
NISSAN Learning Academy

2007 Y61 Patrol ZD30-CRD.

Nissan Australia September 2007



**2007 Y61 NISSAN PATROL (Series V)
ZD30 Common Rail Diesel (CRD)**

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

This Training Manual ONLY discusses (unless otherwise stated) the 2007 Model Year Y61 Patrol Wagon models fitted with the new ZD30DDTi Common Rail Diesel Engine (ZD30 CRD).

Y61 TB48DE variants continue on without any changes since the those introduced on the 2006MY. (Primarily the introduction of the Euro III level TB48DE for 2006). Refer to the relevant Service Manual supplement for more detail regarding TB48DE engine vehicles.

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 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 iNISC.COM. Click on "Training Manual" on the Service Homepage in iNISC.COM. This actual Training Manual will also be readily available at anytime for download & printing within each Nissan Dealership.

Y61 SERVICE MANUAL (ESM) SM7E-5Y61G2

Your dealership service department will have access to a Service Manual (ESM) for Y61 in early March 2007. If not, please contact TechLine via a non vehicle related enquiry.

This new ESM supersedes ESM SM6E-5Y61G1. Discard it & only refer to SM7E-5Y61G2.

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 via a Non Vehicle related enquiry.

Y61 SERVICE TECHNICAL BULLETINS (STB's current as at April 2007)

Please ensure you familiarise yourselves with the following STB's relating to 2006MY & 2007MY Y61 Patrol;

- GI 05-007; Safety Warnings. (In relation to the ZD30-CRD engine)
- GI 07-006; Diesel Injection System Warranty Repair. (Bosch supplied fuel system components on ZD Engine)
- EL 06-008; Changes to Ignition Keys for '06MY Y61 Patrol Wagon.
- GI 06-017; Siemens VDO Warranty Information.
- GI 05-003; E.S.M – Electronic Service Manuals.
- MA 04-001; Revised Engine Oil Specification. (This refers to ALL ZD30 engines)
- GI 07-003; CONSULT II Software Update CD-ROM.
- MA 06-001; Maintenance Items. (General)
- MA 06-002; Wheel Nut Tension.

NISSAN Learning Academy

2007 Y61 Patrol ZD30-CRD.

Nissan Australia September 2007

How to use the Y61 Service Manual (ESM) SM7E-5Y61G2

This image below is what appears on the screen of the computer when the ESM (CD) is installed in the disc drive of the computer, a window (which will automatically appear) containing an icon called "Start" is double clicked & then the button marked "Service Manual" is clicked on.

Item	Applicable from	Check VIN Code	Publication No.	LINK
Y61 Supplement X 1st Revision	Jan.2007	Go!	SM7E-Y61KG1	Click !
Supplement IX 1st Revision	Jun.2006	Go!	SM6E-Y61JG1	Click !
Supplement VIII 1st Revision	Jun.2004	Go!	SM4E-Y61HG1	Click !
Supplement VII 2nd Revision	Sep.2003	Go!	SM4E-Y61GG2	Click !
Supplement VI 1st Revision	Jun.2002	Go!	SM2E-Y61FG1	Click !
Supplement V 1st Revision	Jun.2001	Go!	SM1E-Y61EG1	Click !
Supplement IV	Jul.2000	Go!	SM0E-Y61DG0	Click !
Supplement III 3rd Revision	Jul.1999	Go!	SM9E-Y61CG3	Click !
Supplement II 1st Revision	Feb.1999	Go!	SM9E-Y61BG1	Click !
Supplement I	Jul.1998	Go!	SM8E-Y61AG0	Click !
First Edition 1st Rev.Volume 1	Oct.1997		SM7E-1Y61G1	Click !
First Edition 1st Rev.Volume 2	Oct.1997		SM7E-2Y61G1	Click !

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DO NOT refer to these Tech Bulletins. Only refer to STB's released by Nissan Australia. They're located on iNISCOR.

This new ESM supersedes ESM SM6E-5Y61G1. Discard it & only refer to SM7E-5Y61G2.

- 1 Supplement X (10) for 2007 production vehicles (Primarily for ZD30 CRD engine vehicles)
- 2 Supplement IX (9) for 2006 production vehicles (Primarily for Euro III TB48DE engine vehicles)
- 3 Supplement VIII (8) for (late) 2004 ~ 2005 production vehicles. Major facelift with no mechanical changes.
- 4 Supplement VI (6) for 2003 production vehicles (Primarily for TD42 engine with turbo, intercooler & electronic fuel pump vehicles).
- 5 Supplement V (5) for (late) 2001 ~ 2002 production vehicles (Primarily for TB48DE engine vehicles)
- 6 Supplement III (3) for 2000 ~ 2001 production vehicles. (Primarily for ZD30 engine vehicles)
- 7 Supplement II (2) for 1999 production vehicles. (Primarily for TD42 with turbo only engine vehicles)
- 8 Supplement I (1) for 1998 (Minor running changes made. Typically wiring diagrams)
- 9 Original Service Manuals (Vol 1 & Vol 2) introduced in late 1997. Refer to these for information on TD42 non turbo, TB45E & RD28ETi engine vehicles.

BEWARE: Always select the manual relevant to the VIN. If the required detail cannot be found in that particular Supplement, simply go back to the next supplement down the list.

The basic rule of thumb is **start from the newest supplement** (or supplement relevant to the VIN / age of the vehicle) & work **backwards** until the required information is found.

NISSAN Learning Academy

2007 Y61 Patrol ZD30-CRD.

Nissan Australia September 2007

History & Service Manual Reference - Y61 Patrol 1997 ~ 2007

Service Man reference.	(Prod'd from) VIN	Model Year	Comments regarding changes	Nissan Australia derived "Series" coding
*Supp X	JN1TESY61A0395001	2007MY ZD30	New ZD30 - CRD Engine with Cruise Control	Series V New ZD30 CRD engine with cruise control. TB48 unchanged since Euro III. ZD30 in DX, ST, ST-S, ST-L & Ti. TB48 in ST-S, ST-L & Ti. TD42 no longer available.
	JN1TFSY61A0366001	2007MY TB48	No change from '06MY	
*Supp IX	JN1TESY61A0385001	2006MY ZD30	1 piece key but no other change from '05MY	Series IV From August '04 production. Major Cosmetic Changes. Ti with Sat Nav/Rev Camera. All new Interior. Trim colour options. New style 5 spoke 17" alloy wheels. Larger square shaped wheel arch flares. Larger rear taillights. New headlights, bumper & grille. Available in DX, ST, ST-S, ST-L for ZD30 & TD42 engines. ST-S, ST-L & Ti for TB48 engines. Changes for 2006: 1 peice key/remote (except DX). Euro III TB48. New Sat Nav/Rev Camera system for Ti & option of ZD30 Ti variant from Sept '06.
	JN1TCSY61A0365001	2006MY TD42	1 piece key but no other change from '05MY	
	JN1TFSY61A0365001	2006MY TB48	1 piece key, Euro III engine, No Sub Tank & No M/T	
*Supp VIII	JN1TESY61A0370001	2005MY ZD30	Major Facelift + increase in Power & Torque for M/T	
	JN1TCSY61A0360001	2005MY TD42	Major Facelift only. Mech unchanged	
	JN1TFSY61A0360001	2005MY TB48	Major Facelift only. Mech unchanged	
*Supp VI	JN1TESY61A0345001	2003MY ZD30	No change from '02MY	Series III From late 2001 production. Changes to taillights, headlights & grill. New style (6 spoke) 16" alloy wheels & new style Nissan Badges. New TB48DE petrol engine with 5 sp A/T. Changes for 2003: New TD42Ti (turbo intercooled) diesel engine with Cruise Control (except DX). New ST-L variant with rear A/C & leather trim introduced. ST-L available in all engine & transmission combinations.
	JN1TCSY61A0345001	2003MY TD42	New TD42Ti Engine with Cruise Control	
	JN1TFSY61A0345001	2003MY TB48	No change from '02MY	
*Supp V	JN1TESY61A0330001	2002MY ZD30	Facelift only	
	JN1TCSY61A0330001	2002MY TD42	Facelift only	
	JN1TFSY61A0330001	2002MY TB48	Facelift & new TB48DE engine & 5 sp. A/T	
*Supp III	JN1TESY61A0300001	2000MY ZD30	Minor facelift & new ZD30 engine	Series II Minor facelift. New ZD30 engine for DX & ST. Ti gains side SRS airbags. ST gains keyless entry - hazards flash, Ti same. ST gains dual Airbag/ABS ("Safety Pack") as option. Drivers power window gains "Anti Pinch" function. TD42T (turbo) engine available in DX & ST. NATS on all engine options.
	JN1TCSY61A0300001	2000MY TD42	Minor Facelift & NATS	
	JN1TBSY61A0300001	2000MY TB45	Minor Facelift only	
*Supp II	JN1TCSY61A0110001	1999MY TD42	TD42T engine intro running change. ST only	Series I Y61 launched in December 1997 with TB45E engine only (ST & Ti). RD28ETi in ST & DX introduced January 1998. TD42 (non turbo) in DX only introduced in March 1998. NATS available on ALL models except TD42 engine. Keyless Entry ONLY on Ti variants - hazards do NOT flash. Changes for 1999: TD42T (turbo) introduced to ST wagons (along with intro of Cab Chassis). NATS not available on TD engine wagons.
*Supp I	JN1TDSY61A0110001	1998MY RD28	No change from original production	
	JN1TCSY61A0110001	1998MY TD42	No change from original production	
	JN1TBSY61A0110001	1998MY TB45	No change from original production	
*Original Manuals (Vol 1 & Vol 2)	JN1TDSY61A0100001	1998MY RD28	Original production	
	JN1TCSY61A0100001	1998MY TD42	Original production	
	JN1TBSY61A0100001	1998MY TB45	Original production	

Y61 Patrol Cab Chassis				
*Supp X	JN1UCNY61A0026844	2006MY TD42	Introduction of SRS Airbags	Series II New TD42Ti Turbo l'cooled engine, new radiator, new grille & headlights for 2003 (front styling of Ser III wagon, interior style of Ser I wagon continues unchanged). NATS, Keyless Entry and Cruise Control NOT available on C/C. From October 2006: Dual SRS Airbag fitted to all variants except Coil DX.
	JN1UCLY61A0524673	2006MY TD42		
*Supp VI	JN1UCNY61A0020101	2003MY TD42	Facelift & new TD42Ti engine	
	JN1UCLY61A0520101	2003MY TD42		
*Supp II (& Original Manuals)	JN1UCNY61A0000101	1999MY TD42	Original production	Series I Y61 C/C launched Feb '99. Intro of TD42T (turbo) for C/C & ST Wagon. NATS & Keyless Entry not available.
	JN1UCLY61A0500101	1999MY TD42	Original production	

* Refer to this Service Manual / SM Supplement if the VIN matches or is HIGHER than the VIN shown to the right (but not higher than the VIN quoted in the group above). If the information cannot be found in a Supplement Manual, simply refer back to EARLIER Service Manual Supplements (go back 1 Manual at a time) until the information is located.

Finding NO information on a specific system in the Supplement for a VIN simply means no change occurred on that specific system for that VIN breakpoint. Go back 1 Manual at a time until the required information is found.

NISSAN Learning Academy

2007 Y61 Patrol ZD30-CRD.

Nissan Australia September 2007

Y61 HISTORY

Series I; 1997 ~ 1999

- DX variant shown in picture with the RD28ETi engine.
- Bonnet scoop on top of bonnet for RD28 only due to intercooler on top of engine.
- Available in DX only for TD42 engines. No NATS. M/T only.
- Available in DX & ST for RD28 engines with NATS. M/T only.
- Available in ST & Ti for TB45 engines with NATS.
- TD42T (turbo) made available in ST from 1999 onwards. No NATS

Series II; 2000 ~ 2001

- ST variant shown in picture with new ZD30DDTi engine.
- Bonnet scoop on top of bonnet for ZD30 only due to intercooler on top of engine.
- Available in DX & ST for ZD30 & TD42T engines. All with NATS. Option of A/T for ZD30 now available
- Available in ST & Ti for TB45E engines with NATS.
- ST now standard with keyless entry. ST gains safety pack as option (ABS & Dual Airbags).
- TD42 (non turbo) no longer available in wagons.

Series III; Late 2001 ~ 2004

- ST variant shown in picture with new TB48DE engine.
- Available in DX & ST for ZD30 & TD42T engines.
- Available in ST & Ti for TB48DE engines.

2003 Changes;

- Introduction of the ST-L spec for all engine types with any transmission combination. ST-L standard with Leather trim, Rear A/C with manual control front HVAC.
- Introduction of TD42Ti engine for all variants except Ti. (Turbo intercooled TD42. Also known as "TD-6")
- TD42Ti available with Cruise Control as standard. (Except DX & C/Chassis).
- Series II Cab Chassis with TD42Ti introduced at same time, however not fitted with NATS or Cruise Control.

Series IV & V; Late 2004 ~ 2007

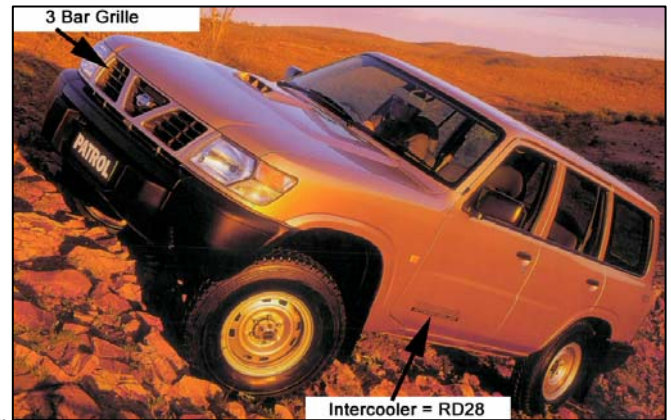
- Major cosmetic changes with new Interior & trim colour options.
- New style 5 spoke 17" alloy wheels.
- Larger square shaped wheel arch flares, larger rear taillights, new headlights & new grille.
- Available in DX, ST, ST-S, ST-L for ZD30 & TD42 engines.
- Available in ST-S, ST-L & Ti for TB48 engines.
- Sat Nav & Rev Camera on Ti. (Eurovox)

2006 Changes;

- Euro III TB48 A/T only engine. No M/T or Sub Tank for TB48.
- 1 piece key / remote for all models (except DX).
- ZD30 Ti variant introduced Sept '06 as running change.
- New Sat Nav & Rev Camera system on all Ti from Sept 06.

2007 (Series V);

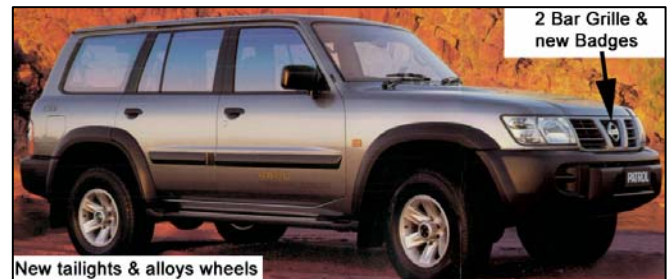
- New ZD30 CRD engine available for all variants.
- All ZD30 variants fitted with cruise control as standard.
- TB48 unchanged from 2006.
- TD42 no longer available (Not Euro IV compliant).



Series I



Series II



Series III



Series IV & V.

No external change in appearance since 2004.

Y61 ENGINE & TRANSMISSION CODE DESCRIPTION

Y61 Diesel Engines

1. RD28ETi (6 cylinder diesel engine)

RD = Engine series code. The 'D' is common across all diesel engine codes

28 = Engine capacity (2.8L)

E = Electronically controlled injector pump

T = Turbo

i = intercooler

Note 1; CONSULT II compatible as engine system is electronically controlled for injection timing & throttle control.

Note 2; All fitted with NATS.



RD28ETi (1998 ~ 1999)

2. TD42T (6 cylinder diesel engine)

TD = Engine series code. The 'D' is common across all diesel engine codes

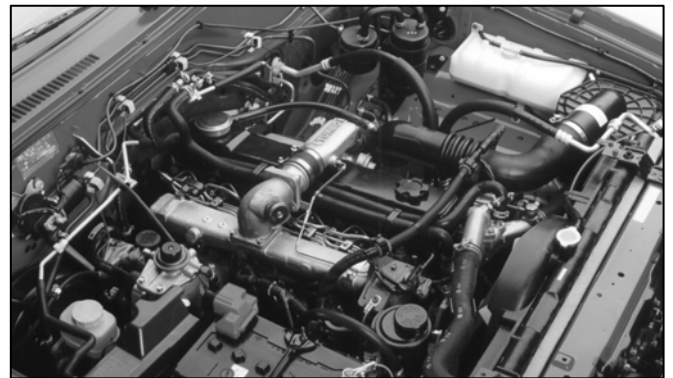
42 = Engine capacity (4.2L)

T = Turbo

Note 1; TD42 = same engine without turbo.

Note 2; Engine system not CONSULT II compatible as engine has no electronic control.

Note 3; Fitted with NATS since introduction of Series II wagon. No NATS on Cab Chassis.)



TD42T (1999 ~ 2002)

3. TD42Ti (6 cylinder diesel engine)

TD = Engine series code. The 'D' is common across all diesel engine codes

42 = Engine capacity (4.2L)

T = Turbo

i = intercooler

Note 1; Also referred to as "TD-6".

Note 2; CONSULT II compatible as pump has electronically controlled injection timing, however throttle control is mechanical.

Note 3; All wagons fitted with NATS, no NATS on Cab Chassis.

Note 4; ASCD (Cruise Control) on all except DX wagon & cab chassis variants.



TD42Ti (2003 ~ 2006)

Y61 ENGINE & TRANSMISSION CODE DESCRIPTION

Y61 Diesel Engines .../Cont'd

4. ZD30DDTi (4 cylinder diesel engine)

ZD = Engine series code. The 'D' is common across all diesel engine codes

30 = Engine capacity (3.0L)

D = Double Overhead camshafts

D = Direct Injection (as opposed to "indirect" injection as it is in the TD & RD engine series)

T = Turbo

i = intercooler

Note 1; None of the coding makes any reference to Electronic Control even though it is an Electronically Controlled Pump.

Note 2; The same code applies to the CRD (Common Rail Diesel) version of this engine.

Note 3; All ZD30 engines are fitted with NATS.

Note 4; Only ZD30 CRD engines from 2007 production have ASCD (Cruise Control).

Note 5; ZD30 engine also applied to D22 Navara models from late 2001 ~ 2006 production. Engine has a conventional turbo, but no intercooler. (ZD30DDT)



ZD30DDTi (Non CRD; 2000 ~ 2006)



ZD30DDTi (CRD; 2007)



Rocker Cover ZD30DDTi CRD (2007)



Rocker Cover ZD30DDTi (2000 ~ 2006)

Y61 ENGINE & TRANSMISSION CODE DESCRIPTION

Y61 Petrol Engines

1. TB45E (6 cylinder petrol engine)

TB = Engine series code

45 = Engine capacity (4.5L)

E = Electronically Controlled Fuel Injection

- Engine construction is Over Head Valve (OHV) 2 Valves per cylinder.

- All fitted with NATS.



TB45E (Late 1997 ~ 2001)

2. TB48DE (6 cylinder petrol engine)

TB = Engine series code

48 = Engine capacity (4.8L)

D = Double overhead camshafts

E = Electronically Controlled Fuel Injection.

- Engine construction is Double Over Head Camshaft (DOHC). 4 valves per cylinder.

- All fitted with NATS.



TB48DE (Late 2001 ~ 2007)

Euro III changes introduced to TB48 in 2006;

- 4 x O2 sensors with 2 separate catalysts in Exhaust manifold. (Only 2 x O2 sensors in 2001 ~ 2005 TB48).

- CKPS in transmission bell housing.

- Platinum tipped spark plugs. 100,000km service interval.

- Not fitted with Sub (fuel) Tank.

- Only fitted with Auto Transmission. M/T TB48 discontinued.

Y61 Transmissions

Manual;

FS5R30A; RD28 only

FS5R50B; TD42, ZD30, TB45 & TB48

F = Floor Shift directly into trans through the floor

S = Overdrive

5 = 5 forward gears

R = Rear wheel drive vehicle

30A / 50B = Factory coding

Automatic;

RE4R03A; All TB45 & ZD30

RE5R05A; TB48 only

R = Remote (lever connected to trans via link rods or cables)

E = Electronically controlled

4/5 = Number of forwards gears (4 or 5 speed transmission)

R = Rear wheel drive

03A / 05A = Factory coding. No specific meaning

GENERAL INFORMATION - GI

CONSULT II APPLICATION

1. Equipment

Whenever CONSULT II is used to access systems on the Y61 Patrol with the new ZD30 CRD engine, the CONSULT II unit MUST be used in conjunction with the Converter Unit.

NEVER USE CONSULT II ON A Y61 ZD30 CRD MODEL WITHOUT THE CONVERTOR UNIT.

1. CONSULT II unit.

2. Software Card

Diagnosis: **AED 06G** (Red 16MB card)

NATS: **AEN 06C** (Purple card)

Two (separate) new CD-R's were supplied in February 2007 which each contain the above noted software.

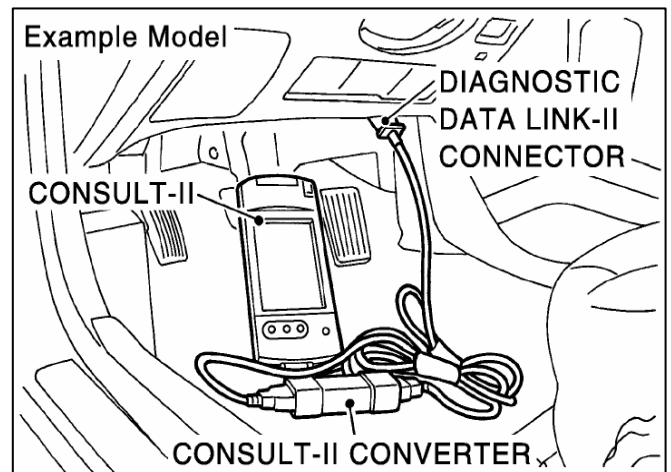
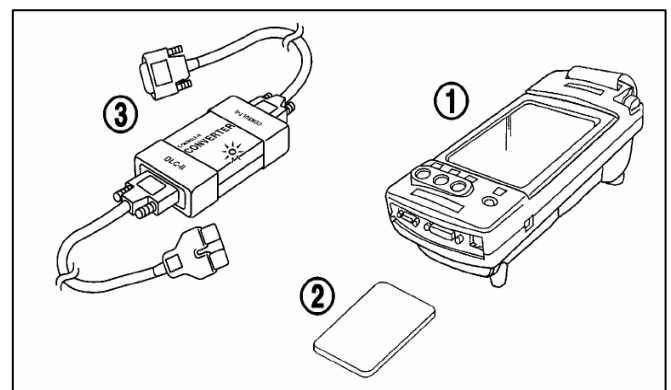
Refer to **STB GI 07-003** for more detail.

3. Converter Unit.

Whenever CONSULT II is connected to the Y61 ZD30 CRD, always use the converter unit.

Failure to connect CONSULT II without the Converter Unit will cause the CAN System to go into a failsafe condition.

See right for the approximate location of the DDL II link on the vehicle.



GENERAL INFORMATION - GI

CONSULT II APPLICATION

2. Accessible Systems (ZD30CRD)

The systems as shown right are accessible with CONSULT II.

Please ensure you are using the correct software prior to connection of CONSULT II to the vehicle.

To access all systems shown right (except NATS) use software version **AED06G**.

(*1) To access NATS, use NATS software version **AEN06C**.

(*2) SPECIAL NOTE WHEN ACCESSING BCM WITH CONSULT II:

Even though CONSULT II can access BCM, please IGNORE any of the items shown on the screen. The BCM only controls the NATS functionality. It has no other functionality in the vehicle.

ENGINE	
A/T	Auto Trans if fitted
AIR BAG	
BCM	(*2)
ABS	Anti-lock Braking System if fitted
NATS	(*1)

3. General Trouble Diagnosis

If the CONSULT-II cannot diagnose the system properly, check the following items in the table below:

Symptom	Check item
CONSULT-II cannot access any system.	<ul style="list-style-type: none"> ● CONSULT-II DLC power supply circuit (Terminal 8) and ground circuit (Terminal 4) (For detailed circuit, refer to "MIL & Data Link Connectors Wiring Diagram" in EC section.) ● CONSULT-II DLC cable and CONSULT-II CONVERTER.
CONSULT-II cannot access individual system. (Other systems can be accessed.)	<ul style="list-style-type: none"> ● CONSULT-II program card (Check the appropriate CONSULT-II program card for the system. Refer to "Checking Equipment".) ● Power supply and ground circuit for the control unit of the system (For detailed circuit, refer to wiring diagram for each system.) ● Open or short circuit between the system and CONSULT-II DLC (For detailed circuit, refer to wiring diagram for each system.) ● Open or short circuit CAN communication.

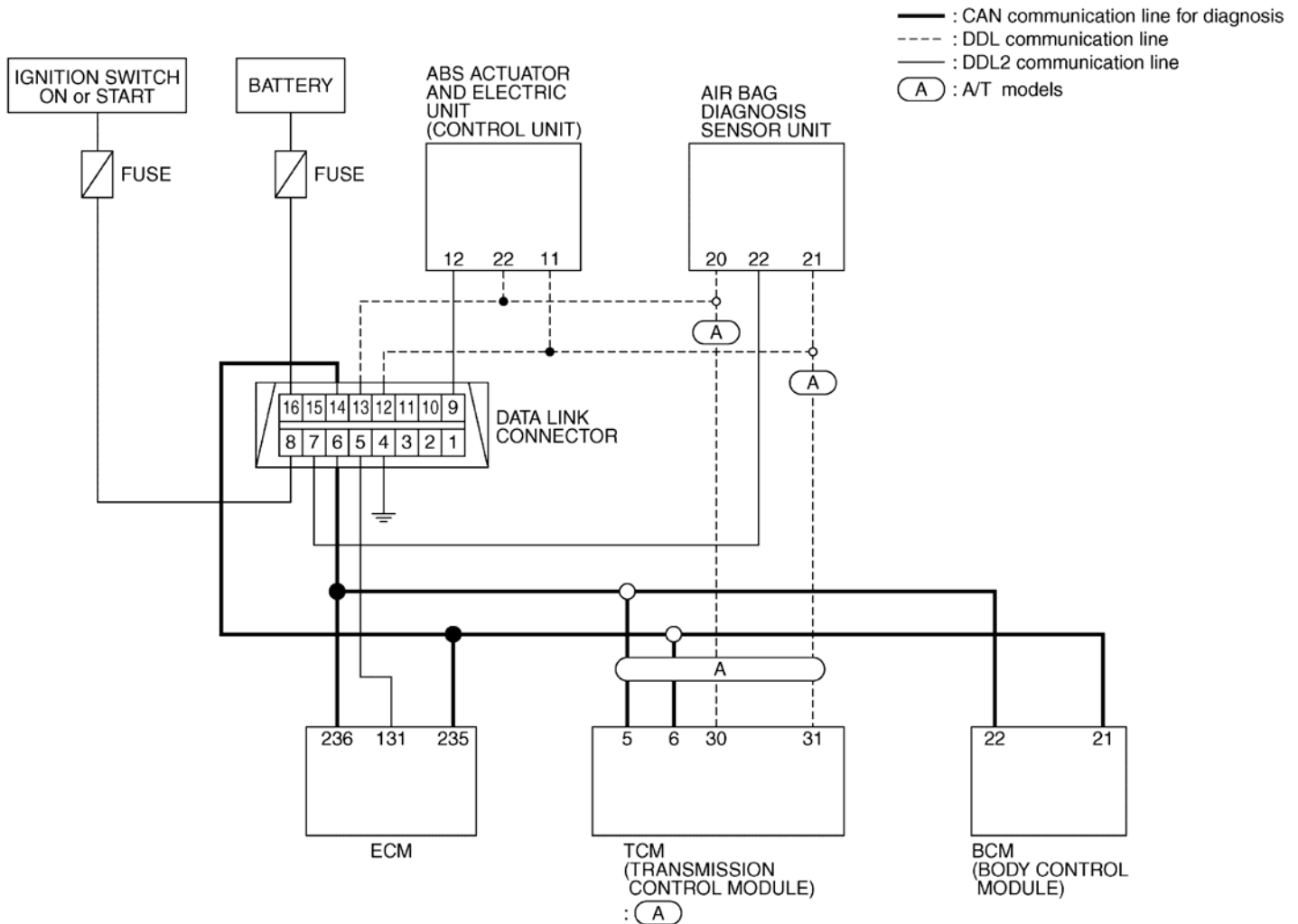
NOTE:

The DDL1 and DDL2 circuits from DLC pins 12, 13, 14 and 15 may be connected to more than one system. A short in a DDL circuit connected to a control unit in one system may affect CONSULT-II access to other systems.

GENERAL INFORMATION - GI

CONSULT II APPLICATION

4. General System Wiring Diagram (ZD30 CRD)



NOTE:

If CONSULT II does not access one (or more than one) of the above systems, switch CONSULT II OFF, then ensure the unit that is missing from the screen of CONSULT II has Power & Ground & that it is actually connected.

Be aware of models with optional systems such as ABS. (ie; A DX or ST variant does not have ABS. Therefore "ABS" will NOT appear on the screen of CONSULT II. Same applies with Manual Transmission vehicles, "A/T" will not appear on the screen of CONSULT II in such a case. A Ti ZD30 variant will have ALL the possible systems as A/T & ABS is standard fitment.

Once the fault is repaired, reconnect CONSULT II & start again. Otherwise if no fault is found, simply disconnect the vehicles battery for 5 minutes, re-connect & then start CONSULT II all over again.

NISSAN Learning Academy

2007 Y61 Patrol ZD30-CRD.

Nissan Australia September 2007

MAINTENANCE - MA

1. Engine Oil (ZD30)

Only use **10W40 ACEA B3** Engine Oil for **ALL** ZD30 Engines that have **EVER** been produced.

This has been clearly highlighted in **STB MA 04-001**

The engine Oil & Filter is to be replaced every 10,000km's or 6 months (whichever comes 1st).

YD25 Engines fitted to R51 & D40 models that **DO NOT** have **DPF** (Diesel Particulate Filter) fitted to them also require this Engine Oil as well.

YD25 Engines **with DPF** require a unique type of Engine Oil. Contact TechLine for more detail regarding DPF engines in 2007MY R51 & D40 models.



2. Engine Coolant (All)

Only use Genuine Nissan Long Life Coolant. **Do NOT** change the coolant until **80,000km's** or 4 years. After that the coolant is then to be replaced every 40,000km's or 2 years.

NEVER MIX ANOTHER BRAND OF COOLANT WITH NISSAN LONG LIFE COOLANT

Severe engine damage will otherwise result.



Coolant should **NOT** be changed on **ANY** Nissan vehicle until **80,000km's** or 4 years!

Change every 40,000km's or 2 years thereafter.

MAINTENANCE - MA

3. 4 Speed Automatic Transmission Fluid

For ALL Y61 ZD30 Patrols produced, they have the option of a 4 Speed electronically controlled Automatic Transmission. (**RE4R03A**). TB45 variants from 1997 ~ 2001 also used the same transmission.

It is recommended that only Nissan **Matic D** is used in this transmission.

Regular servicing is not required, however it would be recommended to carefully monitor the condition of the fluid & replace as per the recommendations of the "Maintenance under Severe Driving Conditions" schedule in section MA of the Service Manual.

Use Matic D fluid for ALL Nissan 3 & 4 speed Auto Transmissions. This includes both Front & Rear wheel drive configured transmissions.

DO NOT use this fluid in RWD 5 speed &/or J31 & Z50 Continuously Variable Transmissions. (CVT)



Transmission Type Identification

Y61 models fitted with the **RE4R03A** Transmission can be EASILY identified via an inspection of the A/T shift lever. Note the O/D OFF Button shown in the picture. Operation of this button will shift the transmission (if driven at the appropriate speed) from 4th gear Overdrive to 3rd gear direct (1:1 ratio).

- ALL Y61 ZD30 & TB45 engine variants utilise this transmission.
- ZD30 with CRD continues to use this same transmission.

R = Remote (lever connected to trans via link rods or cables)

E = Electronically controlled

4 = Number of forwards gears (4 speed transmission)

R = Rear wheel drive

03A = Factory coding. No specific meaning



MAINTENANCE - MA

4. 5 Speed Automatic Transmission Fluid

For TB48 petrol engine variants, they utilise a 5 Speed Automatic Transmission. (**RE5R05A**). Z33, R51 & D40 models also utilise this same transmission.

Only EVER use Nissan **Matic J**. Do **NOT** use any other type or brand of fluid in this transmission.

Regular servicing is not required, however it would be recommended to carefully monitor the condition of the fluid & replace as per the recommendations of the "Maintenance under Severe Driving Conditions" schedule in section MA of the Service Manual.

NOTE: You will require **SST # 31086-VC200** (transmission fluid level gauge Special Service Tool) to check the level of the A/T fluid in these transmissions. (Y61 TB48 only)
Order the SST via parts if your dealership is missing this mandatory tool. The SST # is the part #.



Transmission Type Identification

Y61 models fitted with the **RE5R05A** Transmission can be EASILY identified via an inspection of the A/T shift lever. There is NO O/D OFF Button on the lever.

However, if the vehicle is driven at the appropriate speed and the shift lever is moved to the left, this will cause the transmission to shift from 5th gear Overdrive to 4th gear direct (1:1 ratio).

Moving the lever in the UP or DOWN direction (+ or -), the transmission will move into "Manual Mode"

NOTE: If the shift lever is moved away from the D position, the ASCD (cruise control) will be deactivated.

ALL Y61 TB48 engine variants utilised this transmission.

ALL Z33, R51 & D40 models utilise this transmission as well.

R = Remote (lever connected to trans via link rods or cables)

E = Electronically controlled

5 = Number of forwards gears (5 speed transmission)

R = Rear wheel drive

05A = Factory coding. No specific meaning



MAINTENANCE - MA

5. Transfer Fluid

All Y61 models have the same Transfer unit fitted (**TX12A**). The transfer case is manually controlled via a floor mounted lever adjacent to the main gear shift lever.

They **ALL** have the same fluid requirements.

It is strongly advised that only Nissan **Matic D** is used in this transfer unit. Use of gear oil may cause damage to the Auto Locking (free wheeling) hubs (where fitted).

Nissan **Matic D** Transmission Fluid **must** be used in ALL Transfer units in ALL 4x4 models as follows;

Y61; Manually controlled via floor mounted lever.

D22; Manually controlled via floor mounted lever.

R50; Early models that are Manually controlled via floor mounted lever.

R50; Later models that have a dash mounted All Mode 4x4 Rotary Switch. (Transfer unit is electronically controlled)

R51; Electronically controlled via a dash mounted All Mode 4x4 Rotary Switch.

D40; Electronically controlled via a dash mounted Rotary Switch.

NOTE 1: Unlike R50 & R51 models, D40 models do NOT have the "AUTO" functionality in the transfer unit.

NOTE 2: The Transfer unit attached to the rear of the Transaxle in T30 & Z50 models require an appropriate Gear Oil (GL-5). The coupling unit attached to the front of the rear diff assembly is sealed & non serviceable.

6. Manual Transmission Oil

All TB45 / TB48, TD42 & ZD30 engine Y61 Patrols produced used the **FS5R50B** transmission if they were an M/T model. RD engine vehicles utilised the **FS5R30A** transmission. In both cases, ensure a suitable GL-4 75W 85 Gear Oil is used.

