柴油商業車輛技術講座系列

Date: 11th June 2018

皇冠汽車有限公司

Crown Motors Limited

課程目錄

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   - 進氣和排氣系統
   - 電腦控制系統
   - 維修要點
   - 儀表內燈號
3. 原廠保養需知:
   - 潤滑油和冷卻液規格
4. 診斷工具
5. 故障案例分享
6. Q & A

TOYOTA HIACE

KDH200	KDH201			GDH201
(EURO III)	(EURO IV)	(EURO IV CD mode)	(EURO V)	(EURO VI)
2005 / 01	2006 / 10	2010 / 08	2011 / 10	2017 / 01

TOYOTA D-4D (**D**irect injection **4**-stroke common-rail **D**iesel engine) with Turbocharger

Engine Specifications

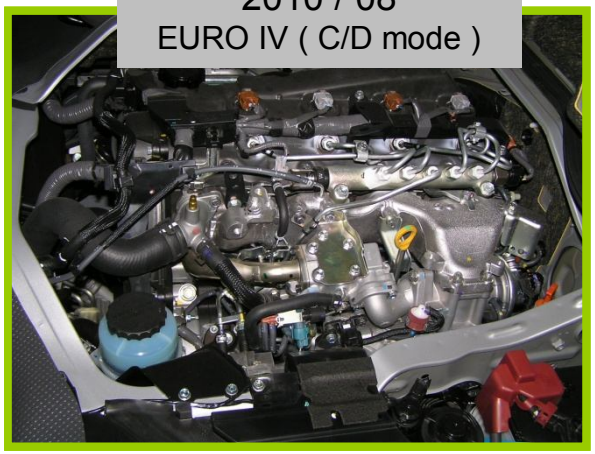
Model	KDH200	KDH201			GDH201
Engine	2KD-FTV	1KD-FTV			1GD-FTV
Emission Regulation	EURO III	EURO IV	EURO IV (C/D mode)	EURO V	EURO VI
Cylinder & Arrangement	4-Cylinder, In-line				
Valve Mechanism	16-Valve DOHC, Belt & Gear Drive				16-Valve DOHC, Chain Drive
Displacement [cm^3]	2,492	2,982			2,755
Bore x stroke [mm]	92.0 x 93.8	96.0 x 103.0			92.0 x 103.6
Compression Ratio	18.5 : 1	16.0 :1		15.0 : 1	15.6 : 1
Max. Output	75kW @ 3,600rpm	80kW @ 3,000rpm	100kW @ 3,400rpm	106kW @ 3,400rpm	111kW @ 3,600rpm
Max. Torque	260Nm @ 1,600 – 2,400rpm	286Nm @ 1,200 – 1,600rpm	300Nm @ 1,200 – 2,400rpm	300Nm @ 1,200 – 3,200rpm	300Nm @ 1,000 – 3,400rpm
Fuel System	Common-rail Type				
EGR	✓				
DPF	—			✓	✓
SCR	—			—	✓

Engine

KDH201 (Without DPF)

2006 / 10
(EURO IV)

2010 / 08
EURO IV (C/D mode)



KDH201 (With DPF)

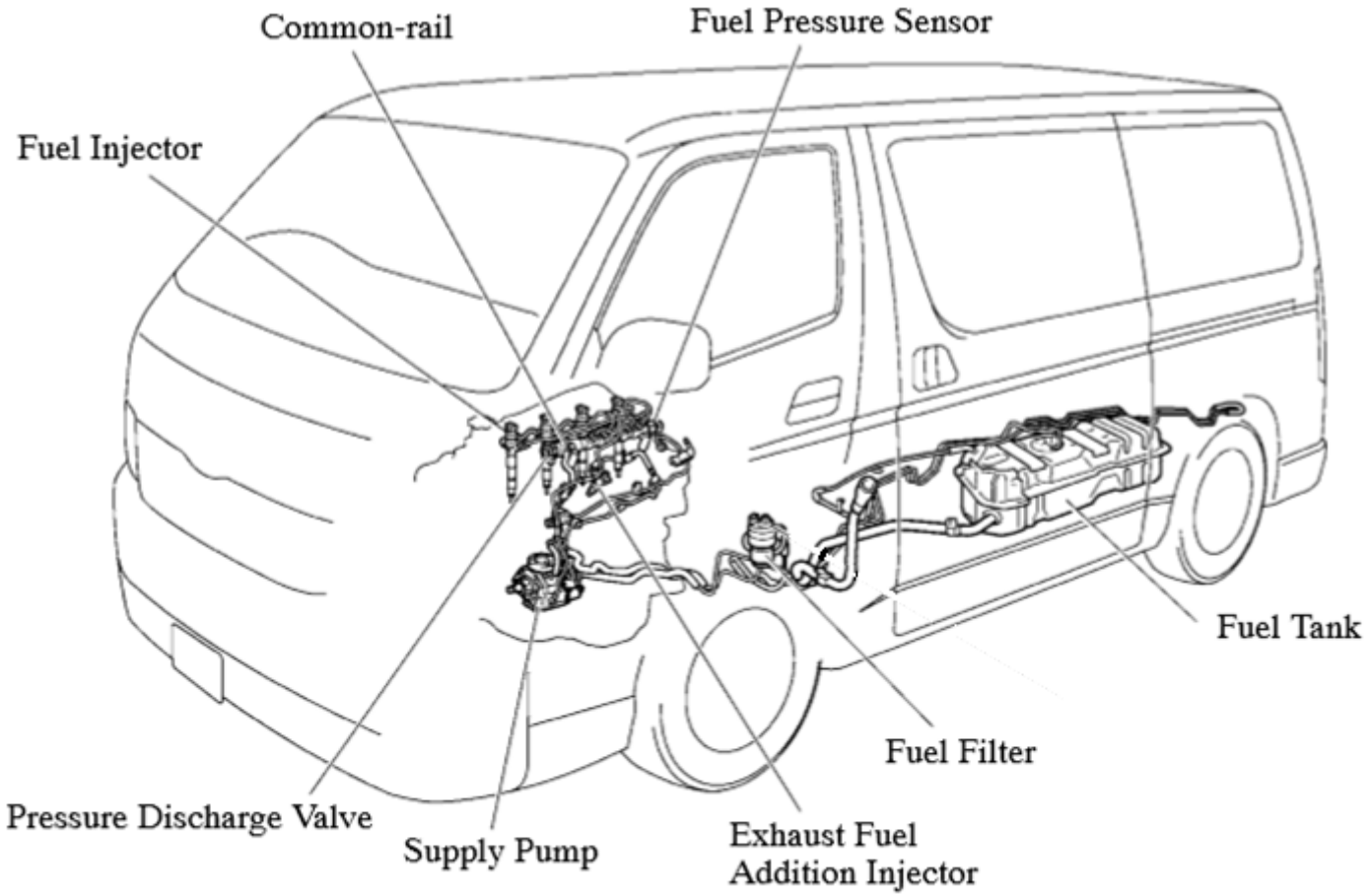
2011 / 10
(EURO V)

GDH201 (With DPF and SCR)

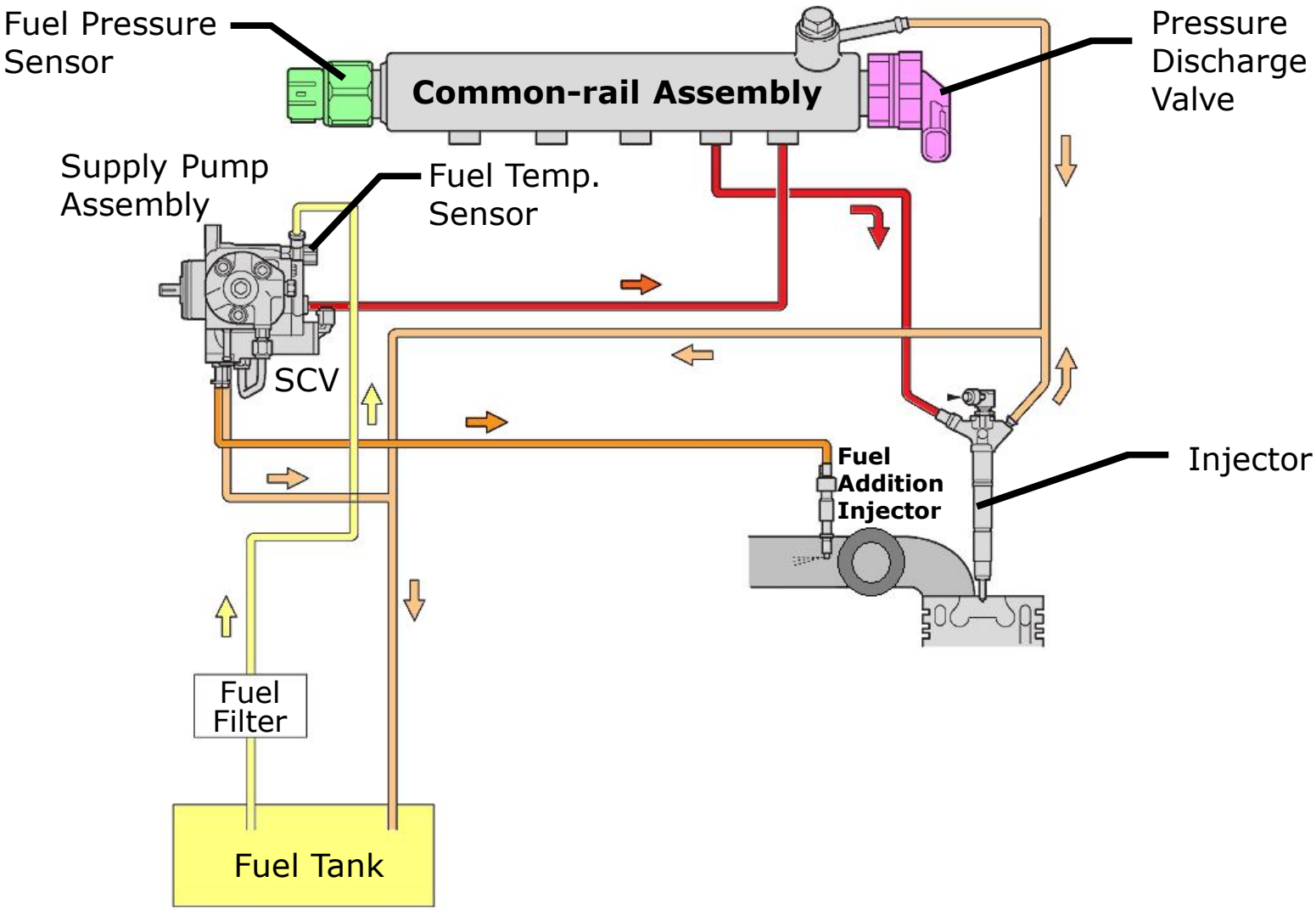
2017 / 01
(EURO VI)

