive diagnosis of ITS communication can be read



ADVANCED DRIVER ASSISTANCE SYSTEMS

2. CAMERA & RADAR

Lane Departure Warning / Lane Departure Prevention (LDW / LDP) - Functionality



- THE DRIVER OF THE VEHICLE MUST ALWAYS REFER TO SECTION 5 OF THE OWNERS MANUAL FOR SPECIFIC DETAILS ON HOW TO OPERATE THE SYSTEM & THE SYSTEMS LIMITATIONS -

With the use of the front mounted Camera Unit (in the top-centre of the windscreen) the Lane Departure Warning (LDW) system / Lane Departure Prevention (LDP) system will operate when the vehicle is driven at speeds of approximately 70 km/h and above, and when it is travelling close to either the left or the right of a travelling lane.

NOTE:

The lanes on the road must have clearly visible white lane marker lines painted onto the road surface.

Each system functions as follows:

- (i) LDW system:** Warns the driver by a warning light and chime
- (ii) LDP system:** Warns the driver by a warning light and chime, and helps assist the driver to return the vehicle to the centre direction of the travelling lane by applying brake control to the left or right wheels individually (for a short period of time)

The LDW and LDP systems monitor the lane markers on the travelling lane using the camera unit located inside the front map light cover so it can view through the windscreen. When the camera unit detects that the vehicle is travelling close to either the left or the right of the travelling lane, the LDW Warning Light on the instrument panel blinks in orange and a warning chime sounds. When the LDP system is on, it will automatically apply the brakes for a short period of time, using the function of the Vehicle Dynamic Control (VDC) system. (Brakes are applied to the wheels of one side of the vehicle which in turn will create a “veering” effect)

When the Driver Wishes to Change Lanes:

The driver will be required to operate the appropriate indicator (left or right turn signal via the indicator stalk) when changing lanes to overtake another vehicle etc.



ADVANCED DRIVER ASSISTANCE SYSTEMS

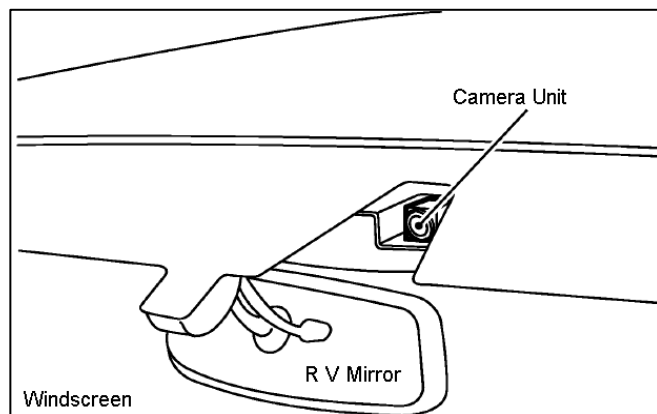
LDW / LDP Operation (Camera Unit)

The Camera Unit is installed in behind the windscreen glass, adjacent to the Rear Vision Mirror.

The Camera is designed to follow the white lines painted on the edge of the road surface or the far left solid line & centre dotted or solid line (depending on the roads being travelled on)

The Camera Cannot See / Operate:

- Yellow painted lines
- Unfinished / missing / faded white lines
- Edges of roads / travelling lanes without any lines painted
- Roads covered with water / snow / dirt etc.
- Non standard painted lines
- Edge of road / travelling lane where the road surface has multiple parallel white lines painted onto it
- If the area of the windscreen where the Camera views through is excessively dirty / covered with snow
- At night if the headlights are not switched on, not functioning correctly or not correctly aligned. (If the headlights are unable to properly illuminate the white lines on the road)
- On roads with sharp curves / bends
- If the driven vehicle is travelling too close to a vehicle in front
- When there is sunlight shining directly into the camera
- When there is a sudden change of brightness (entering / exiting tunnels etc.)
- Below 70km/h
- If reflective material is placed on the dash top (white paper / mirror etc. Can reflect light upwards into the camera)
- If the area of the windscreen near the camera is covered in a "wrap" or stickers (solid or transparent) etc.
- If the camera is subject to extremely high cabin temperatures. If the vehicle parked in the hot sun for periods of time, this will temporarily disable the camera. Once the cabin temperature cools down the camera will again function OK. (System may have to be switched OFF & then back ON to reset it)



The windscreen will require cleaning with a soft cloth from time to time



The Camera can only detect clearly painted white lines on straight roads / motorways



The system will not function on such roads



ADVANCED DRIVER ASSISTANCE SYSTEMS

Lane Departure Warning (LDW) Operation (Switch & Warning Light)

The operation of the LDW & LDP can be separated. It is possible to have the audible & visual warning activate if the vehicle starts to veer out of the lane / but the prevention feature will not function.

However if the LDP system is active, the visual & audible warnings will always occur – regardless of the “Warning Systems” switch operation.



Warning Light on Instrument Cluster
 Green = LDP ON (no light for LDW ON)
 Blinking Orange + chime = LDW / LDP operating
 Constant Blinking Orange = Camera too Hot
 Orange Always ON = System Malfunction

Lane Departure Warning Switch & Master Control

The “Warning Systems” Switch mounted on the lower RH dash fascia must be in the ON position (small yellow light illuminated).

This switch is the same switch for the other 2 warning system (Blind Spot Warning & Forward Collision Warning).

If this switch is ON, the Audible Chimes that are linked to the 3 warning system will be operational where appropriate. The visual warnings where appropriate will also be operational.

If this switch is OFF, the Audible Chimes that are linked to the 3 warning systems will NOT be operational.

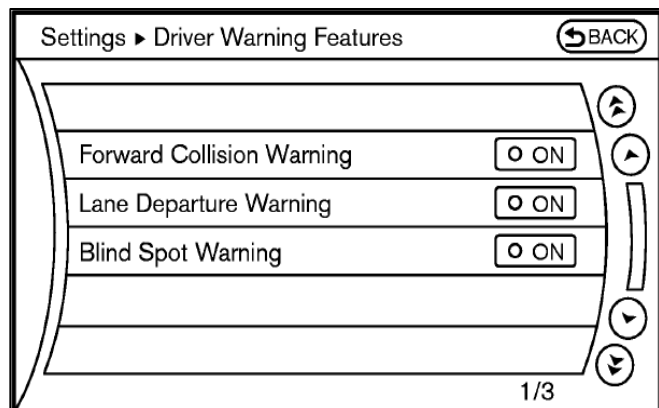


“WARNING SYSTEMS” Switch (FCW / LDW / BSW Systems)

NOTE:

If the DDAS switch is in the ON (LDP is ON) position as described over page, the Visual & Audible warning will also occur even if the Warning Systems switch is OFF.

Located in the AV / Navi system is the Master Controls for the 3 x Warning Systems. Ensure that the Lane Departure Warning feature is ON.





ADVANCED DRIVER ASSISTANCE SYSTEMS

Lane Departure Prevention (LDP) Operation (Switch & Warning Light)

Lane Departure Prevention Switch & Master Control

The “Dynamic Driver Assistance System” switch mounted on the RHS of the steering wheel must be in the ON position (LDP W/L illuminated in GREEN on the instrument cluster).

This switch is the same switch for the other 2 “intervention” systems (Blind Spot Intervention & Distance Control Assist).

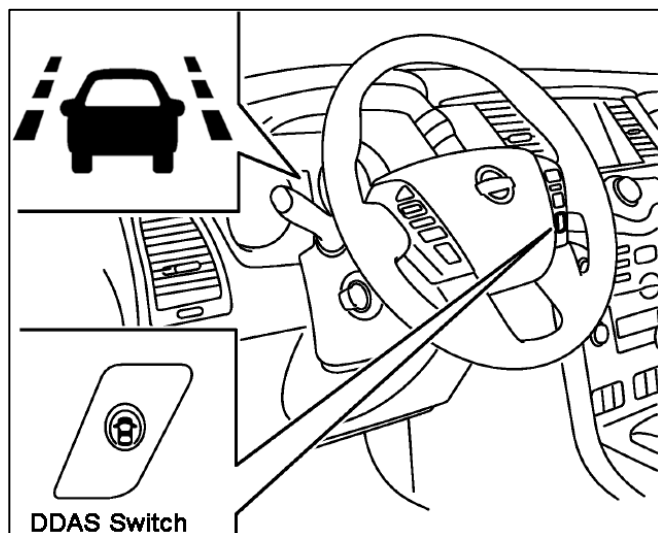
If this switch is ON, the physical intervention systems that are linked to the 3 systems will be operational where appropriate. The visual & audible warnings where appropriate will always be operational regardless of the “Warning Systems” switch position.