7. Final Drive (Differential) Oil

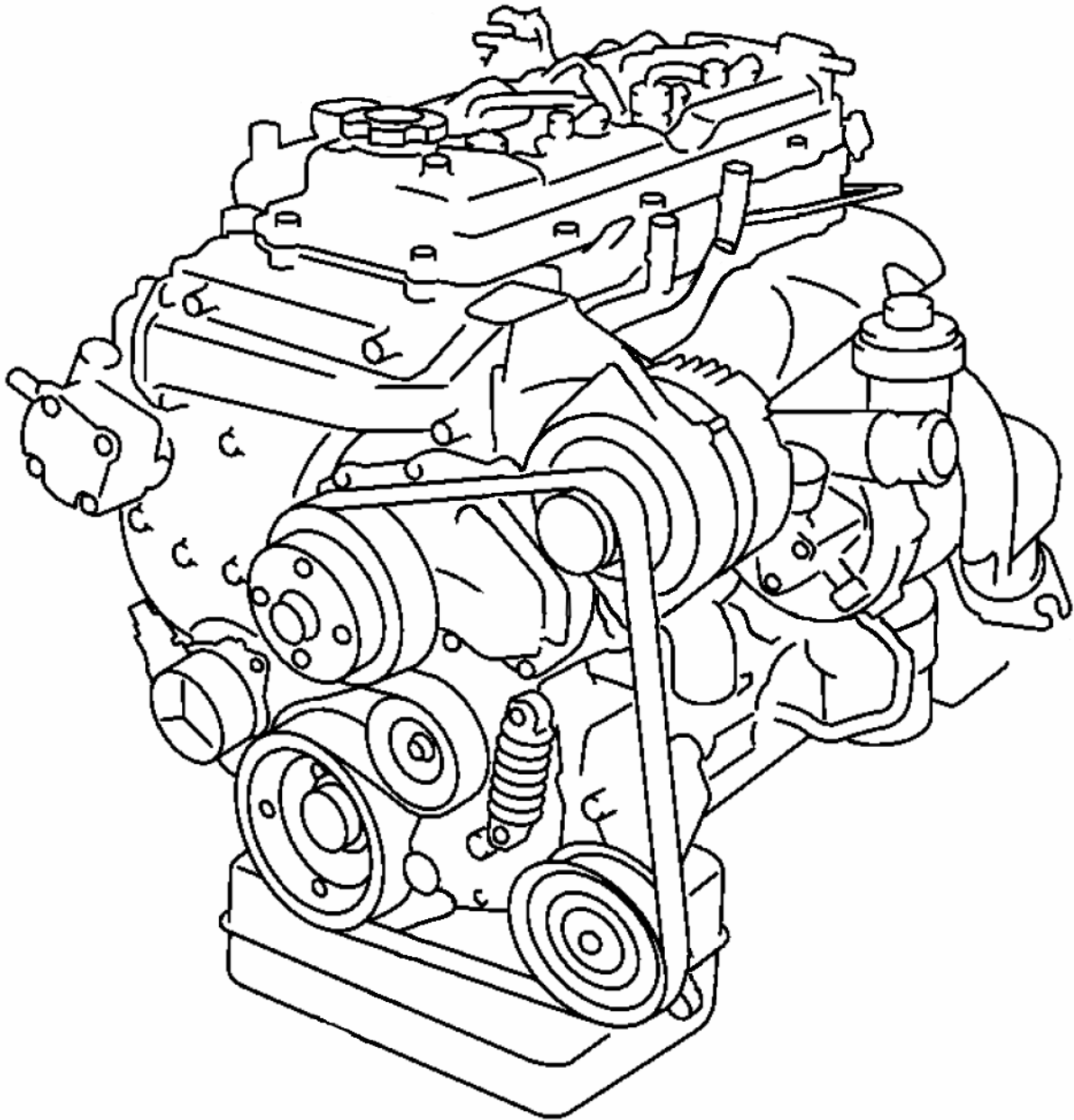
The Final Drive specification is unchanged (**H233B**). Ensure a suitable GL-5 80W 90 LSD type Oil is used.



Recommended Fluid for 4x4 Transfer Units.

ENGINE MECHANICAL - EM

2007 ZD30DDTi Common Rail Diesel (CRD) Engine



With the introduction of the 2007 MY Y61 Patrol, the Diesel Engine range has now been revised with the introduction of the ZD30DDTi CRD Engine.

This new Engine is now the only Diesel Engine option available for both Y61 wagon variants. The TD42Ti engine has been discontinued as it does not comply to strict new Euro IV emission standards.

TB48DE Petrol engine remains available in ST & Ti wagon variants only.

Transmission options for the new ZD30 engine in Y61 is either 5 M/T or 4 E-A/T which have been carried over from the previous models.

All Y61 ZD30 wagon variants are now fitted with ASCD (Cruise Control) as standard.

ENGINE MECHANICAL - EM

YD & ZD Engine Comparison Chart

	YD25DDTi (R51 & D40) (Non DPF engine)	ZD30DDTi VP44 (Y61)	ZD30DDTi CRD (Y61)
Cylinder Arrangement	Inline 4 Cylinder	Inline 4 Cylinder	Inline 4 Cylinder
Displacement (cc)	2488	2953	2953
Bore & Stroke (mm)	89.0 x 100	93.0 x 102.0	93.0 x 102.0
Compression Ratio	16.5 : 1	17.9 : 1	17.9 : 1
Firing Order	1-3-4-2	1-3-4-2	1-3-4-2
Cylinder head	Alloy, cross flow	Alloy, cross flow,	Alloy, cross flow,
Air Intake system	Vacuum operated Air Intake Control valve. (No swirl valves)	Vacuum operated Air Intake Control valve. Swirl valves utilised	Electrically operated Air Intake Control valve. Swirl valves utilised
Valve gear & drive system	DOHC, 16 Valve, shim adjustable. All chain driven	DOHC, 16 Valve, shim adjustable. Combination of gear & chain drive	DOHC, 16 Valve, shim adjustable. Combination of gear & chain drive
Injection	Direct – HP Common Rail (1800 Bar DENSO)	Direct – HP Radial type pump (Bosch VP44)	Direct – HP Common Rail (1600 Bar BOSCH)
Cylinder Block	Cast Iron, 1 piece	Cast iron, 2 piece	Cast iron, 2 piece
Power (kW / rpm) & Torque (Nm / rpm)	128 / 4000 & 403 / 2000	116 / 3600 & 352 / 2000 (*4) (*5)	MT; 118/3600 & AT; 118/3600 MT; 380/2000 & AT; 354/2000
Balance Shafts	Separate Unit located in sump, gear driven	Integrated into Engine Block, gear driven	Integrated into Engine Block, gear driven
VNT Turbo & Intercooler	Yes & Yes	Yes & Yes (*4)	Yes & Yes
Engine Oil Pressure detection system	Standard single switch system	Dual switch system (*3, *4) (HP & LP switches)	OP sensor & separate OP switch system
Engine Oil Level detection system	Electronic. Oil Level Gauge to manually inspect also	Oil Level Gauge to manually inspect only	Oil Level Gauge to manually inspect only
Engine Oil Maint. Intervals (km's)	10,000	10,000	10,000
Engine Oil Specification	ACEA B3 10W40 (*1) Do NOT use in DPF models.	ACEA B3 10W40 (*2)	ACEA B3 10W40 (*2)

(*1) REFER TO STB MA 05-001. (*2) REFER TO STB MA 04-001. (*3) REFER TO STB's EC 06-002a, EC 05-006, EC 03-006.

(*4) Not D22 models (*5) Increase in power & torque, different specs between A/T & M/T on Ser IV, figures not shown.

ENGINE MECHANICAL - EM

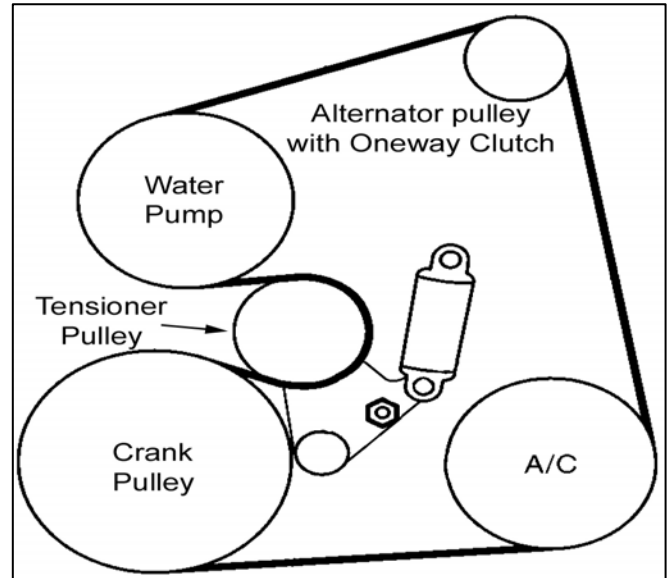
ZD30DDTi Drive Belt

The Single serpentine type drive belt has been carried over from the previous engine.

The belt tension is self adjusting due the Auto hydraulic tensioner unit & the alternator utilises a one way clutch in order to stop belt squeak noise when the engine decelerates.

The Power Steering pump is mechanically driven by the engine on all ZD30 engines.

Reference should be made to section EM of the Service Manual for details on removal, installation & inspection of the belt.



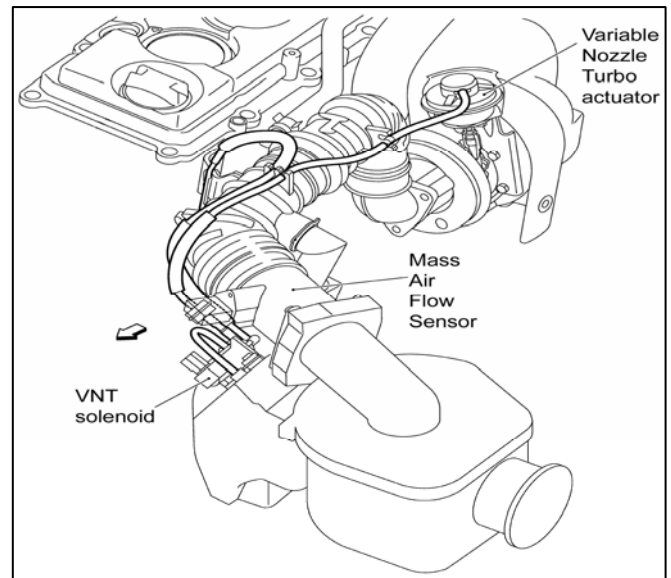
ZD30DDTi Air Cleaner & Intake

The Air Filter Element is a **VISCOUS PAPER TYPE**.

It has been carried over from previous models.

DO NOT REMOVE DIRT FROM THE ELEMENT WITH COMPRESSED AIR!

Pay careful attention to the installation of the Air Cleaner element. Please ensure that there is no leakage of dust. If detected check the seal & paper of the element, if the seal or paper is damaged replace the element immediately.

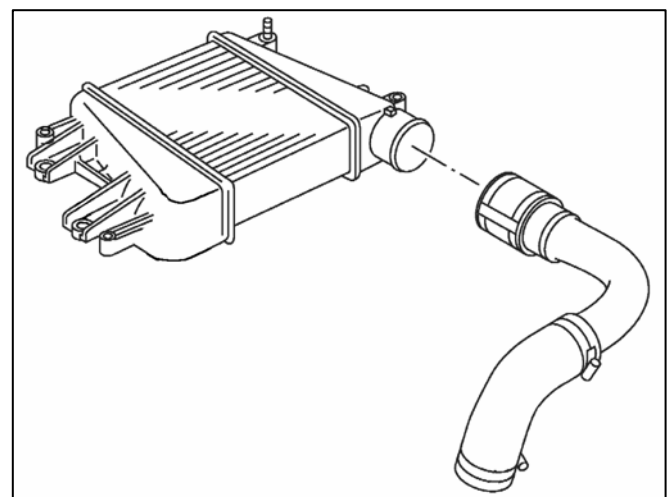


ZD30DDTi Charge Air Cooler

The Charge Air Cooler (Intercooler) continues to be horizontally mounted over the top of the engine as it was in previous models. The air outlet of the cooler has changed due to the change of intake manifold configuration.

Special attention should be paid to section EM of the Service Manual regarding any work involved with the Charge Air Cooler system.

PLEASE ENSURE THAT ALL FITTINGS ARE SECURE & FREE FROM AIR LEAKAGE.



ENGINE MECHANICAL - EM

ZD30DDTi Intake Manifold

The Intake Manifold as shown right is mounted on the RH side of the Cylinder Head.

An electrically operated Air Intake Control Valve is utilised & the Swirl Valves have been incorporated inside the intake manifold.

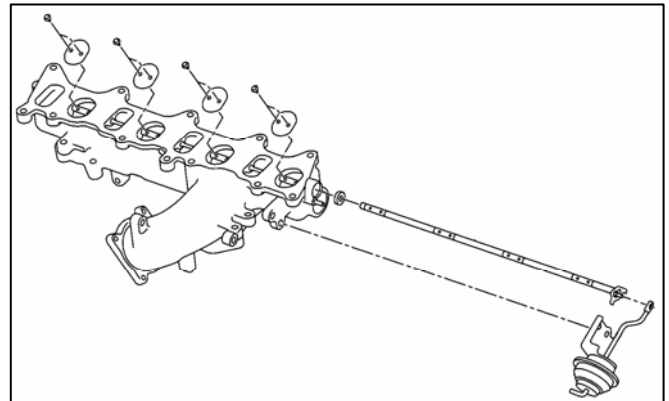
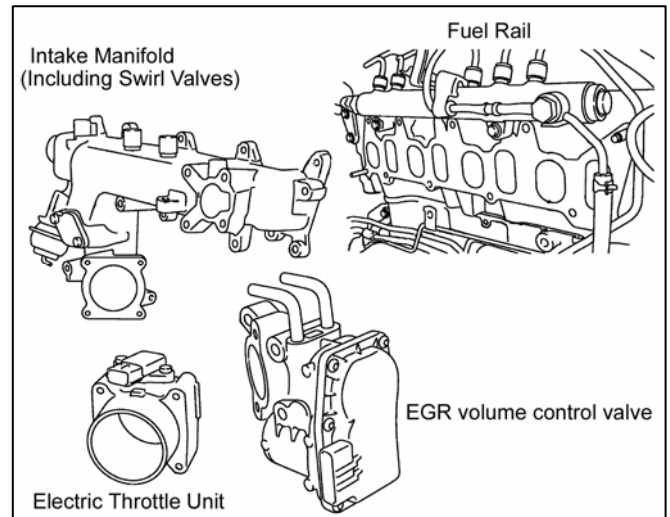
Electric Throttle Control Actuator;

On the previous ZD engine as well as the non DPF YD25 engine, the Air Intake Control valve was vacuum controlled. Now on the new ZD30 CRD engine, the valve has the same purpose as previous, however it is electrically operated. Its operation is very much the same as a ETC unit found on many petrol engines.

The Throttle valve is fully opened when the engine is running. The valve is closed only to perform smooth engine stop when the ignition switch is turned OFF. A feedback sensor (Throttle Position Sensor – TPS) is also installed to ensure the ECM can detect the throttle plates position.

(Vacuum operated) Swirl Valves;

The swirl control valve is installed inside the manifold assembly. While idling and during low engine speed operation, the swirl control valve closes, thus the velocity of the air in the intake passage increases to produce a swirl (rush of air to promote cleaner burning when the fuel is injected into the air) into the combustion chamber. Once the engine speed increases to a certain speed, the valves open to allow more air to enter the engine. Further information regarding the components shown right can be found in section EM & EC of the Service Manual.

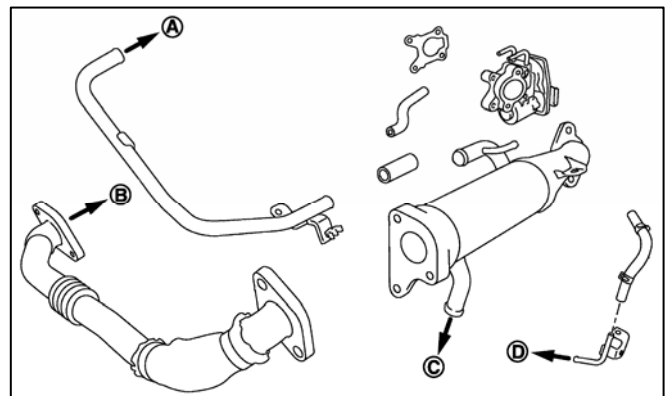


ZD30DDTi Exhaust Gas Recirculation (EGR) System

Major changes have occurred with the EGR system on the new ZD30 CRD engine.

The EGR volume control valve continues to be electrically controlled by the ECM, however it has a throttle valve arrangement & works in a similar way to an ETC unit found on current petrol engines.

The Pipe linking the exhaust manifold to the EGR control valve assembly is also water cooled as it is on R51 / D40 YD25 A/T models.



A, C, D: Engine Coolant

B: Exhaust Gases

Further information regarding the components shown right can be found in section EM & EC of the Service Manual.

ENGINE MECHANICAL - EM

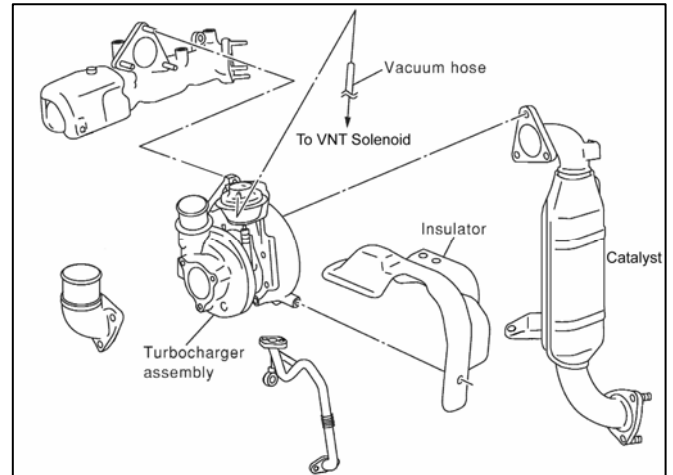
ZD30DDTi Exhaust Manifold, Turbo & Catalyst

The Exhaust Manifold system is similar to that fitted to the previous ZD engine on Y61.

A VNT type Turbo Charger unit continues to be utilised.

Special attention should be paid to section EM of the Service Manual regarding any work involved with the components shown right.

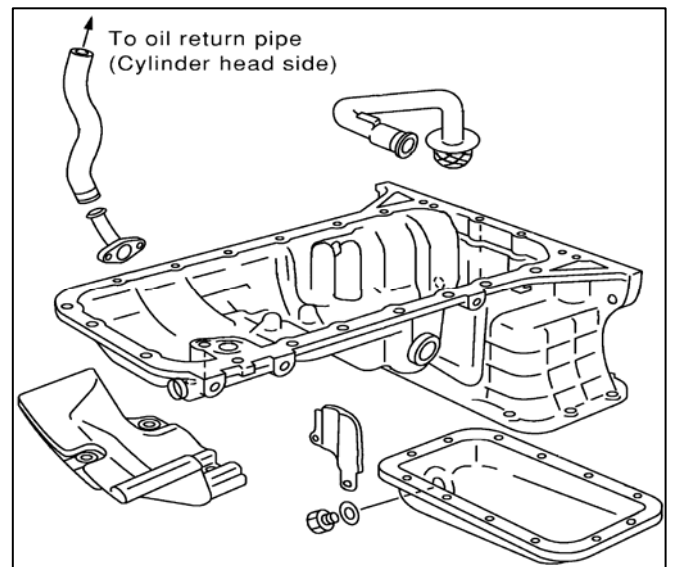
Please ensure that the Engine Oil level is NOT overfull when diagnosing a complaint of Oil Leakage from the Turbo Unit.



ZD30DDTi Oil Pan

The Oil Pan design is very much the same as that installed on the previous ZD Engine.

Further information regarding the components shown right can be found in sections EM of the Service Manual.

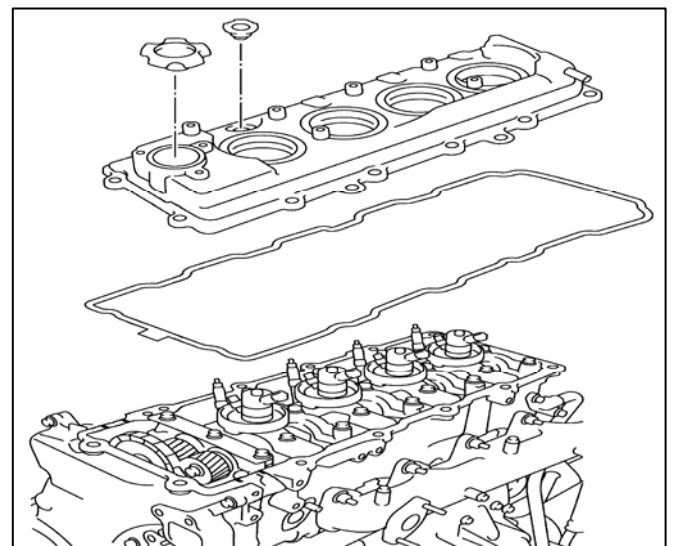


ZD30DDTi Rocker Cover

The Rocker Cover is now made from a resin material and the design has changed to allow the fitment of the new type of Injectors.

The injectors are electrically controlled & the wiring connectors protrude through the top of the Rocker Cover in a similar manner to the Injectors on the YD25 Engine.

Further information regarding the components shown right can be found in sections EM of the Service Manual.



ENGINE MECHANICAL - EM

ZD30DDTi Glow Plugs

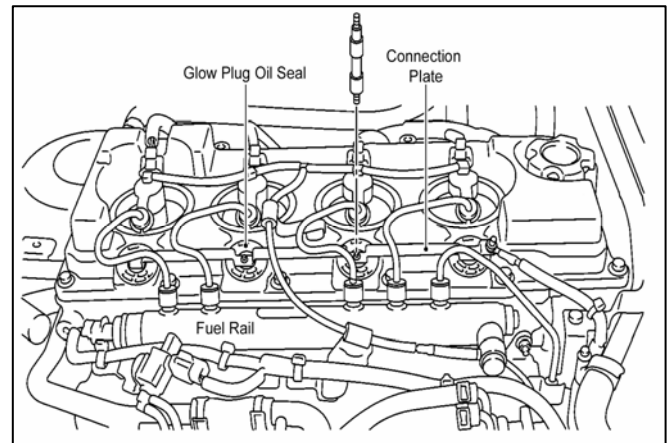
Once again the Glow system construction & operation is near identical to the previous ZD Engine.

It is necessary to remove the Glow Plugs in order to measure the Engine Compression.

NOTE: The same SST adapter for measuring compression is carried over from the previous ZD30 engine. SST# ED19600620 or ED19600620AUS

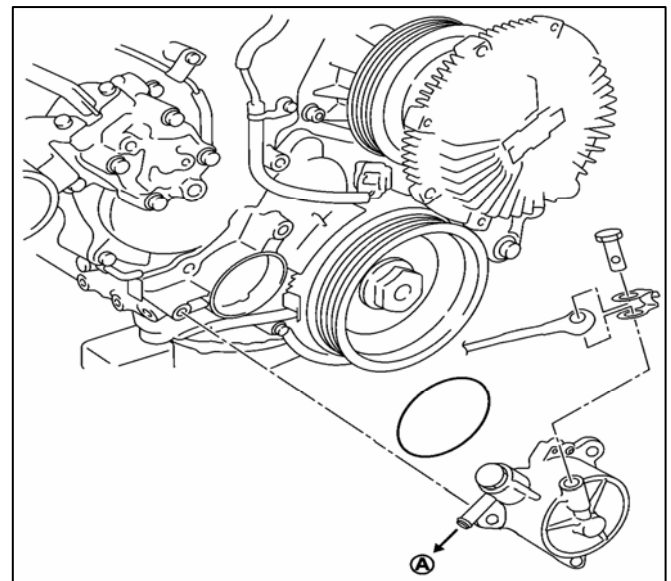
Refer to section EM of the Service Manual for more information on the removal process of the Glow Plugs as well as checking Engine Compression.

Section EC of the Service Manual discusses the operation of the Glow Plugs.



ZD30DDTi Vacuum Pump

The Vacuum Pump continues to be engine driven & is located on the RH side of the engine.



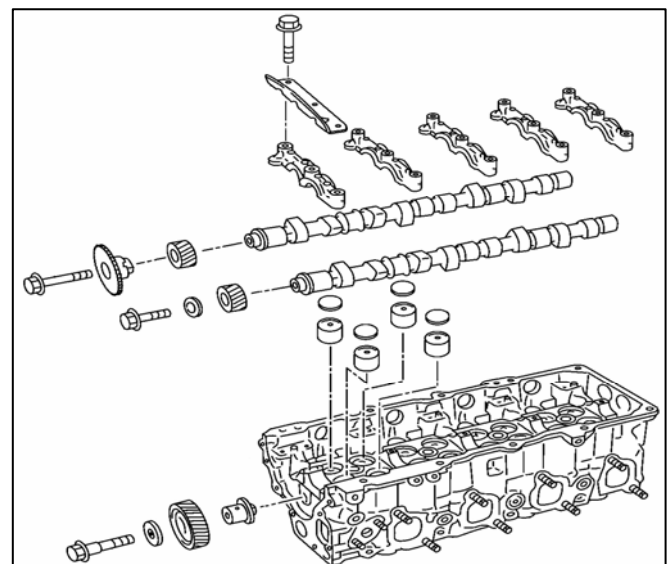
ZD30DDTi Camshafts & Cyl Head

The construction of the Cylinder Head is similar to that on the previous ZD Engine. However the Camshaft Signal Plate & sensor (CMPS) is located at the front of the head. (The previous ZD CMPS is located within the Injector Pump.)

The valves (like the previous ZD as well as the YD engine) are shim adjustable. However valve clearance adjustment is NOT required unless there is a problem. (See over page for more detail)

Refer to section EM of the Service Manual for more information on the components shown right.

Refer to **STB EM 04-002** for information regarding some pre CRD ZD30 engines that have a 1 piece valve lifter assembly. (No shims)



ENGINE MECHANICAL - EM

ZD30DDTi Valve Clearance Adjustment “Shim Kit” Special Service Tool (SST)

Valve clearance checks are NOT a normal maintenance requirement for any ZD30 engine. However, (typically after an engine repair operation) there will be a need to check the valve clearance adjustment on ZD30 engines. (CRD & non CRD engines). If the clearance is incorrect, the adjustment operation is a matter of fitting a different thickness shim between the camshaft lobe & the valve lifter (bucket).

- If the clearance is too tight, the shim needs to be removed & a **thinner** shim is to be put in it's place.
- If the clearance is too loose, the shim needs to be removed & a **thicker** shim is to be put in it's place in order to tighten the clearance.

Nissan Australia have developed a Special Service Tool (SST# 13229 VB200A) to facilitate the shim exchanging operation. The Valve clearance “Shim Kit”.

The shims removed from an engine due to an incorrect clearance are **STILL SERVICEABLE** (to be kept for use in another engine). Therefore **DO NOT** discard them.

Check the actual measurement of them with a micrometer & place them into the compartment of the kit which matches the measured size. Then select another shim of a different size which will correct the valve clearance issue.

Always ensure the micrometer in use is **CORRECTLY CALIBRATED**.

On average, shims of all sizes should always be available in the kit.

Re-order of the complete kit is available through National Parts. Use the SST # as the part #.

Refer to section EM – SDS of the Service Manual for individual shim part numbers.

Refer to section EM – “Valve clearance adjustment” of the Service Manual for the Valve clearance adjustment procedure. There is a slight difference in the procedure between CRD & non CRD engines. Refer to the appropriate Service Manual supplement dependant on the VIN.

Refer to **STB EM 06-003** for more detail about the shim kit.



To be used as a tool. **DO NOT SELL THE SHIMS.**

13229 VB200A; Kit for ALL ZD30 engines. 2000 to current CRD engines. Issued 2006

13229 VB100A; Kit for ALL RD28 engines in Y61 only, 1998 ~ end 1999. Issued 1999. It is recommended to check the valve clearances in Y61 RD28 engines every 20,000km's.

RD28 engines in Y60 models (1994 ~ 1997) used hydraulic lifters. Adjustment is not possible.

These kits are designed to facilitate the **SWAPPING** of shims of one size to another in order to correct the valve clearance on a specific engine.

These kits are **NOT** designed to facilitate the selling of shims. Once the kits arrive at your dealership, they are to be placed in the care of the Workshop & used as a Special Service Tool (SST). Only labour is to be on-sold for a valve clearance adjustment operation. **DO NOT** allow the shims from the kit to be sold.

In the unlikely event that a specific size shim has been used up, (however the number of shims in the kit as a whole should NOT vary) simply re-order that shim via parts to placed in the kit. Part # references can be found in the lid of the kit box.

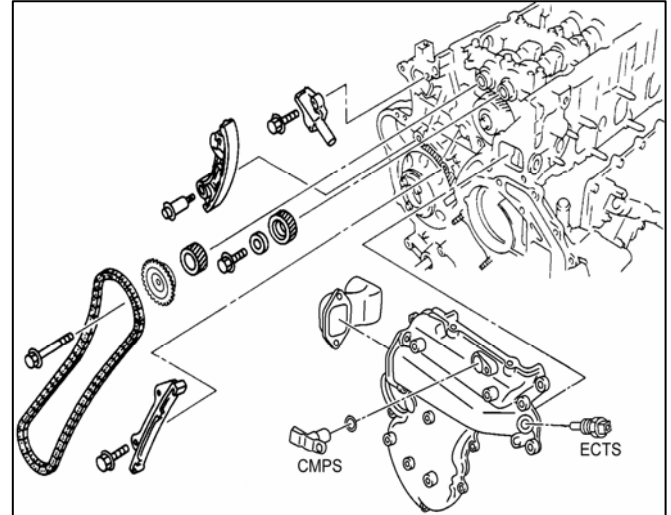
ENGINE MECHANICAL - EM

ZD30DDTi Timing Chain

The mechanical timing system is configured as displayed in the diagram shown right.

As the case with the previous ZD engine, there is only 1 chain & it is driven by the sprocket attached to the Fuel Pump drive gear. The chain then drives a single sprocket which in turn drives the RH camshaft. The 2nd camshaft is driven via an idler gear.

Refer to section EM of the Service Manual for more information on the components shown right.



ZD30DDTi Timing Gears

The Timing Gear arrangement continues in the same format as the previous ZD30 engine.

The Fuel Pump removal procedure has been simplified. The pump needs to have 3 bolts removed from the rear. The Fuel Pump detaches from the engine **without** the need to remove timing gears etc.

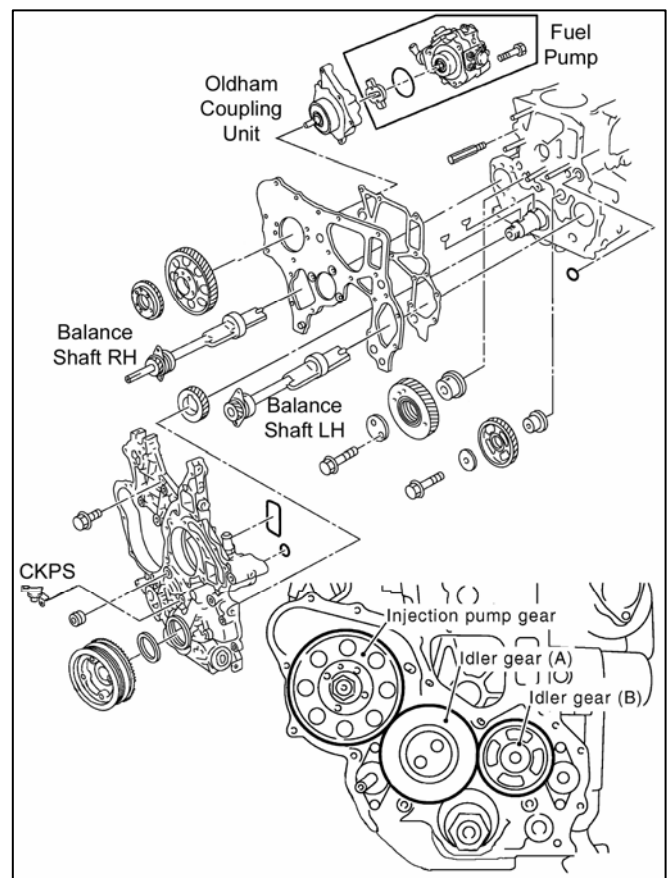
Refer to section EM of the Service Manual for more information on the components shown right.

Refer to Section EC of the Service Manual for information regarding the removal of the Fuel Pump.

Special Notes for the removal of bolts etc. when dismantling the front section of the engine.

1. None of the components (timing gears & chains etc.) in the diagrams shown right need to be removed for the Fuel Pump removal process on the new ZD30 CRD engine. Refer over page for more detail.

2. Please refer to **STB EM 04-005**. It clearly states that you must **NEVER** use an impact gun on any bolts that attach valve train gears etc. to the engine. Otherwise **SEVERE ENGINE DAMAGE WILL RESULT** and it will be at the **REPAIRERS EXPENSE!**

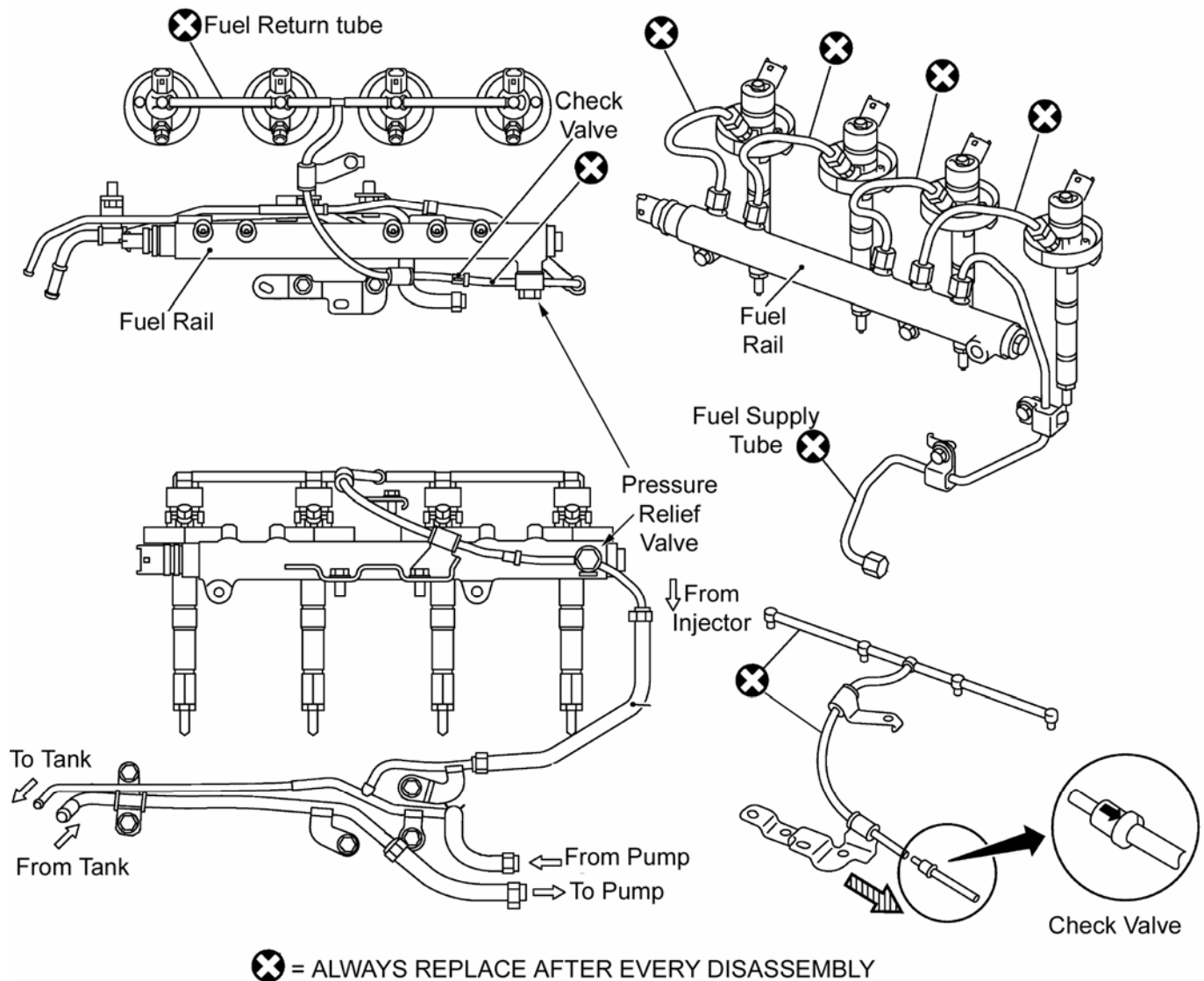


ENGINE MECHANICAL - EM

ZD30DDTi Fuel Rail, Pump & Injectors

The Common Rail along with the Injectors are mounted as shown in the diagram.

TAKE NOTE of the components that **CANNOT** be re-used once they have been removed or loosened.



NEVER “CRACK OPEN” AN INJECTOR LINE WITH THE ENGINE RUNNING OR CRANKING.

Fuel pressure can reach a MAXIMUM PRESSURE of 1600 BAR (23,000PSI).

ENGINE MECHANICAL - EM

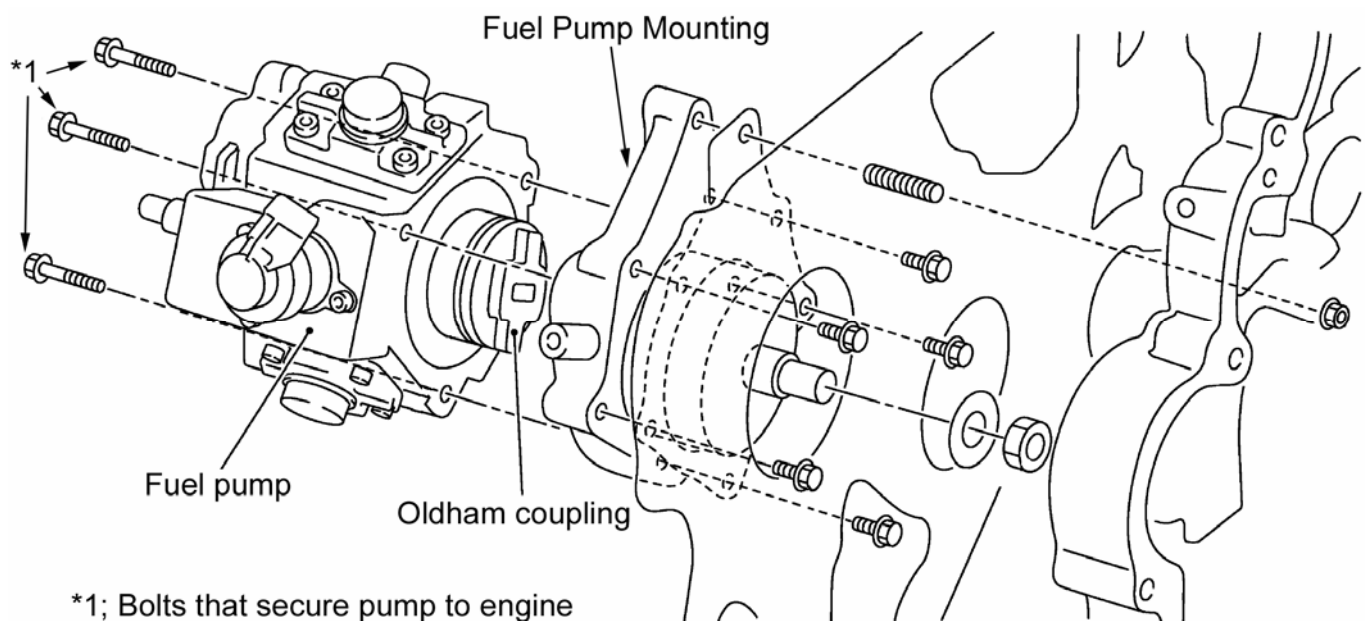
ZD30DDTi Fuel Pump Removal

Refer to section EC of the Service Manual for the removing & re-installing the Fuel Pump procedure. The new pump is now much simpler to remove & re-install than the previous VP44 unit.