Fuel System

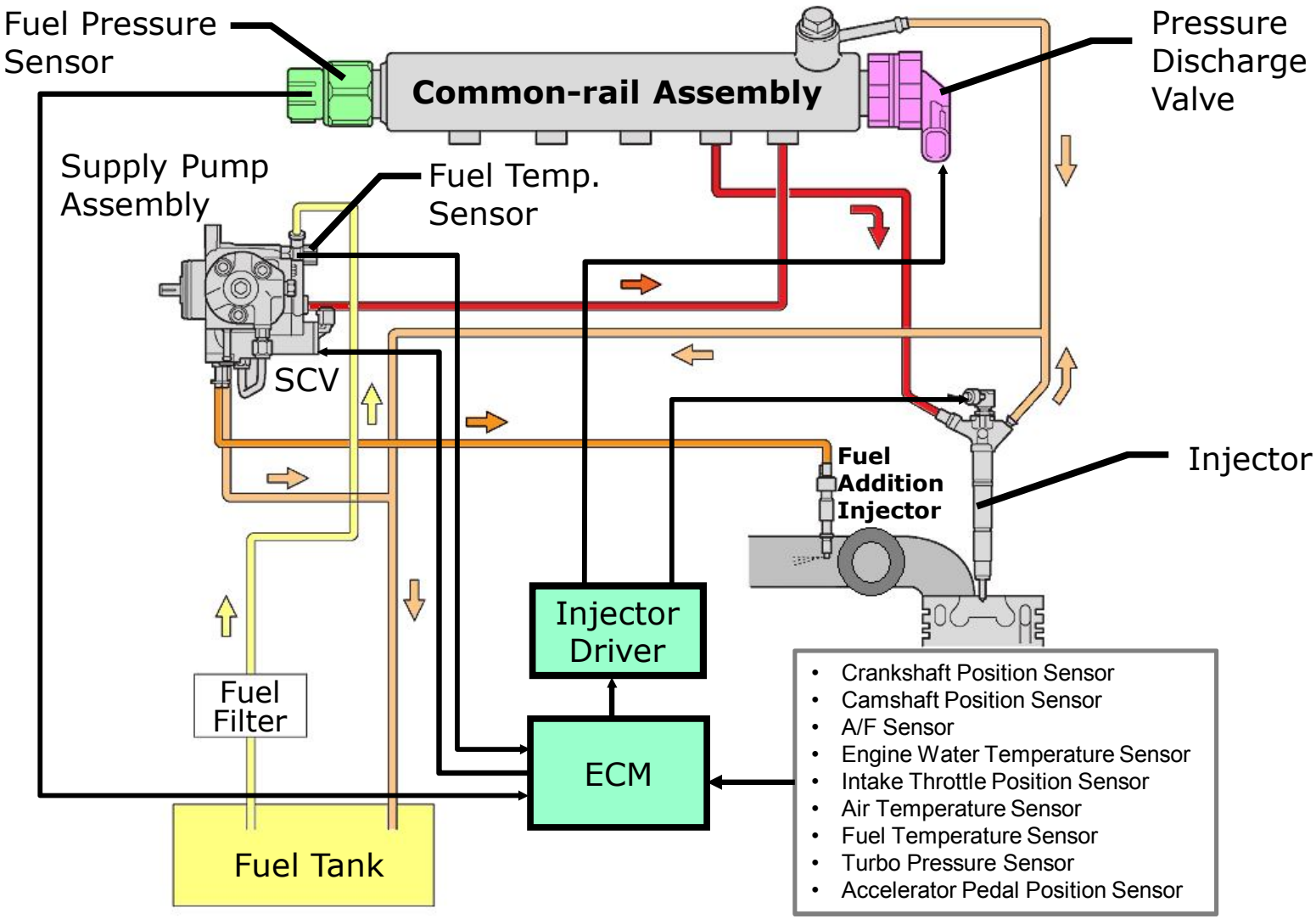
- Fuel System



Fuel System

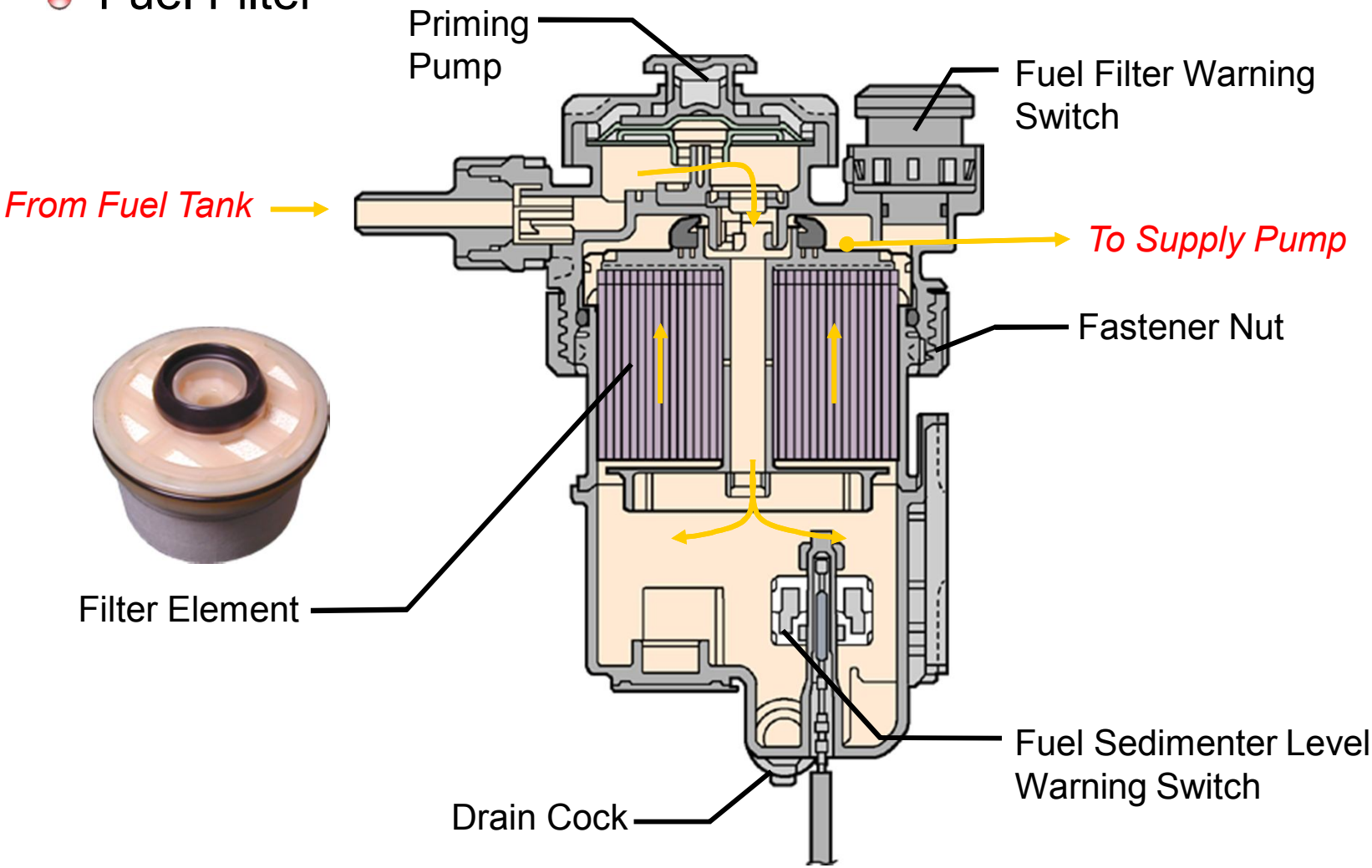

Fuel Pressure Sensor
Common-rail Assembly
Pressure Discharge Valve
Supply Pump Assembly
Fuel Temp. Sensor
SCV
Fuel Addition Injector
Injector
Fuel Filter
Fuel Tank

Fuel System


Fuel Pressure Sensor
Common-rail Assembly
Pressure Discharge Valve
Supply Pump Assembly
Fuel Temp. Sensor
SCV
Fuel Addition Injector
Injector
Injector Driver
Fuel Filter
ECM
Fuel Tank
• Crankshaft Position Sensor
• Camshaft Position Sensor
• A/F Sensor
• Engine Water Temperature Sensor
• Intake Throttle Position Sensor
• Air Temperature Sensor
• Fuel Temperature Sensor
• Turbo Pressure Sensor
• Accelerator Pedal Position Sensor

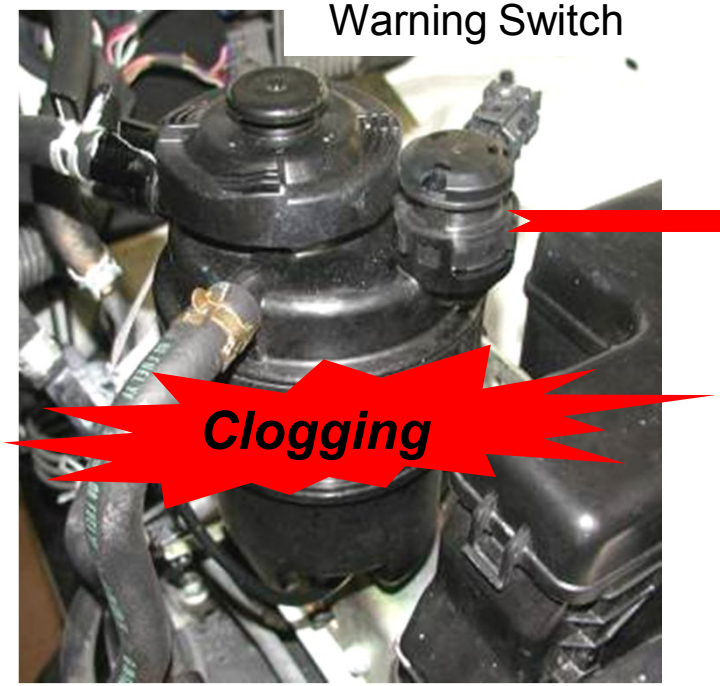
Fuel System

- Fuel Filter

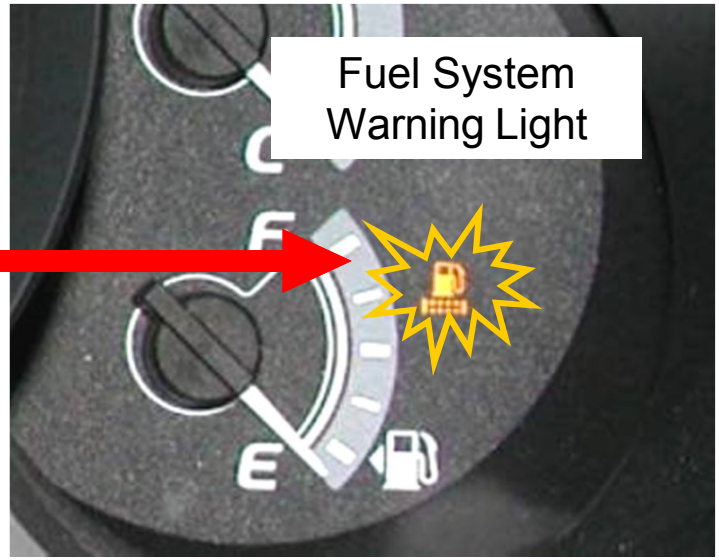


Fuel System

- Fuel Warning System
  - Fuel filter clogging is detected by fuel filter warning switch



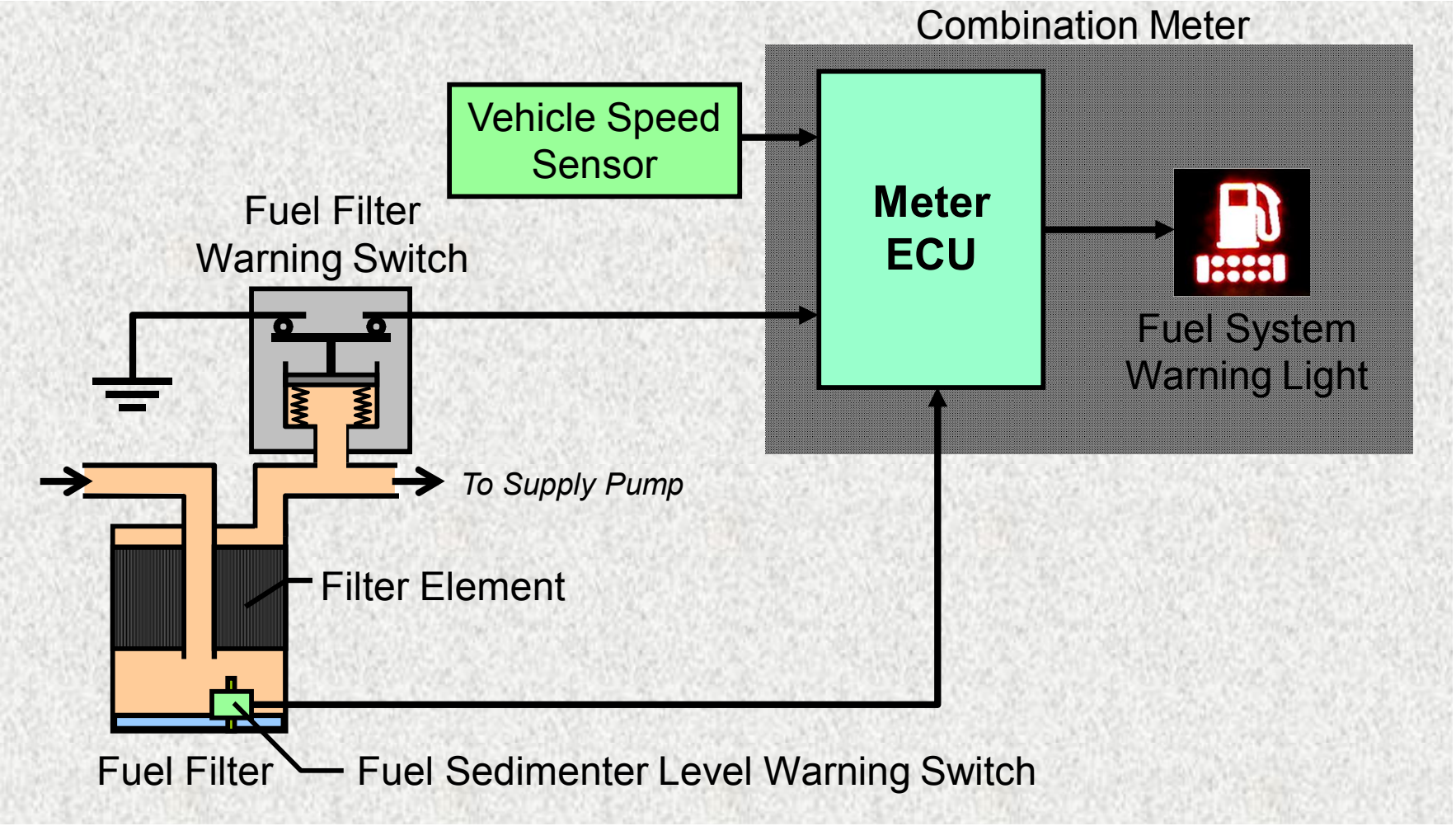
Fuel Filter



Combination Meter

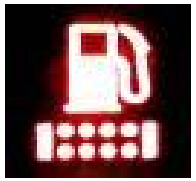
Fuel System

- Fuel Warning System



Fuel System

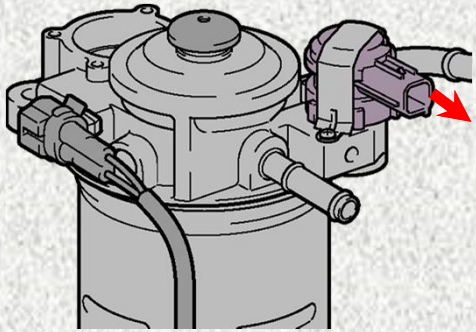
- Fuel Warning System
  - Warning light condition for fuel filter / fuel sedimenter

Warning	Warning Method	Priority
Sedimenter Warning	 Blink	1
Fuel Filter Warning	 ON	2

Fuel System

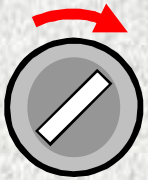
- Fuel Warning System
  - Install fuel filter / Reset warning light

Reset warning light



Fuel Filter Replacement

(Fuel filter warning switch connector disconnected)



IG ON

Within 3 - 60 sec.

Connect the connector

3 sec.