If the DDAS switch is OFF, the physical intervention systems that are linked to the 3 warning systems will NOT be operational. (However the visual / audible warnings on the instrument cluster will continue to operate if they are switched ON)

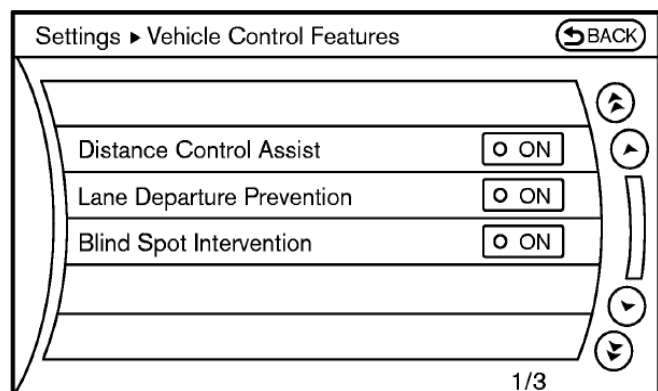
Located in the AV / Navi system is the Master Controls for the 3 x Intervention Systems. Ensure that the Lane Departure Prevention feature is ON.

LDP Limitations (May &/or Will not operate if):

- The road or white line condition as previously described is unsuitable for LDW / LDP operation.
- Operated in poor weather conditions
- When changing lanes & using the lane change signal (indicators) or when the hazards are operating
- The tyres &/or suspension has been modified or if the tyres are worn &/or underinflated
- If the road is slippery / covered with snow & ice, uneven &/or winding etc.
- Towing a trailer or carrying a heavy load in the rear
- The vehicle speed is less than 70km/h
- The ABS / TCS / VDC system is operating
- The 4WD Shift switch is in 4H or 4Lo or of the 4WD mode switch is in SNOW, ROCK or SAND modes
- The camera is too hot if the vehicle has been sitting in the hot sun for a period of time



Warning Light on Instrument Cluster
Green = LDP ON (no light for LDW ON)
Blinking Orange + chime = LDW / LDP operating
Constant Blinking Orange = Camera too Hot
Orange Always ON = System Malfunction





ADVANCED DRIVER ASSISTANCE SYSTEMS

Normal Operation of LDW / LDP

Vehicle condition/ Driver's operation	Action	Indication on the combination meter	Buzzer
Less than Approx. 60 km/h Steering wheel mounted DDAS Switch = ON	Close to lane marker No action	 (Green) ON	—
Approx. 70 km/h Steering wheel mounted DDAS Switch = ON	Close to lane marker Warning and yawing • Buzzer sounds* • Warning lamp blinks* • Brake control (if LDP is ON) * Action of LDW & LDP	→ → (Green) ON (Yellow) Blink (Green) ON	Short continuous beeps
	• Close to lane marker • Turn signal ON (Deviate side) No action	 (Green) ON	—
	Close to lane with soft braking Warning • Buzzer sounds • Warning lamp blinks Only Buzzer & Yellow Blink will Occur if DDAS Switch = OFF	→ → (Green) ON (Yellow) Blink (Green) ON	Short continuous beeps
	• VDC OFF • When the variable 4×4 mode selector switch is turned to not ON ROAD position • When the 4WD shift switch is turned to not AUTO position Cancellation • Buzzer sounds • Indicator lamp blinks NOTE: When dynamic driver assistance switch is ON ⇒ OFF, indicator lamp is turned OFF	→ (Green) ON (Green) Blink	Beep

Operation with Fault / DTC

Vehicle condition / Driver's operation	Warning systems ON indicator (Small light in Switch)	Indication on the combination meter	Buzzer (Only if LDP is ON)
Ignition switch OFF ⇒ ON (Bulb check)	Approx. 5 sec. ON	OFF → → → OFF (Yellow) ON (Green) ON	—
When DTC is detected (Except "C1B01" and "C1B03")	ON	OFF → (Yellow) ON	Beep
Camera aiming is not completed ("C1B01" is detected) NOTE: This is detected while driving the vehicle and the indication remains ON until the ignition switch is turned OFF	ON	OFF → (Yellow) ON	Beep
Temporary disabled status at high temperature ("C1B03" is detected)	ON	OFF → (Yellow) Blink	Beep
When the warning systems switch is pressed (When the settings of LDW system, FCW system, and BSW system on the navigation screen are "OFF")	Blink	—	N/A
When the dynamic driver assistance switch is pressed (When the settings of LDP system, DCA system and Blind Spot Intervention system on the navigation screen are "OFF")	N/A	 (Green) Blink	—



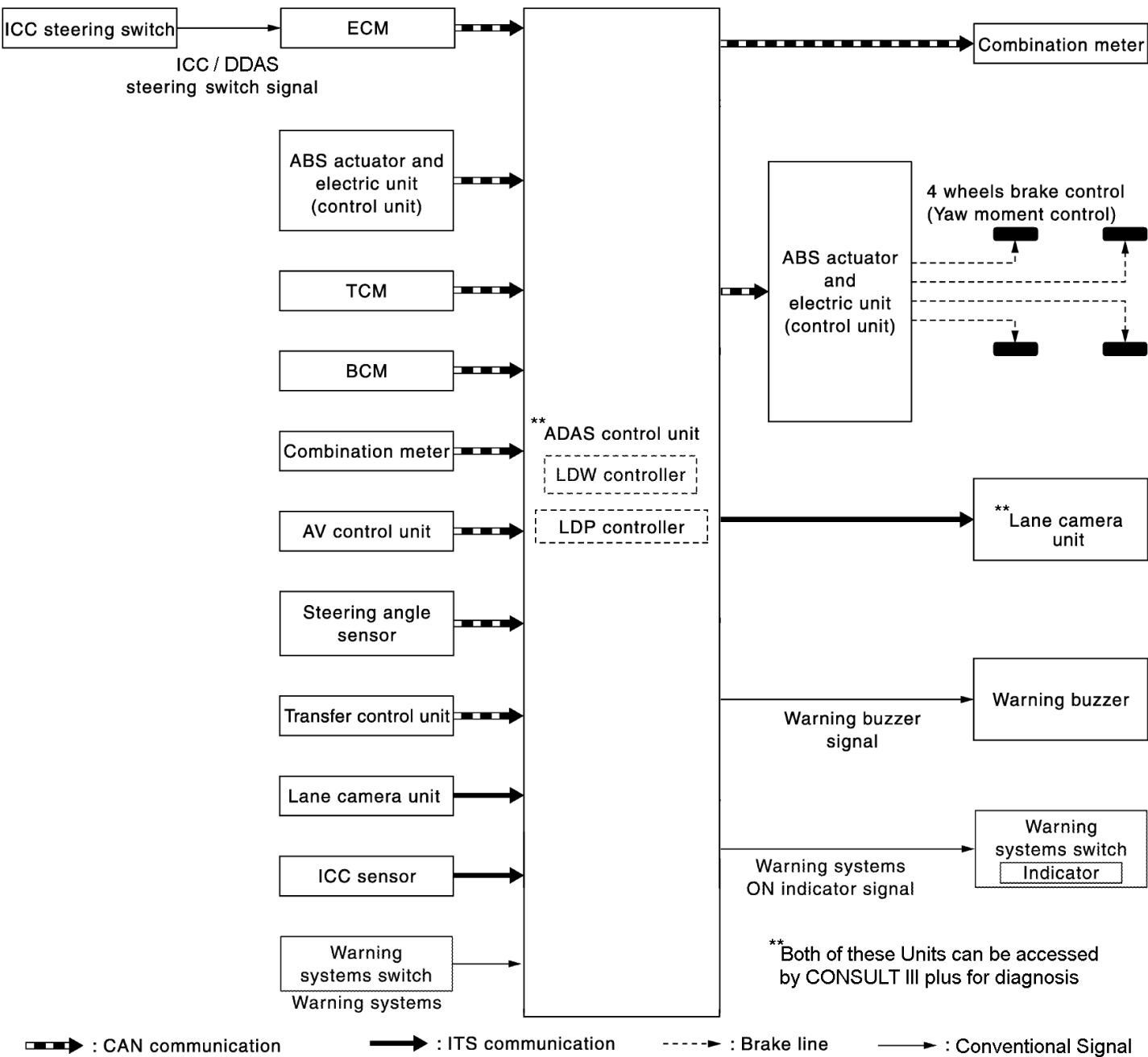
ADVANCED DRIVER ASSISTANCE SYSTEMS

Control System Operation

The entire operation of the Advanced Driver Assistance System is controlled by the ADAS Control Unit.