The procedure involves the disconnection of the fuel lines & electrical plug. The pump is attached to the engine with 3 x forward facing bolts. The pump simply detaches from the engine **without** the need to remove any timing gears etc.

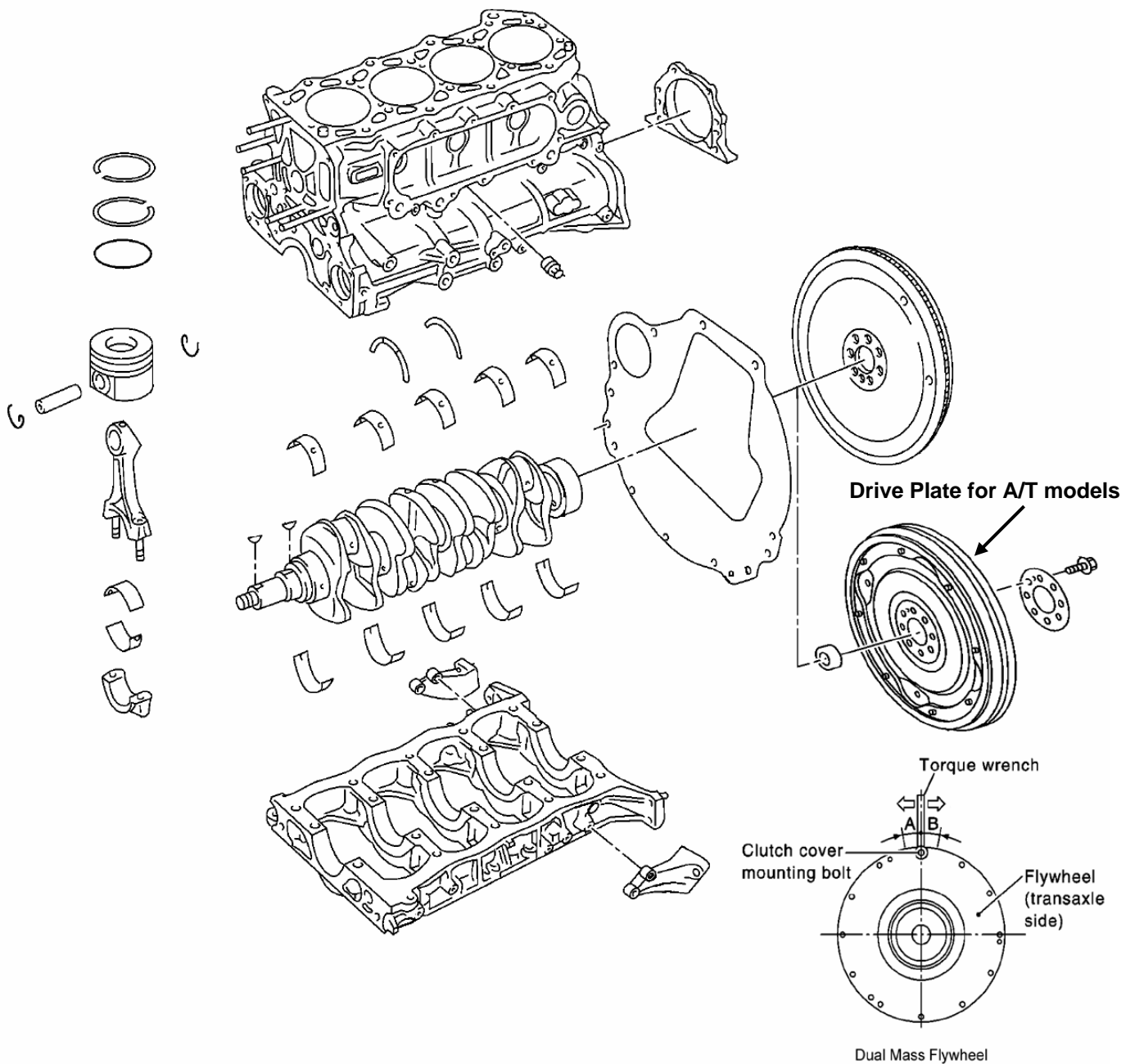
NOTE: When removing the Fuel Pump, there is **NO NEED** to remove the bolts located behind the pump drive gear. Only remove the bolts marked *1 in the diagram and the pump is removed rearwards.

The other bolts shown attached the pump mounting / drive unit to the engine & they can only be accessed by 1st removing the front timing chain / gear cover & fuel pump drive gear.



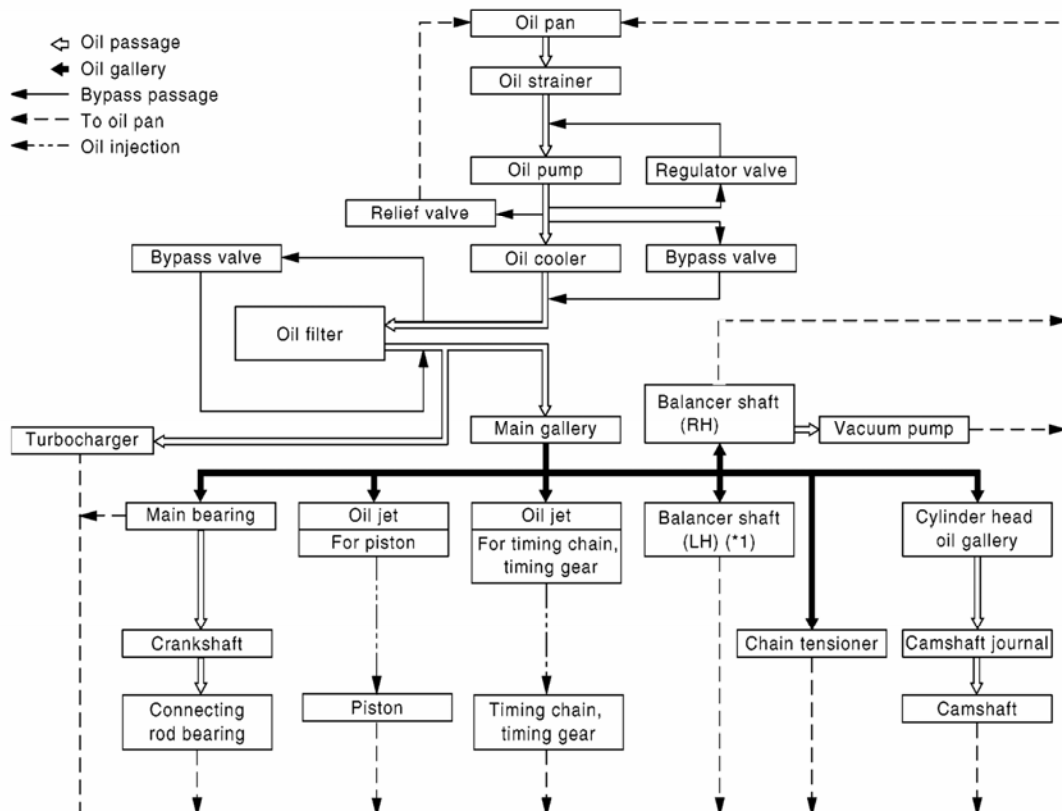
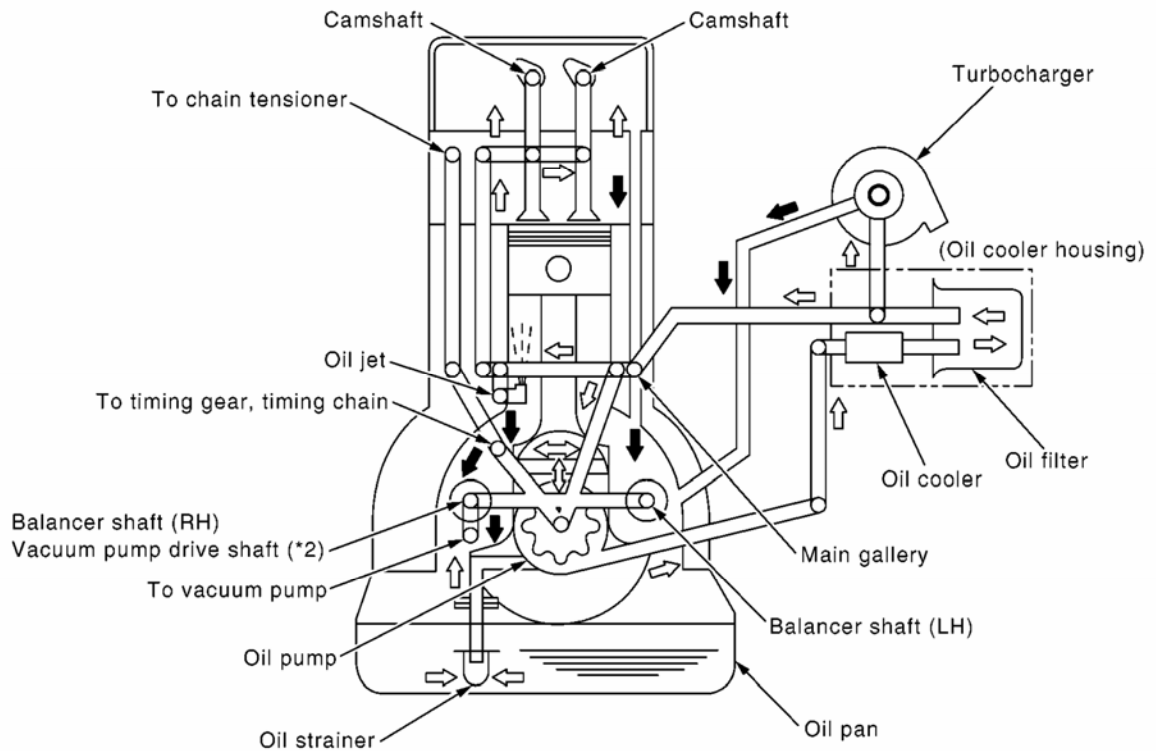
ENGINE MECHANICAL - EM

ZD30DDTi Cylinder Block & Dual Mass Flywheel (M/T)



ENGINE LUBRICATION & COOLING SYSTEMS - LC

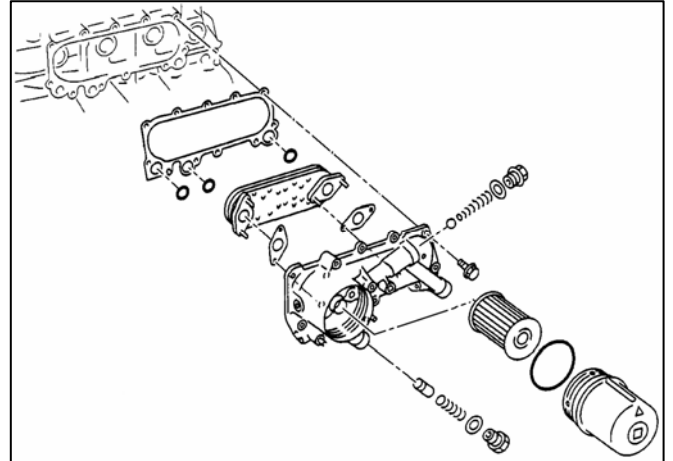
⇨ Feed
⇩ Return



ENGINE LUBRICATION & COOLING SYSTEMS - LC

ZD30DDTi Engine Oil Filter & Cooler

The Oil Filter is located on the LH side of the engine towards the front. It is the same design as the previous ZD engine.



ZD30DDTi Engine Oil Pump

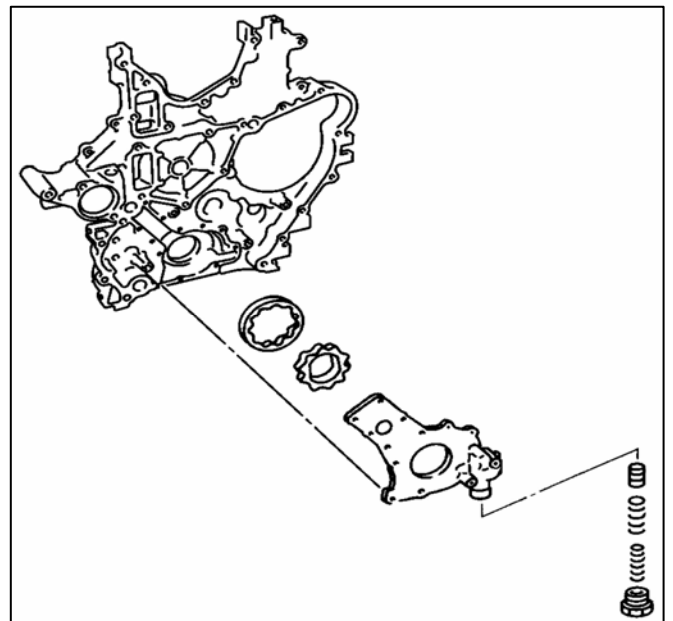
The Oil Pump is driven by the front of the crankshaft. The design of the pump is unchanged from the previous engine.

Oil Pressure is monitored via the ECM with the utilisation of an Oil Pressure **Sensor** which is located at the RH rear of the engine.

In addition to the Oil Pressure **Sensor** there is an Oil Pressure **Switch** located at the LH front of the engine, above the oil filter. This switch will ground & illuminate the 'red oil can' warning light when there is close to 0 Oil Pressure.

The Above mentioned Oil Pressure **SENSOR** is connected directly to the ECM. If the ECM measures specific pressures at certain engine speeds & temperatures, the ECM will signal the Instrument Cluster to illuminate the RED OIL CAN warning light on the Instrument Cluster.

Refer to section EL of this Training Manual for more detail.



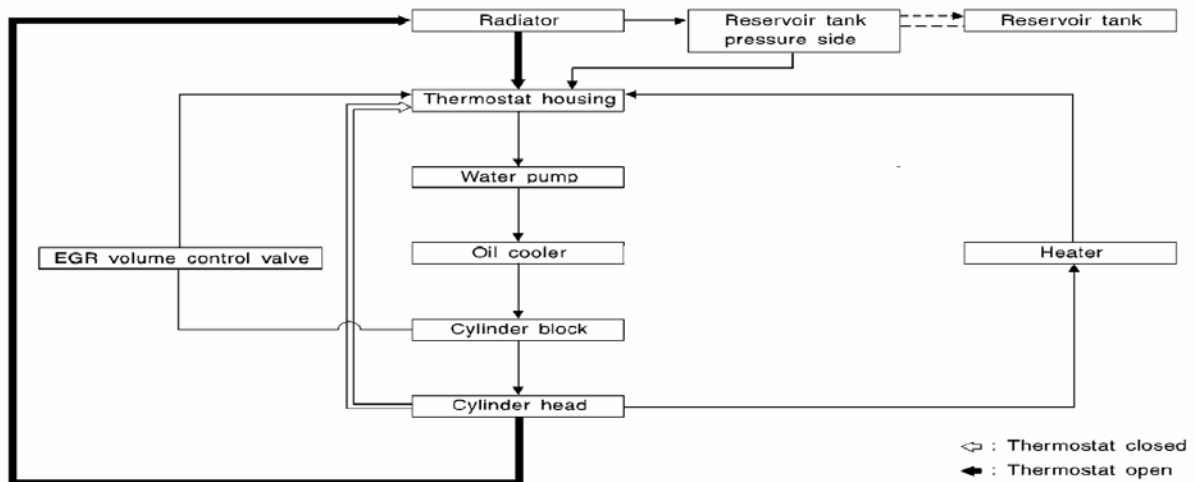
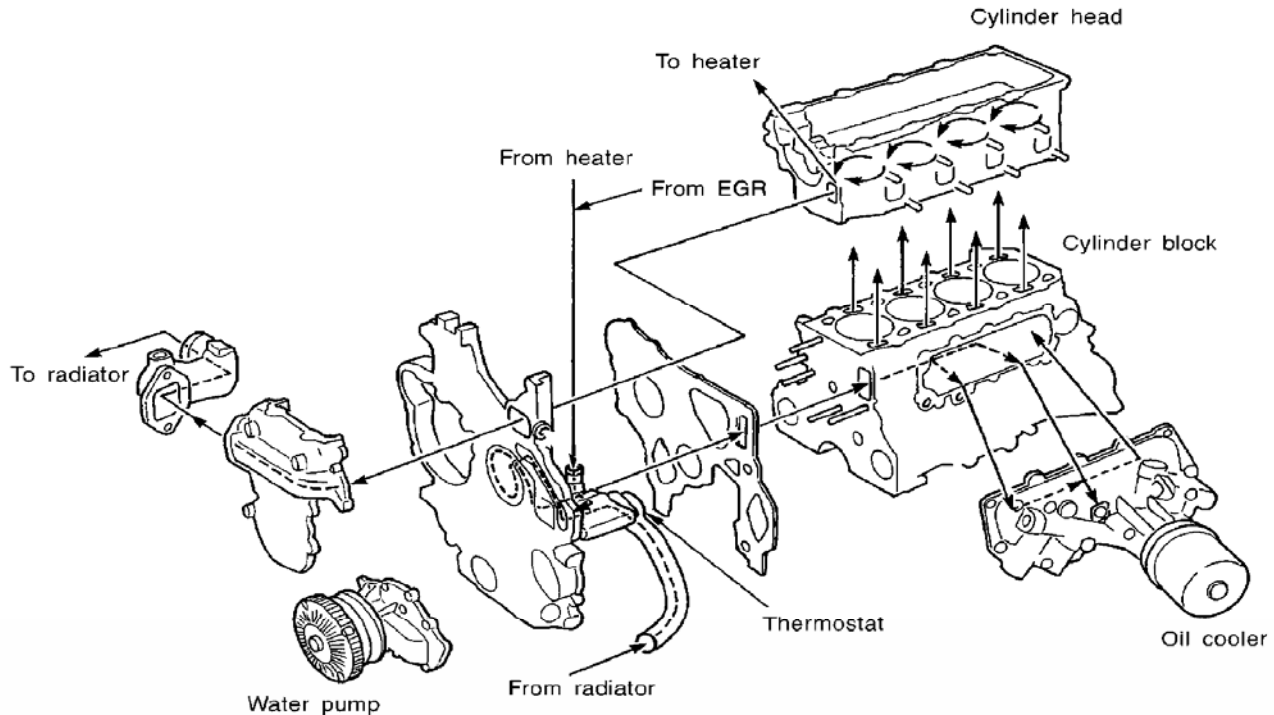
ZD30 CRD Engine Oil Pressure Specifications.

Engine Oil Pressure measurements are to be taken from the RH Rear of the engine after the removal of the Oil Pressure **SENSOR**. **DO NOT** confuse the **Oil Pressure SENSOR** with the Oil Pressure Switch located on the LHF of the engine next to the Oil Filter.

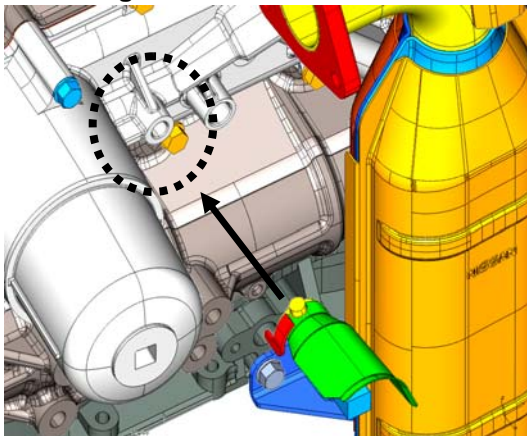
See over page for more detail of the Sensor & Switch locations.

Engine speed rpm	Approximate discharge pressure kPa (bar, kg/cm ² , psi)
Idle speed	More than 196 (2.0, 2.0, 28)
2,000	More than 392 (3.9, 4.0, 57)
3,300	More than 635 (6.4, 6.5, 92)

ENGINE LUBRICATION & COOLING SYSTEMS - LC

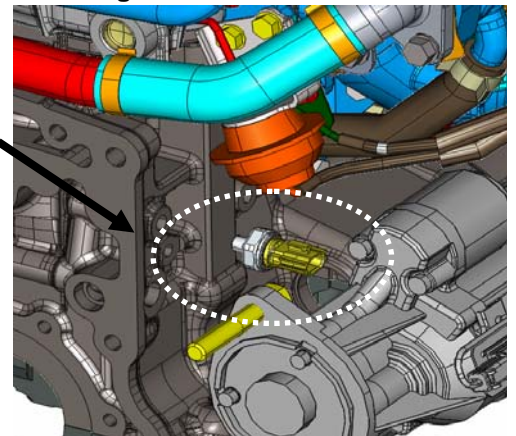


Engine Oil Pressure SWITCH



Only EVER attach an Oil Pressure gauge to this point if actual Engine Oil Pressure measurements are to be taken.

Engine Oil Pressure SENSOR

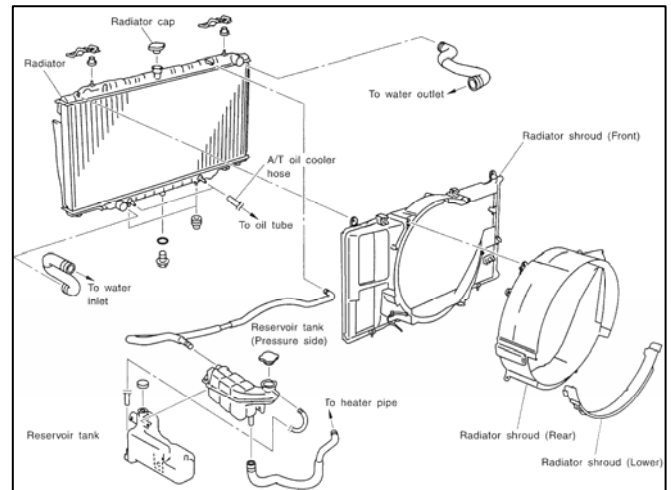


ENGINE LUBRICATION & COOLING SYSTEMS - LC

ZD30DDTi Radiator

The design of the Radiator has not changed from the previous design.

It is a down flow configuration & the system uses 1 x pressurised coolant reservoir & 1 x non pressurised coolant overflow tank.

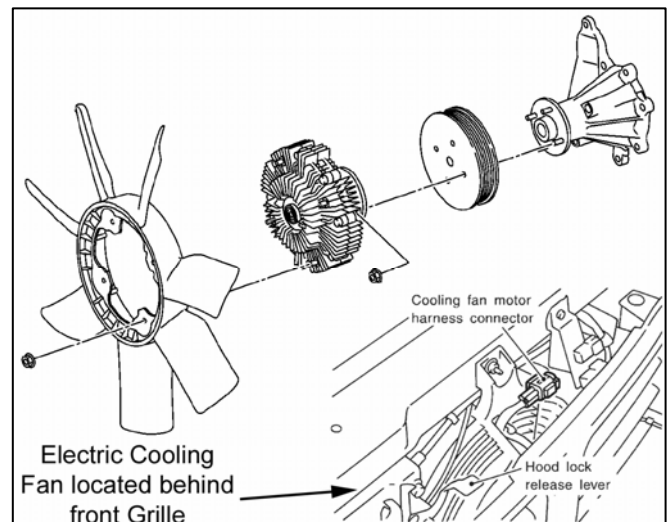


ZD30DDTi Viscous Coupling & Electric Cooling Fans

The engine driven cooling fan has a temperature sensitive viscous coupling & is mounted on the Water Pump drive shaft.

The design differs from the previous ZD engine as the viscous coupling is now a separate part from the water pump.

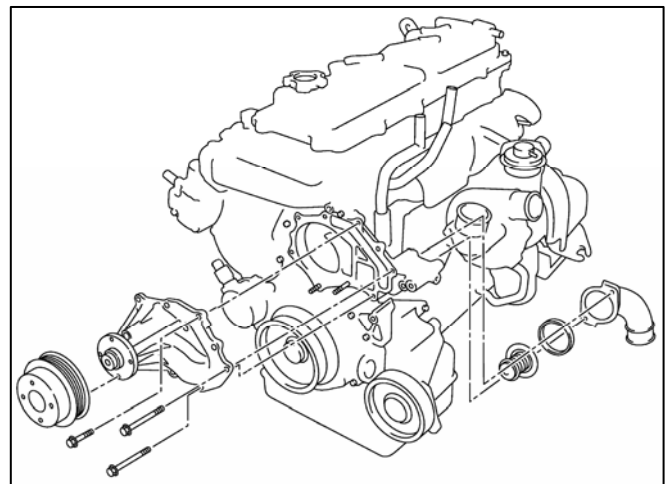
The electrically operated cooling fan is located in the same position as the electric fan on previous models. It's operation is via a relay which is controlled by the ECM.



ZD30DDTi Water Pump & Thermostat

As mentioned above, the Water Pump & Viscous Fan Coupling are now separate parts. Otherwise the water pump design is unchanged.

The Thermostat is unchanged from the previous engine also.



ENGINE LUBRICATION & COOLING SYSTEMS - LC

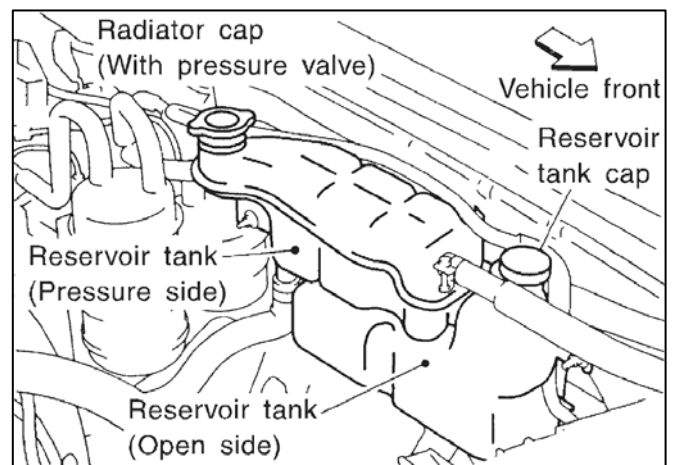
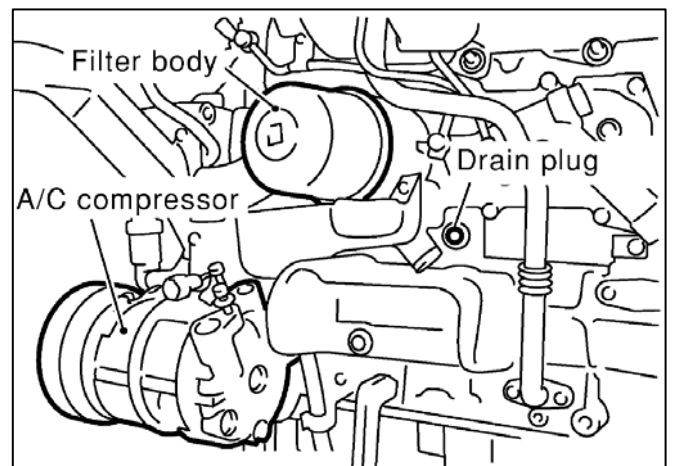
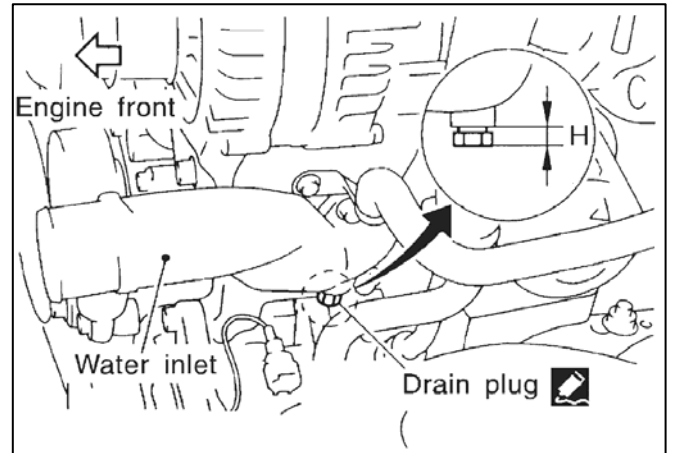
ZD30DDTi Cooling System Maintenance

When the Coolant is to be changed please ensure the coolant is completely drained from the 2 x positions shown right.

As with ALL current Nissan models, the coolant is NOT to be changed until 80,000km's or 4 years (whichever comes 1st). Thereafter the coolant is to be changed every 40,000km's or 2 years.

When refilling, there is no specific bleeding point as the air will bleed itself out via the pressurised overflow tank.

Refer to section MA of the Service Manual for more detail.



BOSCH COMMON RAIL DIESEL INJECTION

Written with the kind permission & support of
BOSCH AUSTRALIA PTY. LTD.

Basic Design Features of CRD

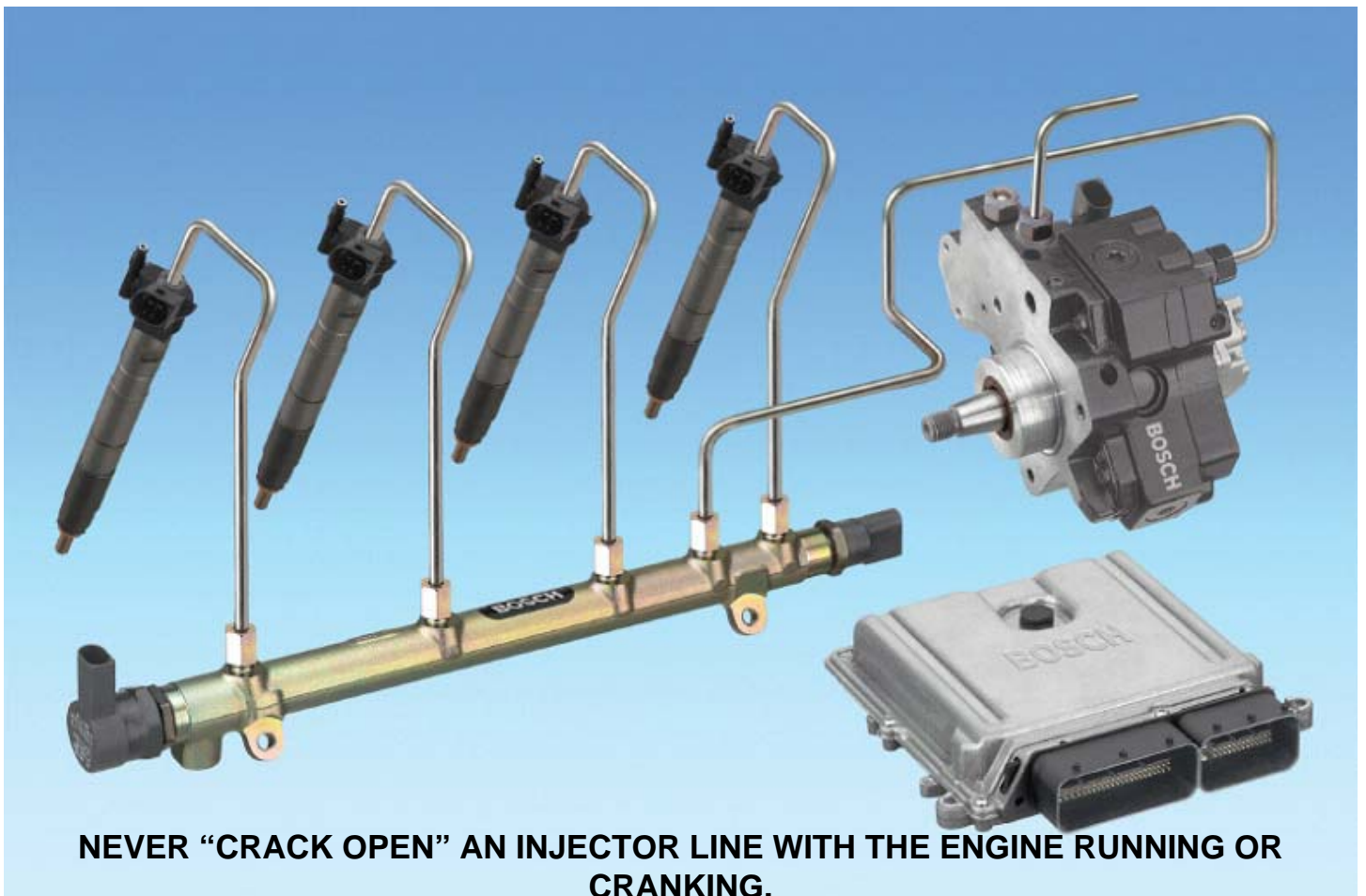
There is a chamber which is similar in appearance to a Petrol Engine EFI Fuel Rail mounted along the top of the Engine (i.e: the Fuel Rail or otherwise known as the "Common Rail")

The Rail is filled with fuel via a High Pressure Pump being driven directly by the engine. The design principle & operation is near identical to that of a Petrol Engine with EFI.

NOTE: Fuel Pressure is NOT created via Engine Oil Pressure as it is in some other types of CRD engines. This system is known as Hydraulic Electric Unit Injection – **HEUI**.

The Fuel is maintained under this extremely high pressure in the rail as so desired by the ECM. Steel tubes connected to each injector supply this pressurised fuel from the rail.

The injectors therefore can be operated by the ECM at any time to produce the very fine spray pattern (thanks to the readily available - at all times - high fuel pressure) in order to promote clean combustion.



Fuel pressure can reach a **MAXIMUM PRESSURE** of 1600 BAR (23,000PSI).

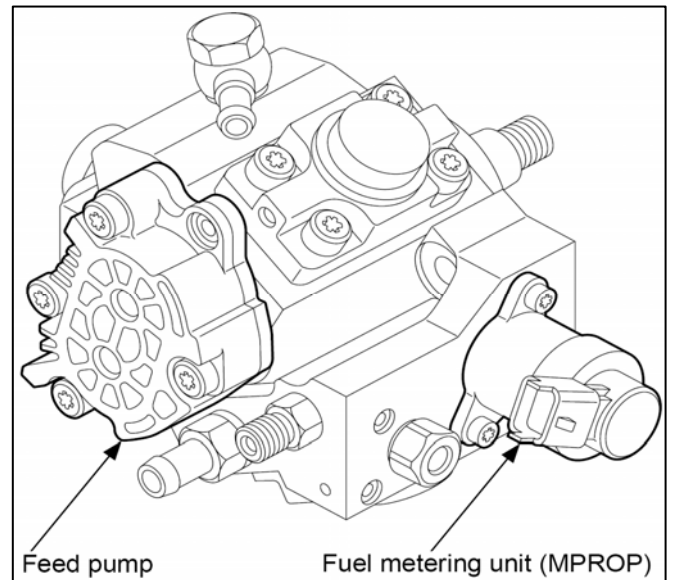
BOSCH COMMON RAIL DIESEL INJECTION

Written with the kind permission & support of
BOSCH AUSTRALIA PTY. LTD.

1. Fuel Pump (BOSCH CP1H)

The supply pump consists primarily of the following;

- Feed pump
- Fuel Metering Unit (MPROP - Metering Proportional Valve)
- High Pressure Pump

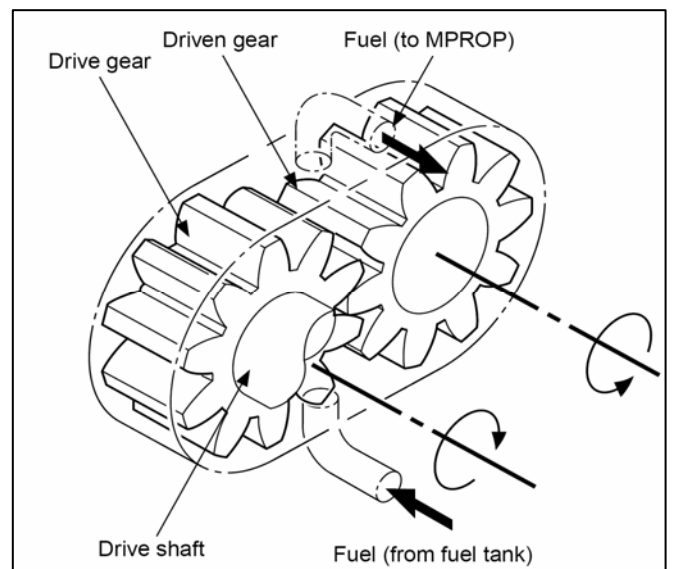


(i) Feed Pump

The feed pump is a circumscribed gear type pump and consists of a drive gear and a driven gear.