OFF

Fuel System

- Fuel Warning System
  - Detection conditions

After the driving for 30 min. or more

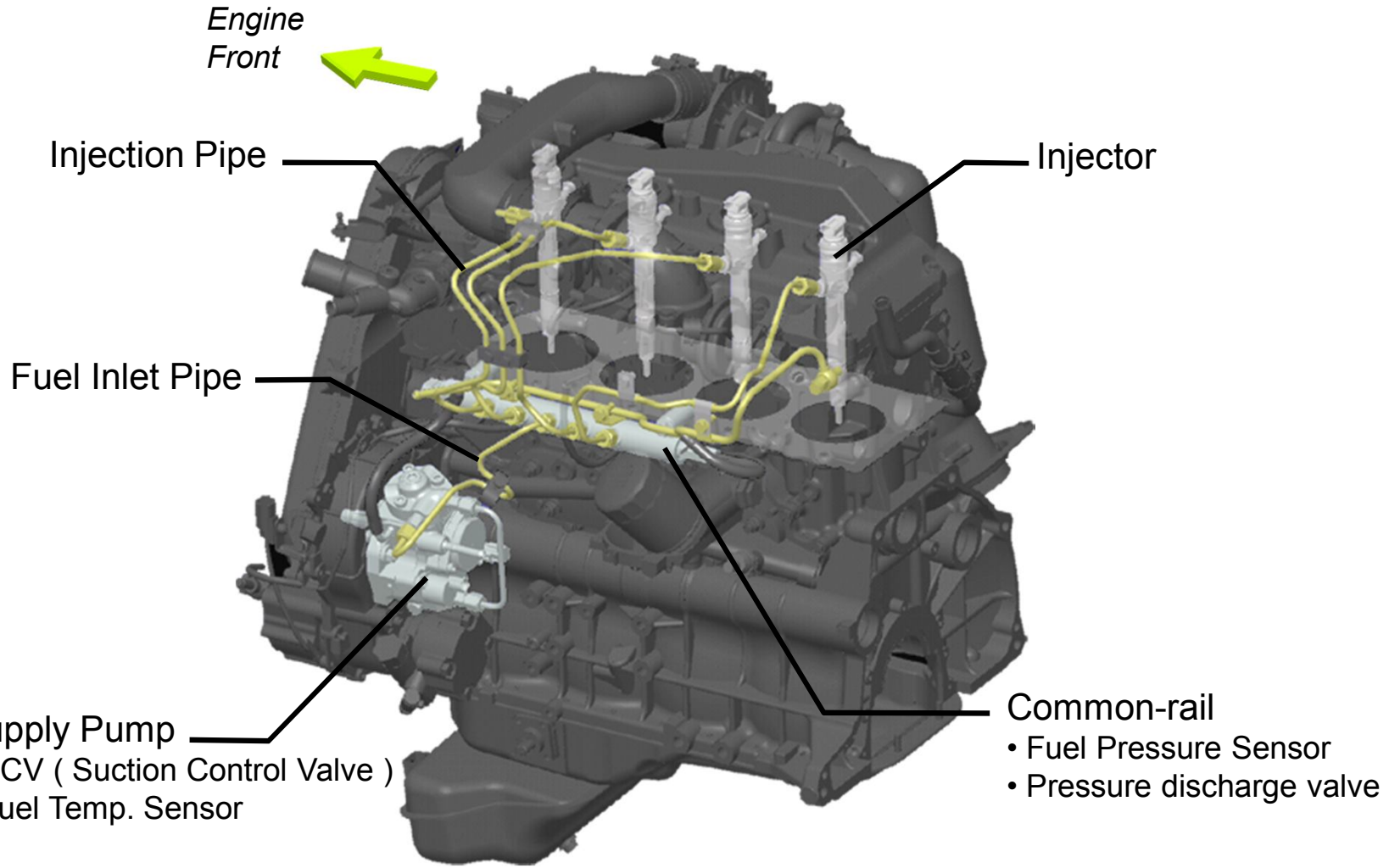
Fuel Filter Warning Switch Condition

OFF for 10 min. or more *or* **OFF is detected for 2 times during 1 trip**

The warning light keeps ON until the reset operation is done

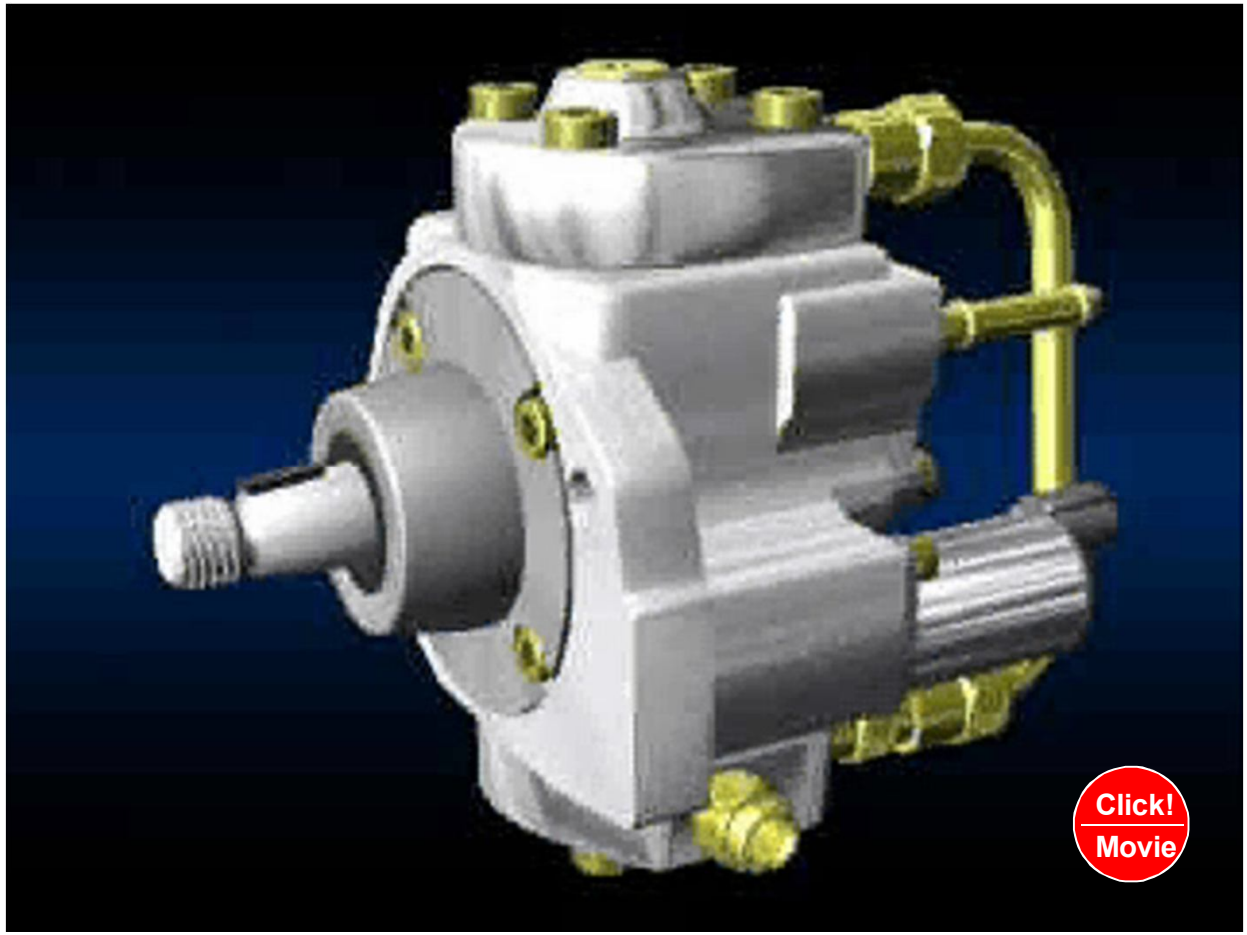
Fuel System

- Common-rail System



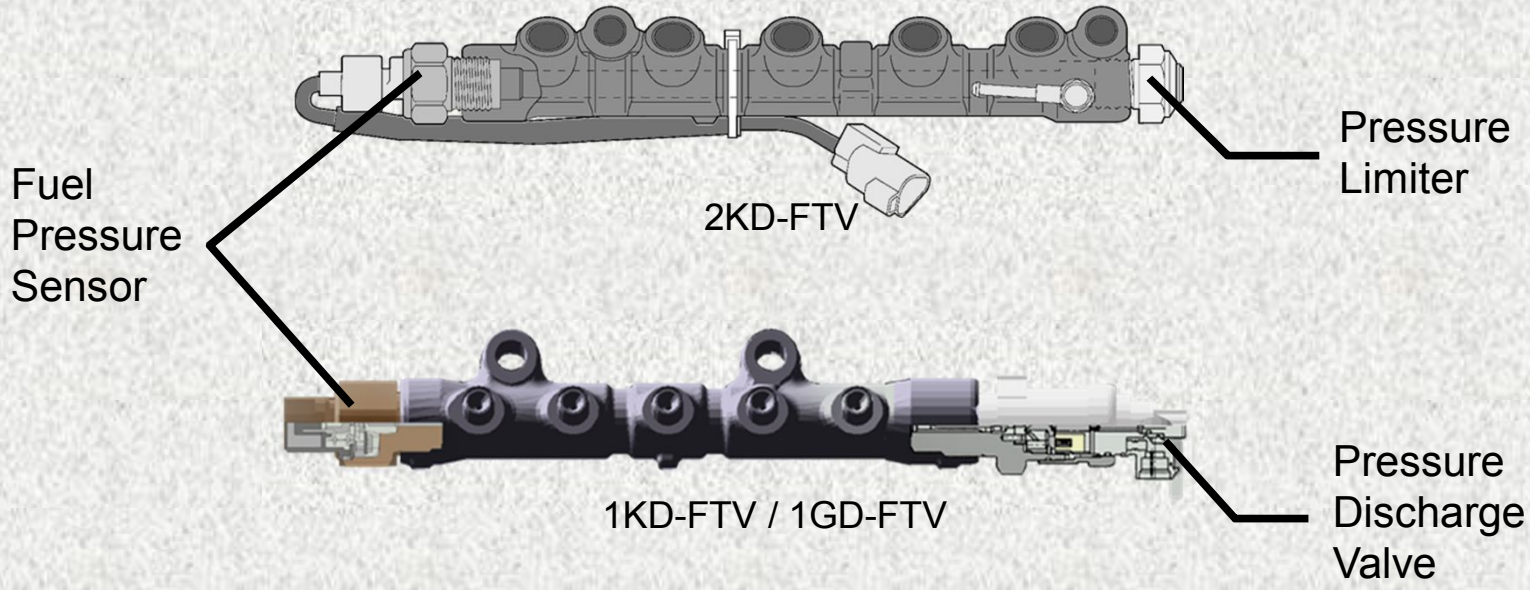
Fuel System

- Supply Pump
  - Fuel flow (reference)



Fuel System

- Common-rail
  - Stores high pressure fuel and supplies to injector

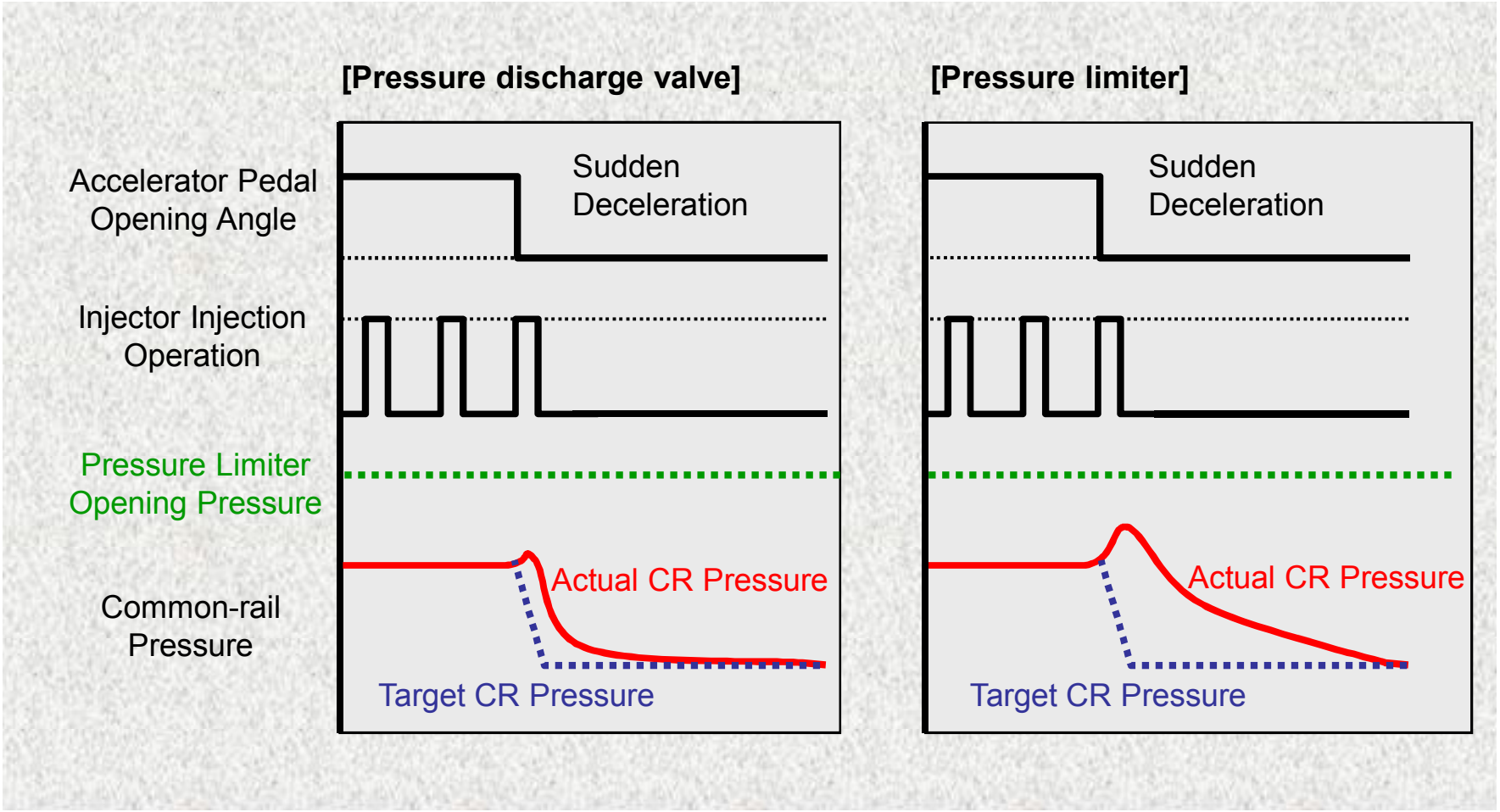


	Engine Stop	Idling – Full Load
*Common-rail Pressure	Gradually become 0 MPa	30 – 220 MPa