The diagram below details the Inputs / Outputs of the LDW / LDP system.

See over page for specific details of each component involved in the ADAS system .

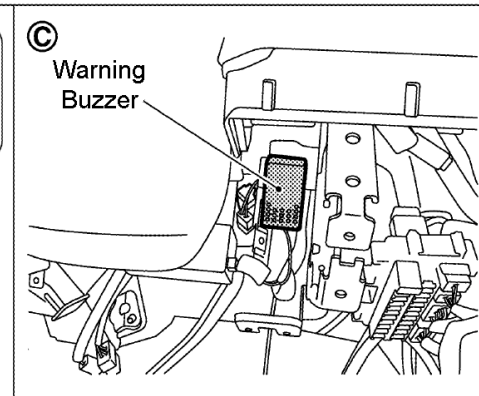
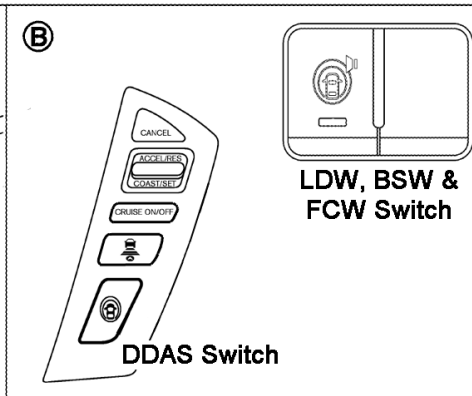
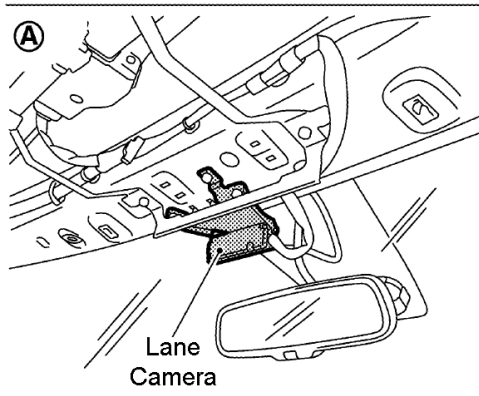
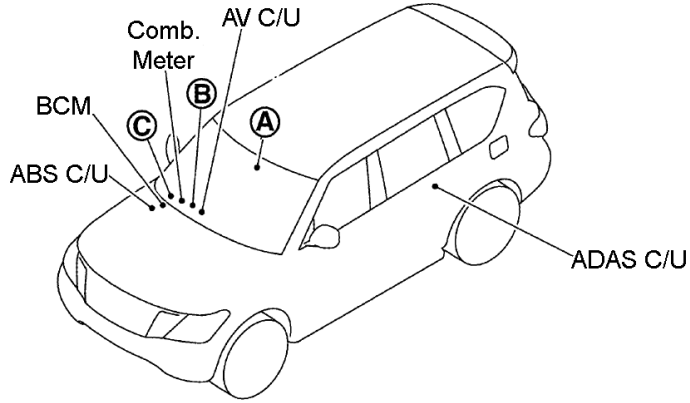


** Both of these Units can be accessed by CONSULT III plus for diagnosis



ADVANCED DRIVER ASSISTANCE SYSTEMS

ADAS (LDW / LDP) Component Location (Y62 Patrol)



Lane Camera Unit (covers removed)



ADVANCED DRIVER ASSISTANCE SYSTEMS

Trouble Diagnosis

Step 1;

Confirm the operation of the system via the instruction from section 5 of the Owners Manual (Is the system operating correctly & as it was designed to do so?)

Step 2;

If it is found there is a fault, connect CONSULT III plus to the vehicle & access ICC/ADAS &/or LANE CAMERA.

- Check for any DTC's. If there are any, refer to the ESM as follows;

> O CRUISE CONTROL & DRIVER ASSISTANCE > DAS > LDW & LDP > DTC/CIRCUIT DIAGNOSIS

More detail & the Diagnosis Procedure for the DTC is located here.

- If there are no DTC's yet the fault is clearly evident, refer to the ESM as follows;

> O CRUISE CONTROL & DRIVER ASSISTANCE > DAS > LDW & LDP > SYMPTOM DIAGNOSIS

Various processes are discussed dependant on the fault at hand.

Wiring Diagrams

Refer to the ESM as follows for a wiring diagram of the ADAS system;

> O CRUISE CONTROL & DRIVER ASSISTANCE > DAS > ADAS CONTROL UNIT > WIRING DIAGRAM

Here you will find Power & Ground supplies as well as the appropriate locations of the fuses & ground connections.

Access to the ICC/ADAS &/or LANE CAMERA systems with CONSULT III plus

Full interaction with the system for setting customer preferences, checking for any system DTC's, checking for input & output activity & checking component operation is available with CONSULT III plus. See below a description of each diagnosis mode available;

ICC/ADAS:

Diagnosis mode	Description
Work Support	Displays causes of automatic system cancellation occurred during system control
Self Diagnostic Result	Displays the name of a malfunctioning system stored in the ADAS control unit
Data Monitor	Displays ADAS control unit input/output data in real time
Active Test	Enables an operational check of a load by transmitting a driving signal from the ADAS control unit to the load
Ecu Identification	Displays ADAS control unit part number
CAN Diag Support Monitor	Displays a reception/transmission state of CAN communication and ITS communication

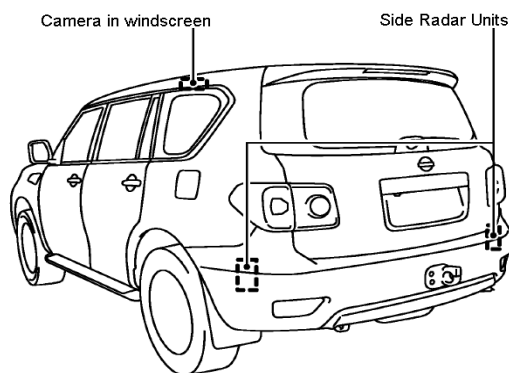
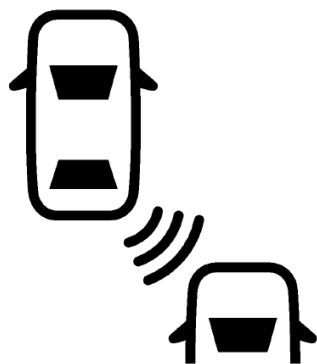
LANE CAMERA:

Diagnosis mode	Description
Work Support	Performs the camera aiming
Self Diagnostic Result	Displays the name of a malfunctioning system stored in the lane camera unit
Data Monitor	Displays lane camera unit input/output data in real time
Ecu Identification	Displays lane camera unit part number
CAN Diag Support Monitor	Displays a reception/transmission state of ITS communication



ADVANCED DRIVER ASSISTANCE SYSTEMS

Blind Spot Warning / Blind Spot Intervention (BSW / BSI) - Functionality



- THE DRIVER OF THE VEHICLE MUST ALWAYS REFER TO SECTION 5 OF THE OWNERS MANUAL FOR SPECIFIC DETAILS ON HOW TO OPERATE THE SYSTEM & THE SYSTEMS LIMITATIONS -

With the use of 2 x Side Radar Units (LH & RH Rear) & front mounted Camera Unit, (in the top-centre of the windscreen) the Blind Spot Warning (BSW) and Blind Spot Intervention (BSI) systems can help alert the driver of other vehicles in adjacent lanes. Also when the driver wishes to change lanes, the driver is alerted of another vehicle beside the driven vehicle travelling in the intended lane. The BSI feature will further assist the driver by “veering” the driven vehicle back into the original lane so that a collision is avoided.

The Blind Spot Warning (BSW) system / Blind Spot Intervention (BSI) system will operate when the vehicle is driven at speeds of approximately 32 km/h & above (BSW only) & 60km/h & above (BSW & BSI).