The drive gear is connected to the high-pressure pump drive shaft by a plate coupling.

The rotational speed of the drive gear is the same as that of the drive shaft.



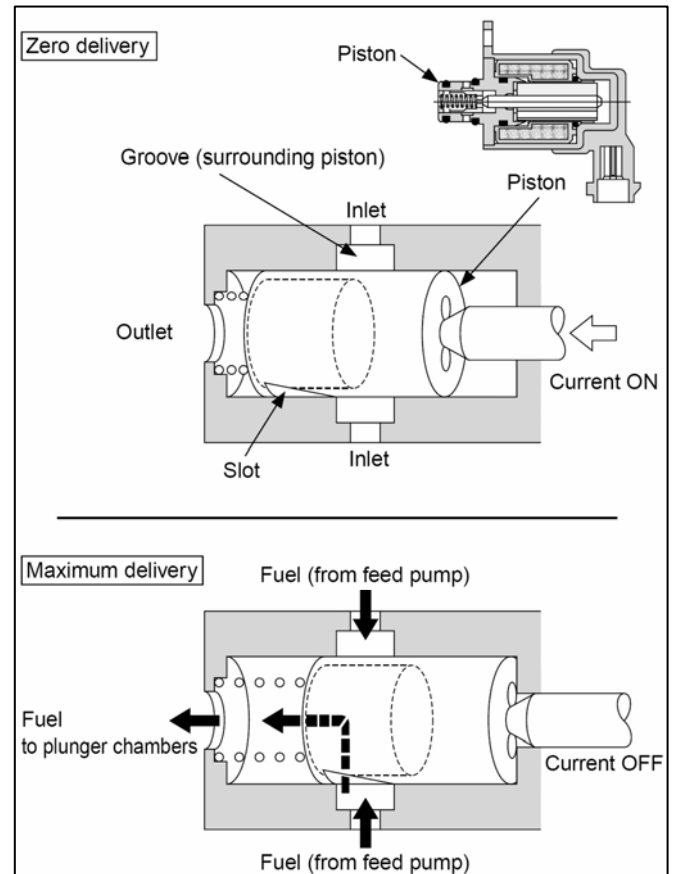
BOSCH COMMON RAIL DIESEL INJECTION

Written with the kind permission & support of
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1. Fuel Pump (BOSCH CP1H) .../Cont'd (ii) Fuel Metering Unit (MPROP)

The fuel metering unit consists of a housing, an armature assembly, a magnetic core, a solenoid core, a piston and a spring.

The piston is located inside the magnetic core. Fuel flows through the inlets and into a groove running around the inside of the magnetic core.



BOSCH COMMON RAIL DIESEL INJECTION

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1. Fuel Pump (BOSCH CP1H) .../Cont'd

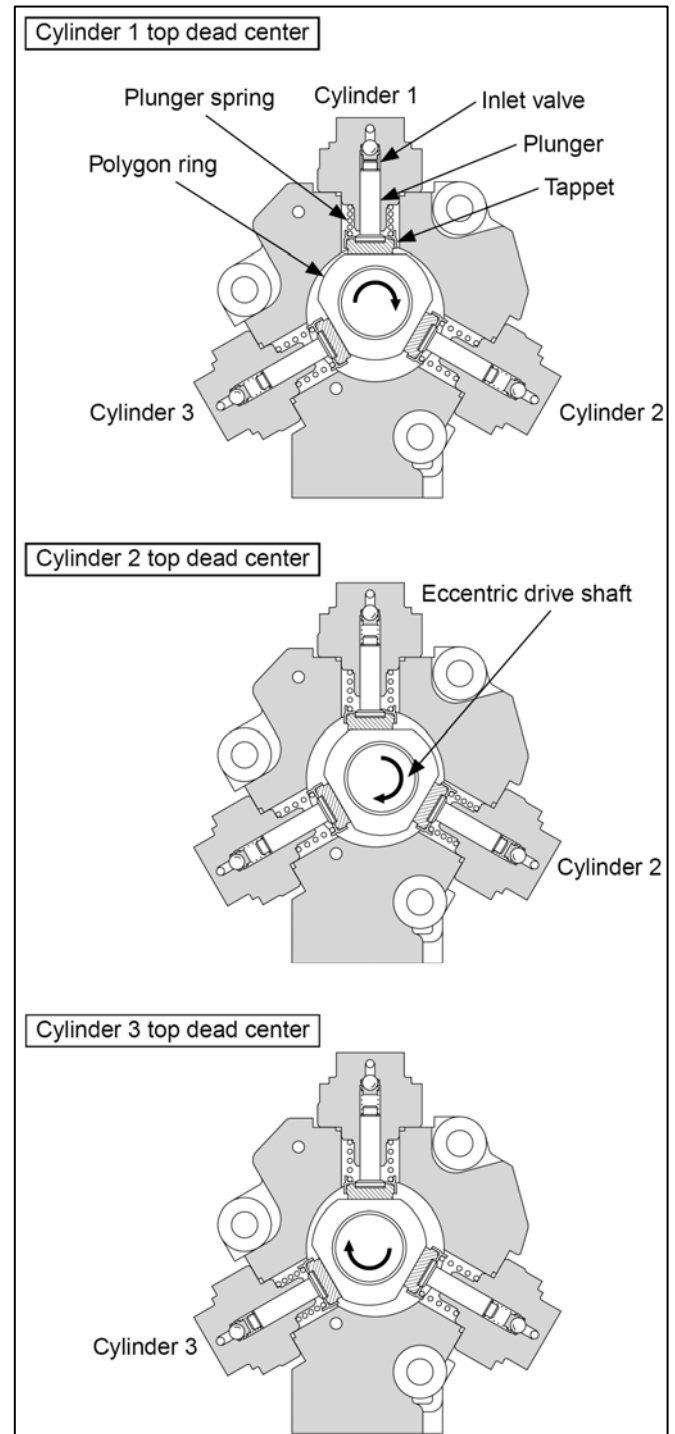
(iii) High Pressure Pump

The high-pressure pump is a radial piston high pressure pump in which three plungers are arranged radially around the eccentric drive shaft.

The plungers are reciprocated by the eccentric rotation of the polygon ring assembled on the drive shaft. (The polygon ring itself does not rotate; it is only moved in a circular motion.)

The drive shaft is driven directly by the engine via a coupling.

The high-pressure pump consists of inlet valves, outlet valves, plungers, plunger springs, tappets, a polygon ring, a drive shaft and a pump housing.



BOSCH COMMON RAIL DIESEL INJECTION

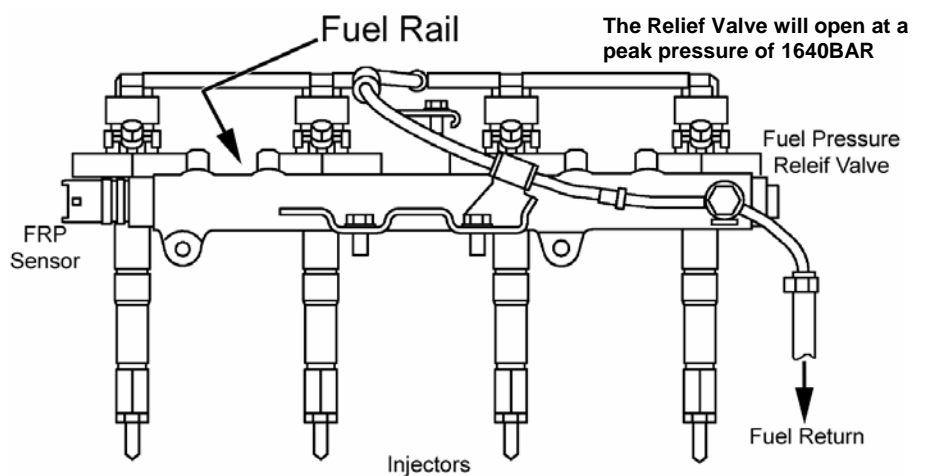
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2. Rail (BOSCH)

The Rail stores pressurised fuel (0 to 1600 BAR, 23,000psi) delivered from the supply pump and distributes the fuel to each cylinder's injector.

**NEVER "CRACK OPEN" A FUEL LINE WITH THE ENGINE RUNNING OR CRANKING.
SEVERE INJURY WILL BE A RESULT OF THIS ACTION!!!**

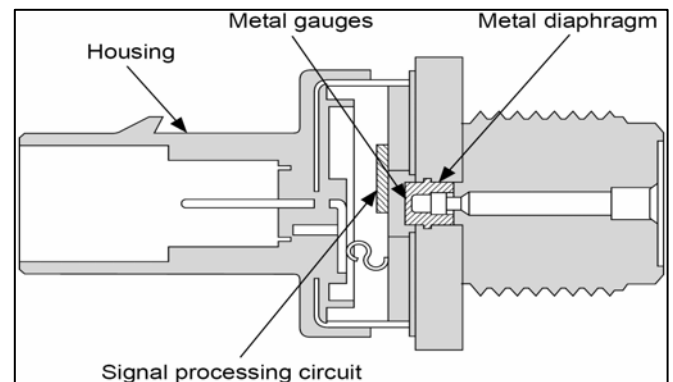
**PLEASE OBSERVE THE SAFETY
PRECAUTIONS REGARDING HIGH
FUEL PRESSURE SYSTEMS.
REFER TO STB GI 05-007 FOR
MORE DETAIL.**



(i) Fuel Rail Pressure Sensor (BOSCH)

The rail pressure sensor is mounted in the rear end of the rail and detects the fuel pressure in the rail. This signal is sent to the engine's ECU.

This sensor is a semi-conductor type pressure sensor which uses the Piezo resistive effect to detect changes in electrical resistance when pressure is applied to a silicon wafer.

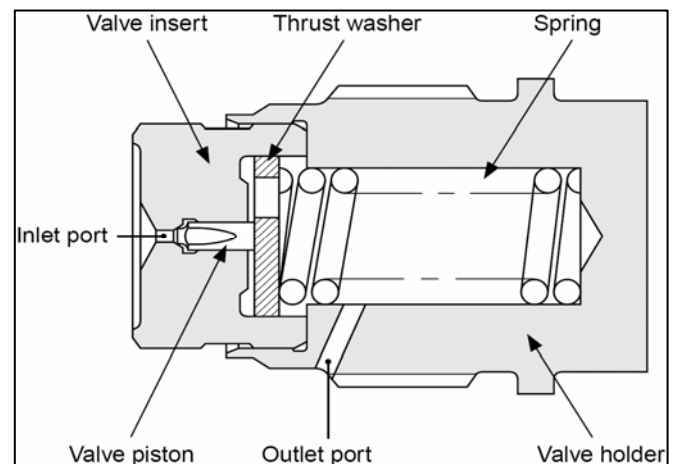


(ii) Pressure Limiting Valve (Fuel Pressure Relief Valve) (BOSCH)

The pressure limiting valve is a piston type seat valve. When abnormal pressure develops in the common rail, the pressure limiting valve returns fuel to the fuel tank to prevent an abnormal increase in pressure.

Once abnormal pressure develops, the valve piston opens and the overflow quantity is automatically adjusted to maintain a fixed fuel pressure in the rail and enable simplified vehicle running. Because this is an abnormal condition, it is then necessary to have the system inspected.

The valve will lift off its seat at a peak pressure of **1640 BAR.**



BOSCH COMMON RAIL DIESEL INJECTION

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3. Fuel Injector (BOSCH)

In response to the signal from the ECU, the injector assembly supplies pressurized fuel from the common rail to the engine's combustion chamber at the optimum injection timing and the optimum injection quantity.

The injector assembly can be divided into the following two functional units;

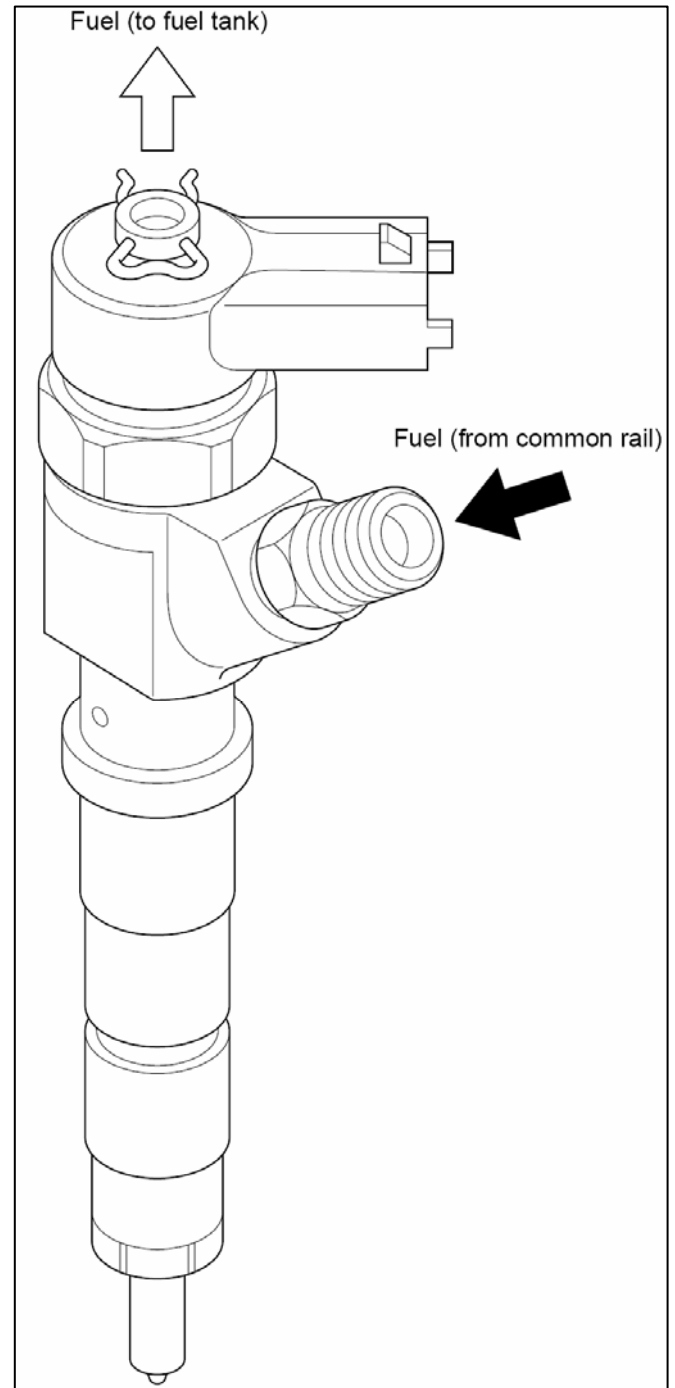
(i) Control section

The control section consists of a control chamber, a magnet, a valve spring, an armature plate, a valve ball, a valve body, a valve piston and 2 orifices.

A valve piston is located between the control section and the injector.

(ii) Injector

The injector consists of a nozzle body, a nozzle needle, a nozzle spring and a nozzle nut.



BOSCH COMMON RAIL DIESEL INJECTION

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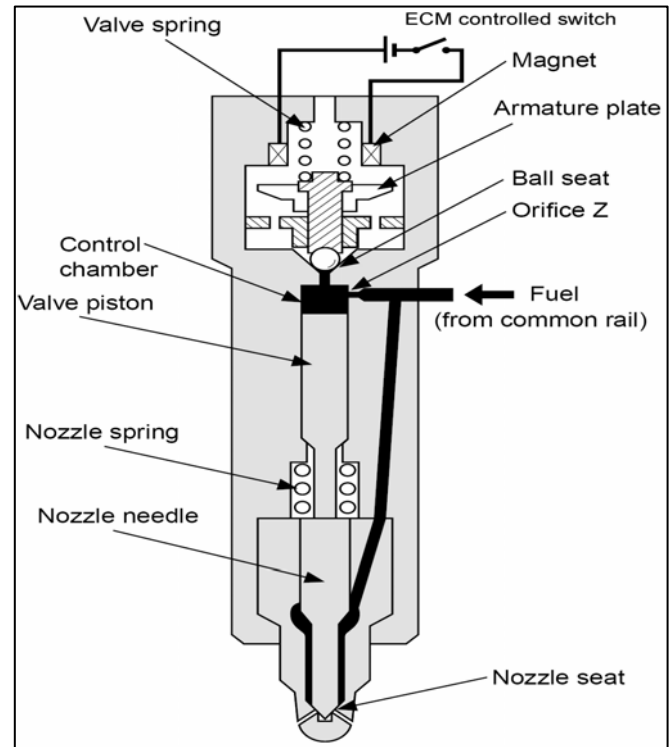
3. Fuel Injector (BOSCH) .../Cont'd Injector Operation;

(i) Non Injection

When the magnet is not energized, the armature plate is pushed down by the valve spring and the ball seat is closed.

High pressure fuel is acting on the control chamber through orifice Z. The same pressure also acts on the nozzle needle side.

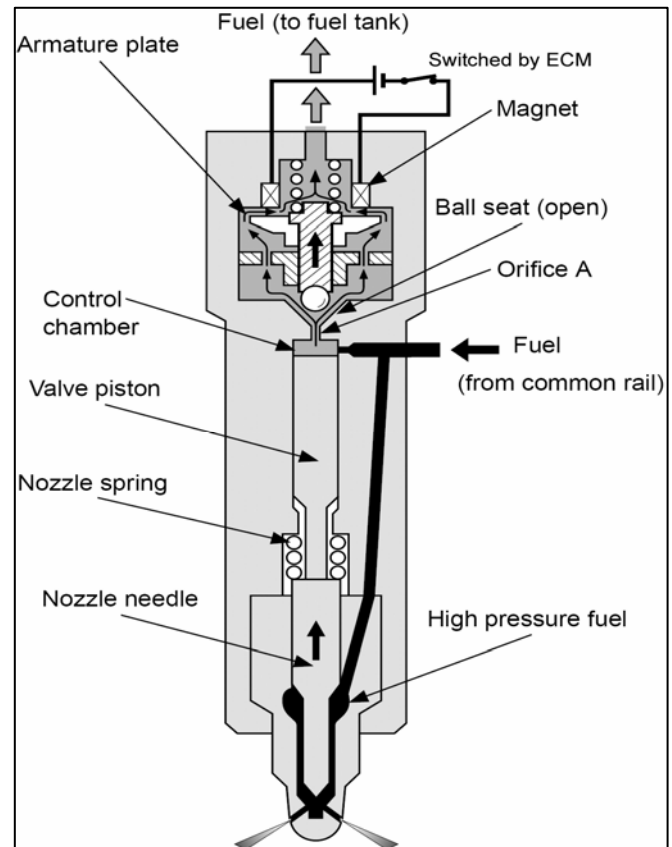
The nozzle needle is pushed down because of the difference in the pressure bearing areas of the valve piston and the nozzle needle, as well as the nozzle spring's set force, and the nozzle seat is closed. Consequently, fuel injection cannot be performed.



(ii) Beginning of Injection

When the magnet is energized, the armature plate is attracted upward by electromagnetic force and the ball seat is opened.

The high pressure fuel in the control chamber flows out through the ball seat and orifice A to the fuel tank. Because of this, the force of the high pressure fuel acting on the nozzle needle overcomes the force of the valve piston and the nozzle spring's set force, the nozzle needle is pushed up, and fuel injection begins. If energising of the magnet continues, the maximum injection rate is obtained.



BOSCH COMMON RAIL DIESEL INJECTION

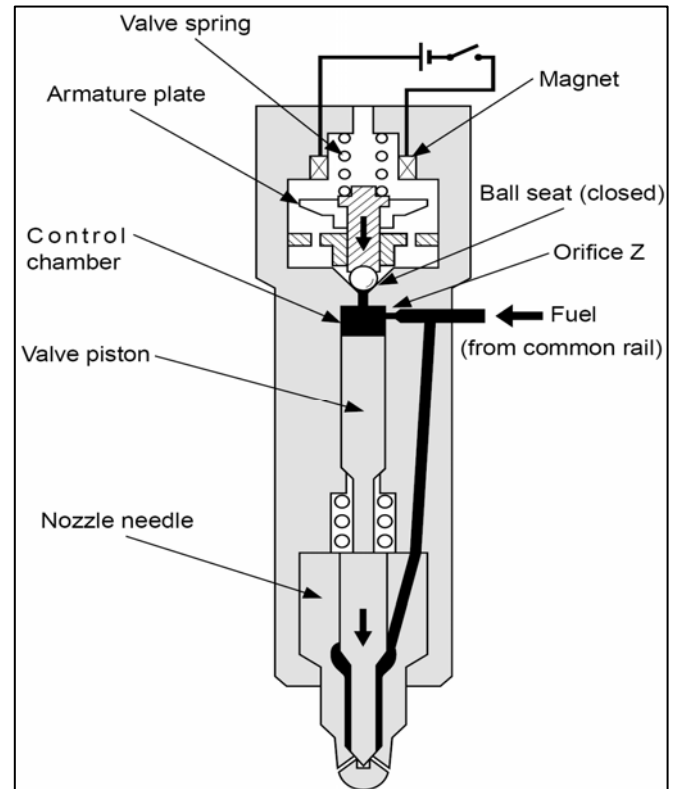
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3. Fuel Injector (BOSCH) .../Cont'd

Injector Operation;

(iii) End-of-injection

When the power to the magnet is stopped, the armature plate is pushed down by the valve spring and the ball seat is closed. At this time, high pressure fuel flows into the control chamber through orifice Z, the valve piston and the nozzle needle are pushed down, and fuel injection ends.



BOSCH COMMON RAIL DIESEL INJECTION

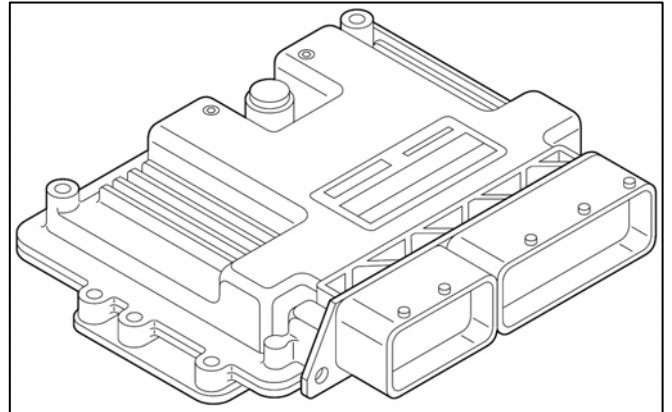
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4. Electronic Control Module (ECM - BOSCH)

Information signals detected by the various sensors and switches are input to a microcomputer inside the ECM. In accordance with these information signals, characteristic data and compensation data recorded on the ROM (Read Only Memory device) are read into the CPU (the central processing unit).

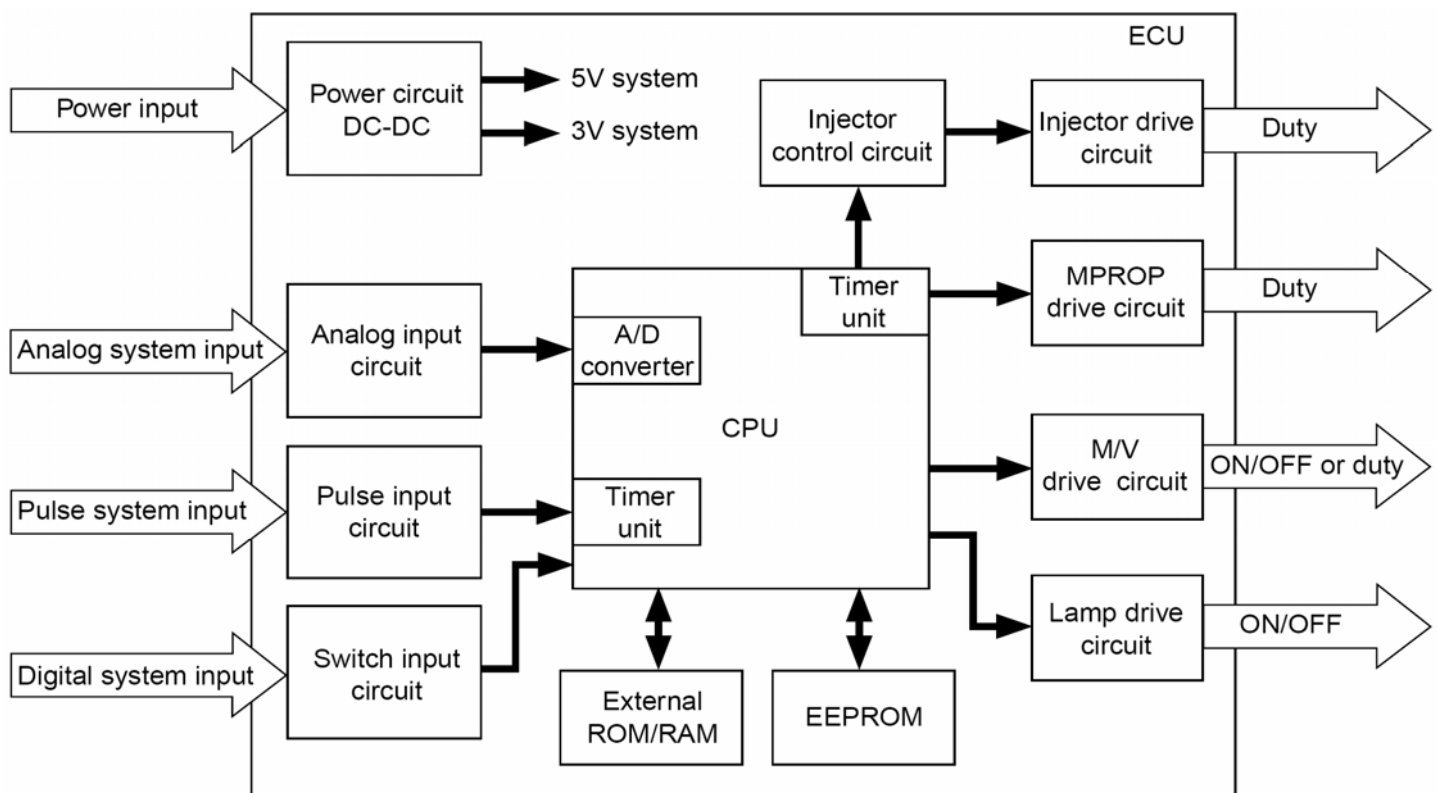
Computations are performed using this control data and the information signals from the input section, and the results are output as control signals.

The control signals output from the microcomputer are converted to drive signals in accordance with their content. These drive signals are output to the injectors and the solenoid valves to control injection quantity and injection timing.



NEVER “swap” a known GOOD ECM to a problem vehicle. Fit the suspect ECM to a known good vehicle instead. If it is proven to be a failed ECM, then there is a fault in the vehicle which caused the failure of the ECM. LOCATE & REPAIR THE FAULT prior to installing a new ECM to a problem vehicle.

As a rule of thumb, ECM failures are EXTREMELY RARE. Fuel, Air, Power & Ground issues are most typically the cause of engine running faults.



BOSCH COMMON RAIL DIESEL INJECTION

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Service & Repair of Bosch Fuel System Components

1. High Pressure Fuel Pump;

If the diagnosis process has been correctly followed & it has been determined that the Fuel Pump is at fault, please refer to **STB GI 07-006** for repair or instructions. Only a specific Bosch agent is authorised to inspect, dismantle & repair these Fuel Pumps.

DO NOT ORDER A NEW PUMP FROM PARTS TO REPAIR A PUMP OR SUSPECT PUMP PROBLEM.

2. Injectors;

If the diagnosis process has been correctly followed & it has been determined that the Injectors at fault, please refer to **STB GI 07-006** for repair or instructions.

3. Fuel Rail;

If the diagnosis process has been correctly followed & it has been determined that either the Fuel Rail, Fuel Rail Pressure Sensor &/or the Fuel Pressure relief valve is at fault, please order a COMPLETE NEW FUEL RAIL ASSEMBLY via normal parts channels as the rail & attached components are not serviceable & are not supplied separately.

4. Steel Fuel Tubes & Plastic Fuel Injector Return Tubes;

Once removed, these components must NEVER be reused. Order replacement ones via normal parts channels. Refer to page 24 of this Manual for more detail.

5. ECM;

It is HIGHLY UNLIKELY that the ECM has failed, however if it suspected that the ECM has done so, install it into a known good vehicle. NEVER "swap" a known GOOD ECM to a problem vehicle. If it is proven to be a failed ECM, then there is a fault in the vehicle which caused the failure of the ECM. LOCATE & REPAIR THE FAULT prior to installing a new ECM to a problem vehicle.

As a rule of thumb, ECM failures are EXTREMELY RARE. Fuel, Air, Power & Ground issues are most typically the cause of engine running faults.

Replacement ECM's are available via normal parts channels.

BOSCH COMMON RAIL DIESEL INJECTION

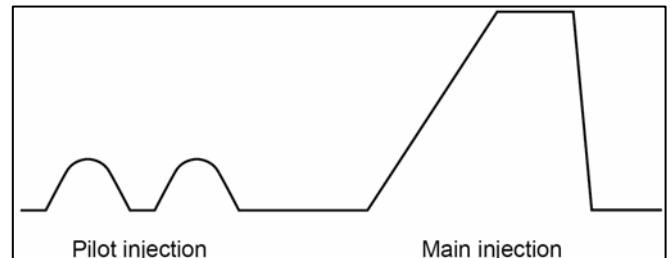
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Fuel Injector Operation

1. Pilot Injection

Pilot injection precedes the usual injection (ie, main injection) and is the injection of a very small quantity of fuel.

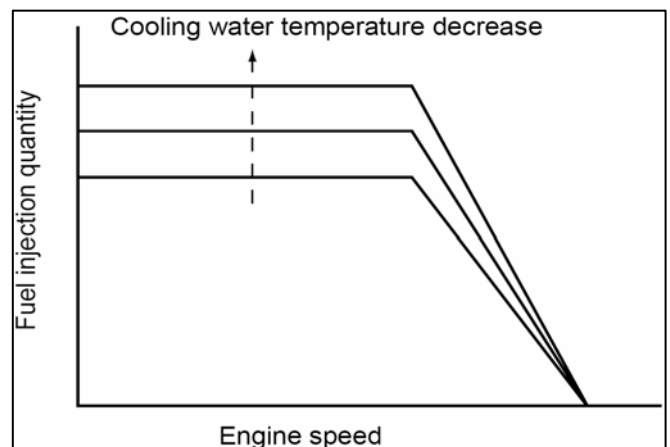
Pilot injection suppresses the initial generation of heat to decrease NOx and noise generated at the beginning of combustion.



2. Fuel Injection Quantity Control

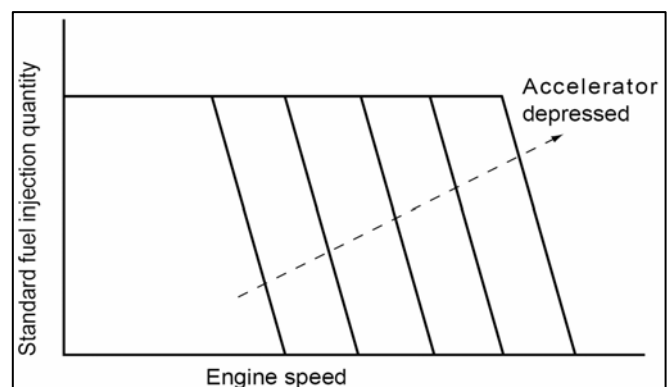
(i) Fuel injection quantity at engine starting

At engine starting, the fuel injection quantity is determined by the engine speed at starting and cooling water temperature.



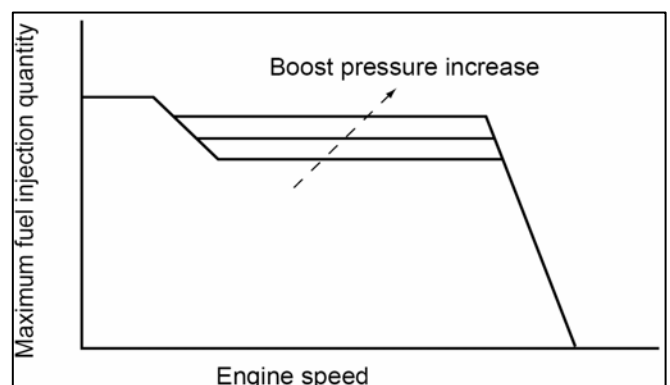
(ii) Standard fuel injection quantity

The standard fuel injection quantity is determined by the engine speed and accelerator position.



(iii) Maximum fuel injection quantity

The maximum fuel injection quantity is calculated from engine speed and boost pressure.



BOSCH COMMON RAIL DIESEL INJECTION

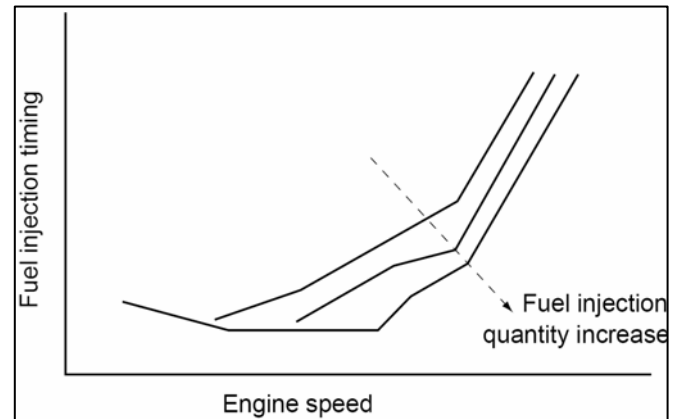
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Fuel Injector Operation .../Cont'd

3. Fuel Injection Timing Control

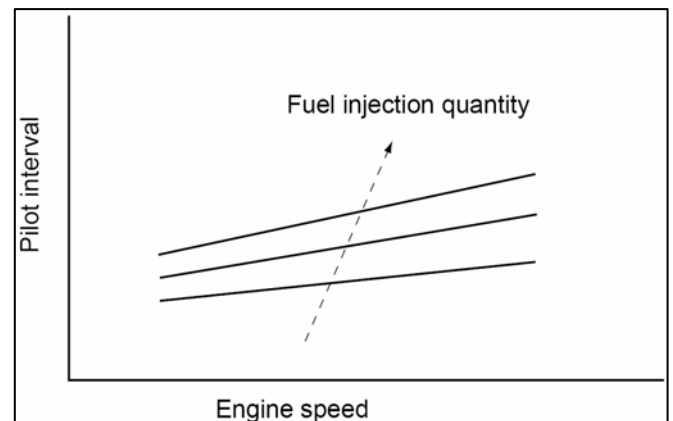
(i) Main Injection Timing

Main injection timing is calculated from the fuel injection quantity and engine speed.



(ii) Pilot Injection Timing (pilot interval)

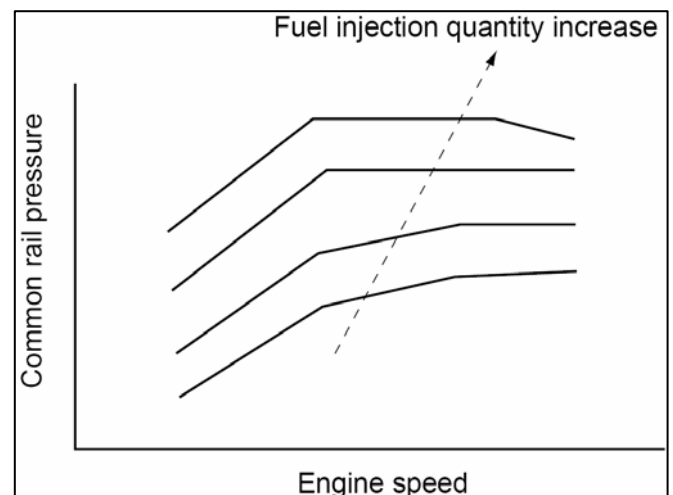
The pilot interval is calculated from the fuel injection quantity and engine speed.