* Depends on engine model

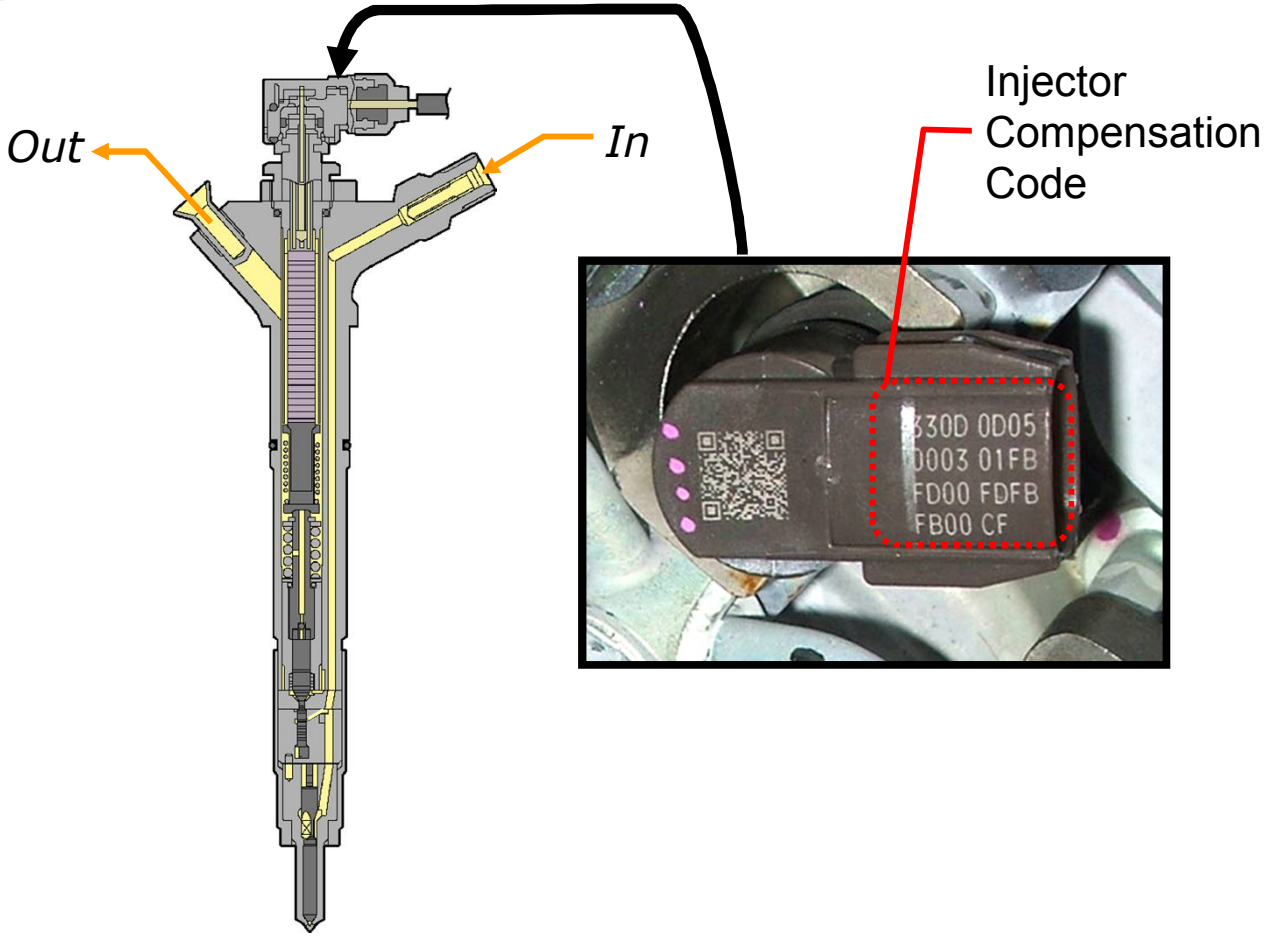
Fuel System

- Common-rail
  - Pressure discharge valve



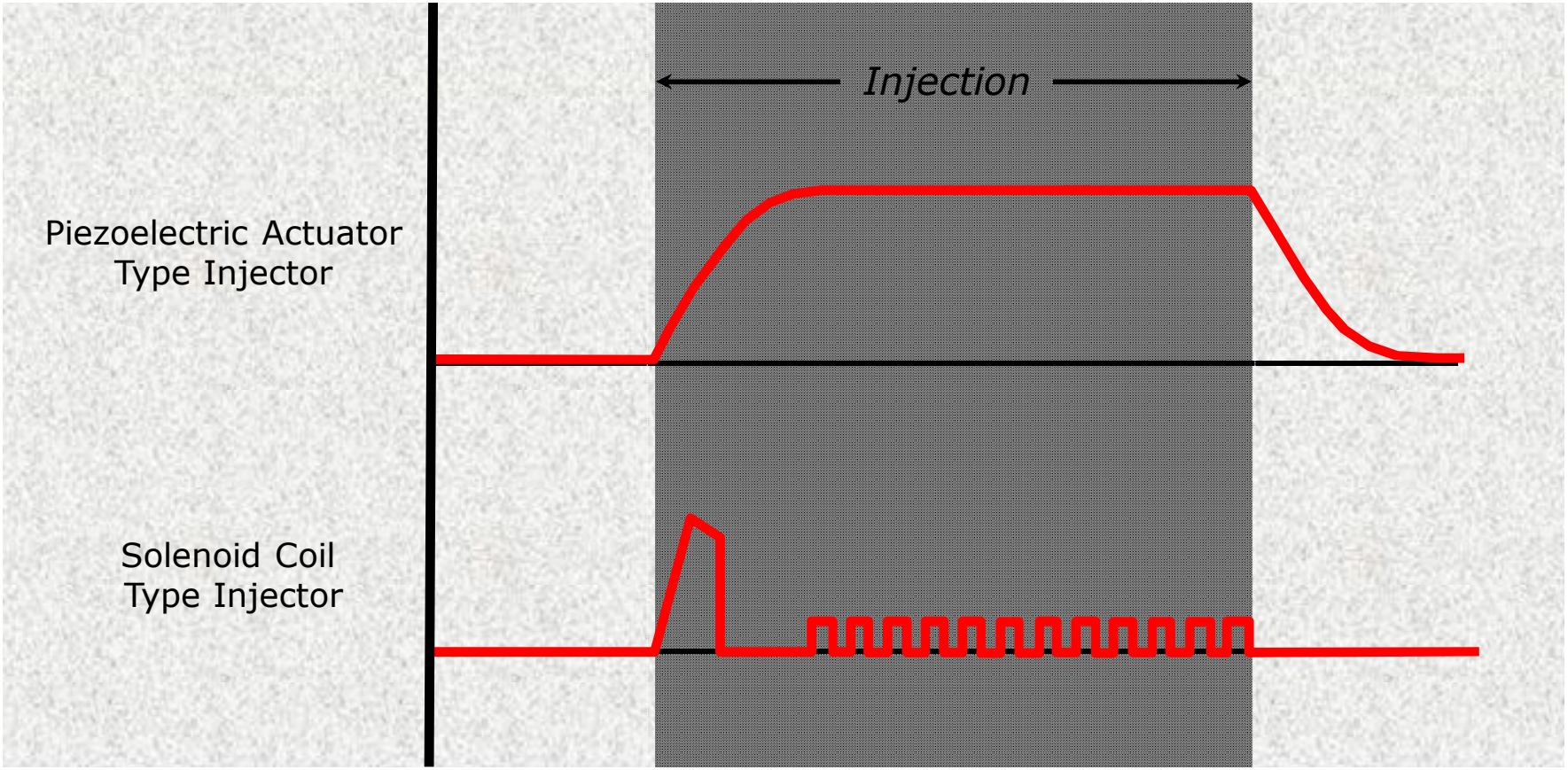
Fuel System

- Injector
  - Injector Compensation Code



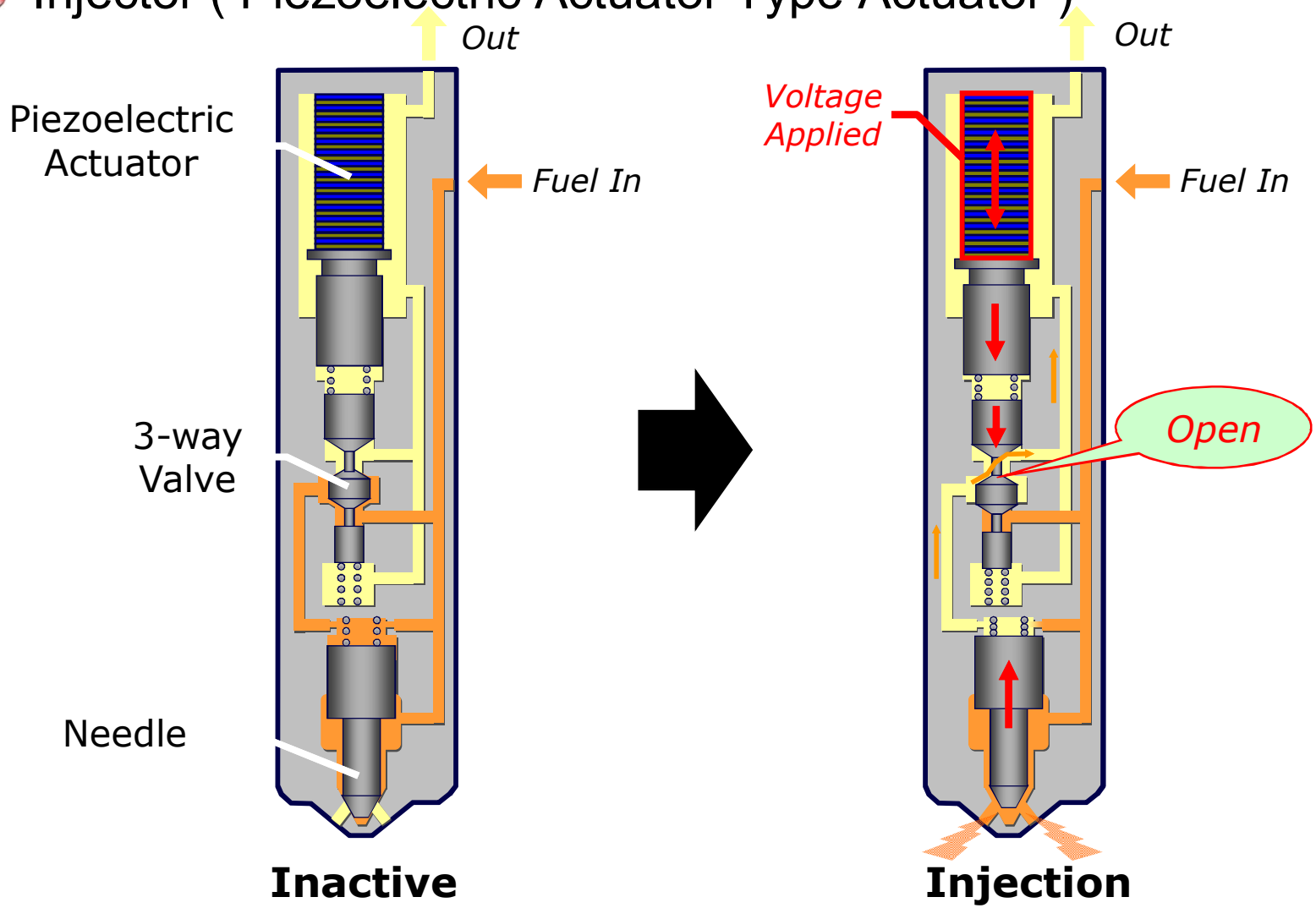
Fuel System

- Injector
  - Injectors are driven by injector driver (approx. 150 V)



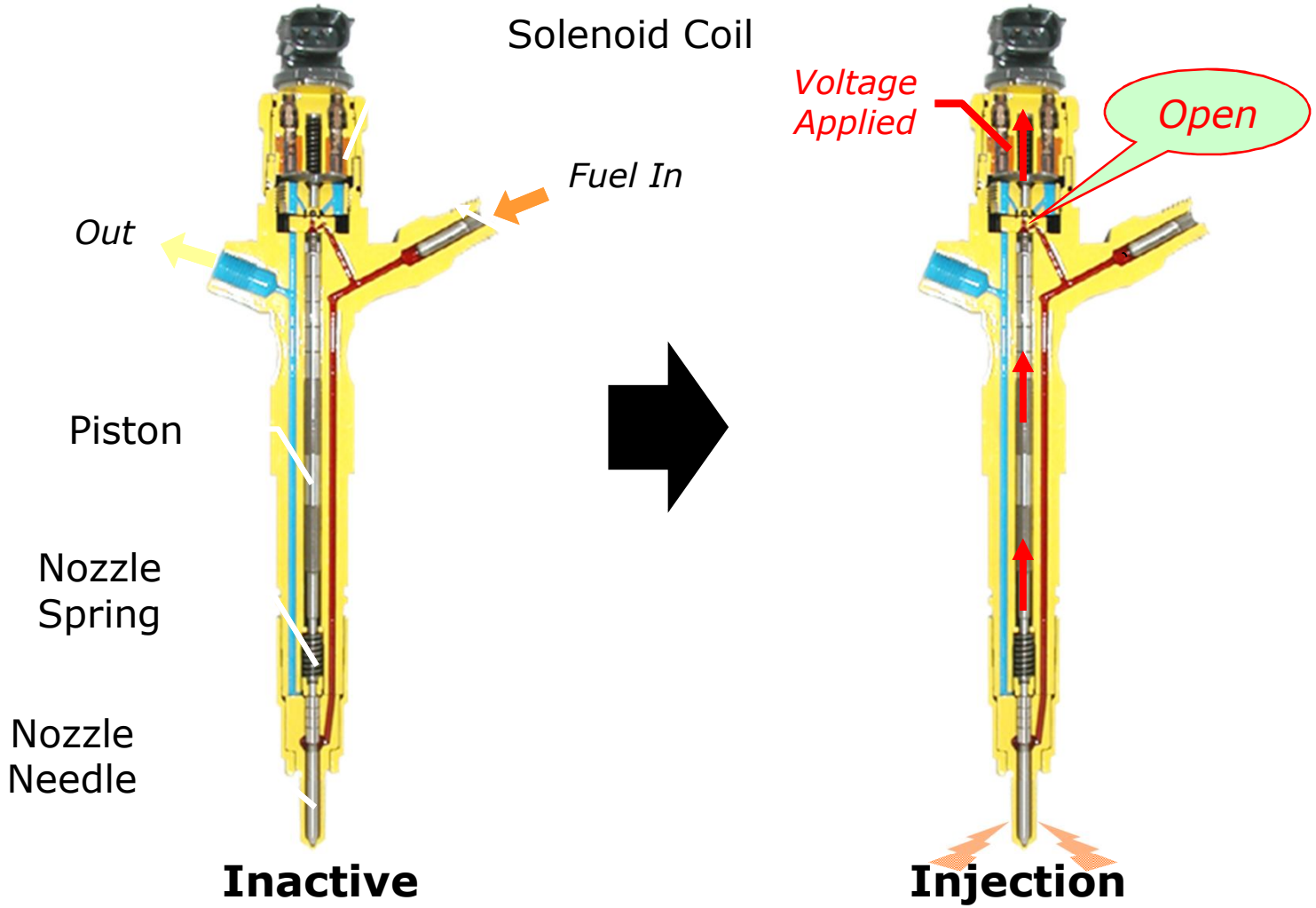
Fuel System

- Injector (Piezoelectric Actuator Type Actuator)



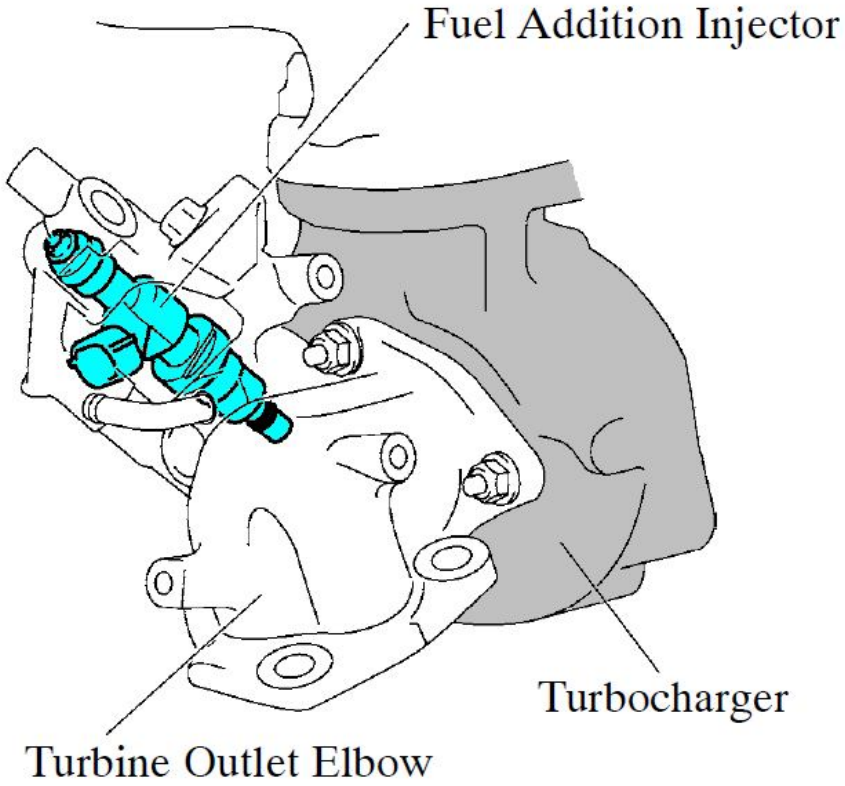
Fuel System

- Injector (Solenoid Coil Type Actuator)