Each system functions as follows:

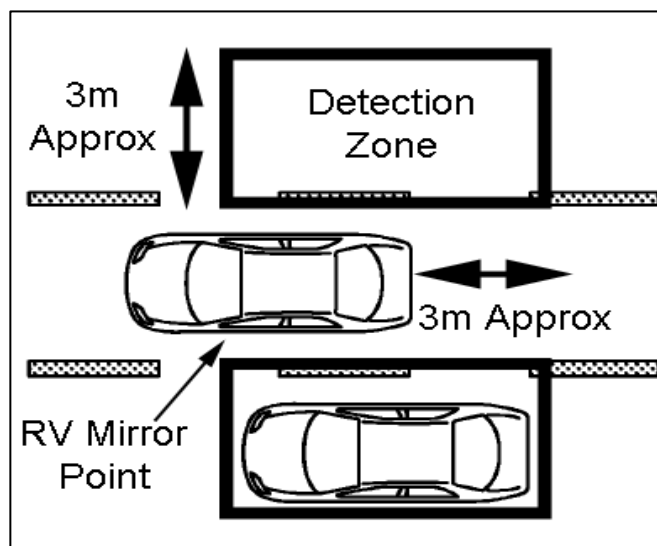
(i) BSW system: Warns the driver by a warning light and chime

(ii) BSI system: Warns the driver by a warning light and chime, and helps assist the driver to return the vehicle to the centre direction of the travelling lane by applying brake control to the left or right wheels individually (for a short period of time)

NOTE:

- Only the **BSI** system is dependant on the Lane Camera unit installed on the inside (top centre) of the windscreen. Therefore clearly painted lines on the road are necessary for BSI operation. The 2 x Side Radar units are also required for the BSI systems operation.

- The **BSW** system is only dependant on the Side Radar units being able to detect vehicles moving at a different speed (to the driven vehicle) along side the driven vehicle.



The Radar Sensors can detect vehicles on either side of the driven vehicle within the detection zones shown above.

Both detection zones starts from the outside mirror of the driven vehicle and extends approximately 3m behind the rear bumper & approximately 3m sideways



ADVANCED DRIVER ASSISTANCE SYSTEMS

Blind Spot Warning (BSW) Operation (Switch & Warning Light)

The operation of the BSW & BSI systems can be separated. It is possible to have the visual only or audible / visual warning activate if there is a vehicle alongside the driven vehicle, or if the driven vehicle starts to move across lanes into another alongside, but the prevention feature will not function. However if the BSI system is active, the visual & audible warnings will always occur – regardless of the “Warning Systems” switch operation.



Indicator Light (LH & RH sides)
 Orange Only

Constantly ON = Vehicle detected along side
Flashing + Buzzer = Warning of potential collision
 Brightness adjusts dependant on Ambient Light

Blind Spot Warning Switch & Master Control

The “Warning Systems Switch” mounted on the lower RH dash facia must be in the ON position (small yellow light illuminated).

This switch is the same switch for the other 2 warning systems (Lane Departure Warning & Forward Collision Warning).

If this switch is ON, the Audible Chimes that are linked to the 3 warning system will be operational where appropriate. The visual warnings where appropriate will also be operational.

If this switch is OFF, the Audible Chimes that are linked to the 3 warning systems will NOT be operational.

NOTE:

If the DDAS switch is in the ON (BSI is ON) position as described over page, the Visual & Audible warning will also occur even if the Warning Systems switch is OFF.

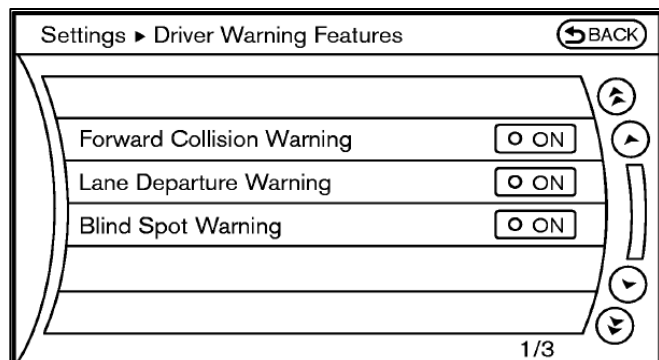


“WARNING SYSTEMS” Switch
 (FCW / LDW / BSW Systems)

Located in the AV / Navi system is the Master Controls for the 3 x Warning Systems. Ensure that the Lane Departure Warning feature is ON.

BSW Limitations (May &/or Will not operate if):

- Operated in poor weather conditions
- When the hazards are operating
- If there is a motorcycle, bicycle, pedestrians &/or animals in the detection zone





ADVANCED DRIVER ASSISTANCE SYSTEMS

Blind Spot Intervention (BSI) Operation (Switch & Warning Light)

Whenever the BSI system is active, the visual & audible warnings will always occur.

Blind Spot Intervention Switch & Master Control

The “Dynamic Driver Assistance System” switch mounted on the RHS of the steering wheel must be in the ON position (BSI W/L illuminated in GREEN on the instrument cluster).

This switch is the same switch for the other 2 “intervention” systems (Lane Departure Prevention & Distance Control Assist).

If this switch is ON, the physical intervention systems that are linked to the 3 systems will be operational where appropriate. The visual & audible warnings where appropriate will also be operational if they are also switched ON.

If this switch is OFF, the physical intervention systems that are linked to the 3 warning systems will NOT be operational. (However the visual / audible warnings on the instrument cluster will continue to operate if they are switched ON)

Located in the AV / Navi system is the Master Controls for the 3 x Intervention Systems. Ensure that the Blind Spot Intervention feature is ON.

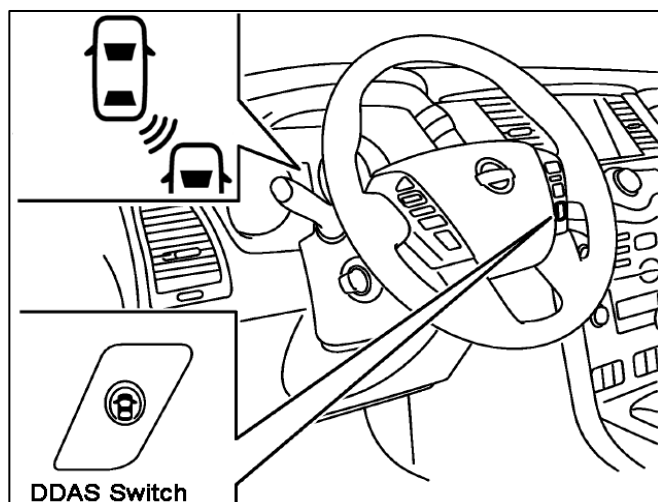
BSI Limitations (May &/or Will not operate if):

- The road or white line condition as previously described is unsuitable for BSI operation.
- Operated in poor weather conditions
- When the hazards are operating
- If there is a motorcycle, bicycle, pedestrians &/or animals in the detection zone
- The tyres &/or suspension has been modified or if the tyres are worn &/or underinflated
- If the road is slippery / covered with snow & ice, uneven &/or winding etc.
- The vehicle speed is less than 60km/h
- The ABS / TCS / VDC system is operating
- The 4WD Shift switch is in 4H or 4Lo or of the 4WD mode switch is in SNOW, ROCK or SAND modes
- The camera is too hot if the vehicle has been sitting in the hot sun for a period of time
- Bright light / sunshine is shining directly into the camera

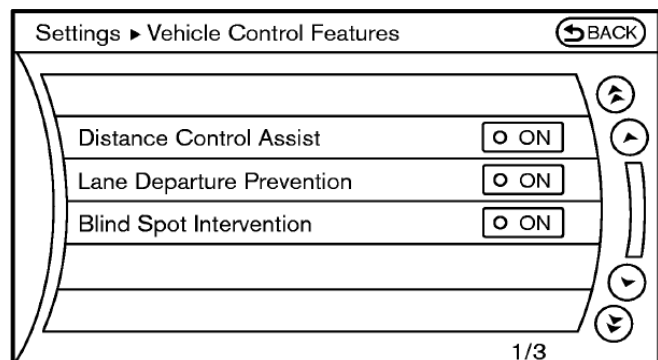


Indicator Light (LH & RH sides)
Orange Only

Constantly ON = Vehicle detected along side
Flashing + Buzzer = Warning of potential collision
Brightness adjusts dependant on Ambient Light