4. Fuel Injection Pressure Control

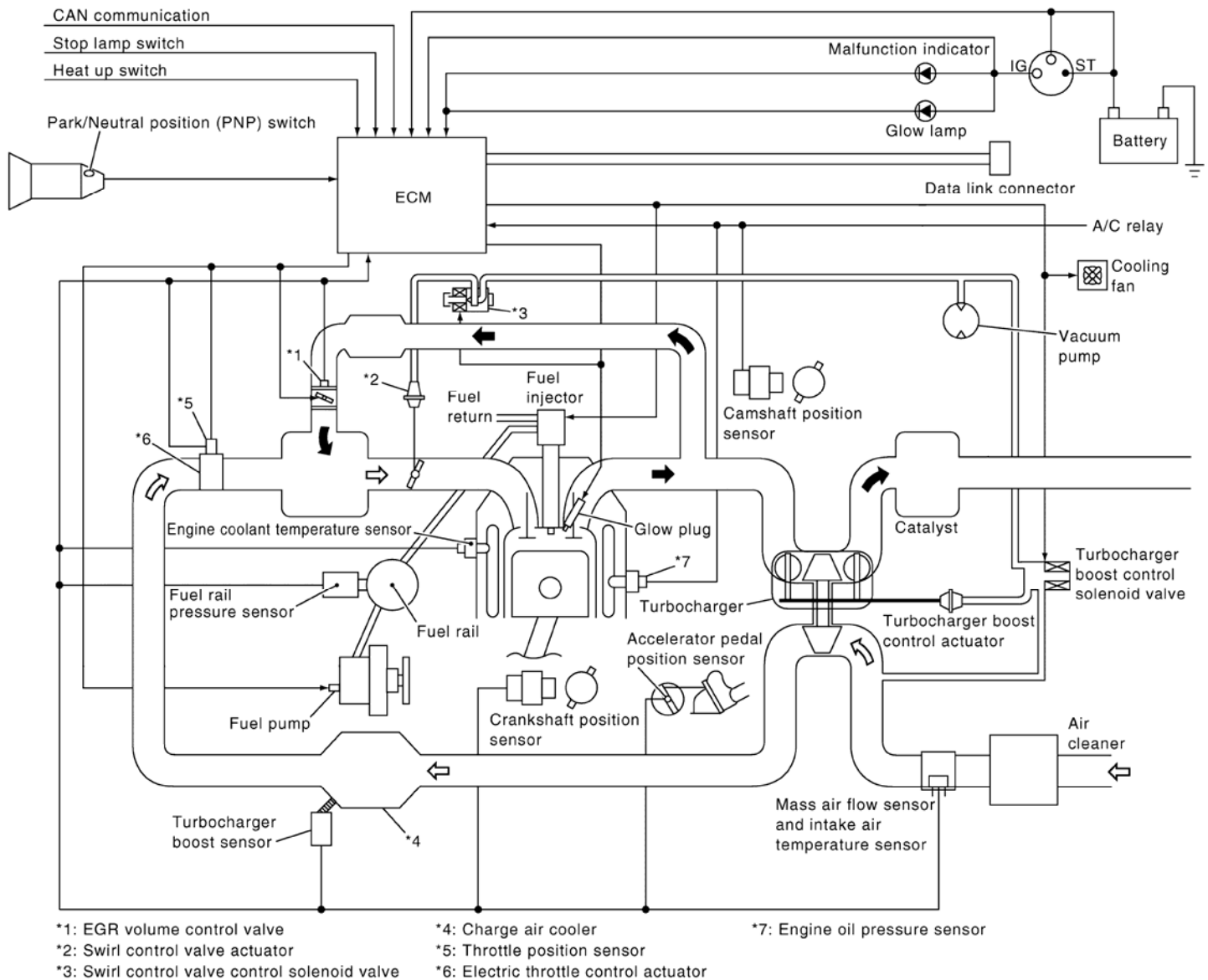
The fuel injection pressure is calculated from the fuel injection quantity and engine speed.

Pressure in the Rail is regulated by the Fuel Metering unit on the Fuel Pump.



ENGINE CONTROL SYSTEM - EC

ZD30DDTi - CRD



ENGINE CONTROL SYSTEM - EC

ZD30DDTi - CRD

INPUT	ECM FUNCTION	OUTPUT (ACTUATOR)
BATTERY VOLTAGE (& Ground)	FUEL INJECTION QUANTITY	FUEL INJECTOR & PUMP
IGNITION SWITCH ACTIVITY		
ACCELERATOR PEDAL ACTIVITY	FUEL INJECTION TIMING	
CRANK POSITION & SPEED		
CAMSHAFT POSITION	VEHICLE SPEED CONTROL (ASCD)	GLOW <u>RELAY</u> & INDICATOR LAMP
FUEL RAIL PRESSURE		
HEAT SWITCH (Fast idle warm up control)	GLOW PLUG OPERATION	EGR VALVE
ENGINE COOLANT TEMPERATURE		
MASS AIR FLOW	EGR VOLUME CONTROL	COOLING FAN <u>RELAY</u>
INTAKE AIR TEMPERATURE		
TURBO BOOST (Air Pressure in Intake)	COOLING FAN CONTROL	TURBO BOOST CONTROL SOLENOID VALVE
ASCD REQUEST FROM DRIVER		
ASCD CANCEL REQUEST (Brake & Clutch pedal switches)	TURBO BOOST CONTROL	ELECTRIC THROTTLE CONTROL VALVE
BRAKE PEDAL ACTIVITY		
GEAR LEVER POSITION (P/N)	THROTTLE VALVE CONTROL	AIR CONDITIONER COMPRESSOR <u>RELAY</u>
BAROMETRIC PRESSURE (Altitude)		
ENGINE OIL PRESSURE	AIR CONDITIONER CONTROL	SWIRL VALVE SOLENOID
EGR VALVE POSITION		
THROTTLE VALVE POS'N	SWIRL VALVE CONTROL	MALFUNCTION INDICATOR LAMP & ECM (SELF DIAGNOSIS – CONSULT II)
* VEHICLE SPEED		
* AIR CONDITIONER REQUEST	ON BOARD DIAGNOSIS	
(* CAN COMMUNICATION)		

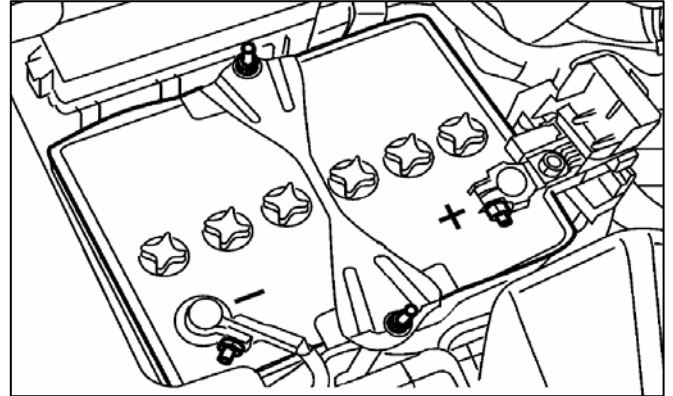
ENGINE CONTROL SYSTEM - EC

ZD30DDTi Inputs to ECM

1a. Battery Voltage

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

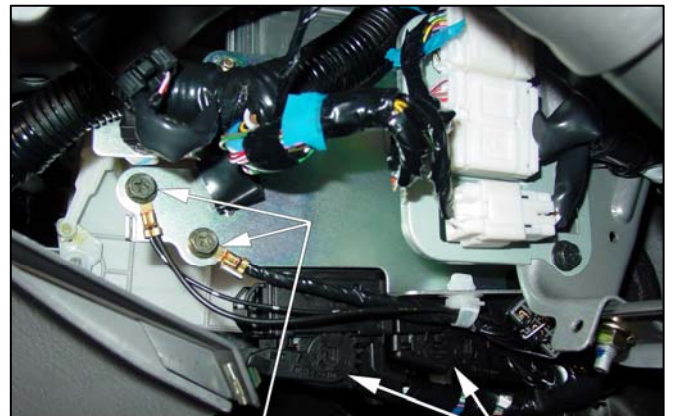
Ensure that the voltage level remains stable, especially during cranking. A situation maybe possible where there is enough battery voltage for cranking, however there maybe an insufficient level for the ECM to operate properly.



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.

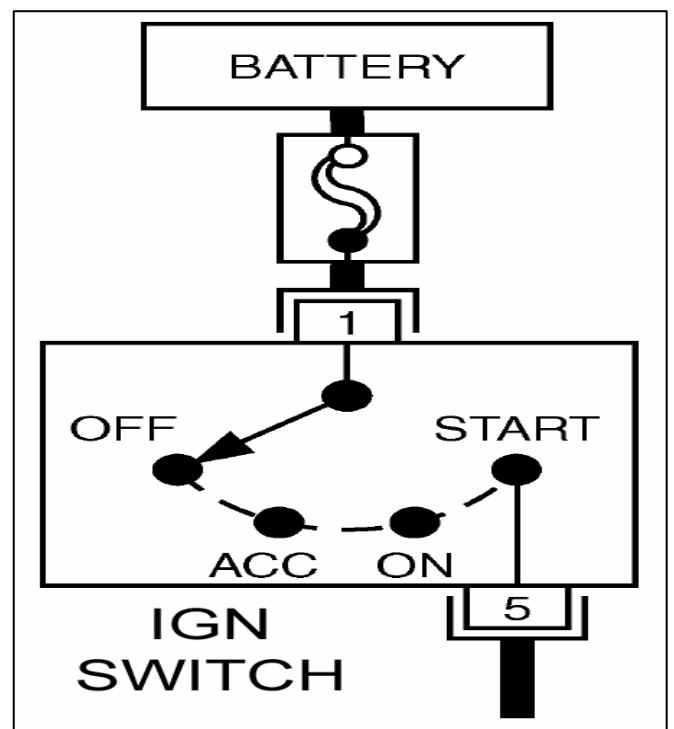
Please ensure the Ground connections as shown here are in good condition (Clean & Tight.)



ECM, TCM & BCM Grounds ECM Harness Connectors
ECM located under dash, left of steering column

2. Ignition Switch

The ECM needs to know if the engine is being cranked, if the Ignition Switch is simply ON, held in the cranking position & of course when it is OFF.



ENGINE CONTROL SYSTEM - EC

ZD30DDTi Inputs to ECM

3. Crankshaft Position Sensor (CKPS)

The CKPS is located at the front of the cylinder block directly above the front pulley. It is attached to a bracket above the pulley & is facing the teeth of the signal plate on the rear of the front pulley.

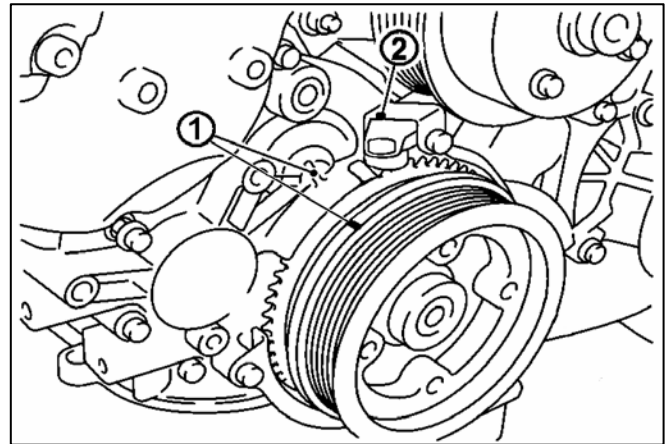
The CKPS informs the ECM of the following information;

- The position of the crankshaft
- If the crank is actually moving & if so how fast?

A section of the signal plate has teeth missing, which is used to determine the TDC point.

1; TDC timing marks.

2; CKPS



4. Camshaft Position Sensor (CMPS)

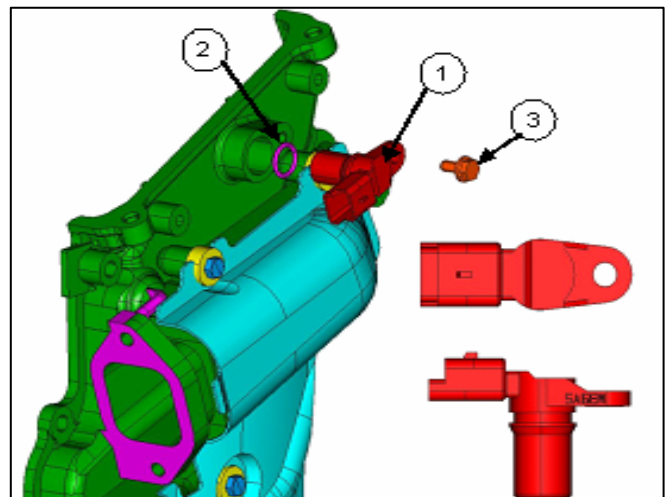
The CMPS is located at the front of the cylinder head. It senses the camshaft rotation.

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.

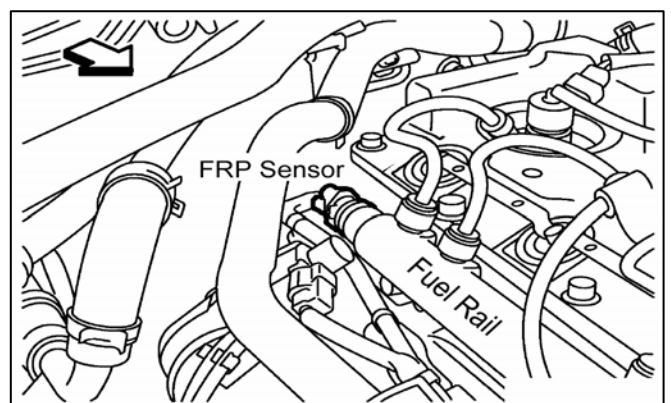
This provides some control of the engine management system by utilising the timing of cylinder identification signals.

They are of a permanent magnet and Hall IC construction.



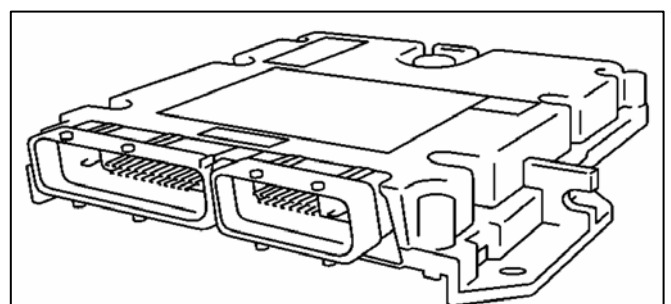
5. Fuel Rail Pressure Sensor (FRPS) (BOSCH)

The FRPS is an extremely important input into the ECM. From this signal, the ECM can determine how to operate the Solenoid on the Fuel Pump in order to vary the amount of fuel that is forced into the Fuel Rail.



6. Barometric Sensor (BOSCH)

The Barometric Pressure Sensor is built into ECM. The sensor detects barometric pressure (altitude) and sends the voltage signal to the microcomputer.



ENGINE CONTROL SYSTEM - EC

ZD30DDTi Inputs to ECM

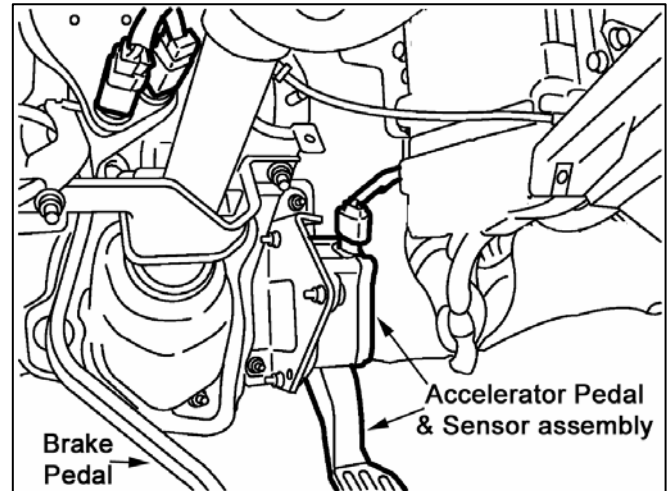
7. Accelerator Pedal Position Sensor (APPS)

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

- 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 signal is sent to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.

The signal is also utilised by the TCM for shift control & the ECM for A/C compressor cut.

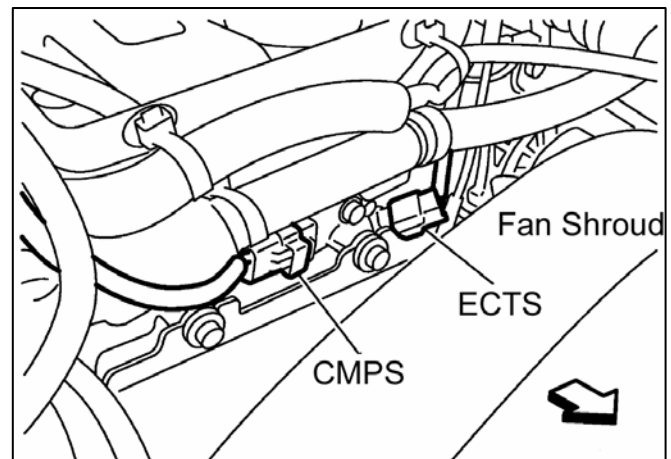
NOTE; The signal from the accelerator pedal will be IGNORED & the engine will revert to normal idle control if the brake pedal is applied whilst the vehicle is being driven. Refer to page 50 for more detail



8. Engine Coolant Temperature Sensor (ECTS)

The ECTS is used to detect the engine coolant temperature.

Its design & operation is the same as other ECT sensors utilised by the Nissan engine range.



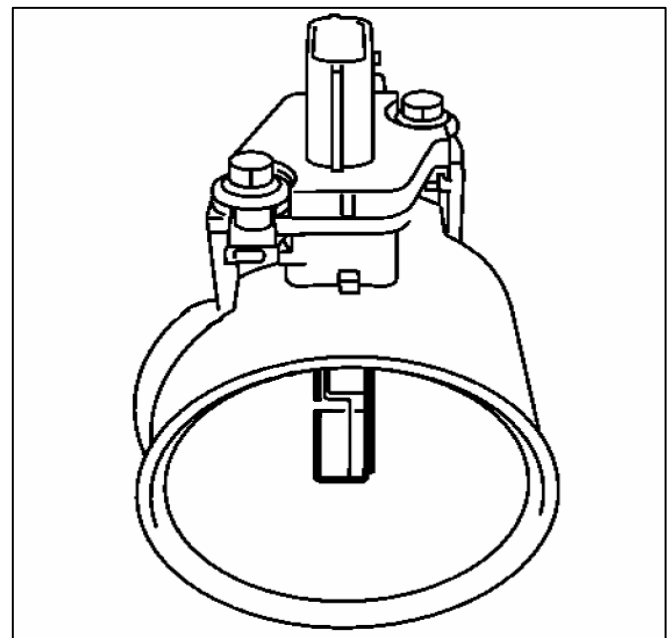
9. Mass Air Flow Sensor (MAFS)

The MAFS is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow.

The MAFS 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 the 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)

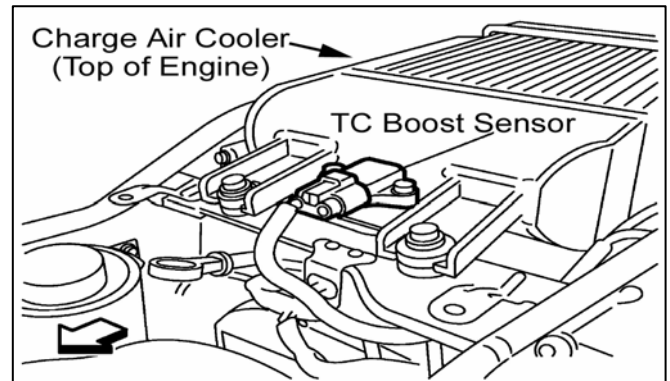
The IATS is built into the MAFS. The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

ENGINE CONTROL SYSTEM - EC

ZD30DDTi Inputs to ECM

11. Turbo Charger (TC) Boost Sensor

The Turbo Boost Sensor detects pressure in the exit side of the Charge Air Cooler (Intercooler). The sensor output voltage to the ECM increases as pressure increases.

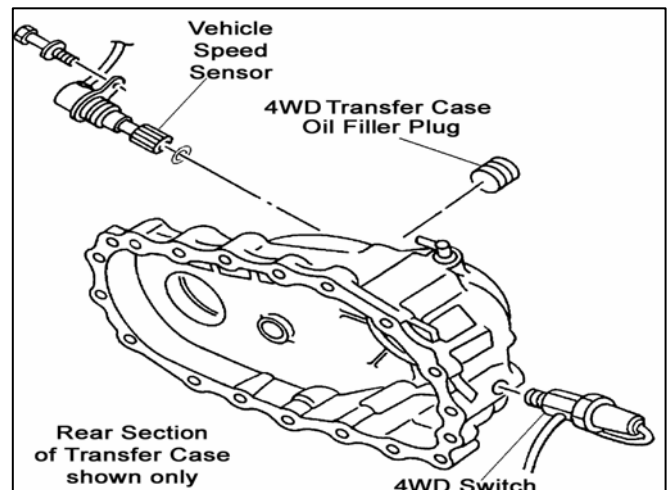


12. Vehicle Speed Signal (VSS)

The ECM receives VSS via CAN communication line. Even though it is sent from the combination meter, the source of the signal originates from the Vehicle Speed Sensor located at the rear of the Transfer unit. The VSS sends the signal directly to the instrument cluster (Unified Meter Control Unit) via a dedicated wiring connection. From there the UMCU outputs the Vehicle Speed signal onto the CAN for use by other systems in the vehicle that require a VSS.

The ECM primarily uses this signal for ASCD control.

NOTE: Ti variants have a local fit Satellite Navigation system. Refer to **AWB 017a/06** for detail regarding the supplier & repair information. The system requires a vehicle speed input which is taken directly from the Vehicle Speed Sensor.

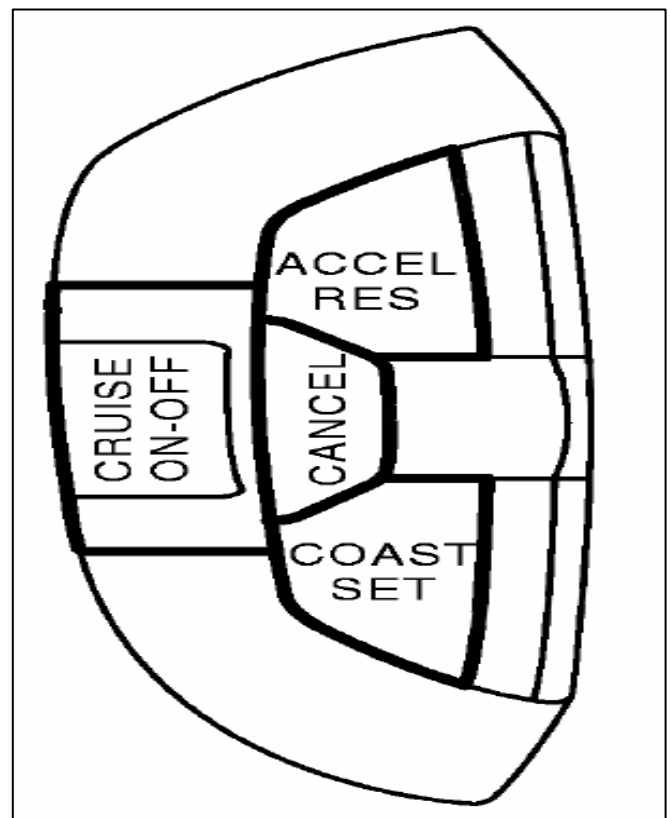


13. Automatic Speed Control Device (ASCD) Switches

ZD30 CRD Y61 is available with ASCD. (Cruise Control) The control switches are mounted on the steering wheel and each has a 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.



ENGINE CONTROL SYSTEM - EC

ZD30DDTi Inputs to ECM

14. ASCD Brake (pedal) Switch

When the brake pedal is depressed, ASCD Brake Switch and Stop Lamp Switch are turned ON. The ECM detects the state of the brake pedal by these 2 SEPARATE inputs.

On M/T models, there is also a Clutch Pedal Switch, if the Clutch Pedal is depressed the Switch individually sends an "Open Circuit" signal to the ECM. ASCD operation is cancelled as a result

15. Stop Lamp Switch

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

Accelerator and Brake mutual comparison diagnosis (Failsafe Control)

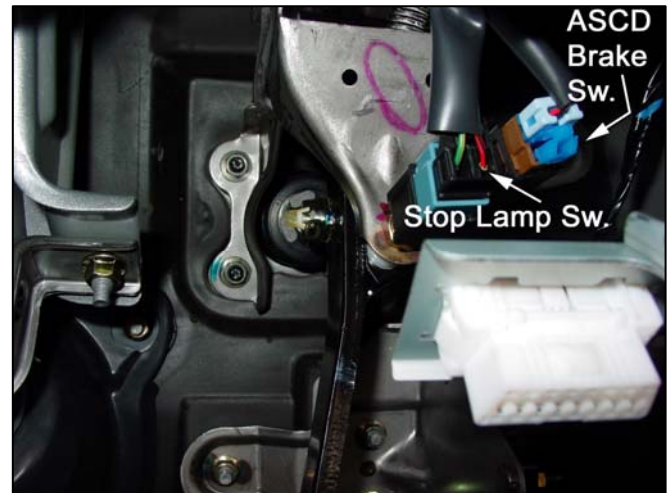
This diagnosis is designed to return the engine to normal idle when the driver depresses the brake pedal whilst the accelerator pedal is being held to drive the car (ASCD OFF) The new diagnosis feature judges that driver wants to stop driving the vehicle. (ECU judges that the accelerator pedal is hanging).

However if the brake pedal is depressed **prior** to the accelerator pedal being depressed, it will **not** drop engine RPM.

Activation conditions;

- Engine RPM; >1000rpm
- Vehicle speed; >5km/h

NOTE; 1998 R20 Terrano models fitted with the Bosch supplied fuel control system on the TD27ETi engine utilised a similar strategy.



NOTE; If the brake pedal is applied whilst the accelerator is being applied to drive the vehicle, the engine will revert to normal idle control regardless of the accelerator pedal position.

Care **MUST** be taken with the fitment if **ANY** electrical accessories that require a STOP LAMP switch input are being installed to the vehicle

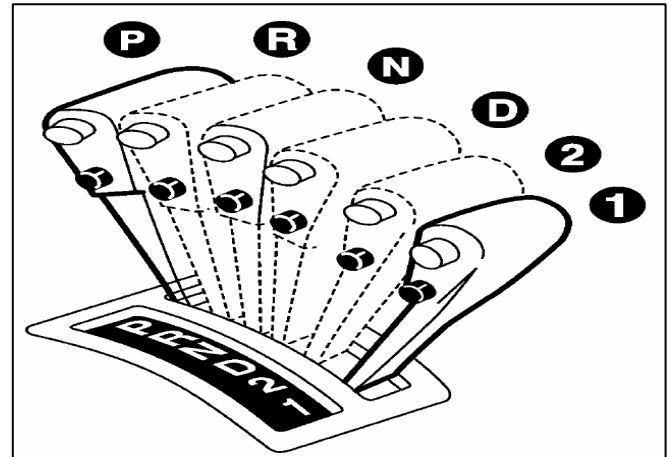
ENGINE CONTROL SYSTEM - EC

ZD30DDTi Inputs to ECM

16 a. PNP Switch – AT Models

When the gear position is in P or N (A/T) the Park / Neutral position is ON. ECM detects the position via a signal sent out on the CAN.

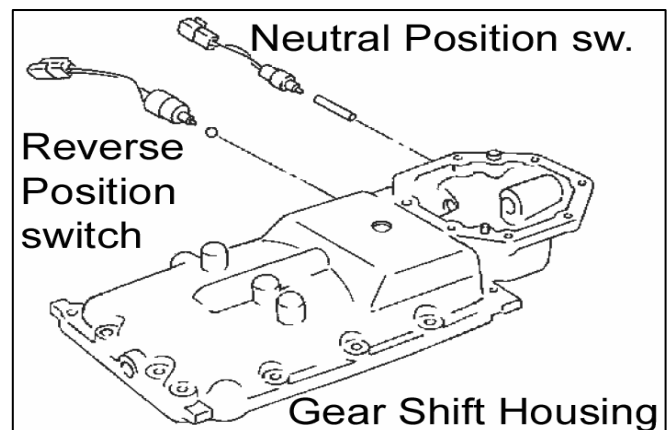
The actual switch signal is sent from the shift lever position switch located on the A/T assembly to the instrument cluster. The cluster issues the signal out on the CAN & from there the ECM receives the P/N signal. If the ECM receives a P/N signal (due to a faulty switch or wiring for example) whilst the vehicle is being driven, a DTC will be logged.



16 b. PNP Switch – MT Models

When the gear lever is in N the neutral position switch is ON (P/N Posi is ON). The ECM detects the position as the switch is connected directly to the ECM.

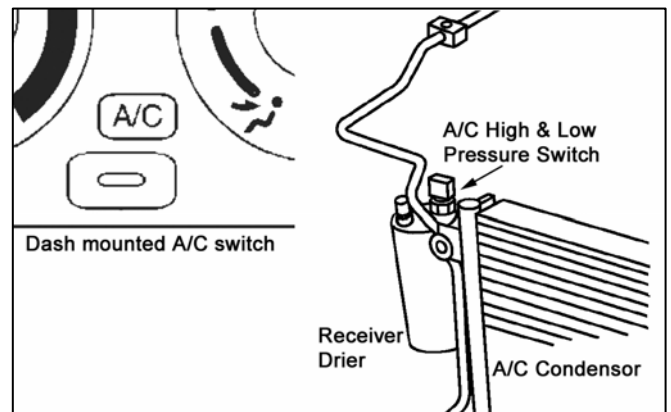
If the ECM receives a P/N signal (due to a faulty switch or wiring for example) whilst the vehicle is being driven, the engine performance will be reduced. Monitor the activity of the switch ("P/N POSI") in Data Monitor to confirm it's correct operation.



17. A/C Control & Refrigerant Pressure Switches

For A/C operation to occur, the dash mounted A/C switch must be on (as well as cabin fan switch) and the High / Low pressure switch mounted on the Receiver Drier unit must be in a closed circuit condition.

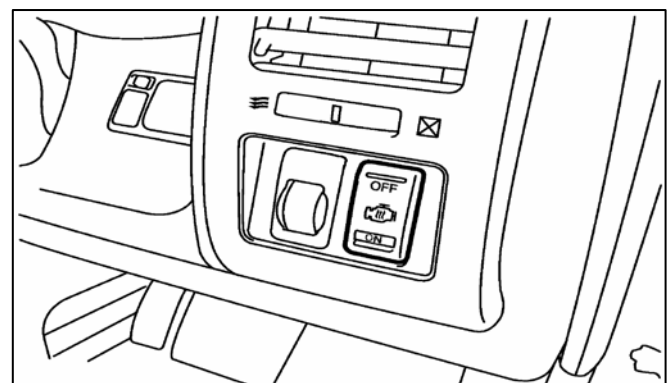
The signal from the switches is sent to the Unified Meter Control Unit (instrument cluster) & the ECM receives the "A/C ON" request from the cluster via CAN. The ECM then operates the A/C Compressor Relay.



18. Heat Switch

This feature continues from previous models. The switch is used to increase the idle speed & to warm up the engine at a faster rate for improved cabin heater operation.

Heat up switch	ON
Engine coolant temperature	Below 105°C (221°F)
Shift lever	P or N (A/T) Neutral (M/T)
Accelerator pedal	Fully released



ENGINE CONTROL SYSTEM - EC

ZD30DDTi Inputs to ECM

19. Engine Oil Pressure Sensor

An Engine Oil Pressure Sensor is now utilised in place of the Oil Pressure "High" switch utilised on the previous Engine.

The signal from the pressure sensor is sent directly to the ECM. If the ECM detects that the Oil Pressure has fallen below a certain value for given conditions, a signal is sent from the ECM to the Instrument Cluster via CAN. The Instrument Cluster will then illuminate the Oil Pressure warning light (Red Oil Can).

A standard Oil Pressure "Low" switch continues to be used as well. It is located adjacent to the Oil Filter & it's connected directly to the instrument cluster only. It illuminates the "Red Oil Can" in the conventional manner.

Refer to section EL of this Training Manual for further discussion on the operation of the Engine Oil Pressure warning light.

Engine Oil Pressure Warning Light Operation

If the ECM detects the below conditions, it sends a signal to the Instrument Cluster via CAN.

After the ECM has detected the following conditions for MORE than 5 seconds;

- a) Engine rpm: 3600 – 4200rpm
- b) Coolant temp: Less than 95 deg C
- c) Oil pressure: Less than 2.5 BAR (Oil pressure sensor voltage less than 2V approx.)

The "RED OIL CAN" warning light on the instrument cluster is illuminated by the Unified Meter Control Unit (instrument cluster) after it receives a request from the ECM via CAN to illuminate the light.

Engine Oil Pressure Inspection

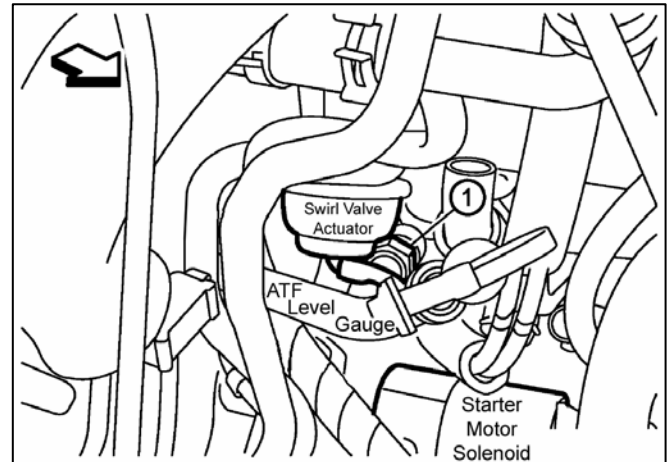
If there is any doubt over the Oil Pressure in the Engine, the Engine Oil Pressure Sensor located above the Starter Motor should be removed & a **Known Good Oil Pressure Gauge** should be installed.

With the engine running at various speeds, the Oil Pressure should be observed & the results written down.

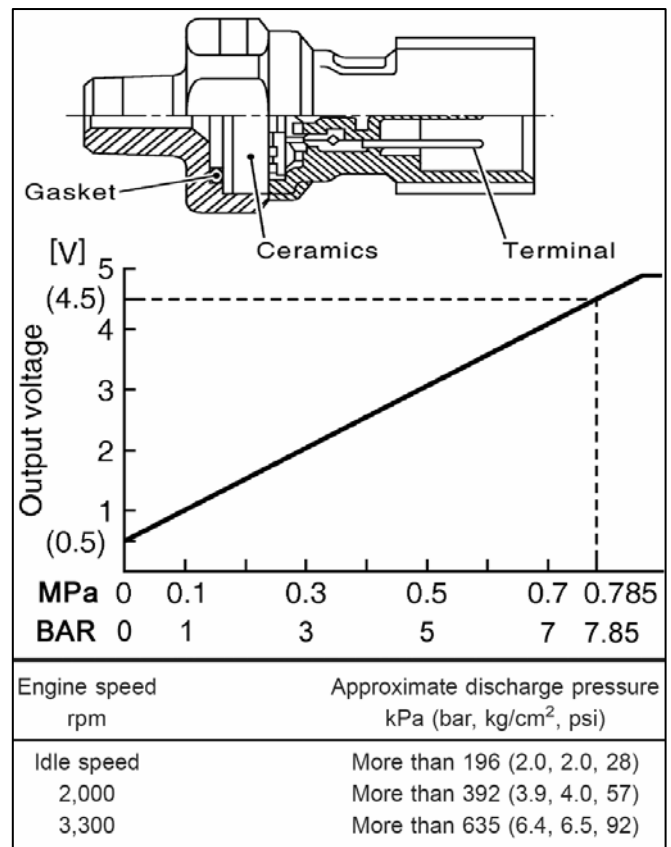
Note;

DO NOT TAKE THE ENGINE OIL PRESSURE READINGS FROM THE OIL PRESSURE SWITCH LOCATION.

The Oil Pressure SWITCH is located adjacent to the Oil Filter.



1; Oil Pressure Sensor



ENGINE CONTROL SYSTEM - EC

ZD30DDTi Inputs to ECM

20. EGR Volume Control Valve Position Sensor

The ECM can monitor the movement of the EGR Valve via a feedback sensor installed on the EGR Volume Control Valve assembly. The ECM regulates electrical current to the valve to either open or close it. The ECM waits for a feedback signal from the position sensor mounted on the valve assembly to observe the Valves new position.

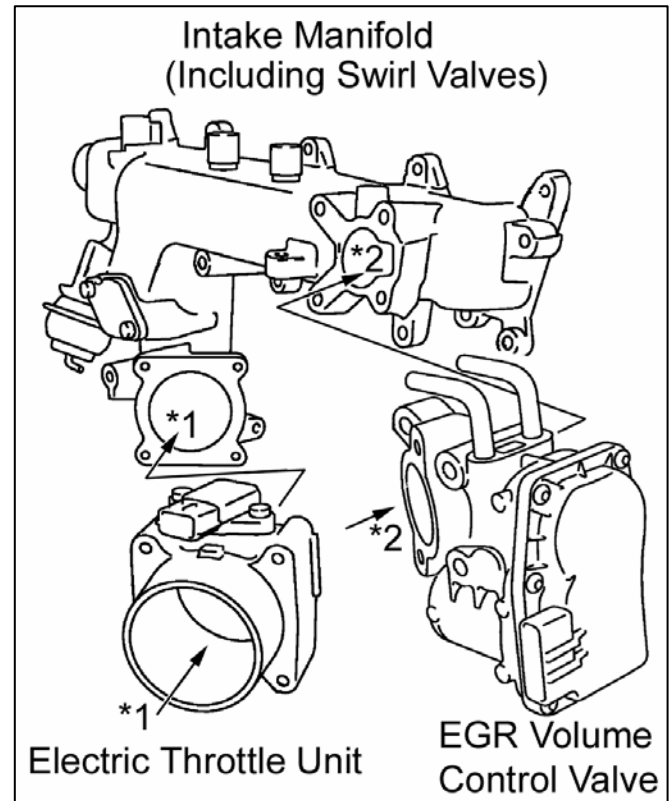
The basic operation of the EGR Volume Control Valve is similar to an Electric Throttle Control (ETC) assembly commonly used on current petrol engines.

21. Throttle (valve) Position Sensor (TPS)

The TPS is mounted on the Electric Throttle Control valve assembly . As described above, the sensor monitors the position of the Throttle Valve & feeds the information back to the ECM.