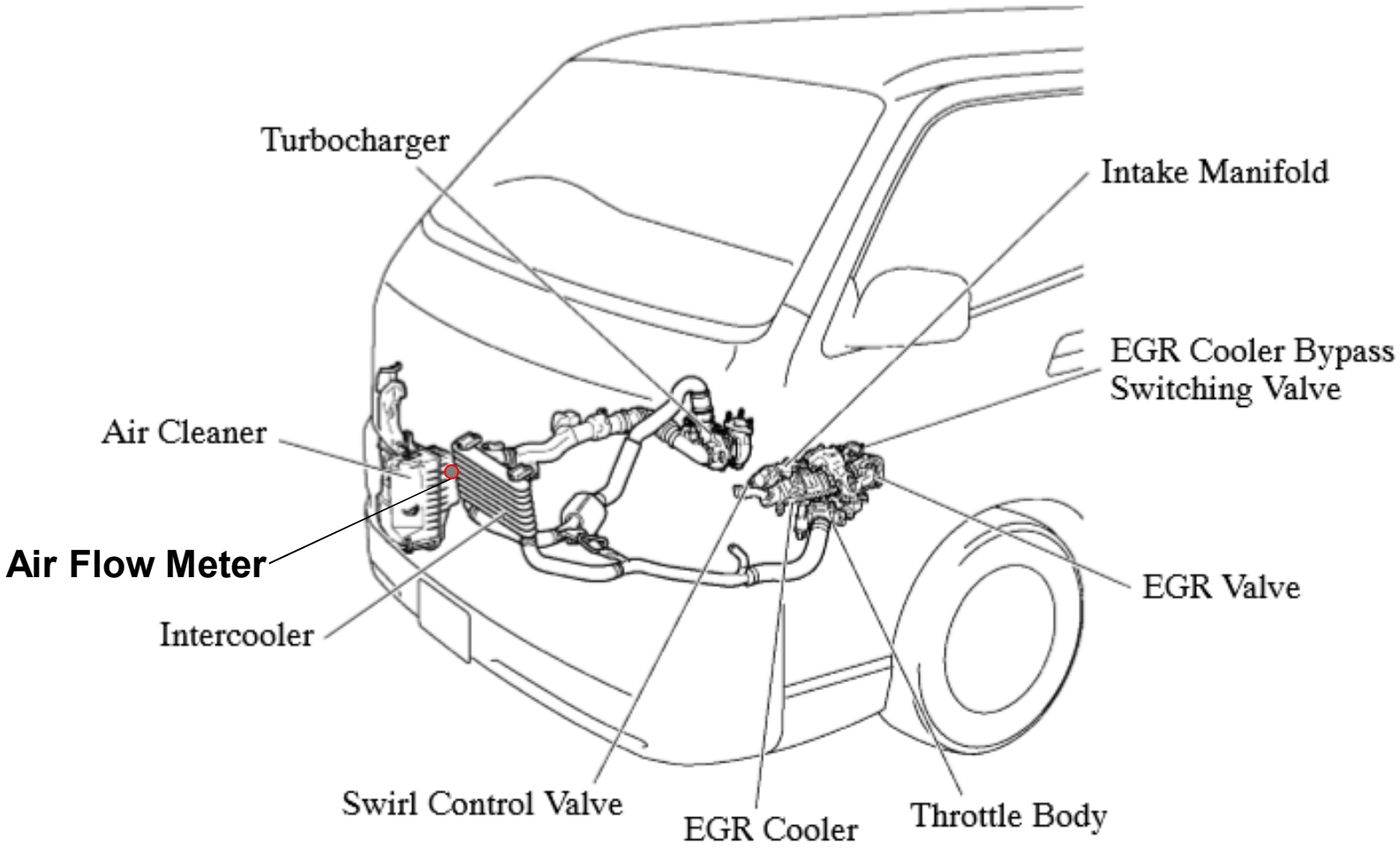
Fuel System

- Exhaust Fuel Addition Injector (With DPF)
  - Fuel adds into exhaust port in order to raise catalyst temperature for PM forced regeneration



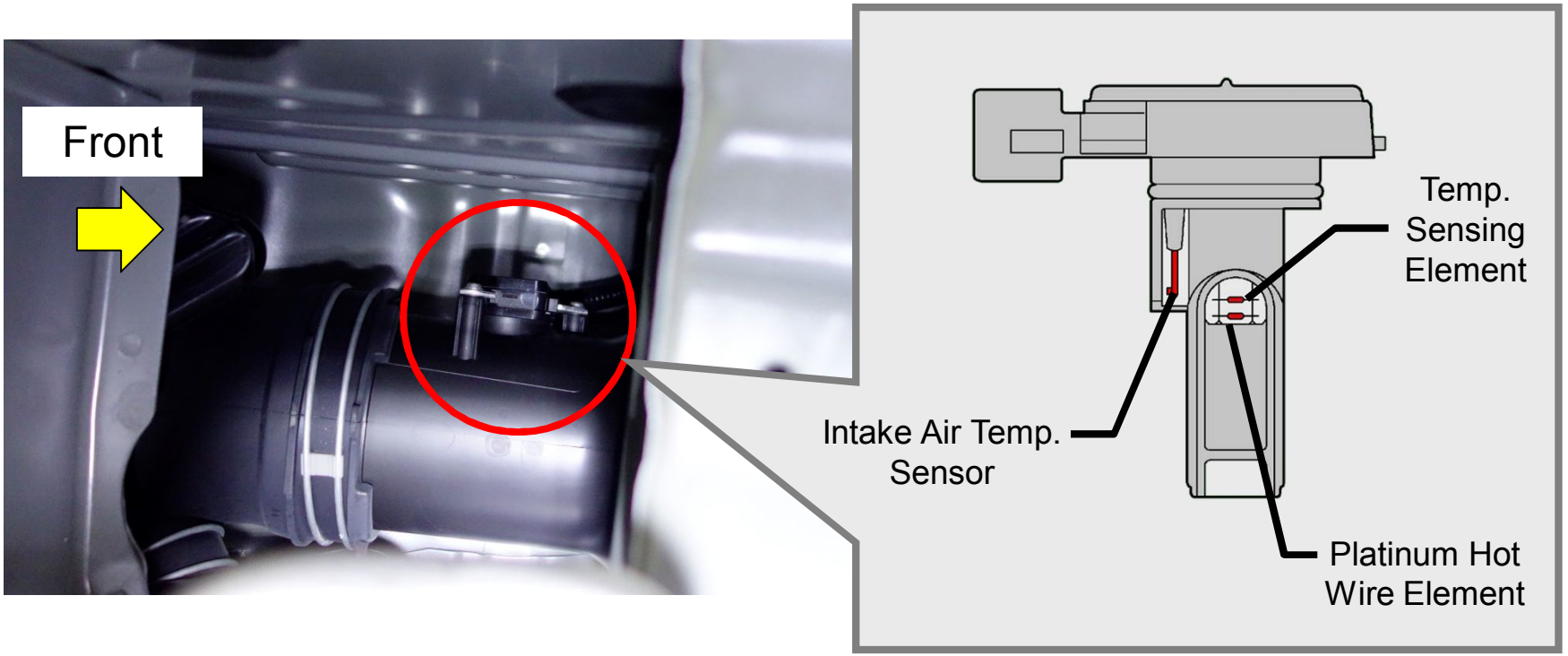
Intake and Exhaust System

- Intake System



Intake and Exhaust System

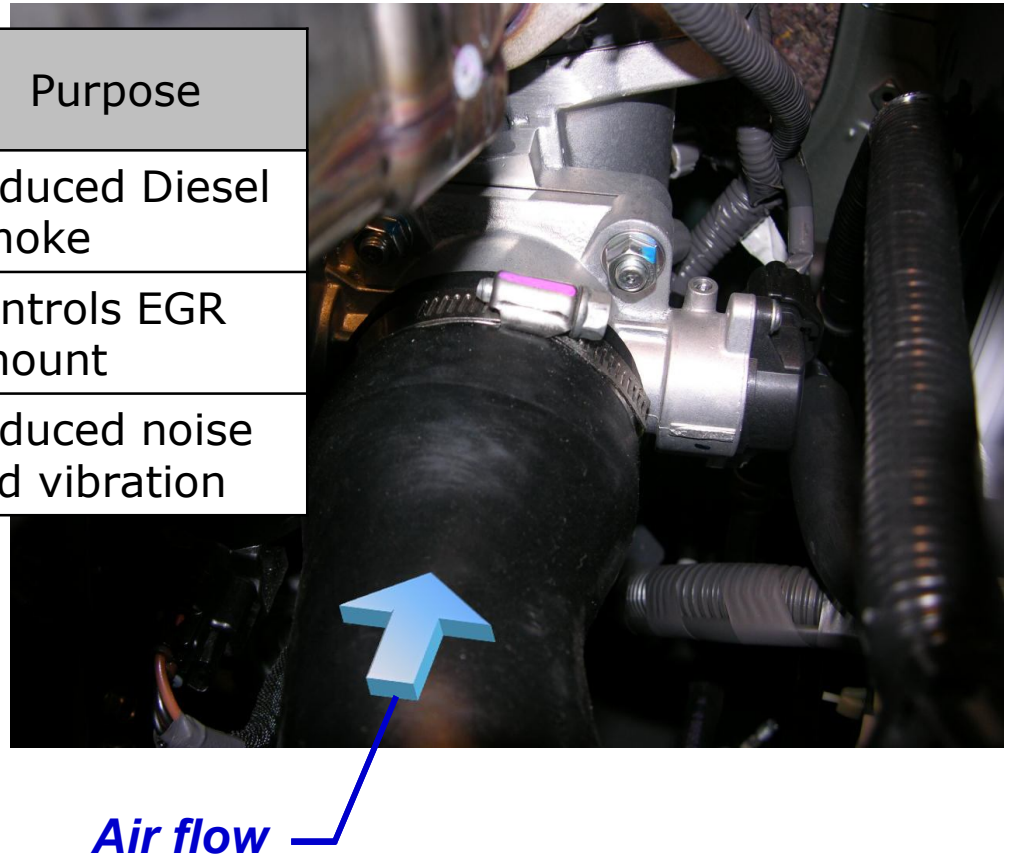
- Air Flow Meter (Hot wire type)
  - Measuring the mass and the flow rate of the intake air
  - The air flow meter has a built-in air temperature sensor



Intake and Exhaust System

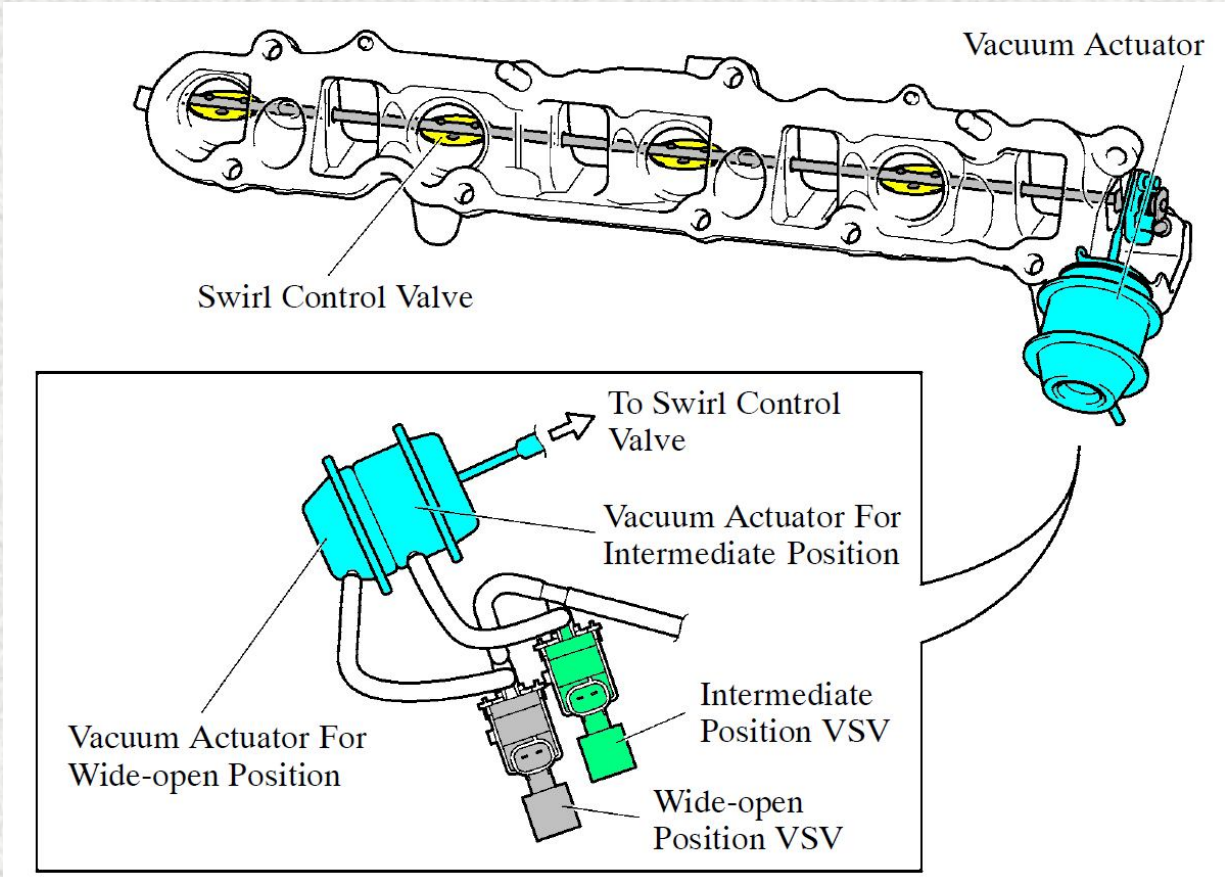
- Throttle Body
  - Throttle body is used to improve EGR performance

Engine Condition	Valve Position	Purpose
Starting	Full Open	Reduced Diesel Smoke
Running	Small - Full Open	Controls EGR amount
Stop	Full Close	Reduced noise and vibration