Green = BSI ON
Yellow = System Fault

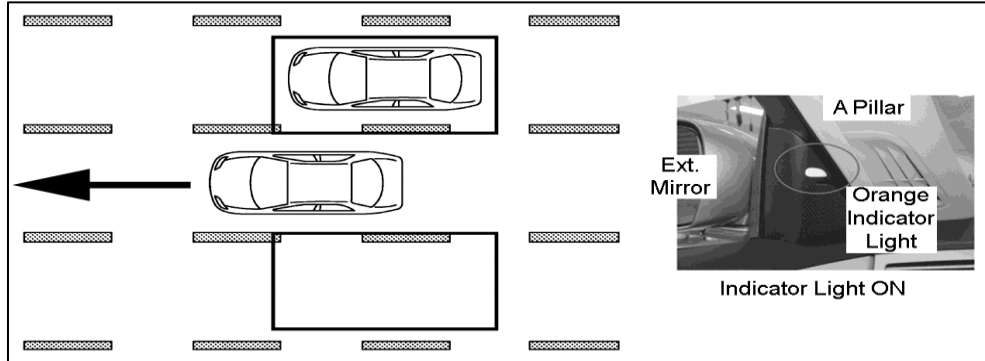




ADVANCED DRIVER ASSISTANCE SYSTEMS

BSW / BSI Operation Scenarios

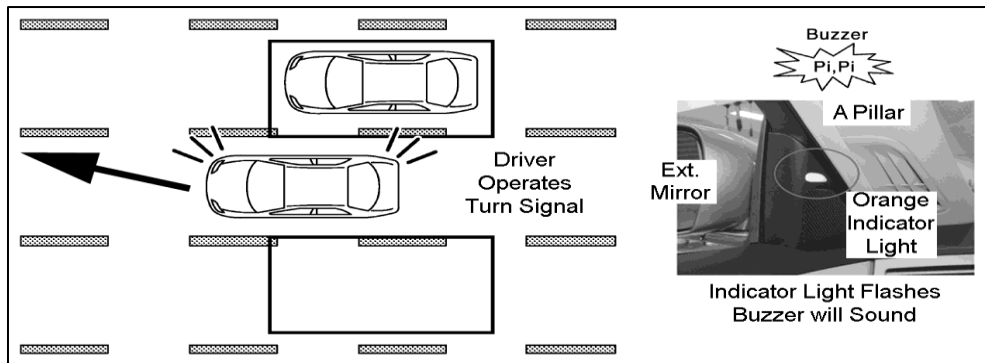
BSW = ON
BSI = ON or OFF



1. Vehicle enters detection zone (either side). The appropriate (LHS or RHS) Indicator Light on the corresponding door will illuminate (stay on constantly, not flash) when a vehicle has been detected. Visual warning only. Light will go OFF when the detection zone is clear.

NOTE:
May not detect Motor Cycles etc.

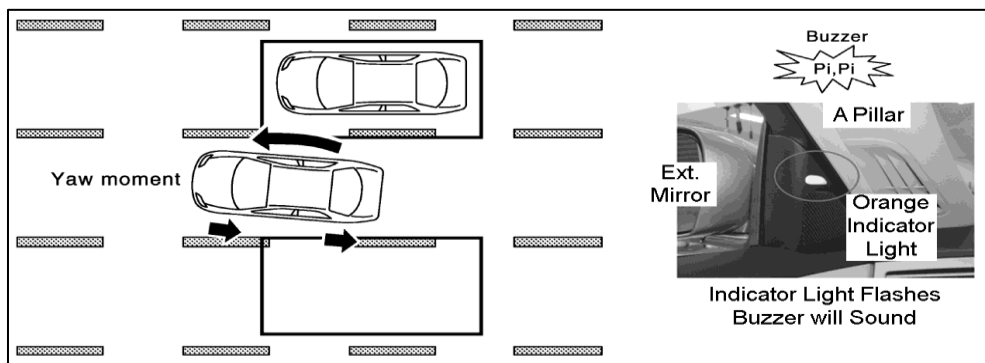
BSW = ON or OFF
BSI = ON



2. If a vehicle is in the detection zone & the driver operates the turn signal (for the side of where the vehicle in the detection zone is), the Indicator Light will FLASH & an alarm will sound.

NOTE:
If the turn signal is operated 1st & then a vehicle enters the detection zone, the Warning Indicator will flash, but the buzzer will not sound.

BSW = ON or OFF
BSI = ON



3. Regardless of turn signal (indicator) operation, if the driven vehicle starts to veer across into the area where a vehicle is in the detection zone, the BSI system will operate accordingly. The BSI system will activate the ABS system to create a braking effect on the LHS or RHS wheels which in turn creates a "veering" effect.



ADVANCED DRIVER ASSISTANCE SYSTEMS

Normal Operation of BSW

Vehicle condition / Driver's operation				Action		
Warning systems ON indicator	Vehicle speed (Approx.) km/h	Turn signal condition	Status of Vehicle Detection within Detection Area	Indication on the BSW / BSI Indicator (on the door)	Buzzer	
OFF	—	—	—	OFF	OFF	
ON	Less than 29km/h	—	—	OFF	OFF	
		OFF	Vehicle is detected	ON	OFF	
	32km/h or more	ON (vehicle detected direction)	Before turn signal operates Vehicle is detected	Blink Indicator ON: 200 ms pulse, 200 ms gap Indicator OFF: 200 ms gap	Short continuous beep Buzzer ON: 80 ms pulse, 550 ms gap Buzzer OFF: 550 ms gap	
			Vehicle is detected after turn signal operates	Blink Indicator ON: 200 ms pulse, 200 ms gap Indicator OFF: 200 ms gap	OFF	

NOTE:
If the steering wheel mounted DDAS switch is operated so that the BSI system is activated, the BSW system will always be active regardless of the "Warning Systems Switch" position (ON or OFF)

Normal Operation of BSI

Vehicle condition / Driver's operation				Action		
BSI ON indicator	Vehicle speed (Approx.) km/h	Status of Vehicle Detection within Detection Area	Status of approach to adjacent lane	Indication on the BSW / BSI indicator	Brake control	Buzzer
OFF	—	—	—	OFF	OFF	OFF
Green	Less than approx. 60km/h	—	—	OFF	OFF	OFF
		Vehicle is detected	Not approaching	ON	OFF	OFF
	Approx. 60km/h or more	Vehicle is detected	Approaching	Blink Indicator ON: 200 ms pulse, 200 ms gap Indicator OFF: 200 ms gap	ON	Short continuous beeps Buzzer ON: 50 ms pulse, 50 ms gap Buzzer OFF: 50 ms gap
			Approaching	Approaching	ON	Short continuous beeps Buzzer ON: 50 ms pulse, 50 ms gap Buzzer OFF: 50 ms gap

NOTE:
If the steering wheel mounted DDAS switch is operated so that the BSI system is activated, the BSW system will always be active regardless of the "Warning Systems Switch" position (ON or OFF)

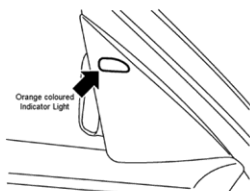


ADVANCED DRIVER ASSISTANCE SYSTEMS

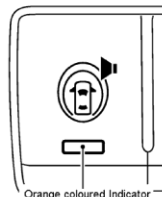
Operation with Fault / DTC

Vehicle condition/Driver's operation	BSW / BSI Indicators (Orange Lights LHS & RHS)	Warning systems ON indicator (Light in Button)	Warning buzzer	Indication on the combination meter
Ignition switch: OFF ⇒ ON	Approx. 2 sec. ON	Approx. 5 sec. ON	OFF	
Engine Idling / Running (DDAS Switch ON, not driven)	OFF	ON	OFF	
When DTC is detected	OFF	ON	Beep	
When the camera detects that interior temperature is high	OFF	ON	Beep	
When radar blockage is detected	OFF	ON	Beep	
When the Warning Systems Switch is pressed when LDW, FCW & BSW systems on the Navi Screen are OFF	OFF	Blink	—	—
When the DDAS Switch (on steering wheel) is turned ON with settings of DCA, LDP & BSI Systems is OFF	OFF	—	—	