The basic operation of the Electric Throttle Control Valve assembly is similar to an Electric Throttle Control Valve assembly commonly used on current petrol engines.

The Electric Throttle Control Valve assembly is used for smooth engine shut down only. It replaces to the vacuum operated Intake Air Control Valve which was located on top of the rocker cover of the pervious ZD30 engine. With the engine running, this valves remains WIDE OPEN at all times.



***1; Passage the main air flow travels after it exits the Charge Air Cooler.**

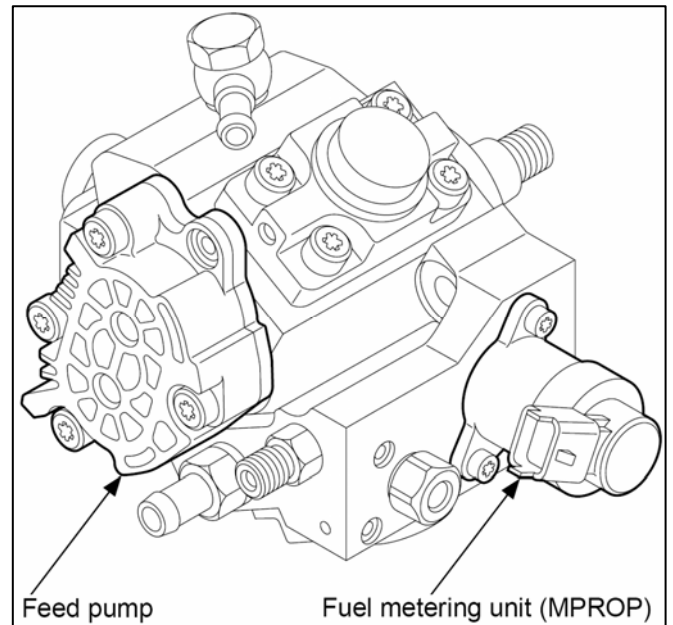
***2; Passage the exhaust gas travels.**

ENGINE CONTROL SYSTEM - EC

ZD30DDTi Outputs from ECM

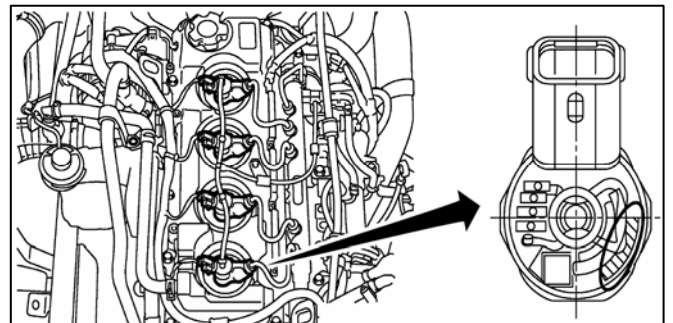
1. Fuel Metering Unit (MPROP) (BOSCH)

As already discussed earlier in this manual, the ECM controls this valve in order to regulate the amount of fuel that is allowed to be delivered (forced into) the Fuel Rail. The Fuel Metering unit in principal works in a similar manner to the Suction Control Valve (SCV) on the Denso High Pressure Fuel pump fitted to R51 / D40 models with the YD25 engine.



2. Fuel Injector (BOSCH)

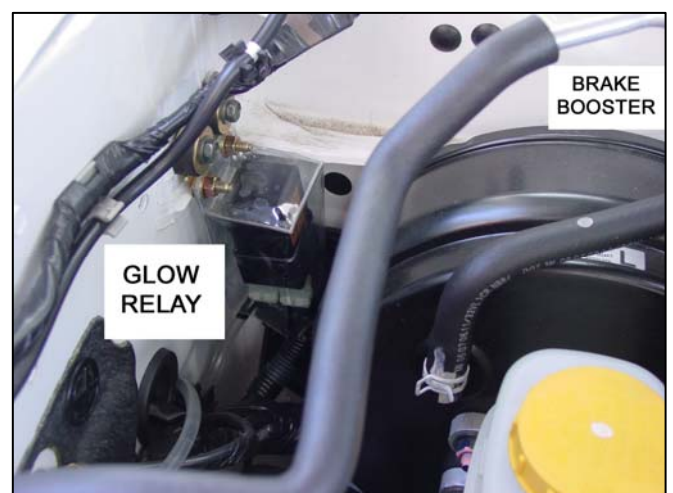
Once again the Fuel Injector has been discussed earlier in this manual. The operation of the Injector is in principle the same as the operation of the Injector in a gasoline engine. The ECU has complete control of when the Injector is open, how long it is opened for & in turn the amount of times the Injector is open & shut in 1 piston cycle.



PLEASE OBSERVE THE SAFETY PRECAUTIONS REGARDING THE HIGH VOLTAGE WHICH OPERATES THE FUEL INJECTORS. REFER TO STB GI 05-007 FOR MORE DETAIL.

3. Glow Relay

The ECM operates the Glow Relay in the same manner as other electronically controlled diesel engine vehicles. Once the relay is switched ON by the ECM, it feeds power through to the Glow Plugs.



ENGINE CONTROL SYSTEM - EC

ZD30DDTi Outputs from ECM

4. Electric Cooling Fan Relay

Whenever the A/C is operated regardless of the engine or ambient temperature, the electric cooling fan located behind the grill is operated. The ECM in actual fact switches on a relay which in turn directs current to the fan motor. If the engine temperature exceeds a pre-determined level the electric fan is also operated with or without the A/C switched on.

5. Air Conditioner Relay

The ECM has the final control over the A/C compressor operation via control of a relay. The driver request for A/C comes from the A/C Amplifier (Auto Temp Control models) or the control panel switch (Manual Temp Control models) on the dash. The signal is sent to the instrument cluster. The signal is then sent from the instrument cluster to the ECM via the CAN.

If conditions such as acceleration demand, excessive engine temperature, excessive A/C system pressure or lack of A/C system pressure (no gas) are NOT evident, the ECM will operate the A/C relay which will direct power to the A/C compressor clutch.

6. EGR Volume Control Valve

The EGR valve is an all new design for the ZD30 CRD engine.

It simply works like a conventional Electric Throttle Control (ETC) valve found on current Petrol engine models.

The valve is operated via a simple 12V DC electric motor. As the valve opens & closes, there is a sensor following the movement of the valve. This sensor sends a signal back to the ECM & therefore the ECM can see what the position the valve is at for any given moment.

NOTE; If the EGR Valve is disconnected, removed & refitted or replaced, YOU MUST carry out the following operations;

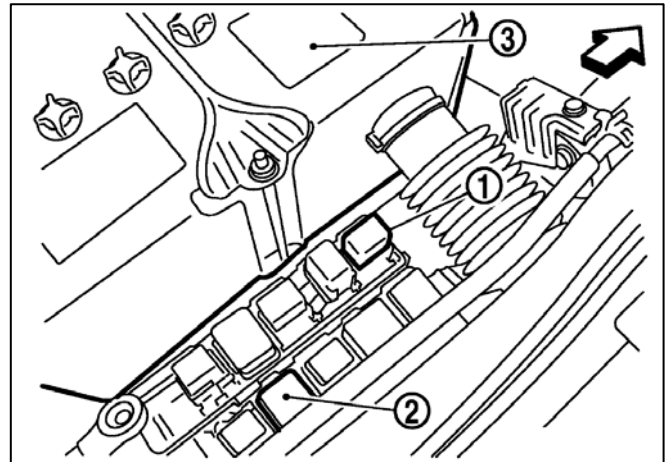
- EGR Volume Control Valve Closed Position

Learning Value Clear

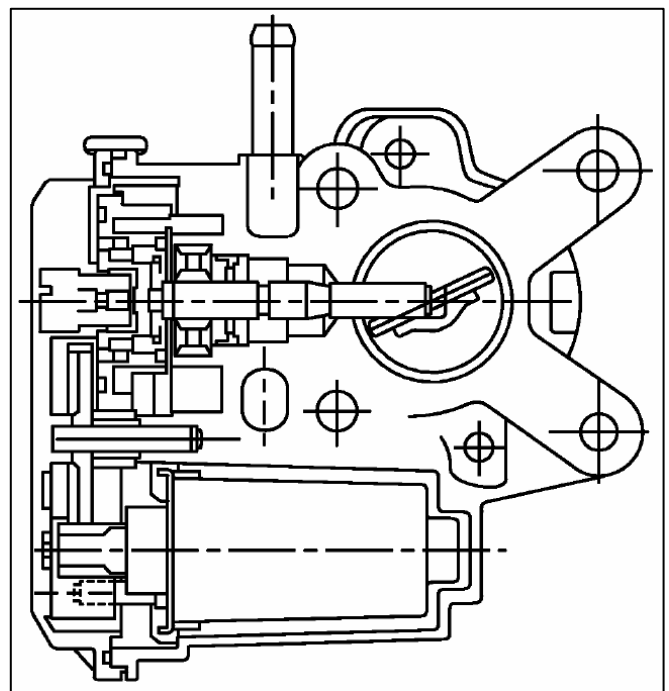
- EGR Volume Control Valve Closed Position

Learning

Please refer to section EC - Basic Service Procedure in the Service Manual for more detail.



1; Cooling Fan Relay. 2; A/C Compressor Relay
3; Battery



ENGINE CONTROL SYSTEM - EC

ZD30DDTi Outputs from ECM

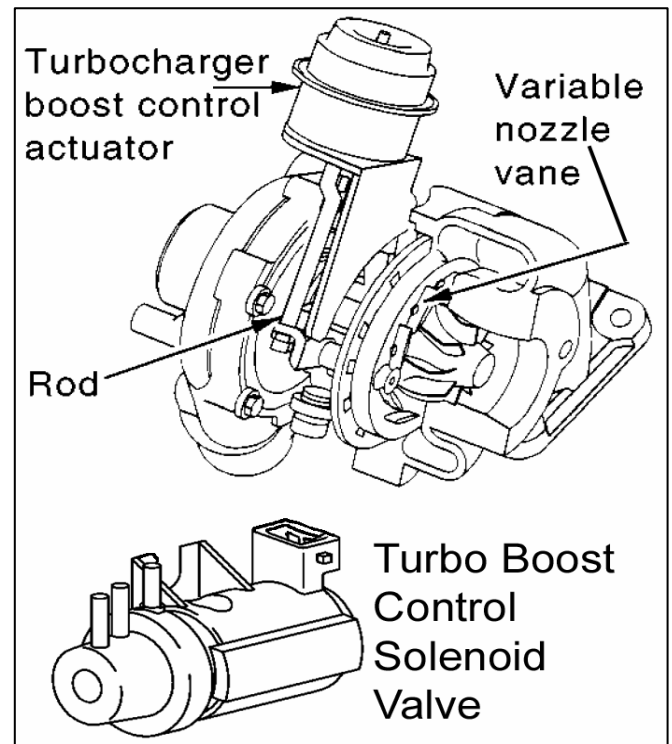
7. TC Boost Control Solenoid Valve

Like the previous ZD30 engine on Y61 & the YD engine in R51 & D40, the Turbo Charger is a Variable Nozzle Turbo.

Vacuum is supplied to the actuator on the turbo. If a high level of vacuum is applied, the actuator rod is forced to lift which in turn allows for maximum boost.

If the vacuum supply is cut, the rod will then be forced to drop with the assistance of spring pressure. The end result is no turbo boost.

The Turbo Boost Control Solenoid Valve is designed to allow vacuum to be applied or stop vacuum being applied to the actuator. The ECM has the ability to provide a partial vacuum situation for partial turbo boosting as well. This is via an ON / OFF pulse being applied to the solenoid by the ECM.



8. Electric Throttle Control Actuator

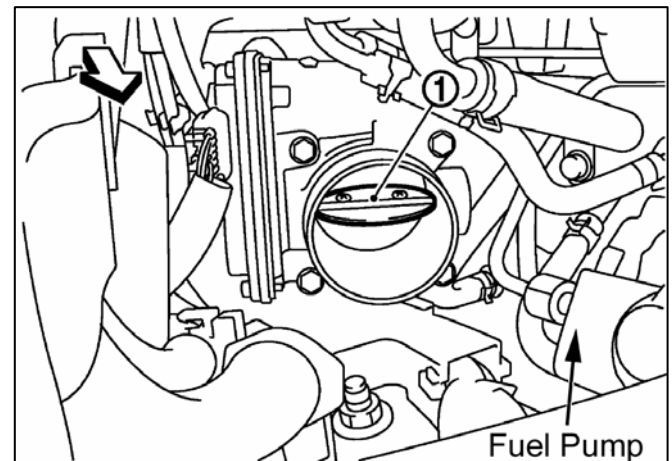
For the purpose of reducing engine shake during shut down, an Electric Throttle Control Valve is fitted to the inlet manifold. All air that exits the Charge Air Cooler travels through this valve.

On the previous ZD engine an Intake Air Control Valve was utilised for the exactly the same purpose. It was vacuum operated via an ECM controlled solenoid & the valve was located on top of the rocker cover.

The YD engine (non DPF engines only) in R51 & D40 models also have a vacuum operated Intake Air Control Valve which serves the same purpose.

When the ignition switch is turned to the OFF position, the ECM activates a DC motor which rotates a throttle valve to block the intake air passage. This action, along with fuel cut at the injectors will stall the engine in a smooth manner.

The ECM is able to monitor the valves position via a feedback sensor (TPS). The overall operation of the motor is very much like the Electric Throttle Control (ETC) valve fitted to current petrol engines. Obviously the valve remains in a wide open condition until the ECM activates the DC motor to close it.



ENGINE CONTROL SYSTEM - EC

ZD30DDTi Outputs from ECM

9. Malfunction Indicator Lamp (MIL) (On Board Diagnosis)

The MIL is located on the Instrument cluster (Bottom left below the Fuel Gauge). It illuminates in the typical ORANGE colour & it indicates an engine system fault. Use of CONSULT II is required to extract DTC(s).

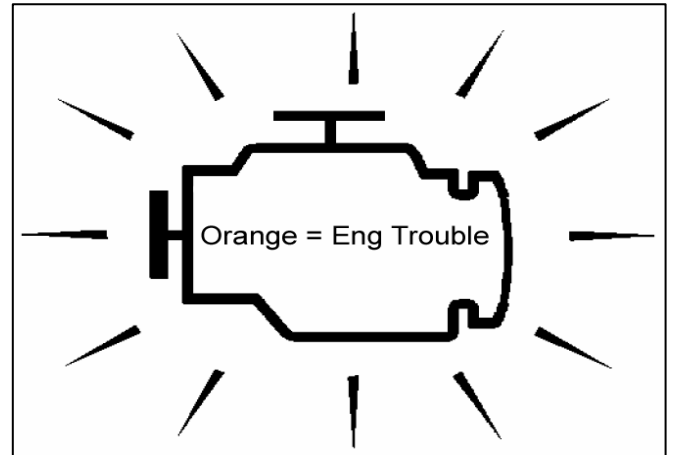
There is a **SEPARATE ORANGE WATER IN FUEL (WIF) LIGHT** adjacent to the MIL. This indicates that WATER collected in the base of the FUEL FILTER. The owner should cease engine operation IMMEDIATELY & drain the water from the base of the Fuel Filter if the WIF light illuminates whilst the engine is running.

NOTE;

A DTC will NOT be logged if there is a Water in Fuel condition.

If BOTH the MIL & WIF lights are illuminated whilst the engine is running, this is a coincidental situation. (However, there is a chance that water has damaged fuel system components if the water has not been drained from the base of the fuel filter within a reasonable period of time. Hence the MIL could illuminate as a result of the water damage.)

Refer to section EL in the rear of this Training Manual for further detail regarding the Water in Fuel Sensor & Warning Light operation.



ENGINE CONTROL SYSTEM - EC

ZD30DDTi Basic Service

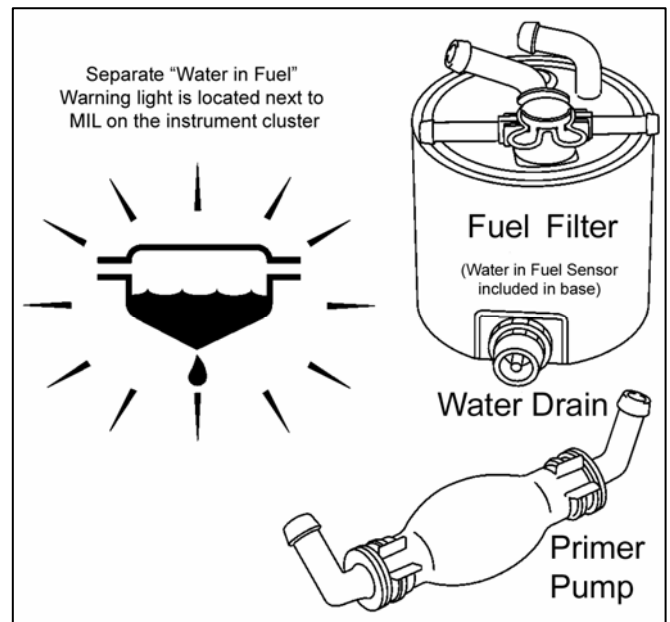
1. Fuel Filter, Bleeding & Water Drain

The Fuel Filter design is an all new type introduced to ZD30 CRD engine vehicles. R51 & D40 YD25 also utilise the same design since mid 2006 production.

There is an in-line type primer pump which is operated by hand & is located adjacent to the Filter assembly. There is a facility to drain water on the base of the unit. If there is an excessive amount of water that collects in the base of the Filter, a sensor activates a SEPARATE ORANGE WARNING LIGHT (located next to the MIL) to warn the driver of the water in fuel condition.

The filter & sensor is only available as 1 complete assembly. The Filter must be replaced every 40,000km's or 2 years. It is ideal to replace it more frequently under severe driving conditions.

Refer to section EC - Basic Service Procedure & section MA of the Service Manual for more detail regarding the servicing of the Fuel Filter.



Refer to section EL in the rear of this Training Manual for more discussion on the "Water in Fuel" warning light

2. EGR Volume Control Valve Closed Position Learning Value Clear

If the following actions regarding the EGR valve have been carried out;

- EGR volume control valve is removed
- EGR volume control valve is replaced

This operation using CONSULT II in WORK SUPPORT must be carried out to ensure proper operation of the EGR valve.

Please refer to section EC - Basic Service Procedure in the Service Manual for more detail.

3. EGR Volume Control Valve Closed Position Learning

If the following actions regarding the EGR valve have been carried out;

- EGR volume control valve is removed.
- EGR volume control valve is replaced.
- ECM is replaced

This operation must be carried out to ensure proper operation of the EGR valve.

This is much like the Accelerator Pedal & Throttle Valve learning operation on Petrol engine models with Electric Throttle. It is a simple matter of operating the ignition key within set time periods.

Please refer to section EC - Basic Service Procedure in the Service Manual for more detail.

SELECT WORK ITEM
XXXXXXXXXX
XXXXXXXXXX
EGR/V LEARN CLR
XXXXXXXXXX
XXXXXXXXXX
XXXXXXXXXX

This screen in CONSULT II is located by 1st selecting ENGINE & then selecting WORK SUPPORT.

ENGINE CONTROL SYSTEM - EC

ZD30DDTi Basic Service

4. Throttle Valve Closed Position Learning Value Clear

Throttle valve closed position learning value should be cleared after the following actions regarding the Electric Throttle Control valve have occurred;

- Electric throttle control actuator is removed.
- Electric throttle control actuator is replaced.

Please refer to section EC - Basic Service Procedure in the Service Manual for more detail.

5. Throttle Valve Closed Position Learning

Throttle Valve Closed Position Learning is an operation to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal.

It must be performed each time any of the following actions have occurred;

- Electric throttle control actuator is removed.
- Electric throttle control actuator is replaced.
- ECM is replaced.

This is much like the Accelerator Pedal & Throttle valve learning operation on Petrol engine models with Electric Throttle. It is a simple matter of operating the ignition key within set time periods.

Please refer to section EC - Basic Service Procedure in the Service Manual for more detail.

SELECT WORK ITEM
XXXXXXXXXXXX
XXXXXXXXXXXX
TP POS LEARN CLR
XXXXXXXXXXXX
XXXXXXXXXXXX
XXXXXXXXXXXX

This screen in CONSULT II is located by 1st selecting **ENGINE** & then selecting **WORK SUPPORT**.

ENGINE CONTROL SYSTEM - EC

ZD30DDTi Basic Service

6. Injector Adjustment Value Registration

Each Injector will tend to have very slight differences between them with the amount of Fuel they deliver when an electrical current is applied to them.

If the ECM was to apply exactly the same current to all 4 x injectors on the Engine, there will tend to be slight differences in the amount of Fuel each Injector delivers.

Therefore once the Injector has been manufactured, a special resistance measurement is taken of the Injector. This measurement is converted into a special code & then printed on the top of the Injector. This code is entered into the ECM at the factory via a special scan tool.

However if during service, 1 or more than 1 of the injectors are replaced, the code of the failed injector needs to be erased from the ECM & the code of the newly installed injector will need to be entered into the ECM. This operation is can be carried out easily using CONSULT II.

If the ECM is replaced, the codes of the already existent Injectors need to be entered into the ECM.

1. Turn ignition switch ON (engine stopped).

SELECT WORK ITEM	
ENTER INJCTR CALIB DATA	

2. Select "ENTER INJECTOR CALIB DATA" in "WORK SUPPORT" mode with CONSULT-II.

ENTER INJCTR CALIB DATA	
IGNITION ON AND ENGINE STOPPED.	
START	

3. Touch "START".

ENTER INJCTR CALIB DATA	
SET VALUE	
CYL1	1F6V1A
CYL2	C1TGMF
CYL3	A2ZSD3
CYL4	4CDF58
CYL1	CYL2
CYL3	CYL4
END	START

4. Select the number of the cylinder which needs Injector Adjustment Value Registration.

KEYBOARD		HEX	
71FZ61			
A	B	C	D
7	8	9	E
4	5	6	F
1	2	3	
<<	>>	0	00
CLEAR	BKSPC	ENTER	

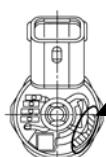
5. Input injector adjustment value, and touch "ENTER".

ENTER INJCTR CALIB DATA	
SET VALUE	
CYL1	71FZ61
CYL2	C2TCME
CYL3	A1FS3B
CYL4	4CA7D9
CYL1	CYL2
CYL3	CYL4
END	START

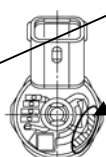
6. Repeat step 4 - 5 till there is no cylinder which needs Injector Adjustment Value Registration, and touch "START".

ENTER INJCTR CALIB DATA	
CMND FINISHED	
SET VALUE	
CYL1	71FZ61
CYL2	C2TCME
CYL3	A1FS3B
CYL4	4CA7D9

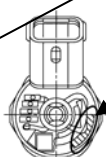
7. After "CMND FINISHED" is displayed, make sure that the following values are same for each cylinder.
- Injector adjustment value which is printed on a injector.
 - Injector adjustment value which is displayed on CONSULT-II screen.



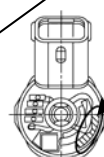
CYL 1



CYL 2



CYL 3

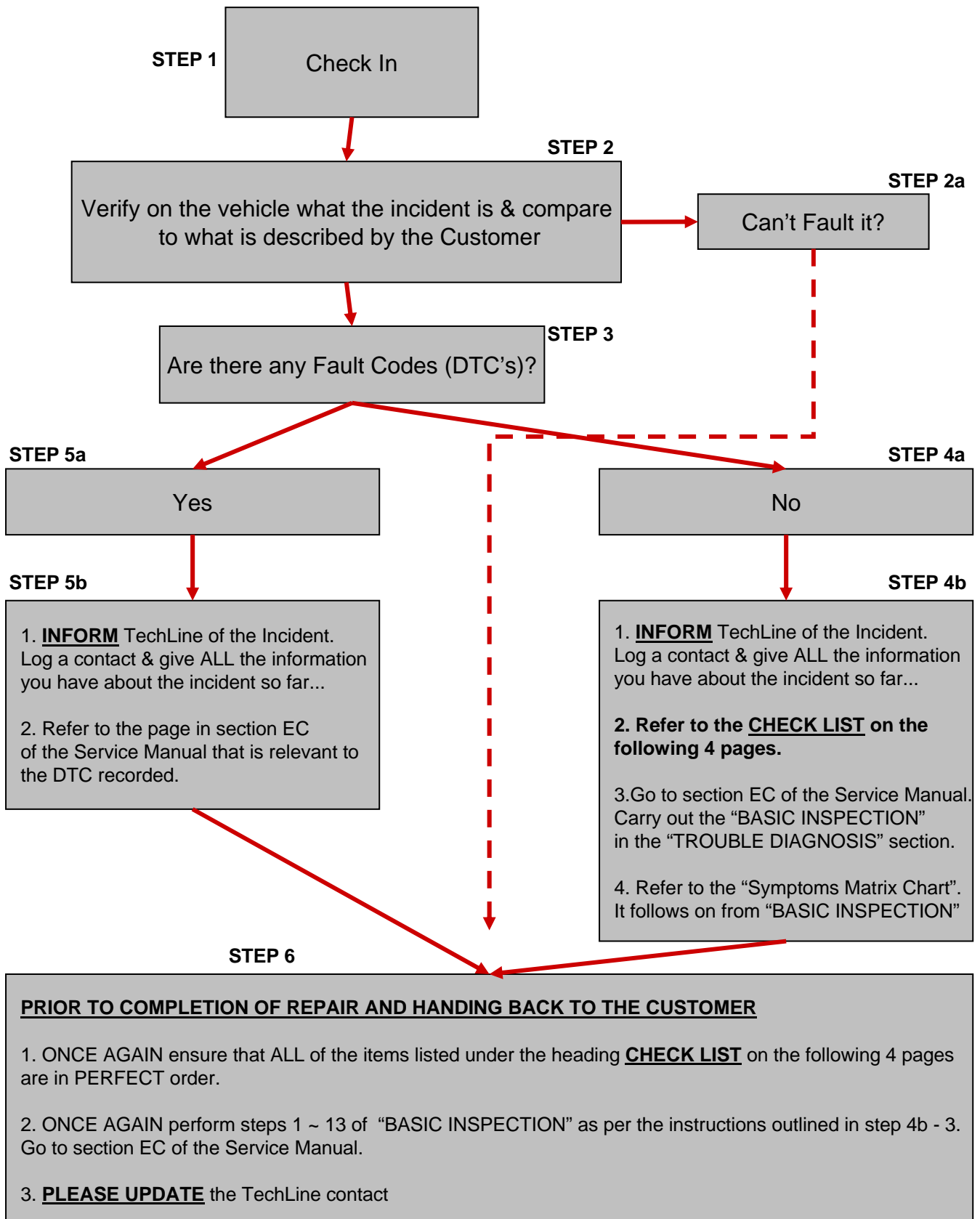


CYL 4

Ensure the codes on CONSULT II screen match the code printed on top of each Injector

ZD30DDTi Engine Trouble Diagnosis

Basic Work Flow Chart



ZD30DDTi Engine Trouble Diagnosis

Checklist - **DON'T FORGET THE BASICS!!!**

1. FUEL

- (a) Is there sufficient QUANTITY of Fuel being delivered to the pump? Blocked Filter or Lines?
- (b) Is there any AIR being sucked into the Fuel lines prior to the pump. Install a piece of clear fuel hose in the line between the Pump & the Fuel Filter outlet & inspect for AERATED FUEL.
- (c) Is there an acceptable QUALITY of Fuel being delivered to the Pump? Drain base of Filter & check for contaminated Fuel + Dirt &/or Water. Check for PETROL as well.

Take a sample of Fuel & store it in a clean – air tight – container for future reference

2. AIR

- (a) Is there sufficient QUANTITY of Air being delivered to the Engine? Blocked Air Filter or Air Intake system? Faulty Air Intake Control Valve? Air Leaks between MAFS & Engine?
- (b) Is there an acceptable QUALITY of Air being delivered to the Engine? EGR valve stuck open? Refer to “EGR FUNCTION” check in section EC of the Service Manual.
- (c) Check that Exhaust System is not blocked
- (d) Check the Turbo Unit. Refer to “TC SYSTEM” check in section EC of the Service Manual. Ensure there is a sufficient vacuum supply coming from the engine driven vacuum pump. Also refer to “TURBO CHARGER” checks in section EM of the Service Manual.
- (e) Check the Engine COMPRESSION with a KNOWN GOOD compression gauge. WRITE down the figures you measured. Follow the directions in section EM of the Service Manual.
- (f) Check that the “Crankcase Ventilation System” as per the information in section EC (“ENGINE CONTROL SYSTEM”) of the Service Manual

3. Power & Earths (More detail 2 pages further on)

- (a) Check the Battery. Is it serviceable. Does the condition improve with a jumper battery connected?
- (b) Confirm the cranking speed (if no start). The engine should crank at a speed of at LEAST 160rpm. Use “DATA MONITOR & view the CKPS in CONSULT II to verify the Engine Cranking Speed.
- (c) Check ALL of the Earth points, Battery Terminals Fuses & Fusible links that relate to the ENGINE SYSTEM. Carry out the “POWER SUPPLY AND GROUND CIRCUIT” checks in section EC of the Service Manual.

4. Service, Other Work & Repairs History

- Is the Engine Oil Level OK? Too Full? Too Low?
- Is it Due / Overdue for a Service?
- Is the Engine Oil type correct? (Is it **10W 40 ACEA B3?**) The wrong type of Engine Oil can cause **Poor Fuel Consumption / Lack of power issues**. Thoroughly investigate the Service History.
- Is it fitted with **NON GENUINE ACCESSORIES?** Accessories which have been poorly / incorrectly fitted? Particularly electrical ones?

ZD30DDTi Engine Trouble Diagnosis

Checklist Continued

5. BASIC SERVICE ITEMS

(a) Perform the following 4 items;

- "EGR Volume Control Valve Closed Position Learning Value Clear"
- "EGR Volume Control Valve Closed Position Learning"
- "Throttle Valve Closed Position Learning Value Clear"
- "Throttle Valve Closed Position Learning"

These are outlined in section EC - "BASIC SERVICE" of the Service Manual.

(b) Check that the "Injector Adjustment Value Registration" has been correctly entered into the ECM as outlined in section EC - "BASIC SERVICE" of the Service Manual.

6. ILLOGICAL INPUTS INTO THE ECM

(a) Whilst being driven as well as stationary, ensure that inputs such as "P/N Posi Sw" & "Brake Sw" are input correctly. For a complete reference list, refer to section EC - "TROUBLE DIAGNOSIS – CONSULT II Reference Value in Data Monitor Mode" of the Service Manual.

(b) If possible, drive the vehicle fitted with a "KNOWN GOOD" Mass Air Flow Sensor.

7. NATS

Are all of the Keys working? Is there a foreign Electronic device on the Key Ring Set? Are the keys genuine parts? The RED LED on top of the dash pad (drivers side) will illuminate if there is a NATS related issue, however this is NOT always the case.

8. BASIC ENGINE CONDITION

Is the Engine's Static Timing OK? (Valve timing etc.) Timing Chains & associated drive components & CKPS / CMPS indication devices OK? Excessive or Insufficient Valve Clearances? Also refer to Check Item 2 on the previous page.

9. KEEP TECHLINE INFORMED

KEEP TECHLINE INFORMED OF WHAT'S GOING ON. You should already have a contact raised, so please keep it updated.

ZD30DDTi Engine Trouble Diagnosis

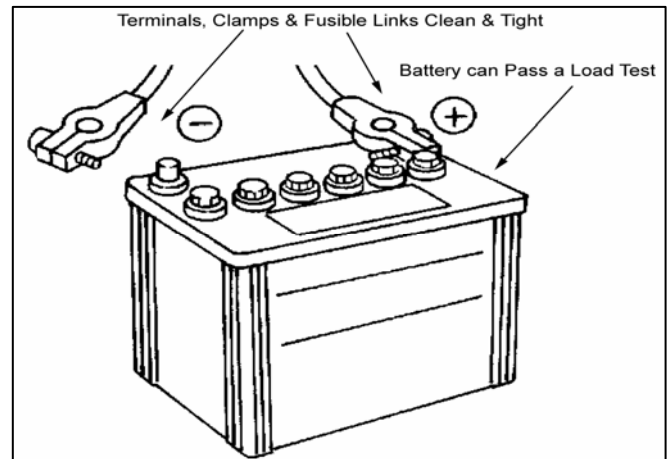
Power & Earths

1. Battery

Ensure that the battery is in GOOD CONDITION. Is it able to cope under load? Carry out a load test on it to be sure.

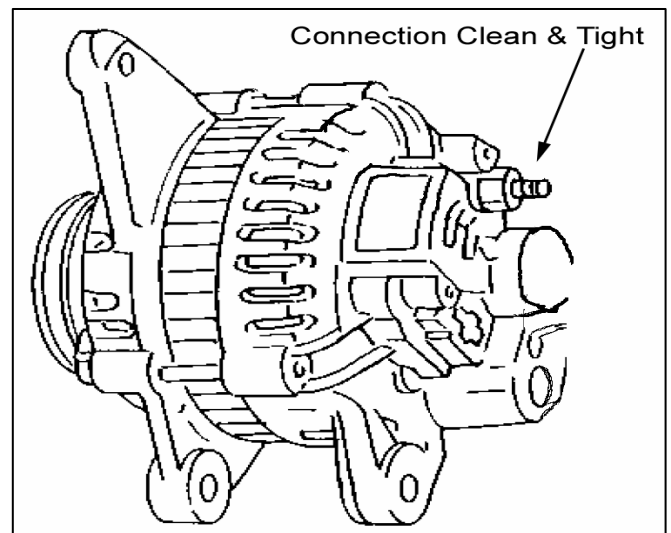
Ensure the POS & NEG terminals are CLEAN & TIGHT. Remove & inspect them closely to be sure.

Make sure the fusible links on the positive terminal are not corroded.



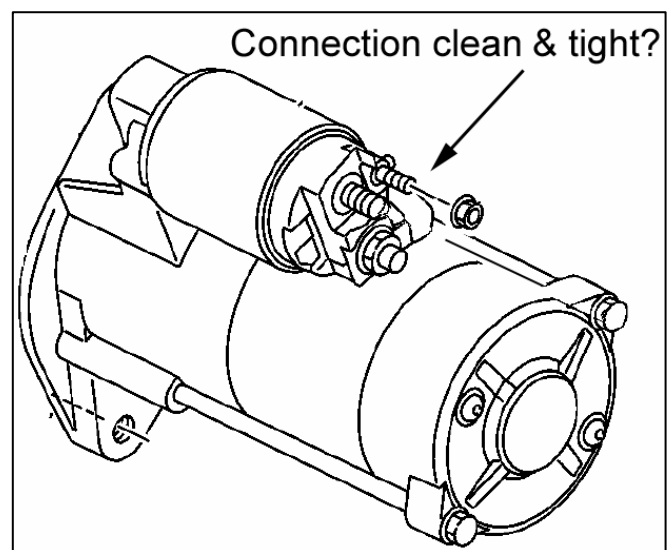
2. Alternator

Is the Alternator outputting a decent charge? Operate all electrical accessories to ensure the Alternator can cope under a loaded condition. Ensure the connections on the rear of the Alternator are Clean & Tight.



3. Starter Motor

Even though it may appear that the Starter is functioning correctly, ensure that the main cables connected to it are Clean & Tight.



ZD30DDTi Engine Trouble Diagnosis

Power & Grounds (Cont'd...)

4. Engine Systems Ground

Ensure that ALL of the Ground Points shown right are in GOOD CONDITION.