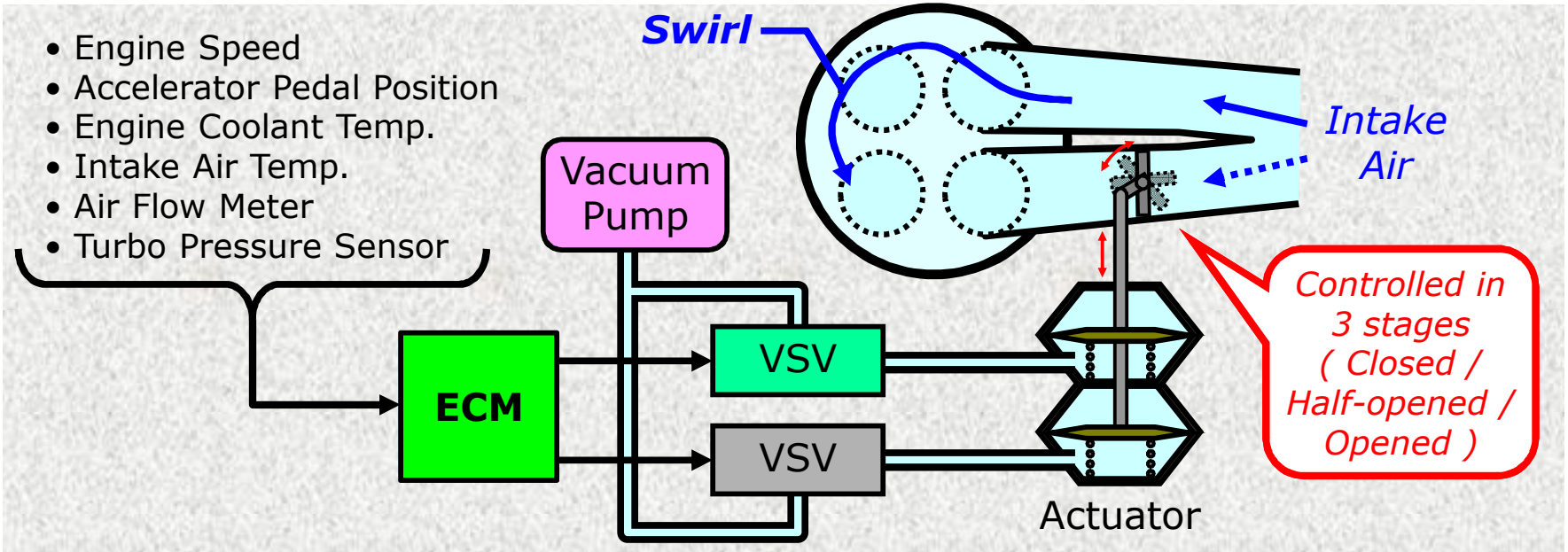
Intake and Exhaust System

- Intake Manifold
  - Operation of the swirl control valve



Intake and Exhaust System

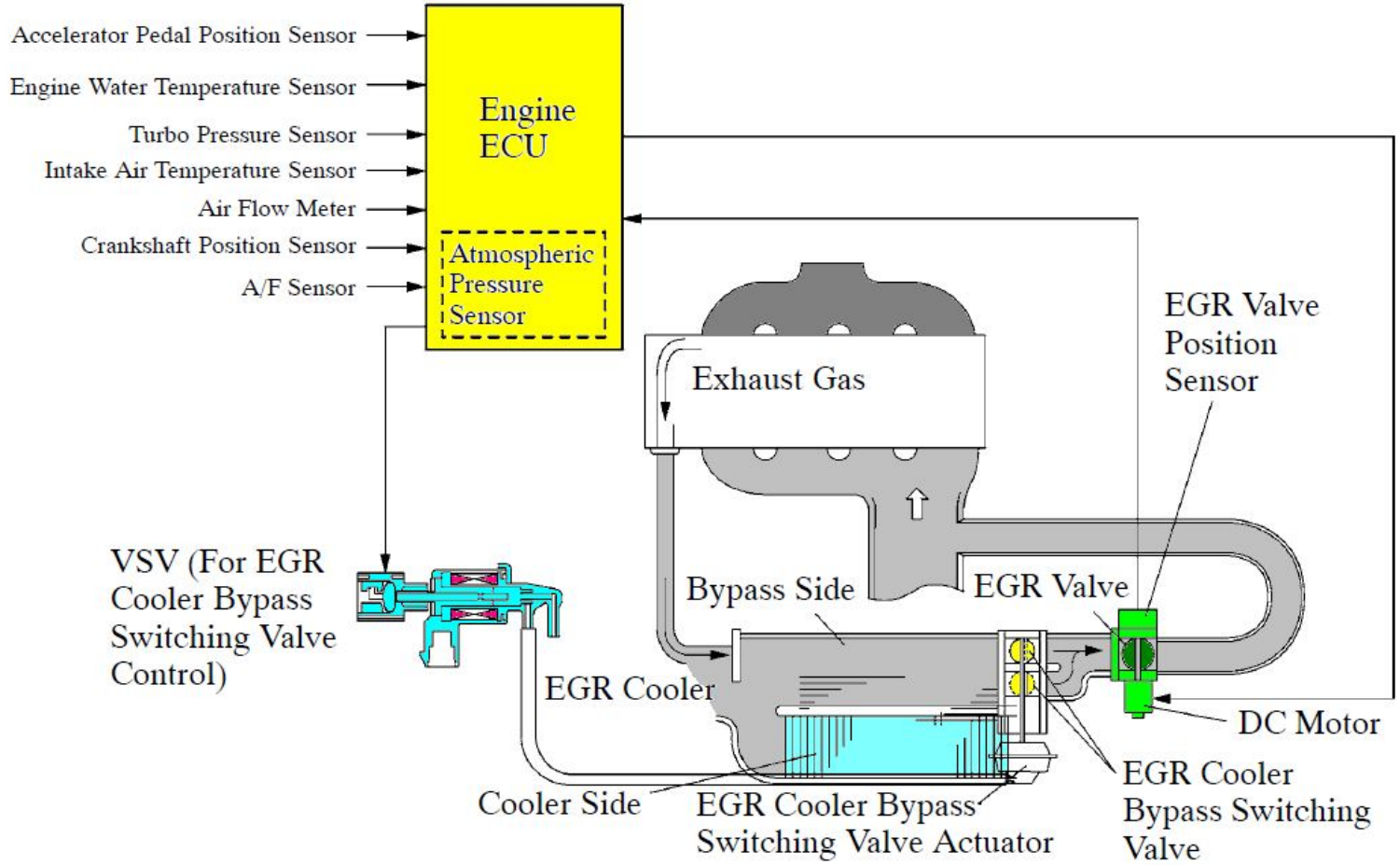
Intake Manifold



Engine Condition	Swirl Control Valve	Effect
Cold Engine	**Closed**	Strengthen the swirl to reduce the white smoke
Low Engine Speed		Strengthen the swirl to stabilizing combustion
Middle Engine Speed	**Half-opened**	Secure the necessary intake air volume and get a certain amount of effect of the swirl strengthening
High Engine Speed	**Opened**	Reduce intake resistance

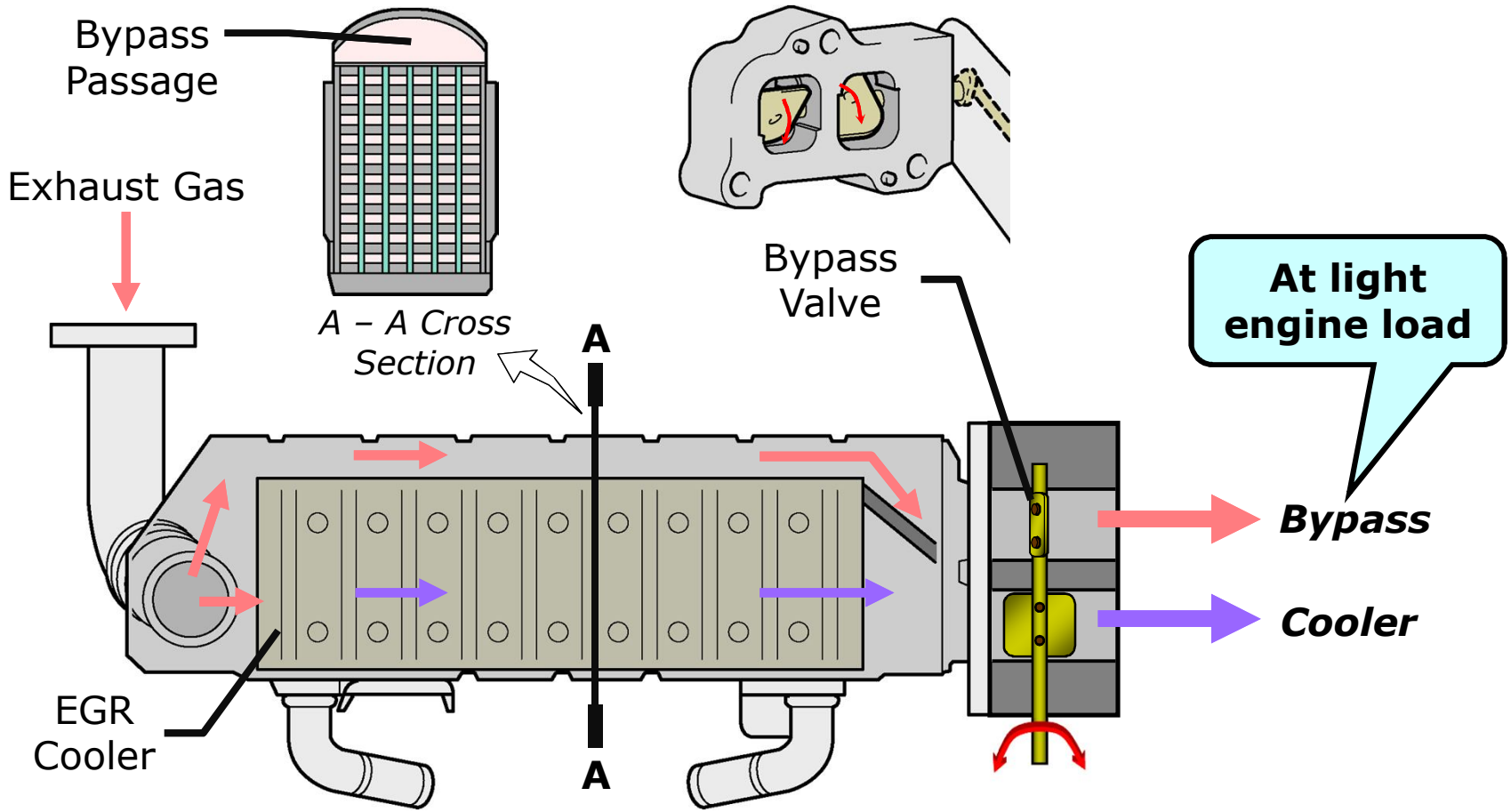
Intake and Exhaust System

- EGR Cooler
  - Bypass valve for EGR cooler



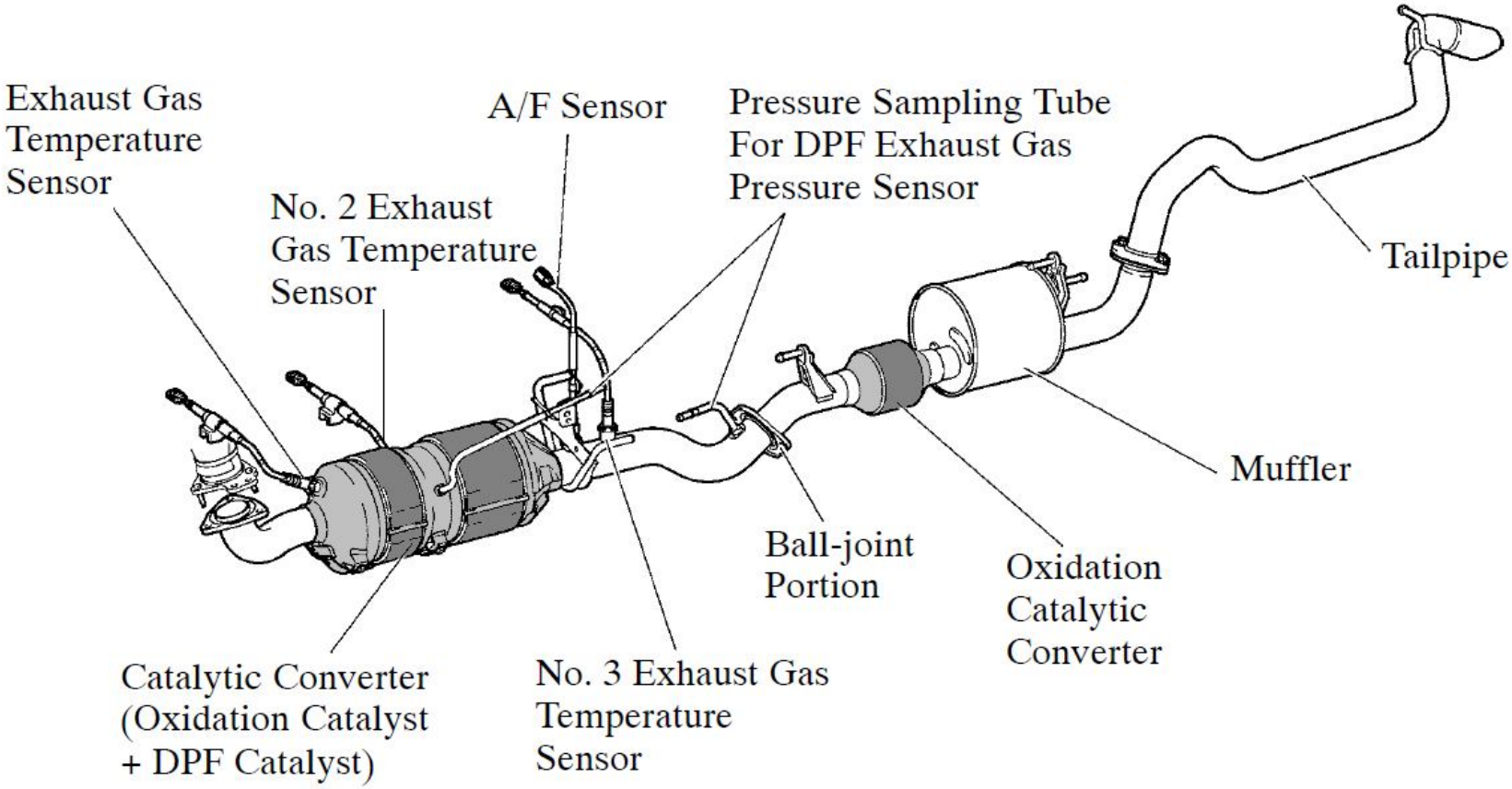
Intake and Exhaust System

- EGR Cooler
  - Bypass valve for EGR cooler



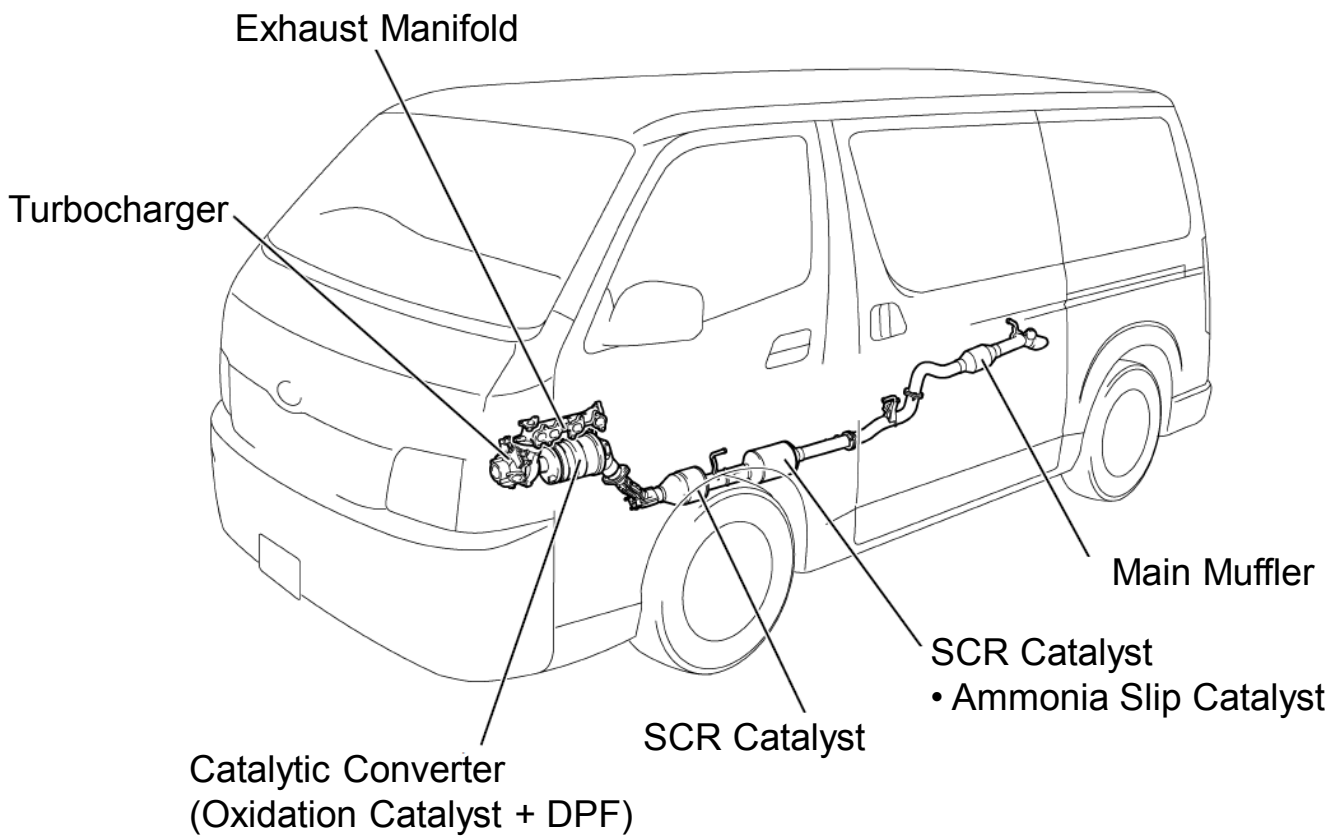
DPF (Diesel Particulate Filter) System

- Catalytic Converter (EURO V)