BSW / BSI Indicators



Warning Systems Switch





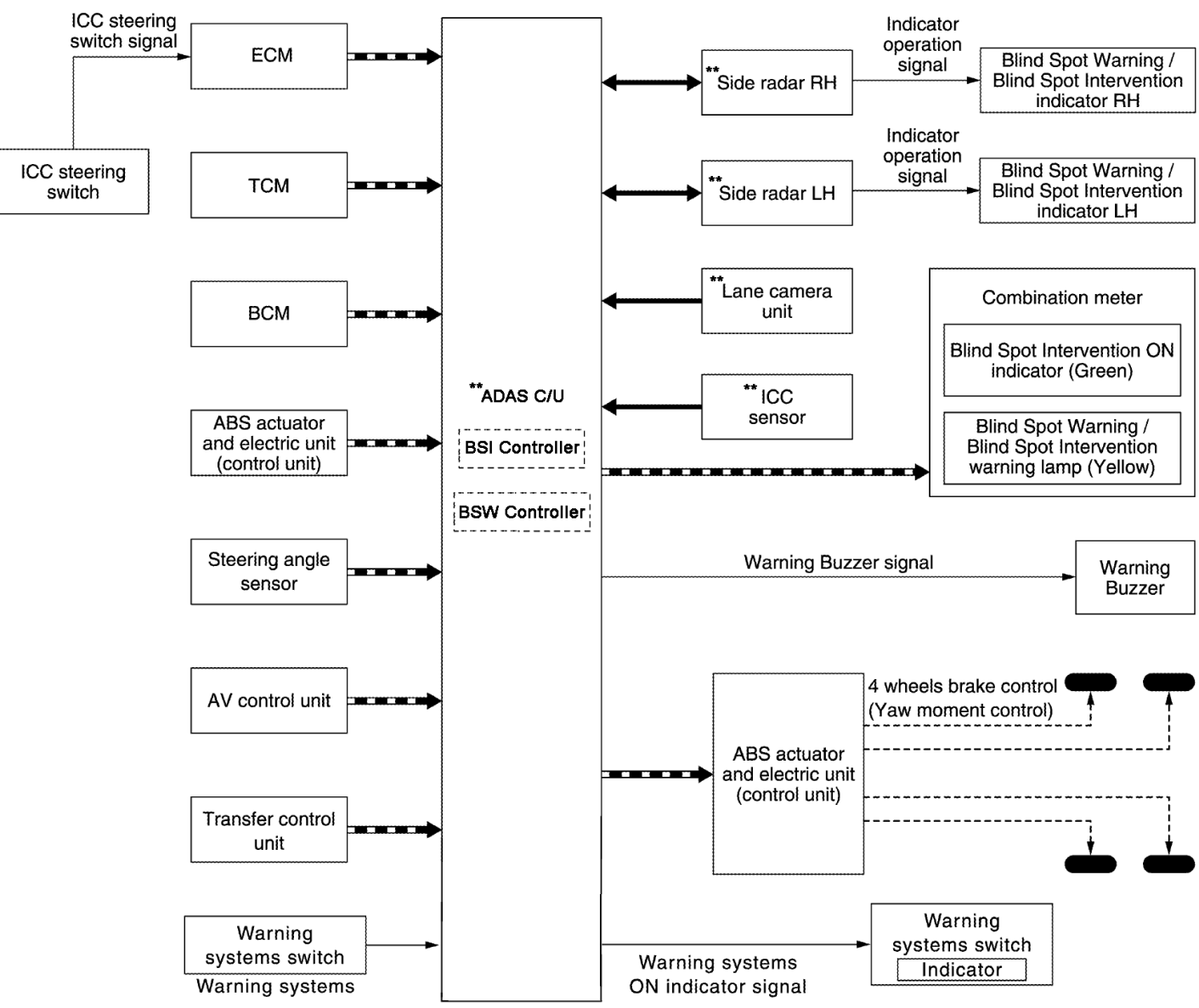
ADVANCED DRIVER ASSISTANCE SYSTEMS

Control System Operation

The entire operation of the Advanced Driver Assistance System is controlled by the ADAS Control Unit.

The diagram below details the Inputs / Outputs of the BSW / BSI system.

See over page for specific details of each component involved in the ADAS system .