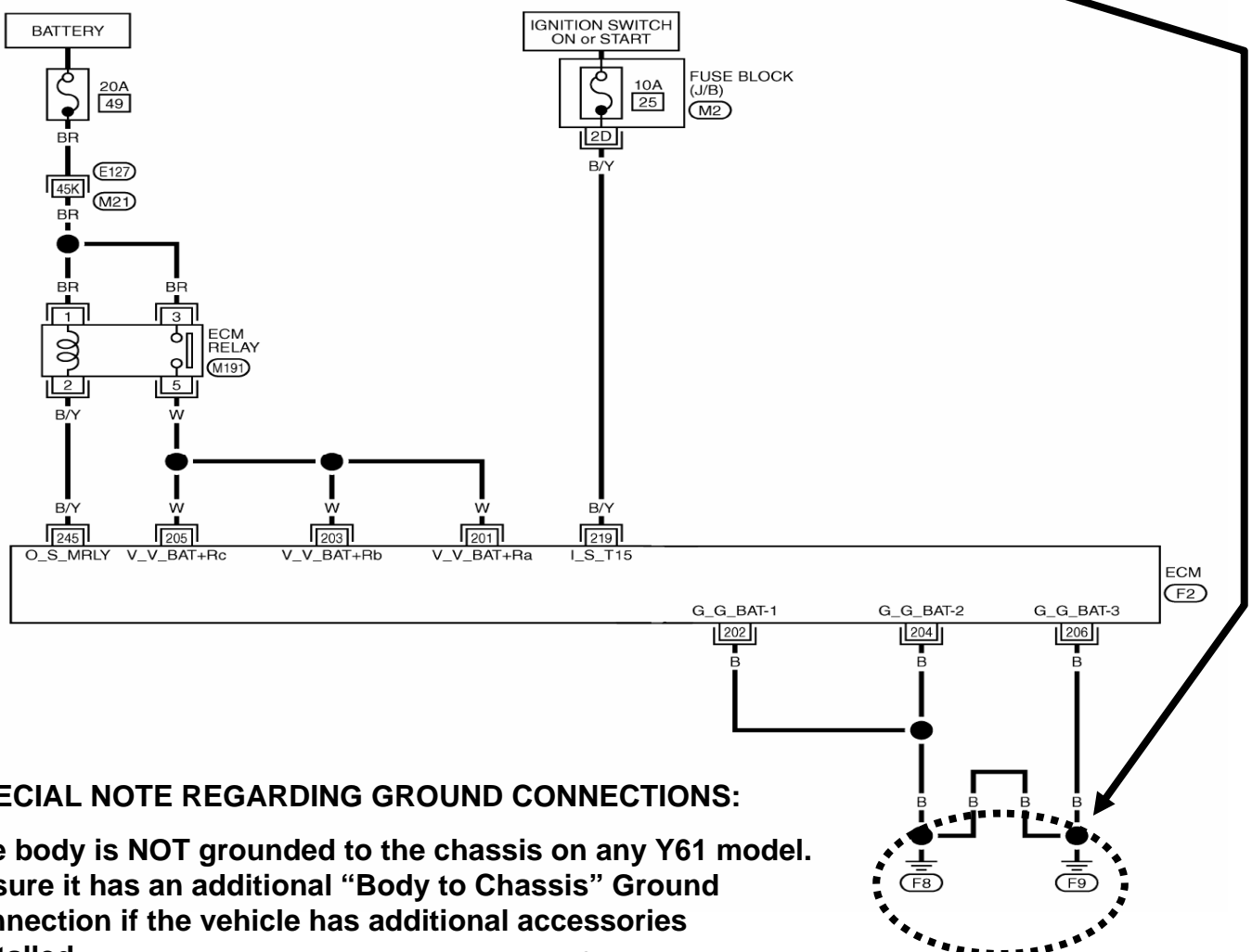
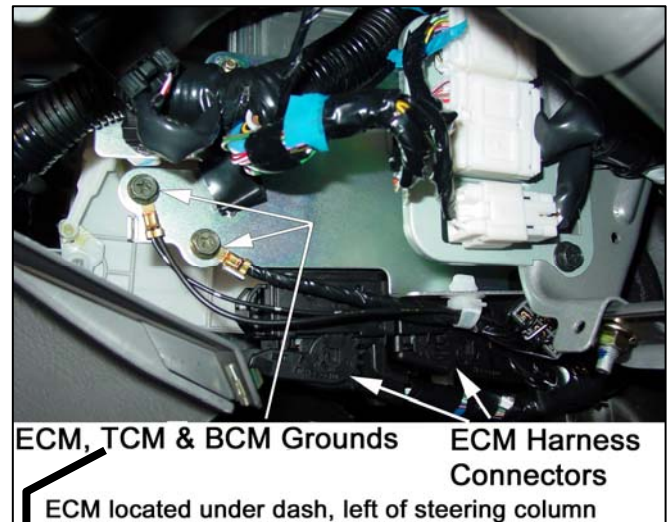
Ensure they are Clean & Tight.

Remember: The ECM outputs an EXTREMELY HIGH CURRENT to operate the Injectors. Therefore a GOOD GROUND connection is very important for reliable engine operation.

Please Note:

There are NO actual Ground connections on the Engine assembly. All Engine Grounds are connected to the body in the 1 location shown right.

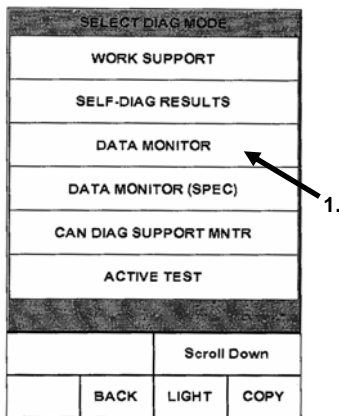
ENGINE, TRANSMISSION & BODY CONTROL MODULE GROUNDS are located on the ECM Bracket under the dash, on the drivers side – left of the Steering Column.



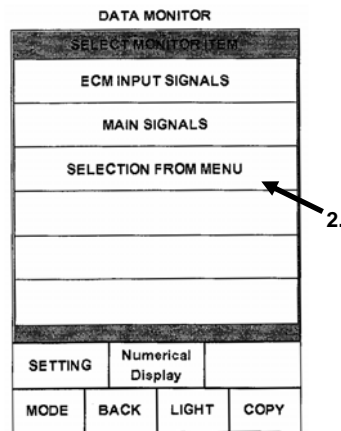
SPECIAL NOTE REGARDING GROUND CONNECTIONS:

The body is NOT grounded to the chassis on any Y61 model. Ensure it has an additional "Body to Chassis" Ground connection if the vehicle has additional accessories installed.

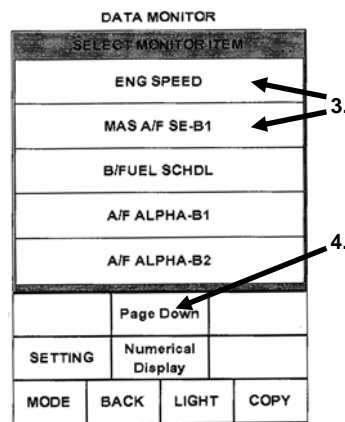
CREATING GRAPHS WITH CONSULT II



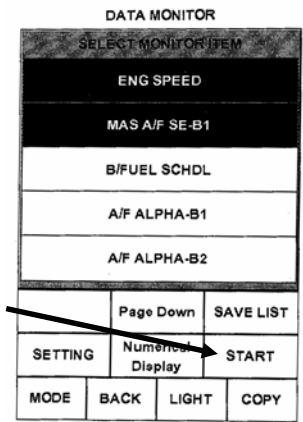
1. Touch;
DATA MONITOR



2. Touch;
SELECTION FROM MENU.
(Otherwise touch MAIN SIGNALS and then START for general items.)

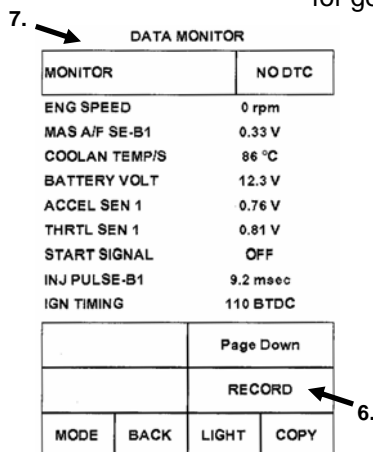


3. Touch the items you would like to view / record.
4. Touch PAGE DOWN to see other items for selection.



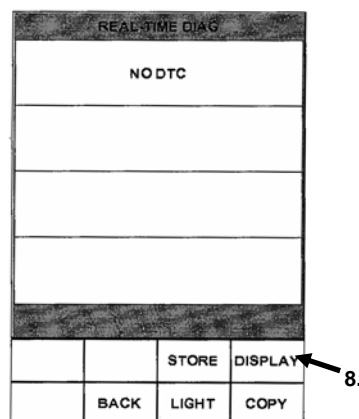
Each selected item is highlighted.

5. Then touch START



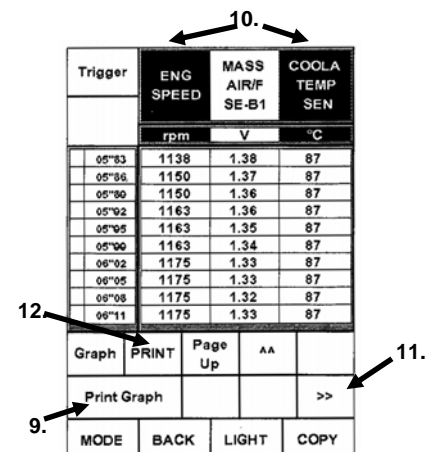
6. Touch RECORD at the desired moment.

7. The timer begins count-down to 0% from 100% (not shown in pic)



Once count down to 0 is complete, above screen is automatically displayed.

8. Touch; DISPLAY



9. Touch until "Print Graph" is displayed.

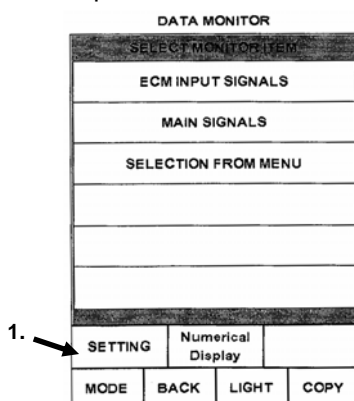
10. Touch items that require graphing.

11. Touch double arrow to reveal other recorded items.

12. Touch "Print". Printer will output graphs as shown over page.

SETTING TO "MANU TRIG"

(This is required if there is a DTC logged & cannot be cleared. Otherwise CONSULT II will "AUTO" record)

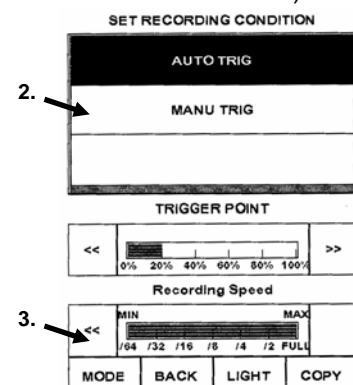


If a situation arises where a known DTC will automatically trigger AUTO RECORD, the machine can be set for MANUAL RECORD regardless of DTC or not.

1. Touch; SETTING

2. Touch; MANU TRIG.

3. (ONLY if required) Touch the double arrows to slow down the time the recording is taken.



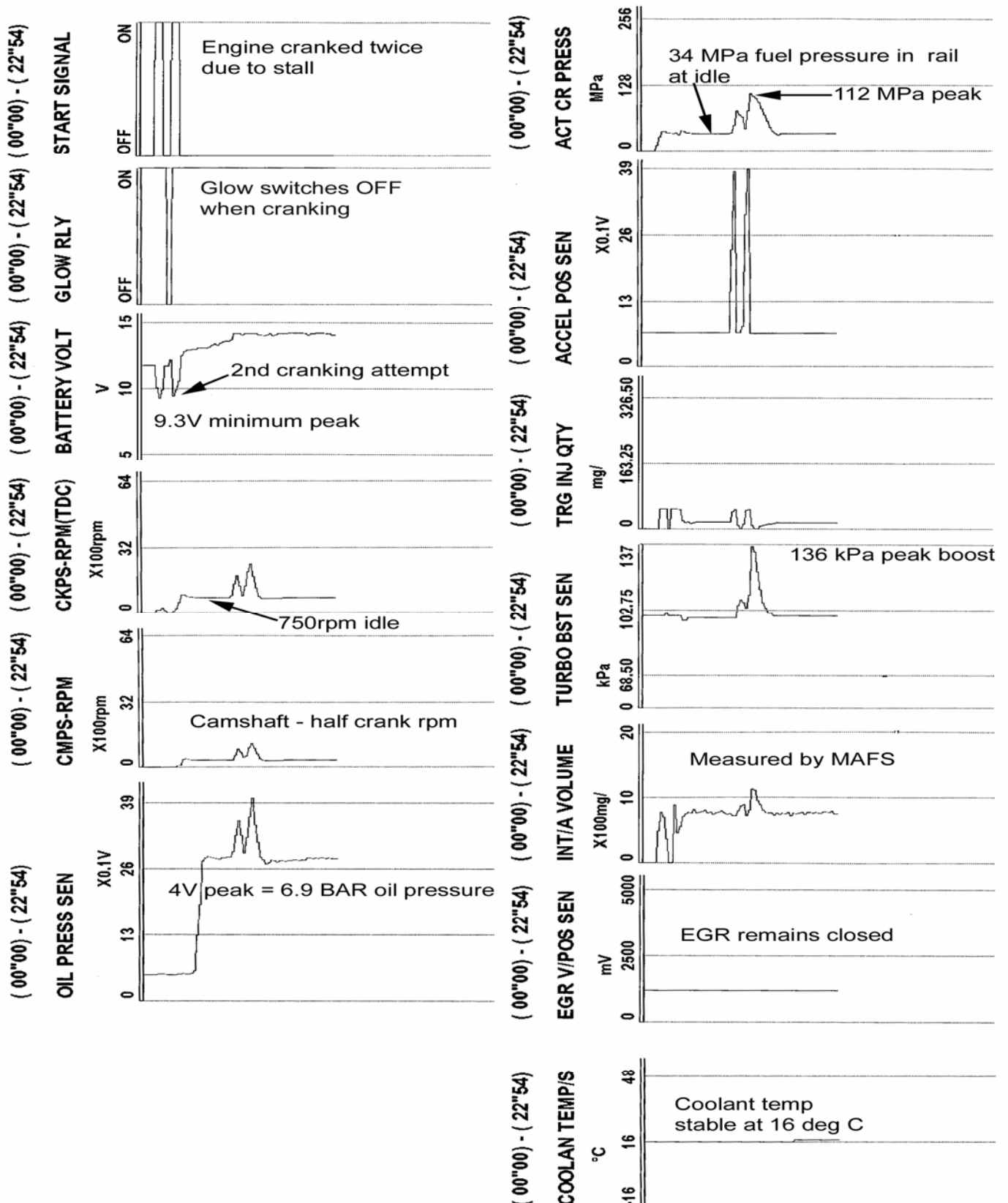
NISSAN Learning Academy

2007 Y61 Patrol ZD30-CRD.

Nissan Australia September 2007

ENGINE COLD START CRANKING TEST – Y61 ZD30 CRD M/T. (Engine Normal).

With Ign ON, “Record” touched on CONSULT II, then engine cranked, engine then stalled so it was re-cranked, engine started & allowed to idle, then & engine raced twice.



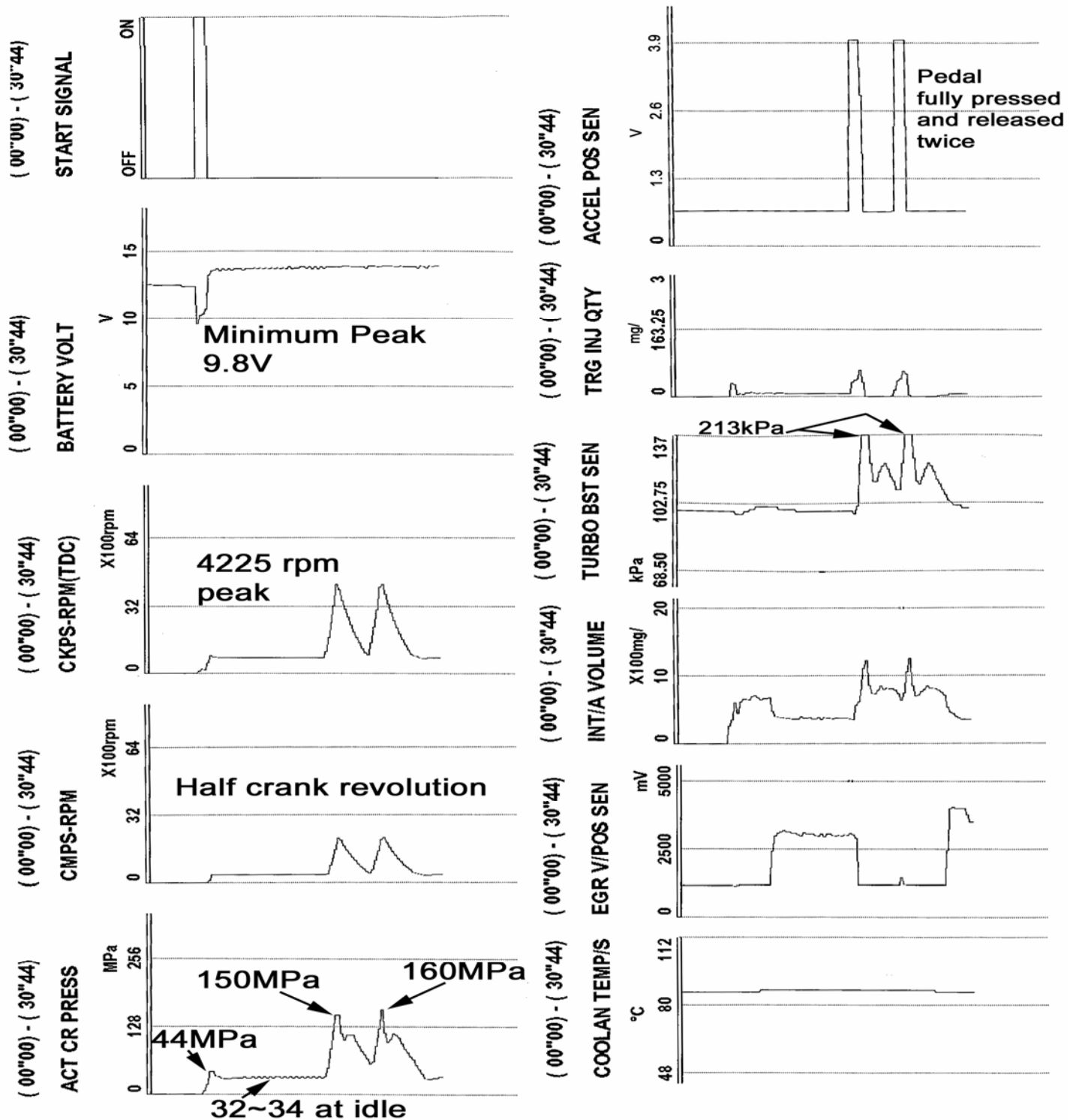
NISSAN Learning Academy

2007 Y61 Patrol ZD30-CRD.

Nissan Australia September 2007

ENGINE HOT START CRANKING TEST – Y61 ZD30 CRD M/T. (Engine Normal).

With Ign ON, “Record” touched on CONSULT II, then engine cranked, started & allowed to idle, then & engine raced twice.



NISSAN Learning Academy

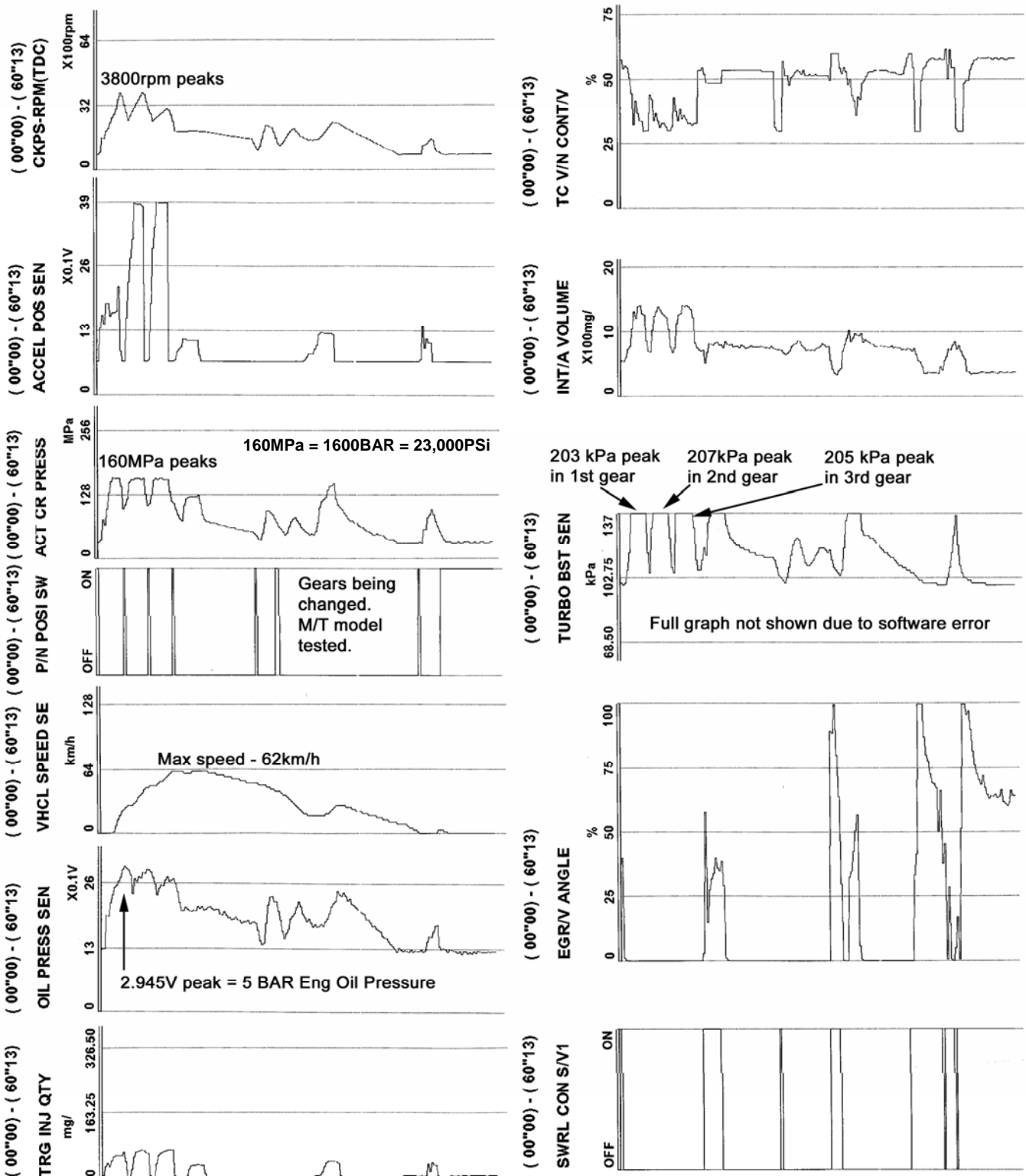
2007 Y61 Patrol ZD30-CRD.

Nissan Australia September 2007

DRIVE TEST – Y61 ZD30 CRD M/T. (Recorded over a period of 1 minute).

Engine already idling & already in 1st gear, “Record” touched on CONSULT II, then driven changing through all gears (from 1st, then 2nd, 3rd & finally 4th) until vehicle speed reached 62km/h. Then slowed down changing back gears & eventually brought to a stop.

NOTE: Engine was already at operating temperature. (Approximately 88 deg C)



ACCELERATOR, FUEL & EXHAUST SYSTEM - FE

ZD30DDTi CRD Fuel Filter

1. Layout

Refer to the picture shown right. This details the basic configuration of the Filter in the vehicle

2. Fuel Recirculation System

On top of the Filter assembly, there is a device (Fuel Recirculation Valve) designed to recirculate fuel back into the filter after it returns from the Engine. Dependant on the temperature, the fuel either re-enters the filter to warm the fuel in the filter to stop the fuel freezing, or it returns directly to the fuel tank.

3. Hand Primer Pump

If there is a need to prime the fuel system, simply squeezing & releasing the hand pump bulb will perform this operation in EXACTLY the same manner it did with the previous hand pump design.

4. Filter Element

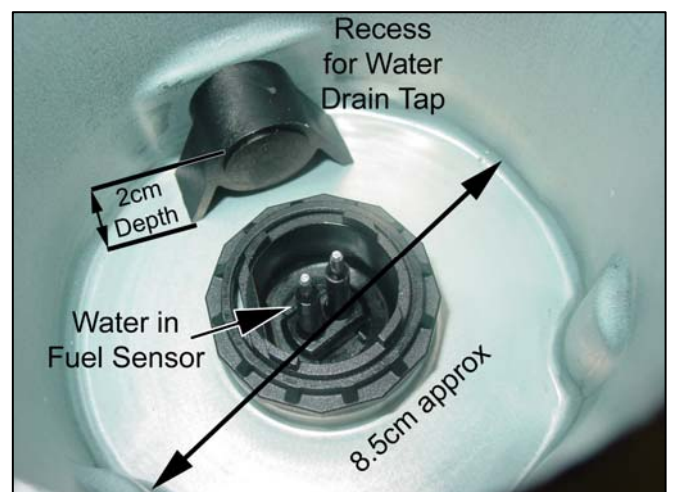
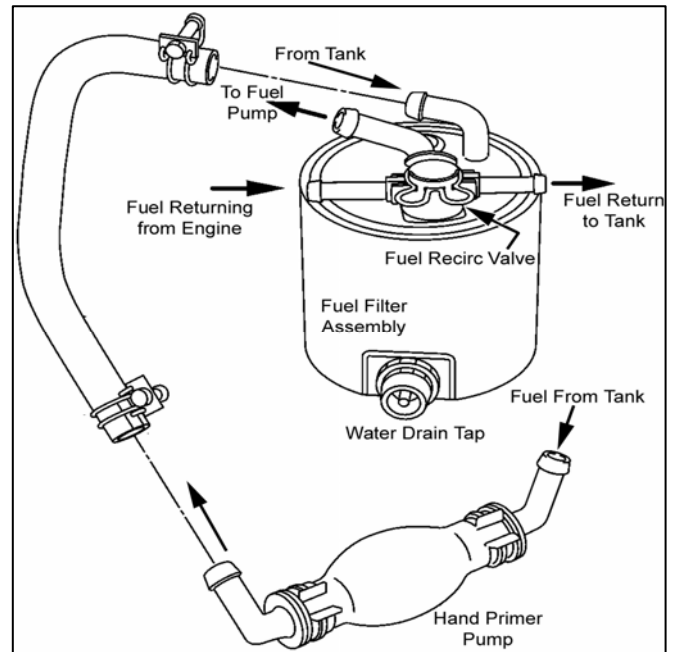
Refer to the picture shown right. This is the element cut out from the steel canister & removed. Fuel enters the canister & is taken from the external side of the filter paper to the inside of the filter paper & then exits the centrally located outlet of the Filter assembly to the Engine (Fuel Pump).

If any water is in the Fuel it will collect in the base of the steel canister.

5. Filter Housing

Refer to the picture shown right. This shows the inside of the steel canister with the element removed. Using the picture, it can be seen the where water is contained. With reference to the picture above as well as this one, it can be seen that there is a 2cm deep reserve for water.

NOTE: The Water in Fuel Sensor, Fuel Recirculation Valve & the drain tap come complete with the fuel filter assembly. They are NOT separate parts.

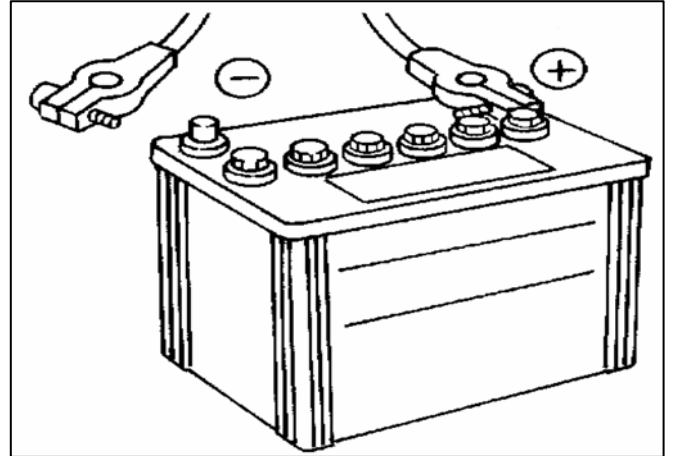


ELECTRICAL SYSTEM - EL

Starting & Charging (ZD30)

1. Battery

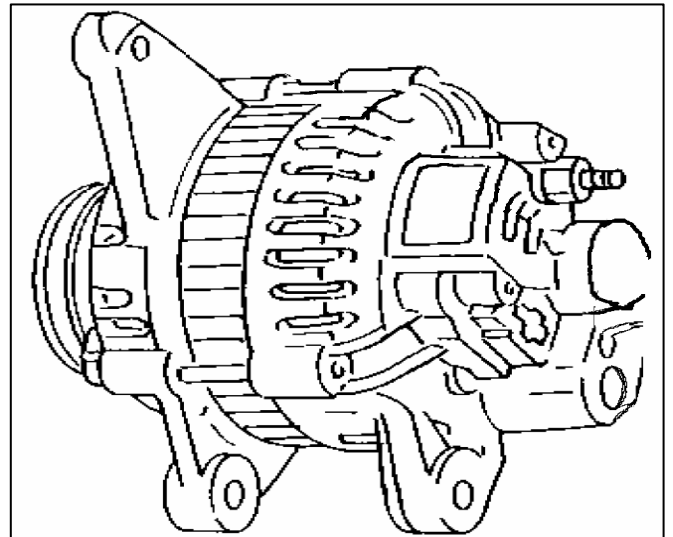
A 12V – 70AH battery continues to be used in ZD30 engine vehicles.



2. Alternator

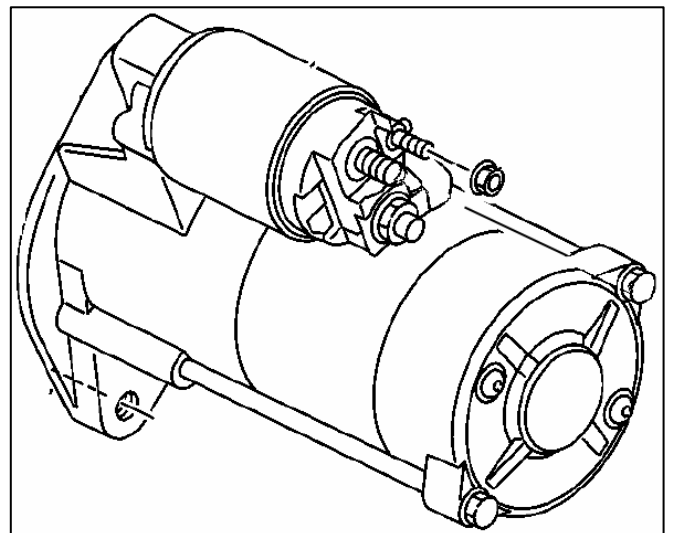
An HITACHI make Alternator is utilised on ZD30 engine vehicles. It continues to be a 12V 90A capacity. The one way clutch fitted to the Alternator on previous models continues to be used. This is used to stop belt squeak noise when the engine decelerates.

SST # KV10118200AU (Alternator clutch removal tool) will be required to service the front pulley on these alternators.
Refer to **STB GI 04-007**.



3. Starter Motor

An HITACHI make reduction gear type Starter Motor is utilised on ZD30 engine vehicles.

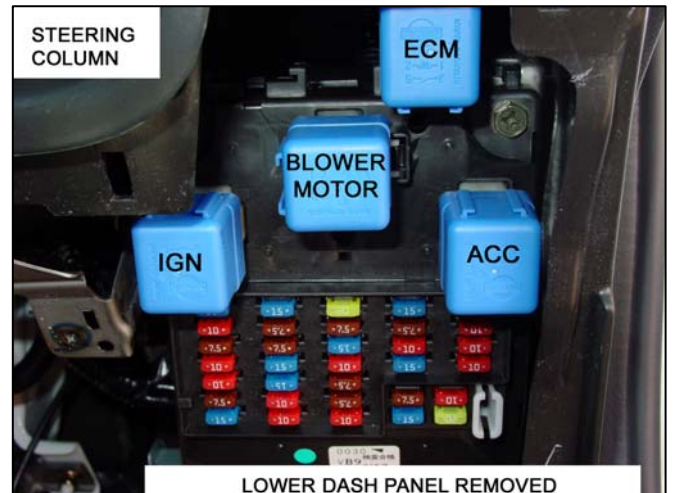


ELECTRICAL SYSTEM - EL

Power Distribution (ZD30)

1. Fuse Block J/B (Junction Block)

Main Fuses & Relays can be found in this location. These are located in the cabin in the lower section of the dash. Look to the RHS of the Steering Column. The lower trim panel has been removed for the purpose of photography.



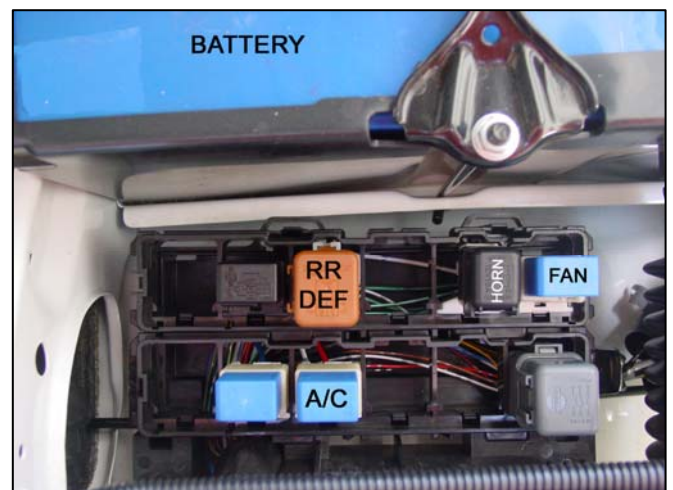
2. Fuse & Fusible Link Box

Additional fuses are located in the engine bay behind the battery.



3. Relay Box

Additional Relays are located in the engine bay next to the battery as shown.



ELECTRICAL SYSTEM - EL

Control Modules (ZD30 CRD)

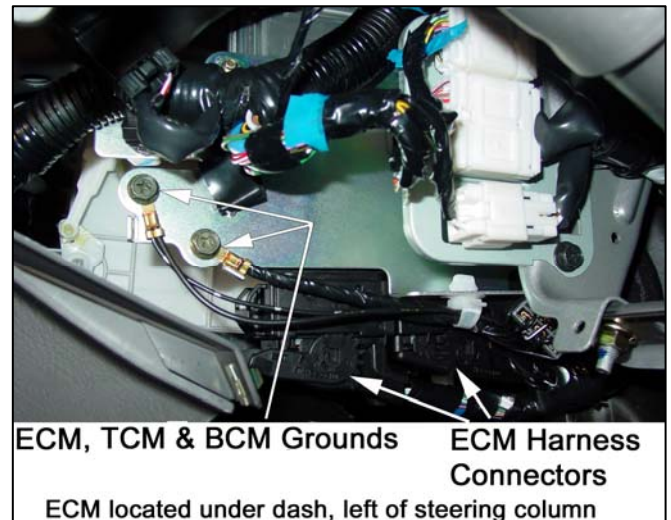
1. ECM (Engine Control Module)

- Accessible with CONSULT II

The ECM is centrally located under the dash, drivers side. It is mounted on a steel bracket adjacent to the Heater / Cooler unit.

Main Power Supply Fuses are located in the Engine Bay Fuse compartment near the battery & the Fuse Box J/B in the dash.

The 2 main Ground connections attached to the bracket are Grounds for the ECM, TCM & BCM.



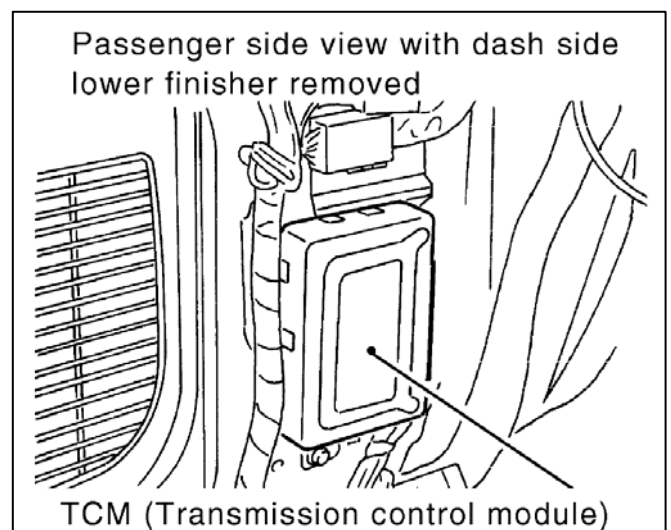
2. TCM (Transmission Control Module)

- Accessible with CONSULT II

On A/T models only, the TCM is located in the Front Passenger side footwell on the far left side. It is required to remove the plastic kick panel for access.

Main Power Supply Fuses are located at the Fuse Box J/B in the dash.

The 2 main Ground connections are attached to the steel bracket for the ECM.



3. BCM (Body Control Module)

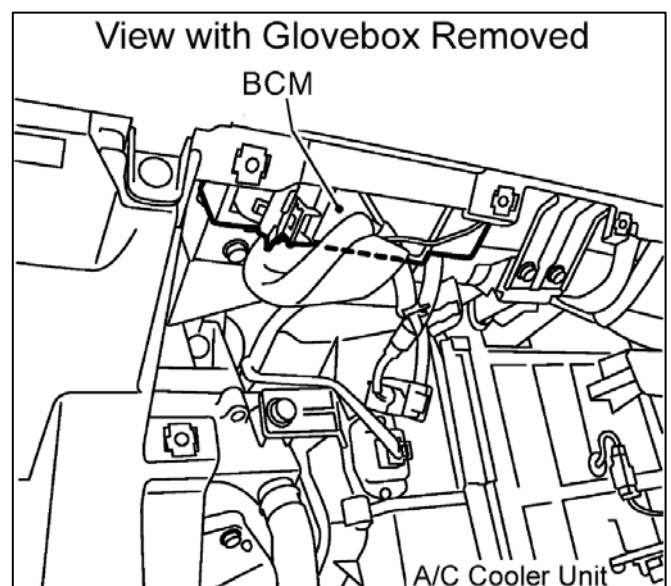
- Accessible with CONSULT II

The BCM serves ONLY to operate NATS. It does NOT have ANY other functions for body control (such as central locking for example) as it does in numerous other current models.

Ignore all of the items seen in CONSULT II as they are inoperative.

Main Power Supply Fuses are located at the Fuse Box J/B in the dash.

The 2 main Ground connections are attached to the steel bracket for the ECM.