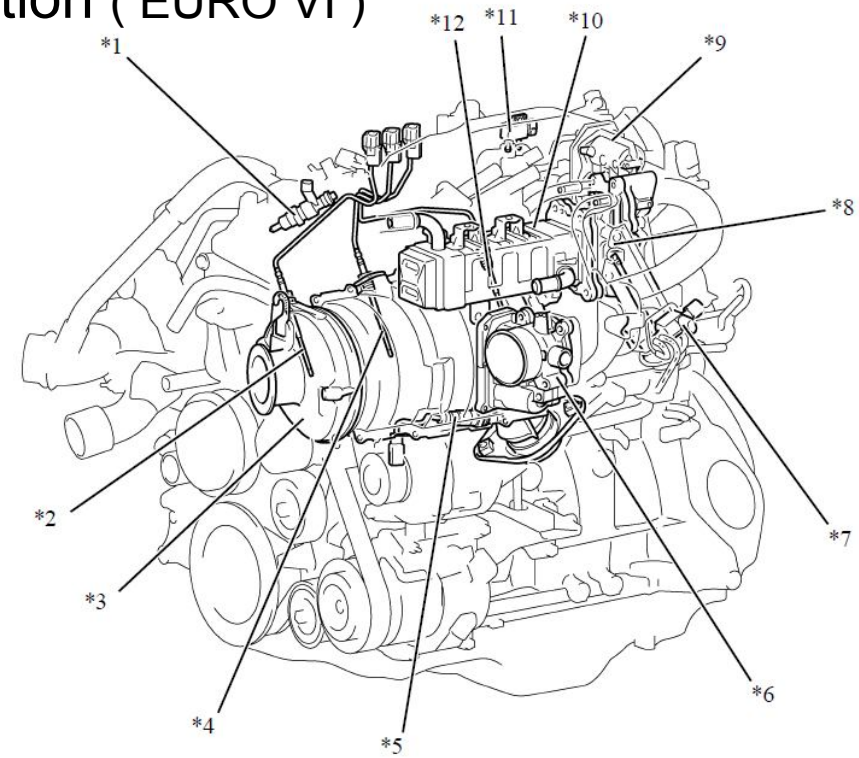
DPF (Diesel Particulate Filter) System

- Catalytic Converter (EURO VI)



DPF (Diesel Particulate Filter) System

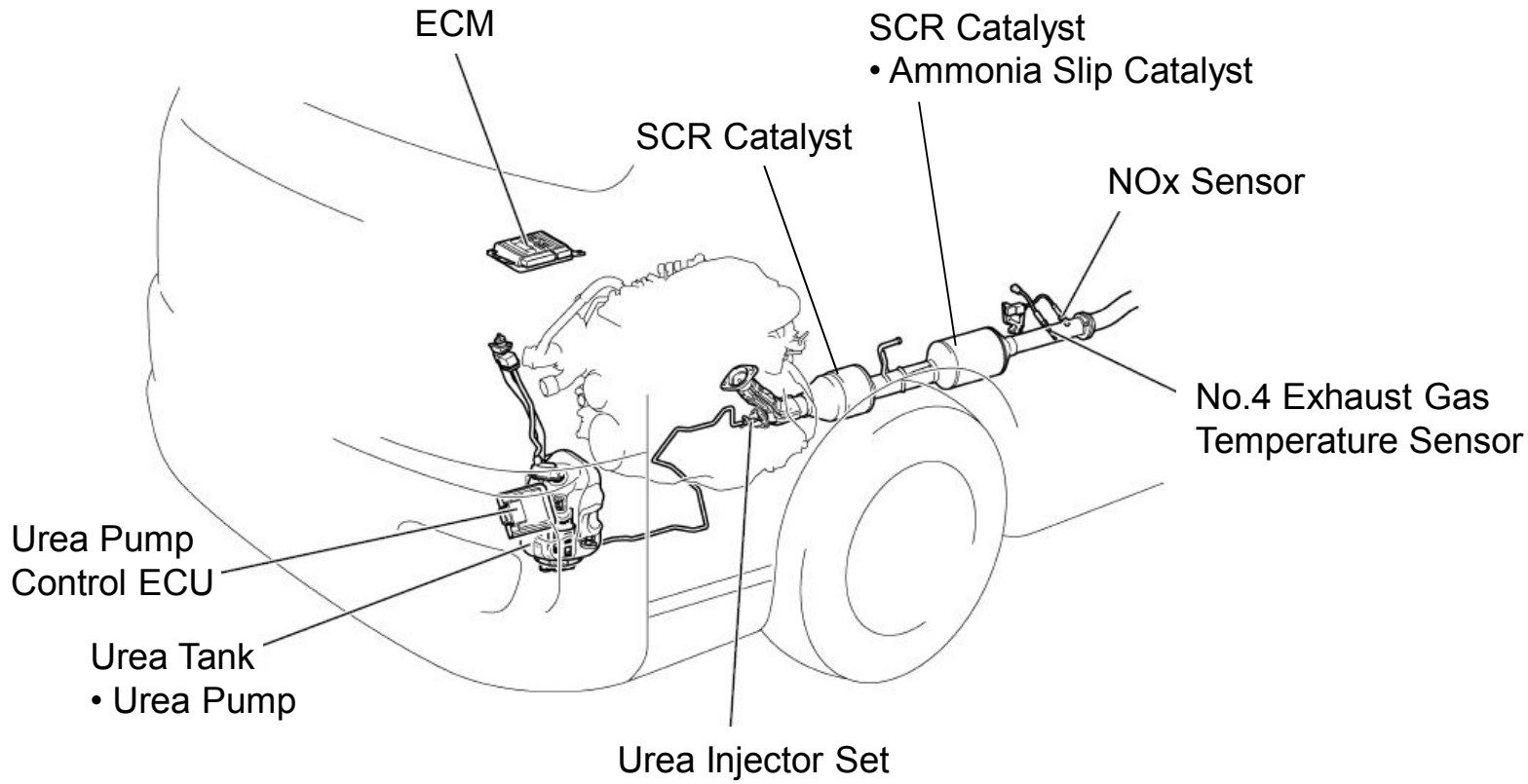
- Parts Location (EURO VI)



*1	Exhaust Fuel Addition Injector Assembly	*2	Exhaust Gas Temperature Sensor	*3	Exhaust Manifold Converter Sub-assembly • Oxidation Catalyst • DPF
*4	No.2 Exhaust Gas Temperature	*5	Air Fuel Ratio Sensor	*6	Diesel Throttle Body Assembly
*7	Vacuum Switching Valve Assembly	*8	No.2 EGR Valve Assembly	*9	Electric EGR Control Valve Assembly
*10	No.1 EGR Cooler	*11	Differential Pressure Sensor	*12	No.3 Exhaust Gas Temperature Sensor

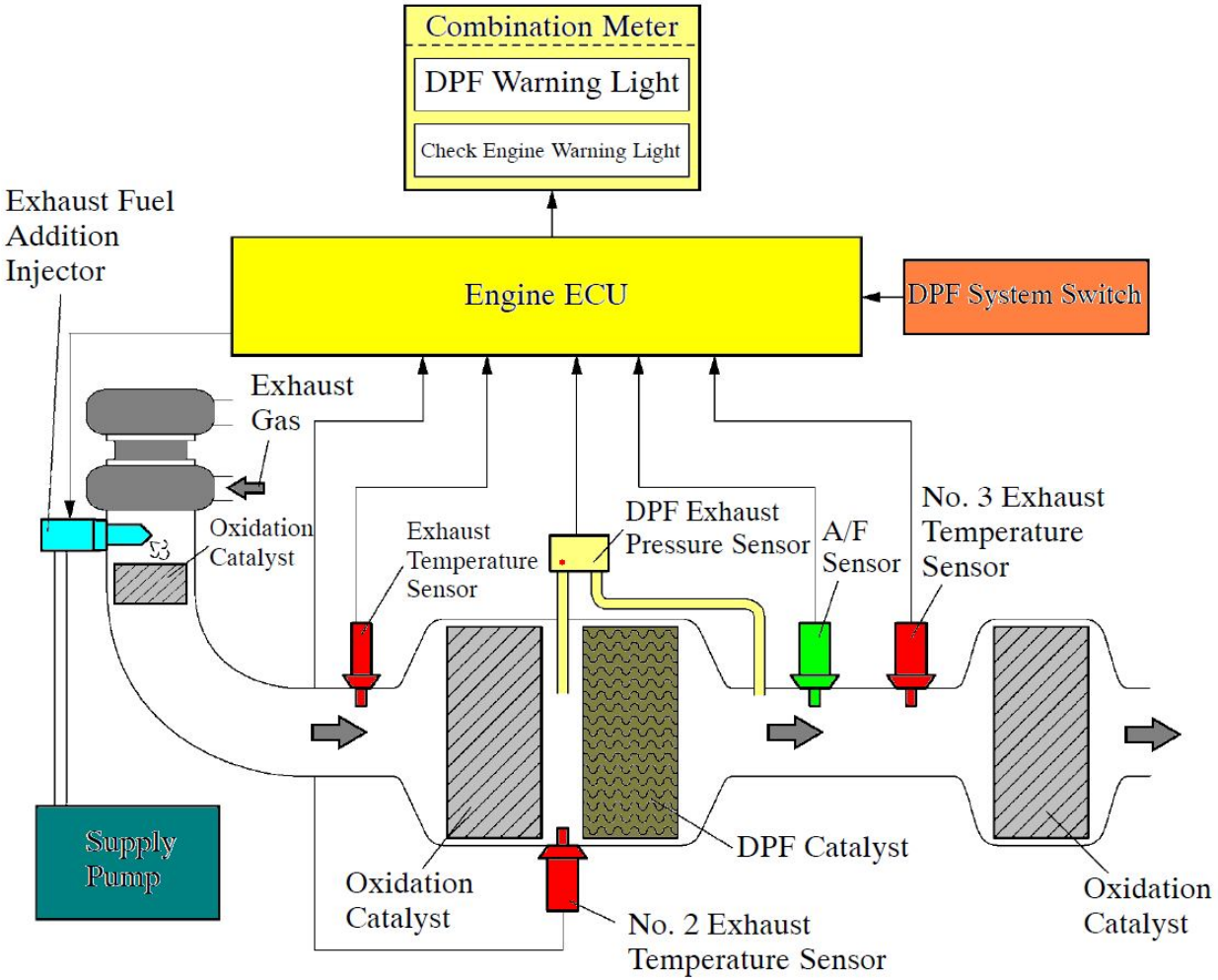
SCR (Selective Catalytic Reduction) System

- Parts Location (EURO VI)