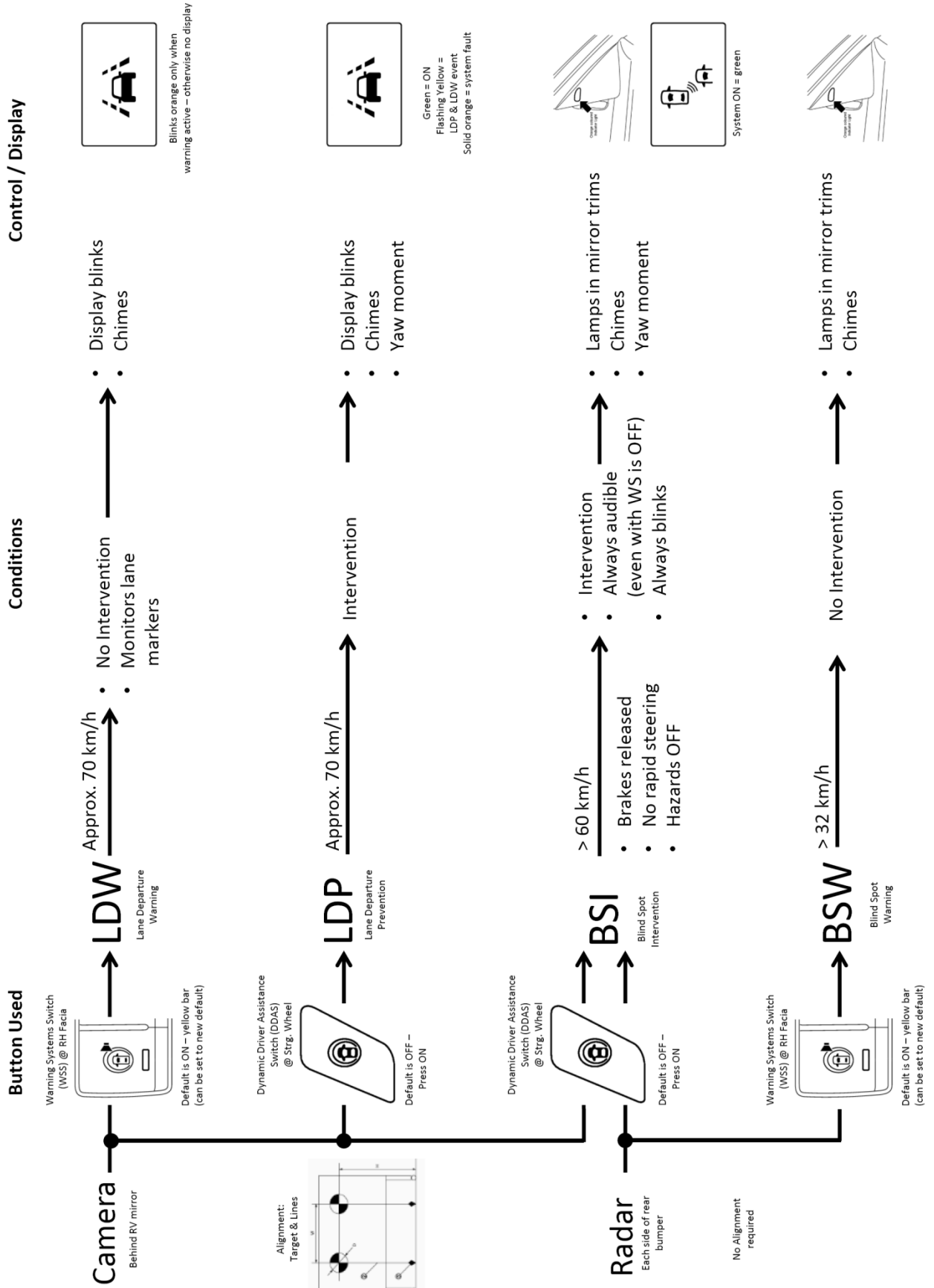


: CAN communication
 : ITS communication
 : Brake line
 : Conventional Signal

**** All of these units can be accessed by CONSULT III plus for diagnosis**



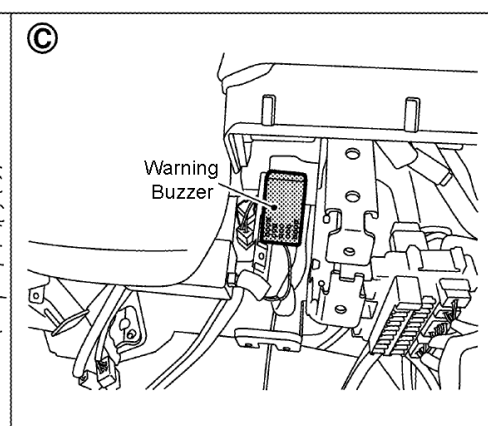
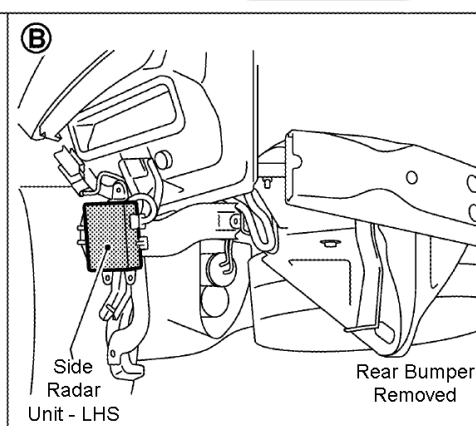
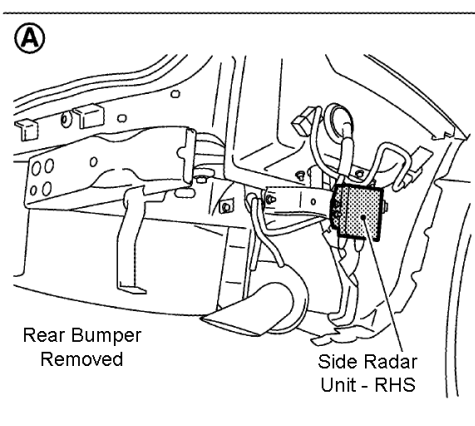
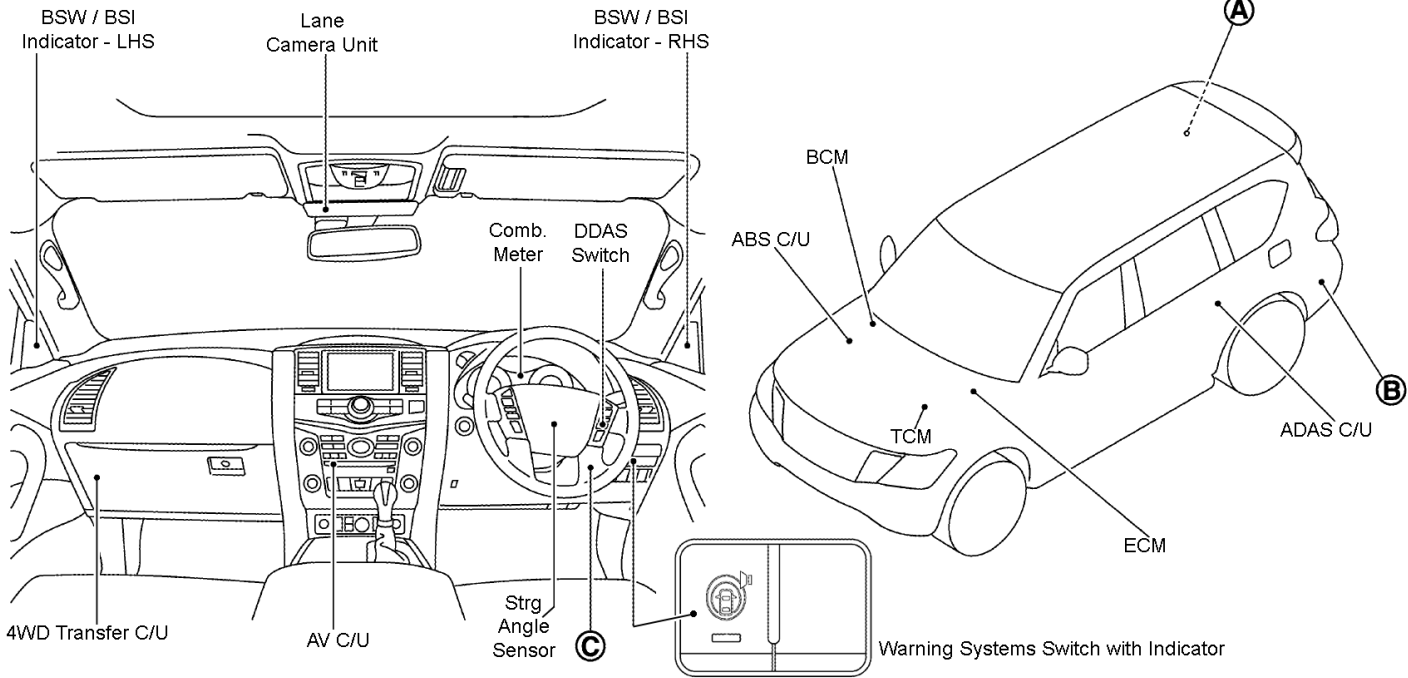
ADAS Summary - 2 (Camera & Radar)





ADVANCED DRIVER ASSISTANCE SYSTEMS

ADAS (BSW / BSI) Component Location (Y62 Patrol)





ADVANCED DRIVER ASSISTANCE SYSTEMS

Trouble Diagnosis

Step 1;

Confirm the operation of the system via the instruction from section 5 of the Owners Manual (Is the system operating correctly & as it was designed to do so?)

Step 2;

If it is found there is a fault, connect CONSULT III plus to the vehicle & access ICC/ADAS &/or LANE CAMERA.

- Check for any DTC's. If there are any, refer to the ESM as follows;

> O CRUISE CONTROL & DRIVER ASSISTANCE > DAS > BSW & BSI > DTC/CIRCUIT DIAGNOSIS

More detail & the Diagnosis Procedure for the DTC is located here.

- If there are no DTC's yet the fault is clearly evident, refer to the ESM as follows;

> O CRUISE CONTROL & DRIVER ASSISTANCE > DAS > BSW & BSI > SYMPTOM DIAGNOSIS

Various processes are discussed dependant on the fault at hand.

Wiring Diagrams

Refer to the ESM as follows for a wiring diagram of the ADAS system;

> O CRUISE CONTROL & DRIVER ASSISTANCE > DAS > ADAS CONTROL UNIT > WIRING DIAGRAM

Here you will find Power & Ground supplies as well as the appropriate locations of the fuses & ground connections.

Access to the ICC/ADAS &/or SIDE RADAR LH / SIDE RADAR RH systems with **CONSULT III plus**

Full interaction with the system for setting customer preferences, checking for any system DTC's, checking for input & output activity & checking component operation is available with CONSULT III plus. See below a description of each diagnosis mode available;

ICC/ADAS:

Diagnosis mode	Description
Work Support	Displays causes of automatic system cancellation occurred during system control
Self Diagnostic Result	Displays the name of a malfunctioning system stored in the ADAS control unit
Data Monitor	Displays ADAS control unit input/output data in real time
Active Test	Enables an operational check of a load by transmitting a driving signal from the ADAS control unit to the load
Ecu Identification	Displays ADAS control unit part number
CAN Diag Support Monitor	Displays a reception/transmission state of CAN communication and ITS communication

SIDE RADAR LH:
 SIDE RADAR RH:

Select diag mode	Function
Self Diagnostic Result	Displays memorized DTC in the side radar.
Data Monitor	Displays real-time data of side radar.
Active Test	Enables operation check of electrical loads by sending driving signal to them.
Ecu Identification	Displays part number of side radar.



ADVANCED DRIVER ASSISTANCE SYSTEMS

ADAS CONTROL UNIT INPUTS

Output From:	(via)	Signal name	The ADAS C/U:		
ECM	CAN	Closed throttle position signal	Receives idle position state (ON/OFF)		
		Accelerator pedal position signal	Receives accelerator pedal position (angle)		
		ICC prohibition signal	Receives an operable/inoperable state of the ICC system		
		ICC steering switch signal	Main switch signal	Receives the operational state of the ICC steering switch	
			SET/COAST switch signal		
			CANCEL switch signal		
			RESUME/ACCELERATE switch signal		
			DISTANCE switch signal		
				Dynamic driver assistance switch signal	
		Engine speed signal	Receives engine speed		
Stop lamp switch signal	Receives an operational state of the brake pedal				
ICC brake switch signal	Receives an operational state of the brake pedal				
Snow mode switch signal	Receives an operational state of the snow mode				
TCM	CAN	Input speed signal	Receives the number of revolutions of input shaft		
		Current gear position signal	Receives a current gear position		
		Shift position signal	Receives a selector lever position		
		Output shaft revolution signal	Receives the number of revolutions of output shaft		
ABS actuator and electric unit (control unit)	CAN	ABS malfunction signal	Receives a malfunction state of ABS		
		ABS operation signal	Receives an operational state of ABS		
		ABS warning lamp signal	Receives an ON/OFF state of ABS warning lamp		
		TCS malfunction signal	Receives a malfunction state of TCS		
		TCS operation signal	Receives an operational state of TCS		
		VDC OFF switch signal	Receives an ON/OFF state of VDC		
		VDC malfunction signal	Receives a malfunction state of VDC		
		VDC operation signal	Receives an operational state of VDC		
		Vehicle speed signal (ABS)	Receives wheel speeds of four wheels		
		Stop lamp switch signal	Receives an operational state of the brake pedal		
		Yaw rate signal	Receives yaw rate acting on the vehicle		
		Side G sensor signal	Receives lateral G acting on the vehicle		