ELECTRICAL SYSTEM - EL

Control Modules (Cont'd...)

4. MRCU (Multi Remote Control Unit)

- **NOT** accessible with CONSULT II

The primary function for the MRCU is to receive the signal from the Remote Fob & transfer the signal to the Unified Meter Control Unit (forms part of the Instrument Cluster) to operate the Door Lock Relay.

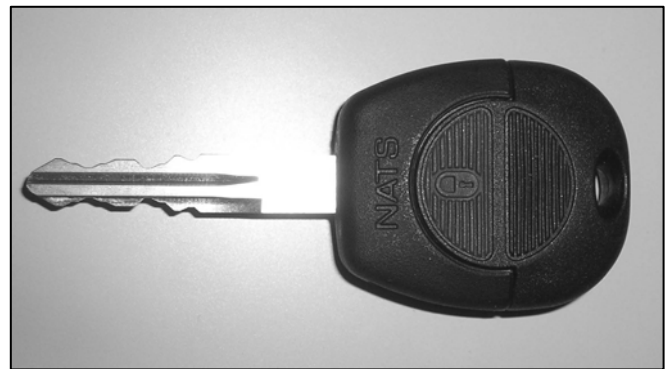
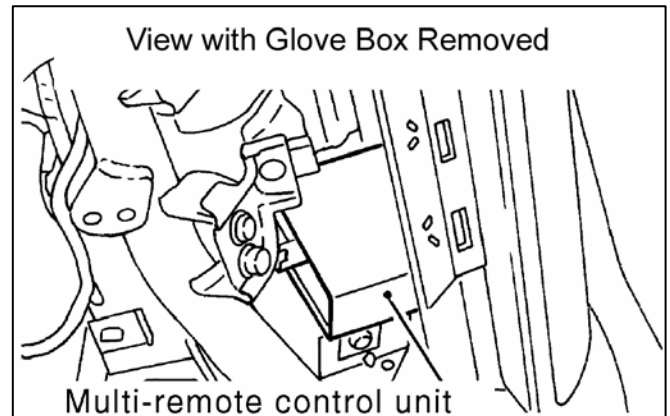
All of the Door Switches are connected to the MRCU, however if a door is **open**, the Door Lock request signal is still transferred over the Unified Meter Control Unit in order to Lock the doors remotely – **regardless of a door open condition or not**. (2006 ~ 2007 built models with 1 piece key only).

Drivers should therefore **NOT assume** that the doors are locked just because the sound of the locking is heard & the indicators flash.

Previous models with a **separate remote & key** (1997 ~ 2005 built models) would **NOT** lock the doors remotely if there was a **door open** condition detected. If the Door lock on the drivers door is turned manually, the Doors will lock electrically regardless of any door open condition or not.

Main Power Supply Fuses are located at the Fuse Box J/B in the dash + a Fusible link in the engine bay.

The 2 main Ground connections are located behind the instrument panel.



To make the Ignition Keys fully functional, refer to STB EL 06-008.

Programming the “Keyless Remote” component of the key is a separate operation to programming the “Immobiliser” component of the Key.

5. UMCU (Unified Meter Control Unit)

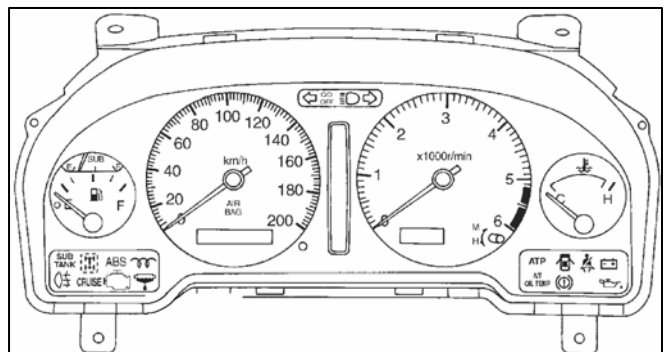
- **NOT** accessible with CONSULT II

The UMCU forms part of the Instrument cluster. It is primarily responsible for the operation of the Instruments & warning lights within the Instrument cluster. It's other functions include;

- It receives a request for Central Locking & operates the Door Lock Relay for central locking control.
- Receives the Key Switch signal (key in ignition barrel signal) & operates the warning chimes for Key in ignition & H/Lights ON.
- Outputs A/C ON request & vehicle speed signal to the CAN.

Main Power Supply Fuses are located at the Fuse Box J/B in the dash.

The 2 main Ground connections are either located behind the instrument panel & behind the drivers kick panel.



ELECTRICAL SYSTEM - EL

Control Modules (Cont'd...)

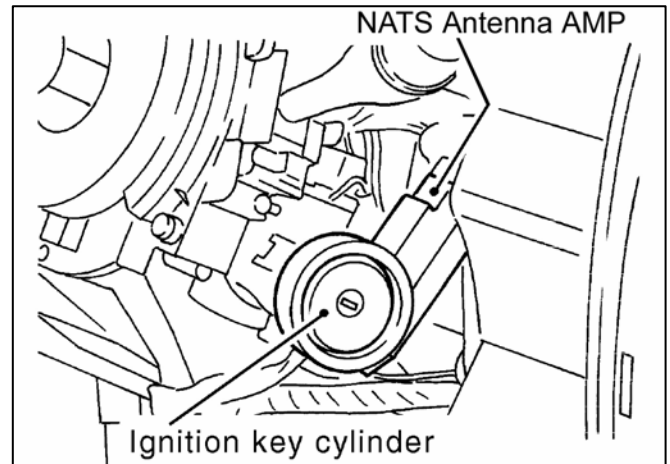
6. NATS Antenna Amplifier

- **NOT** (directly) accessible with CONSULT II

NATS is fully controlled via the BCM. However the BCM must receive a signal from the chip in the ignition key so it can allow the Engine to start. Therefore the NATS Antenna Amplifier reads the chip in the Ignition Key head & transfers the signal to the BCM.

Power & Ground is via the BCM.

On previous models, this unit was known as the NATS IMMU & fully controlled NATS.



7. Power Window Main Switch

- **NOT** accessible with CONSULT II

The control of the Power Windows is housed within the Main Switch assembly in the drivers door. The Drivers window (only when in Auto Up mode) has a "Pinch Detect" function and this is due to the CPU in the Drivers Door Window Switch assembly processing window operation information & activating the Anti Pinch functionality where required.

Power Window functionality has NOT changed since the introduction of the Series II model in 2000.

Main Power Supply Fuses are located at the Fuse Box J/B in the dash + a Fusible link in the engine bay. The 2 main Ground connections are located behind the instrument panel.



Limit Switch Reset Procedure

If components are replaced in the door, a "Re-Learn" procedure MUST be carried out.

Refer to section BT of the Supplement III Service Manual for more detail. ("Front Door Limit Switch Reset")

The Reset button that must be pushed during this process is shown right.

Simply remove the Window Switch assembly from the door & the small black rubber button can be seen underneath the plastic sealing film, at the very bottom edge of the fibre board that supports the door trim.



View looking down into the recess in the drivers door with the power window switch assembly removed. There is NO NEED remove the whole door trim to access the Limit Switch.

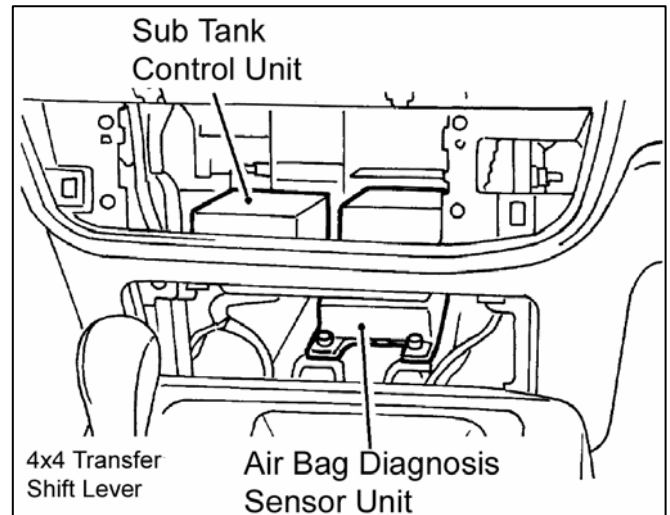
ELECTRICAL SYSTEM - EL

Control Modules (Cont'd...)

8. Air Bag Diagnosis Sensor Unit - Accessible with CONSULT II

The Air Bag Diagnosis Sensor unit is entirely responsible for all SRS functionality in the vehicle. This includes Side Air Bags (where fitted) as well. Main Power Supply Fuses are located at the Fuse Box J/B in the dash.

The 2 main Ground connections are located behind the instrument panel.



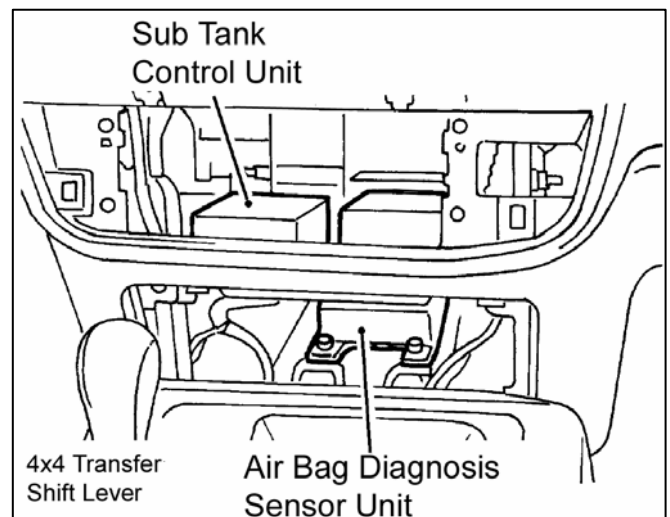
9. Sub (fuel) Tank Control Unit - NOT accessible with CONSULT II

The Sub Tank Control Unit is entirely responsible for the control of transferring Fuel from the Sub Tank to the Main Tank once this operation has been requested by the driver.

The unit will transfer a small amount of fuel over each time the engine is started however. This is for a system self check function only.

Main Power Supply Fuses are located at the Fuse Box J/B in the dash.

The 2 main Ground connections are located in the rear body work. Refer to section EL "Harness Layout / Ground Distribution" for more detail

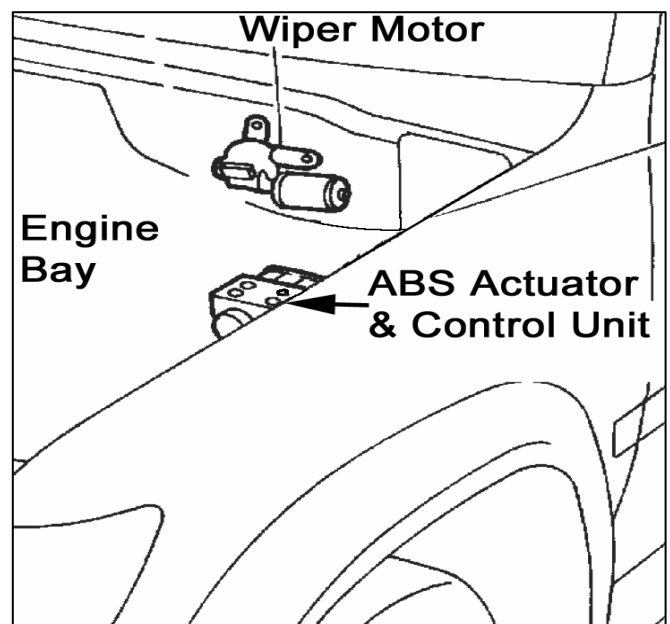


10. ABS Actuator & Control Unit - Accessible with CONSULT II

The ABS Actuator & Control Unit is all in one assembly & is located in the left rear of the engine bay.

Main Power Supply Fuses are located at the Fuse Box J/B in the dash + Fusible links in the engine bay.

The main Ground connection is located in the engine bay.



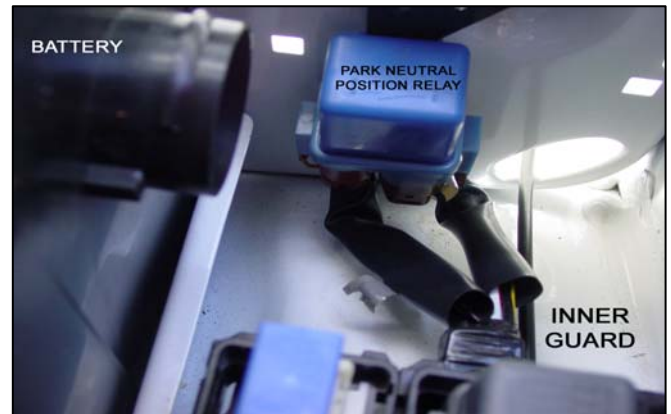
ELECTRICAL SYSTEM - EL

Main Relays

1. Park Neutral Position Relay (A/T only)

This relay is responsible for supplying power to the starter motor solenoid in order to crank the engine for starting. The relay will close ONLY if the transmission lever is in Park or Neutral.

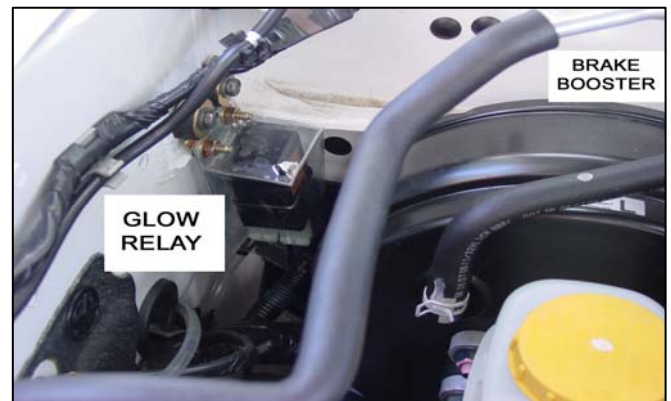
It is located independently of the other nearby relays, adjacent to the battery.



2. Glow Relay

This relay is located in the rear of the engine bay between the inner guard & brake booster.

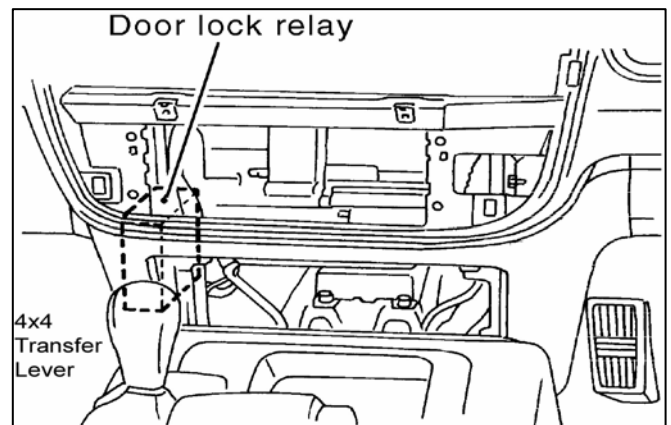
The relay is operated by the ECM & it directs current to the 4 glow plugs on the engine.



3. Door Lock Relay (Central Locking)

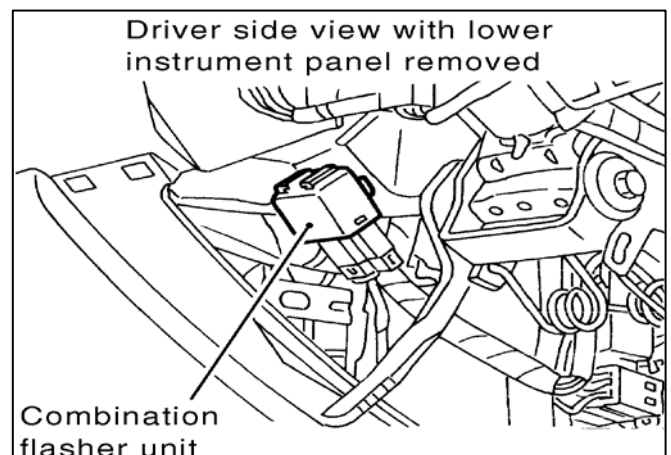
This relay is located behind the facia panel just forward of the 4x4 transfer case lever.

The relay is controlled by the Unified Meter Control Unit in order to send power to all of the door lock solenoids for central locking control.



4. Combination Flasher Unit

The Flasher unit is located in the lower section of the dash & to the left of the steering column.



ELECTRICAL SYSTEM - EL

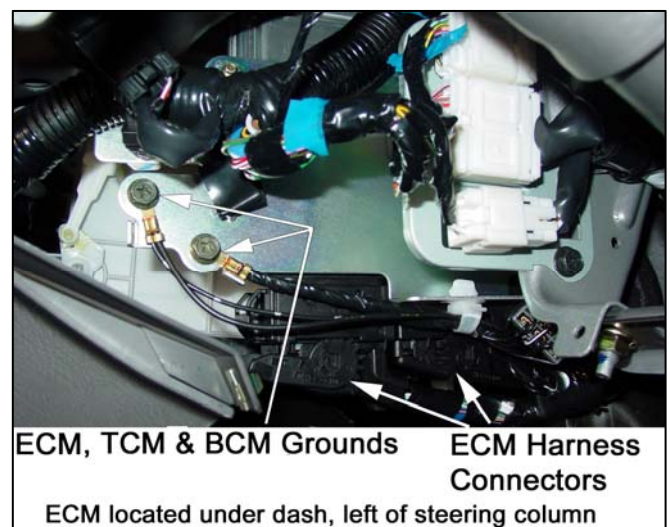
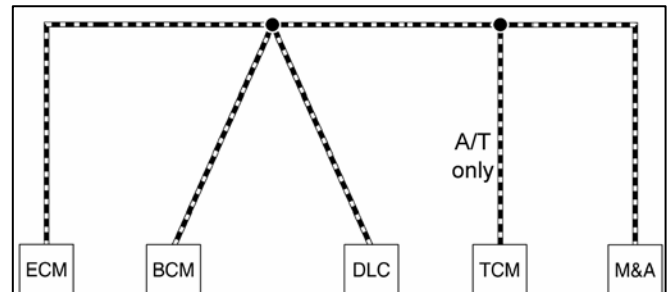
ZD30 CRD Controller Area Network (CAN)

All ZD30 CRD engine models now utilise a CAN system in order to simplify the sharing of signals between each module in the vehicle.

WHAT TO DO WHEN A CAN U1000 / U 1001 DTC IS LOGGED;

1. There is a **VERY HIGH** likelihood that after market accessories which have been poorly installed have caused the fault. Isolate them, clear the codes & re-inspect.
2. It's possible that accessories have been installed & they have been grounded to the chassis. Ensure chassis has been grounded to the body properly if such accessories have been fitted.
3. Individually ensure all of the modules have got decent Power & Ground supply.

HINT: The ECM, TCM & BCM ALL SHARE the same ground connection. Therefore once the Ground is checked, ensure power supply is OK for each unit. Start with inspection of the fuses.

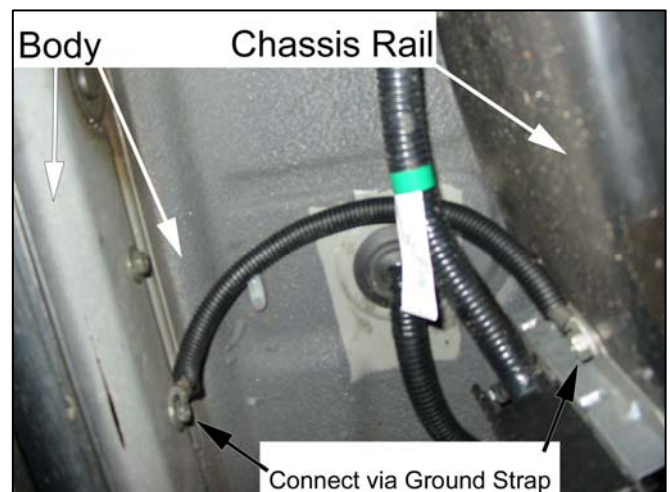


Vehicle Ground

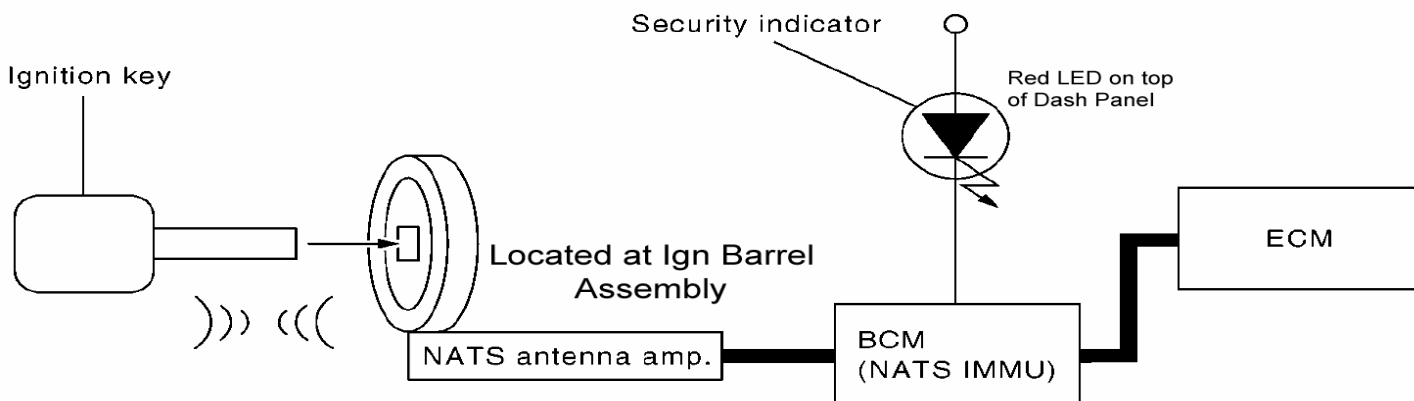
Body to Chassis Ground Connection

The body is NOT grounded to the chassis on any Y61 model. Ensure it has an additional "Body to Chassis" Ground connection if the vehicle has additional accessories installed.

I.E; DO NOT Ground accessories such as driving lights to the chassis unless a ground strap such as the one shown right has been installed.



ELECTRICAL SYSTEM - EL



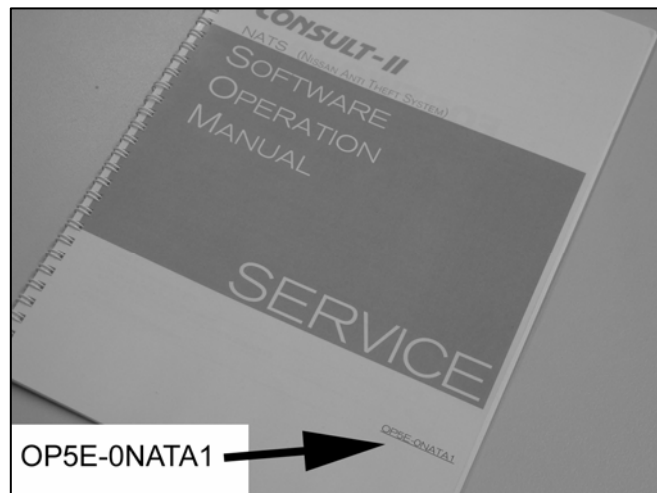
NATS (Nissan Anti Theft System)

The NATS on Y61 Patrol ZD30 CRD variants is a V5.0B BCM controlled system. The system is basically the same as that found on D40 Navara ST-X, R51 Pathfinder, C11 Tiida, Z33 350Z, Z50 Murano & J31 Maxima.

Refer to the following documents for more information on the Servicing of NATS (replacing / adding keys etc.)

1. The NATS Software Operation Manual.

(Publication # OP5E 0NATA1) This publication was issued to all Nissan Dealer Service Managers in June 2005. Contact TechLine if you don't have this **Extremely Important** document.



2. The NATS Application Chart.

(Example shown right). This is located on iNISCOR. Look on the Service Homepage under "NATS". It's just below where Tech Bulletins are found. Contact TechLine if you are unsure of how to locate this **VERY IMPORTANT CHART**.

The chart shown right simply prints out onto an A4 sheet of paper.

NATS APPLICATION CHART February 2007			
NATS Version	NATS parts supplier	Diagrams	Diagrams
Vehicle Model	Type of PIN (password)	No PIN required	Fixed PIN
	NATS version	V2.0 (DIESEL) V3.0/4.0 V5.0	see Note *1
	Number of keys able to be programmed	4 keys	5 keys
			see Note *2
A33	All		
H16	All		
S15	All		
T30	All		
Z33	All		
Z31	All		
Z50	All		
Z11	All		
Z22	All		
Z40	All		
	ST-X variants only (Note *3)		
	Wagon		
	For 2006 MY		
	For 2007 MY		
	For 2008 MY		
	For 2009 MY		
	For 2010 MY		
	For 2011 MY		
	For 2012 MY		
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ELECTRICAL SYSTEM - EL

Instrument Cluster Warning Lights

1. Low Oil Pressure Warning System

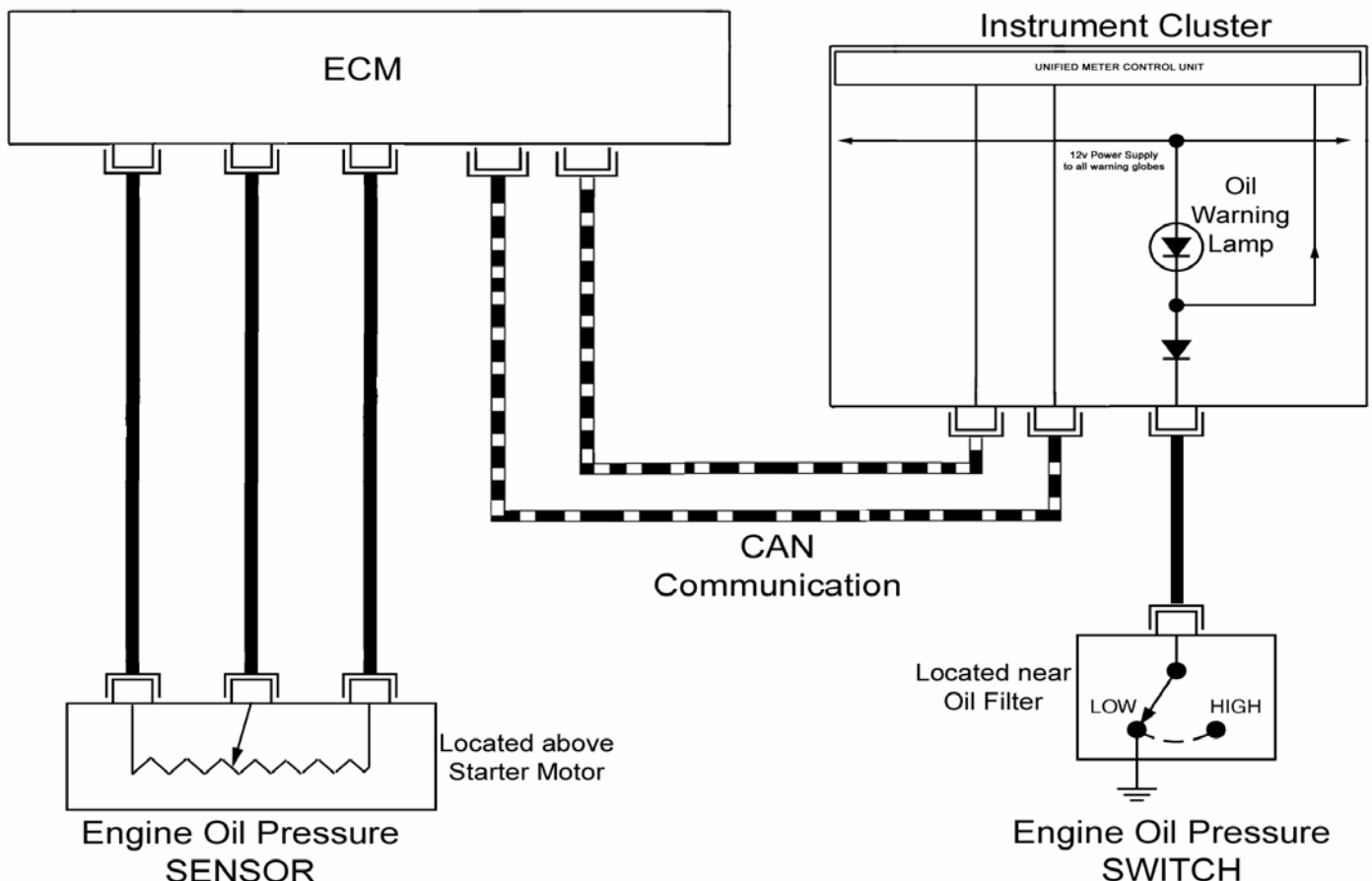
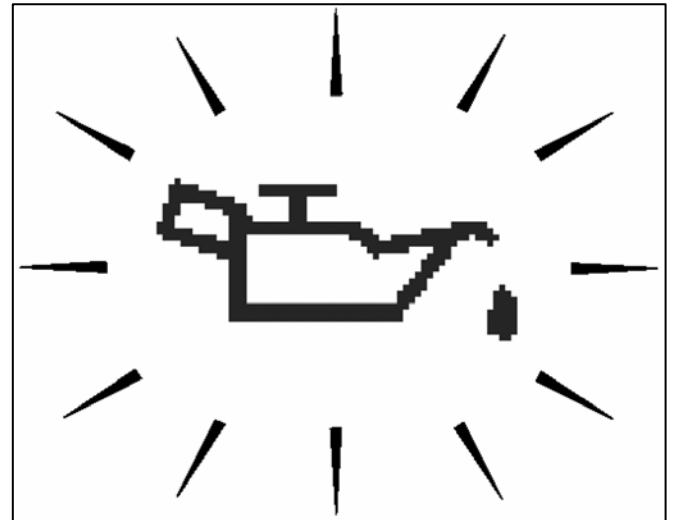
The Oil Pressure warning light on the instrument cluster can be illuminated for 2 different reasons as follows;

1. With an Ignition ON condition, (engine running or not running), the conventional Oil Pressure SWITCH has grounded which in turn illuminates the light.

Typically this occurs normally if the Ignition is ON but engine not running as there is no Engine Oil pressure, therefore the Oil Pressure Switch will connect to ground. Once the engine is started the Oil Pressure Switch will open circuit due to the Oil Pressure acting on the switch.

2. A signal is sent from the ECM to the Instrument cluster via CAN after the ECM has detected the following conditions for MORE than 5 seconds;

- Engine rpm: 3600 – 4200rpm
- Coolant temp: Less than 95 deg C
- Oil pressure: 2.5 BAR or less (Oil pressure sensor voltage less than 2V approx.)



ELECTRICAL SYSTEM - EL

Instrument Cluster Warning Lights

2. Water in Fuel Warning System

There is now a separate light to warn the driver of a "Water in Fuel" condition. In previous models the MIL was illuminated to warn the driver of the same condition.

There is a sensor assembly in the base of the Fuel Filter which triggers the light once a set amount of water has collected in the base of the Filter.

Water in Fuel Sensor Operation

The sensor measures the electrical conductivity of the liquid it is immersed in.

The sensing element (2 x probes) is approximately 2cm up from the bottom of the fuel filter and provided the filter is full of diesel, (as it normally should be) the resistance across the 2 sensor terminals is measured through the liquid (diesel fuel in this case). The value measured will be the default resistance value of diesel fuel. (Conductivity of diesel).

As water gets into the fuel system, its specific gravity is greater than diesel, causing the water to settle in the bottom of the filter. Once 2cm (approx) of water has settled at the bottom of the filter, the conductivity of water is different to diesel, this in turn triggers the water in fuel warning to be activated.

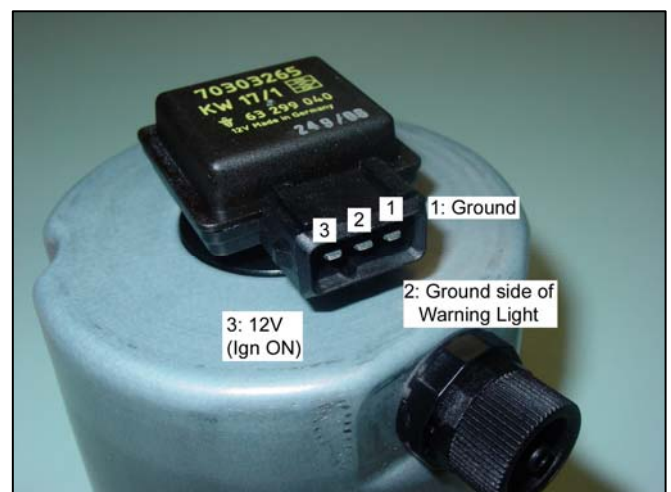
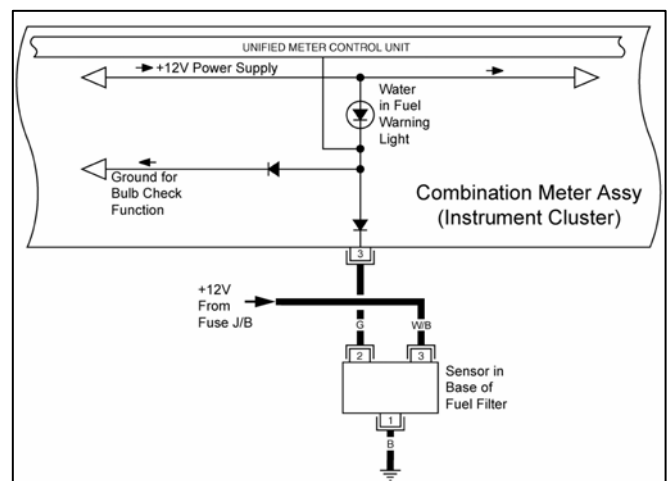
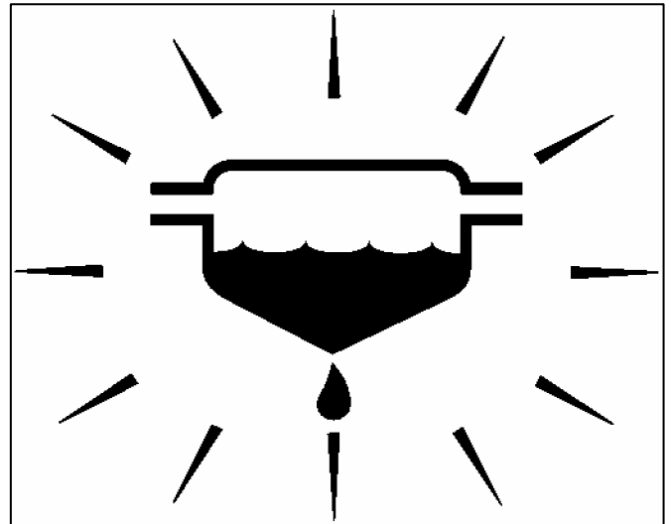
With the ignition ON, power is fed to the sensor unit (terminal 3) in the base of the filter. The sensor unit requires it's own power supply to operate.

Terminal 2 is connected to the Ground side of the globe in the instrument cluster. If this wire is grounded, the globe will illuminate.

Terminal 1 is permanently connected to Ground.

If there is enough water to short the sensor probes inside the filter, (see pic over page) the sensor unit detects this condition & then grounds terminal 2.

In a normal condition, the filter base should ONLY contain diesel fuel, therefore this is not able to short the terminals. Water can conduct electricity (diesel cant) therefore a Water in Fuel condition is detectable.



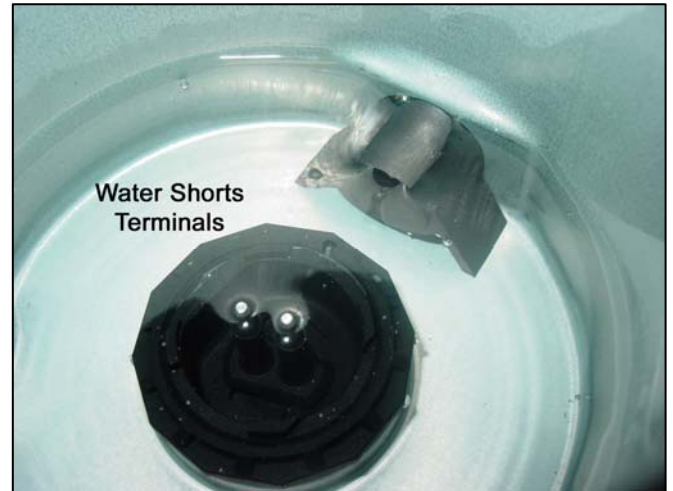
**Filter & Sensor are 1 complete assembly.
They are NOT separate parts.**

Refer to page 70 of this Training Manual for more detail about the Fuel Filter assembly.

ELECTRICAL SYSTEM - EL

(i) Water in Fuel Warning Light ON Condition

Refer to the picture shown right. This shows the amount of water necessary (approximately 2cm deep) to create a short between the 2 probes centrally located in the base of the filter housing. This short will trigger the illumination of the Water in Fuel warning light in the instrument cluster.



(ii) Water in Fuel Warning Light OFF Condition

This picture shown right shows the amount of water remaining AFTER the drain tap has been opened & all possible water has drained out. (Filter remained level)

NOTE:

When draining water from the filter, it is **STRONGLY ADVISED** to remove the filter from the bracket & turn the filter onto its side to ensure that the **maximum** amount of water can be **drained out**.