ADVANCED DRIVER ASSISTANCE SYSTEMS

ADAS CONTROL UNIT INPUTS

Output From:	(via)	Signal name	The ADAS C/U:
Combination meter	CAN	Parking brake switch signal	Receives an operational state of the parking brake
BCM	CAN	Front wiper request signal	Receives an operational state of front wiper(s)
		Turn indicator signal	Receives an operational state of the turn signal lamp and the hazard lamp
		Dimmer signal (Interior Lighting illumination) Steering angle sensor malfunction signal	Receives an ON/OFF state of dimmer signal Receives a malfunction state of steering angle sensor
Steering angle sensor	CAN	Steering angle sensor signal	Receives the number of revolutions, turning direction of the steering wheel
		Steering angle speed signal	Receives the turning angle speed of the steering wheel
AV control unit	CAN	System selection signal	Receives a selection state of each item in "Driver Assistance" selected with the navigation system
A/C auto amp.	CAN	Ambient temperature signal	Receives ambient temperature signal
Transfer control unit	CAN	Variable 4x4 mode select switch signal	Receives a mode selection state of the variable 4x4 mode select
		Current 4WD mode signal	Receives a mode selection state of the 4WD shift switch
ICC sensor	ITS	ICC sensor signal	Receives detection results, such as the presence or absence of a vehicle ahead and distance from the vehicle
Lane camera unit	ITS	Detected lane condition signal	Receives detection results of lane marker
Accelerator pedal actuator	ITS	Accelerator pedal actuator operation status signal	Receives an operational state of accelerator pedal actuator
Side radar LH, RH	ITS	Vehicle detection signal	Receives vehicle detection condition of detection zone
IBA OFF switch	IBA OFF switch signal		Receives an ON/OFF state of the IBA OFF switch
Warning systems switch	Warning systems switch signal		Receives an ON/OFF state of the warning systems switch



ADVANCED DRIVER ASSISTANCE SYSTEMS

ADAS CONTROL UNIT OUTPUTS

Received by:	(via)	Signal name	The ADAS C/U:
ECM	CAN	ICC operation signal	Transmits an ICC operation signal necessary for intelligent cruise control
TCM	CAN	ICC operation signal	Transmits an ICC operation signal necessary for intelligent cruise control via ECM
ABS actuator and electric unit (control unit)	CAN	Brake fluid pressure control signal	Transmits a brake fluid pressure control signal to activate the brake
		Target yaw moment signal	Transmits a target yaw moment signal to generate yaw moment to the vehicle
Combination meter	CAN	Meter display signal	Own vehicle indicator signal
			Vehicle ahead detection indicator signal
			Set vehicle speed indicator signal
			Set distance indicator signal
			SET switch indicator signal
			MAIN switch indicator signal
			DCA system switch indicator signal
	Blind Spot Warning/Blind Spot Intervention warning lamp signal	Transmits a Blind Spot Warning/Blind Spot Intervention warning lamp signal to turn ON the Blind Spot Warning/Blind Spot Intervention warning lamp	
	Blind Spot Intervention ON indicator lamp signal	Transmits a Blind Spot Intervention ON indicator lamp signal to turn ON the Blind Spot Intervention ON indicator lamp	
	LDP ON indicator lamp signal	Transmits an LDP ON indicator lamp signal to turn ON the LDP ON indicator lamp	
Lane departure warning lamp signal	Transmits an lane departure warning lamp signal to turn ON the lane departure warning lamp		
ICC warning lamp signal	Transmits an ICC warning lamp signal to turn ON the ICC system warning lamp		
IBA OFF indicator lamp signal	<ul style="list-style-type: none"> • Transmits a signal to turn ON the IBA OFF indicator lamp • Transmits an ON/OFF state of the intelligent brake assist 		
Buzzer output signal	Transmits a buzzer output signal to turn ON the buzzer of the following systems: <ul style="list-style-type: none"> • Intelligent Cruise Control (ICC) • Distance Control Assist (DCA) • Intelligent Brake Assist (IBA) • Forward Collision Warning (FCW) 		



ADVANCED DRIVER ASSISTANCE SYSTEMS

ADAS CONTROL UNIT OUTPUTS

Received by:	(via)	Signal name	The ADAS C/U:
ICC sensor	ITS	Vehicle speed signal	Transmits a vehicle speed calculated by the ADAS control unit
		Steering angle sensor signal	Transmits a steering angle sensor signal received from the steering angle sensor
Lane camera unit	ITS	Vehicle speed signal	Transmits a vehicle speed calculated by the ADAS control unit
		Turn indicator signal	Transmits a turn indicator signal received from BCM
Accelerator pedal actuator	ITS	Accelerator pedal position signal	Transmits an accelerator pedal angle calculated by the ADAS control unit
		Accelerator pedal feedback force control signal	Transmits a target reaction force value calculated by the ADAS control unit
Side radars (LH & RH)	ITS	Vehicle speed signal	Transmits a vehicle speed calculated by the ADAS control unit
		Blind Spot Warning/Blind Spot Intervention indicator signal	Transmits a Blind Spot Warning/Blind Spot Intervention indicator signal to turn ON the Blind Spot Warning/Blind Spot Intervention indicator
		Blind Spot Warning/Blind Spot Intervention indicator dimmer signal (Interior Illumination)	Transmits a Blind Spot Warning/Blind Spot Intervention indicator dimmer signal to dimmer Blind Spot Warning/Blind Spot Intervention indicator
ICC brake hold relay	ICC brake hold relay drive signal		Activates the brake hold relay and turns ON the stop lamp
Warning Buzzer	Warning buzzer signal	Separate Buzzer from Combination Meter Buzzer. Only for LDW-LDP & BSW-BSI systems	Activates the warning buzzer
Warning systems ON indicator	Warning systems ON indicator signal		Turns ON the warning systems ON indicator



MAINTENANCE

General

Apart from the Brake Bleeding Procedure, the Service & Maintenance of Y62 is fairly conventional

Pre Delivery Inspection

Ensure that a Pre Delivery Inspection is correctly carried out. Refer to the “Dealer PDI Pack” for more details on the PDI of Y62. Refer to page 2 of this Training Manual for details.

Engine Oil for the VK56VD Engine

Ensure that the Nissan 5W 30 ACEA C3 Engine Oil is used. It is to be changed every 10,000 km's or 6 months – whichever comes first. More frequently if the vehicle is operated under harsh conditions.

Engine Oil Capacity including Filter; 6.5L. Nissan 5W 30 ACEA C3 (“Petrol Synthetic”)

Engine Coolant (“Blue”)

Ensure that the Coolant is **not** replaced until **160,000km service or 8 years** – whichever comes 1st. Once it has been replaced the service interval for the coolant is every 80,000km's or 4 years.

NOTE:

Always ensure that all of the old coolant has been drained / flushed from the engine. Only use Genuine Nissan Long Life Coolant.

Engine Cooling System Capacity; 15.1L (Includes Reservoir Bottle which is 0.8L)

AT Fluid: Nissan Matic S

There is no specific servicing requirement for the Automatic Transmission. However if the vehicle is operated in harsh conditions it is **strongly recommended** that the fluid is closely inspected for colour / condition / level etc. every 10,000km's. (otherwise every 20,000km's). If it is discoloured or it appears to be contaminated, drain the fluid & refill with new Nissan Matic S fluid only.

AT Fluid Capacity; 10L. Only use Nissan Matic S.

Brake Fluid

Replace the brake fluid with a suitable DOT 3 / DOT 4 type fluid every 40,000km's or 2 years.

Ensure that the procedure in the ESM is strictly adhered to:

F > BRAKES > PERIODIC MAINTENANCE > BRAKE FLUID

Air Filter Element

Inspect the Air Filter element each service. Lightly blowing it to remove excess dirt is recommended.

Replace it after a maximum of 40,000km's or every 2 years. More frequently for dusty conditions.

Tyre Rotation & Wheel Balance

Ideally the wheels should be rotated & balanced every 10,000km's. Ensure that the wheels are installed properly & that they are **not** tightened with an impact gun. Ensure that they are correctly tightened **using a torque wrench** or driveline vibration will most likely result.

Wheel Alignment

A front & rear wheel alignment must be carried out at the pre delivery. It is strongly recommended to inspect the front wheel alignment every 20,000km's or 1 year thereafter. The rear wheel alignment should also be inspected every 2 years maximum.

HVAC system (in-cabin) Micro Air Filter

Replace it every 20,000km's. More frequently in dusty conditions.



DRIVELINE LUBRICANTS