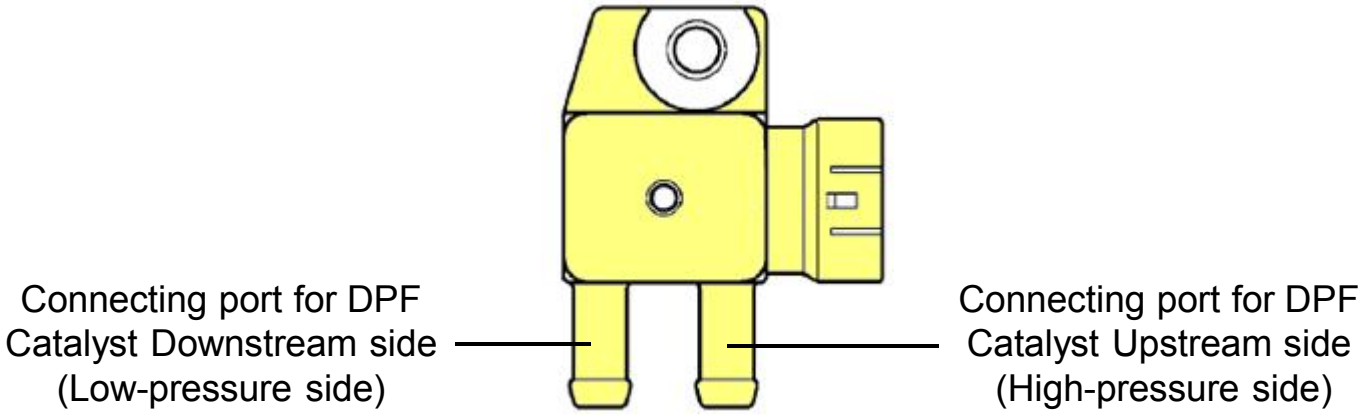
DPF (Diesel Particulate Filter) System

- Catalytic Converter



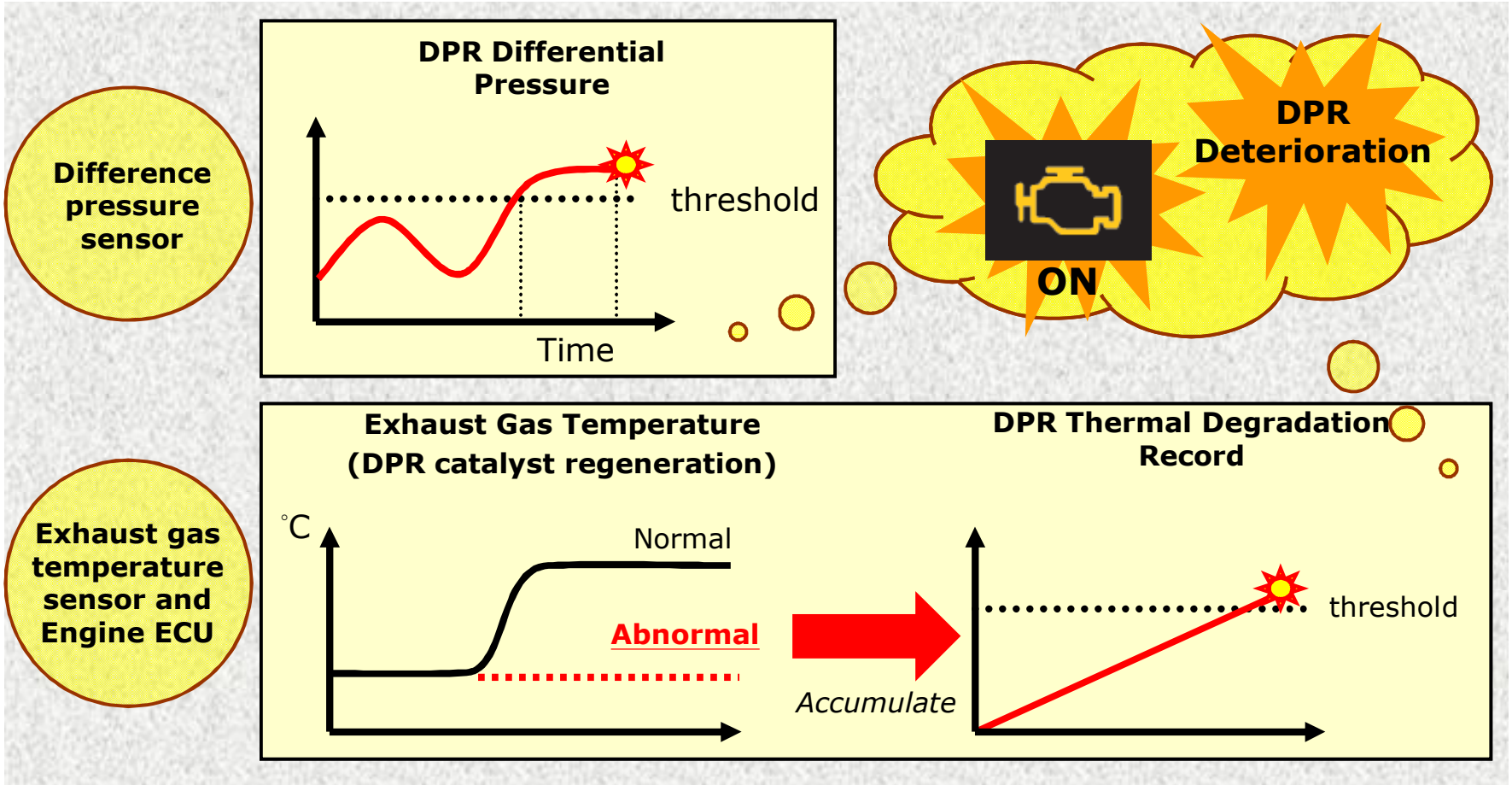
DPF (Diesel Particulate Filter) System

- EGR Exhaust Gas Pressure Sensor
  - Exhaust gas pressure sensor detects the amount of PM (Particulate Matter) accumulation in the DPF catalyst and for judging when clogging has occurred When PM builds up in the DPF catalyst, the "DPF Differential Pressure" value increases
  - At 3,000 rpm (no load), if "Catalyst Differential Pressure" is 0.27 or more (Calculated value), the DPF catalyst has become blocked



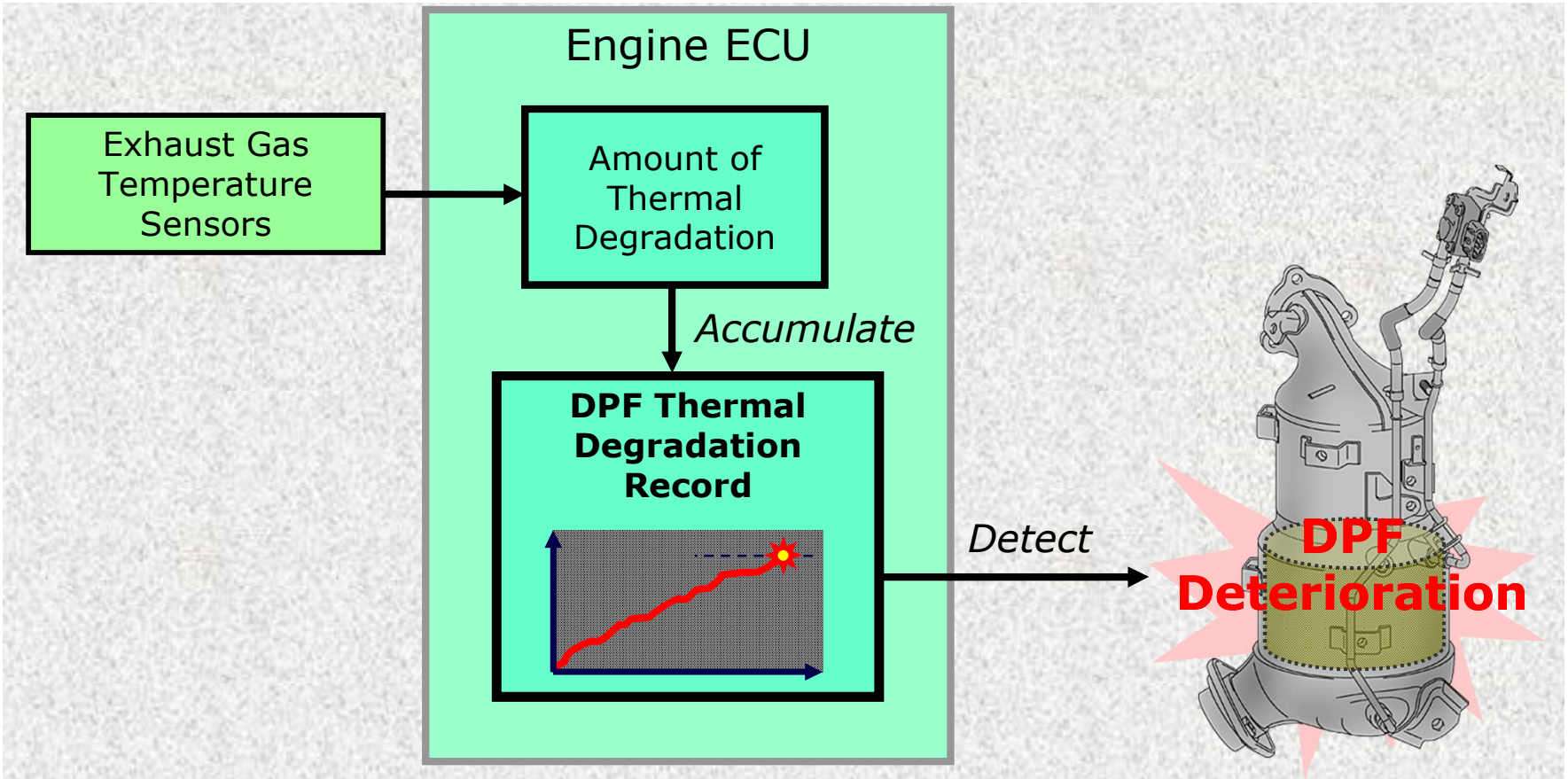
DPF (Diesel Particulate Filter) System

- DPR Deterioration and Clog Detection
  - Two types of detection method



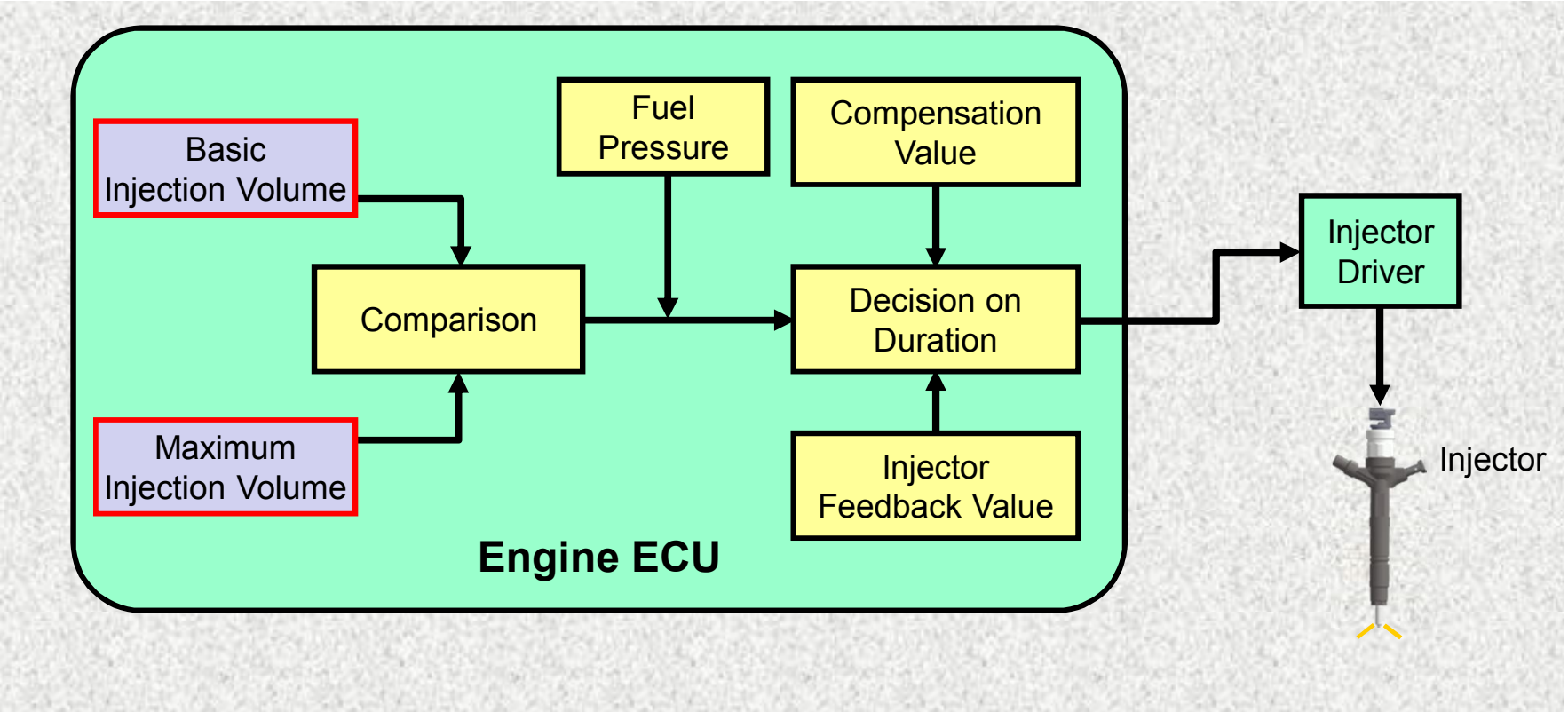
DPF (Diesel Particulate Filter) System

- DPR Deterioration Detection
  - Engine ECU calculates and accumulates the DPF thermal degradation record



Engine Control

- Fuel Injection Volume Control
  - Engine ECU compares the basic and maximum injection volumes, and determine the smaller calculated value to be the final injection volume



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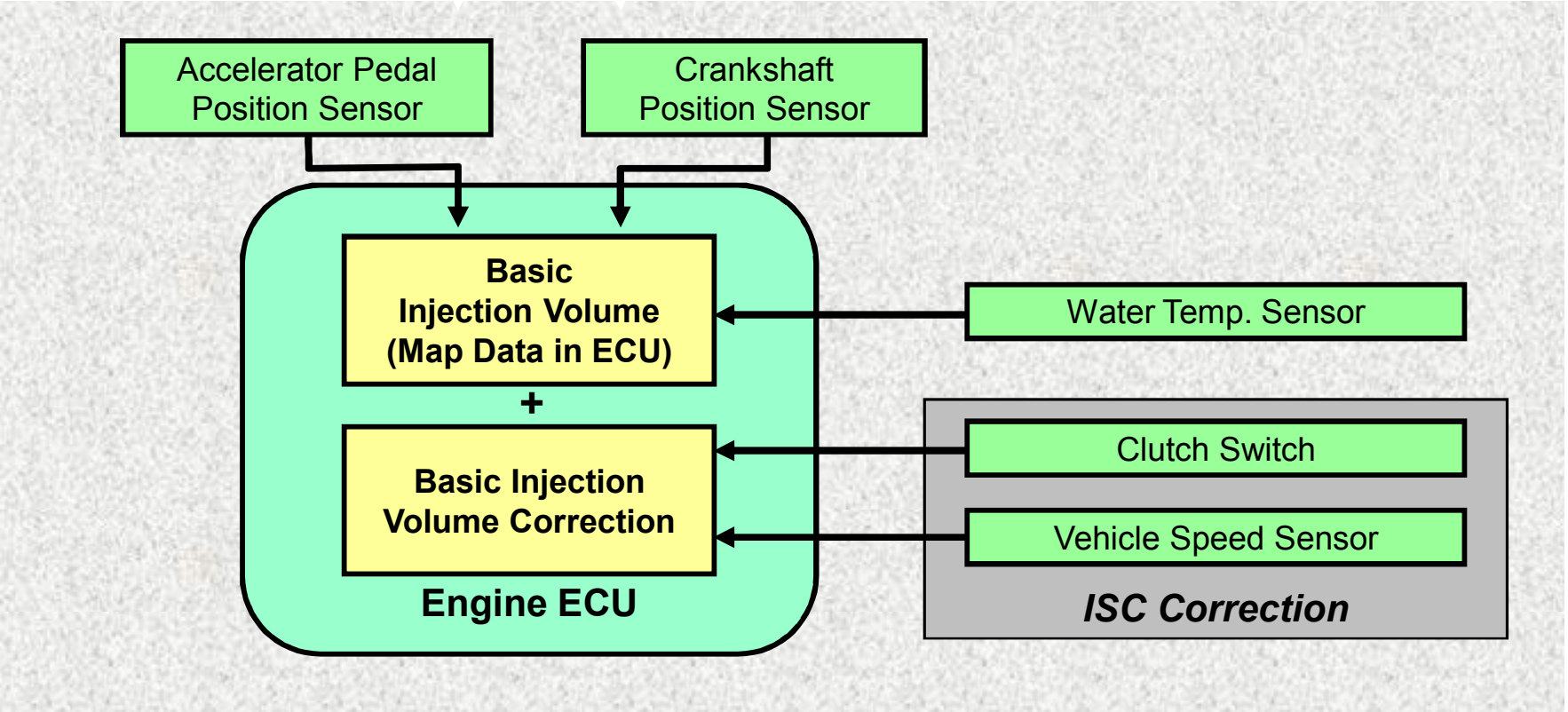
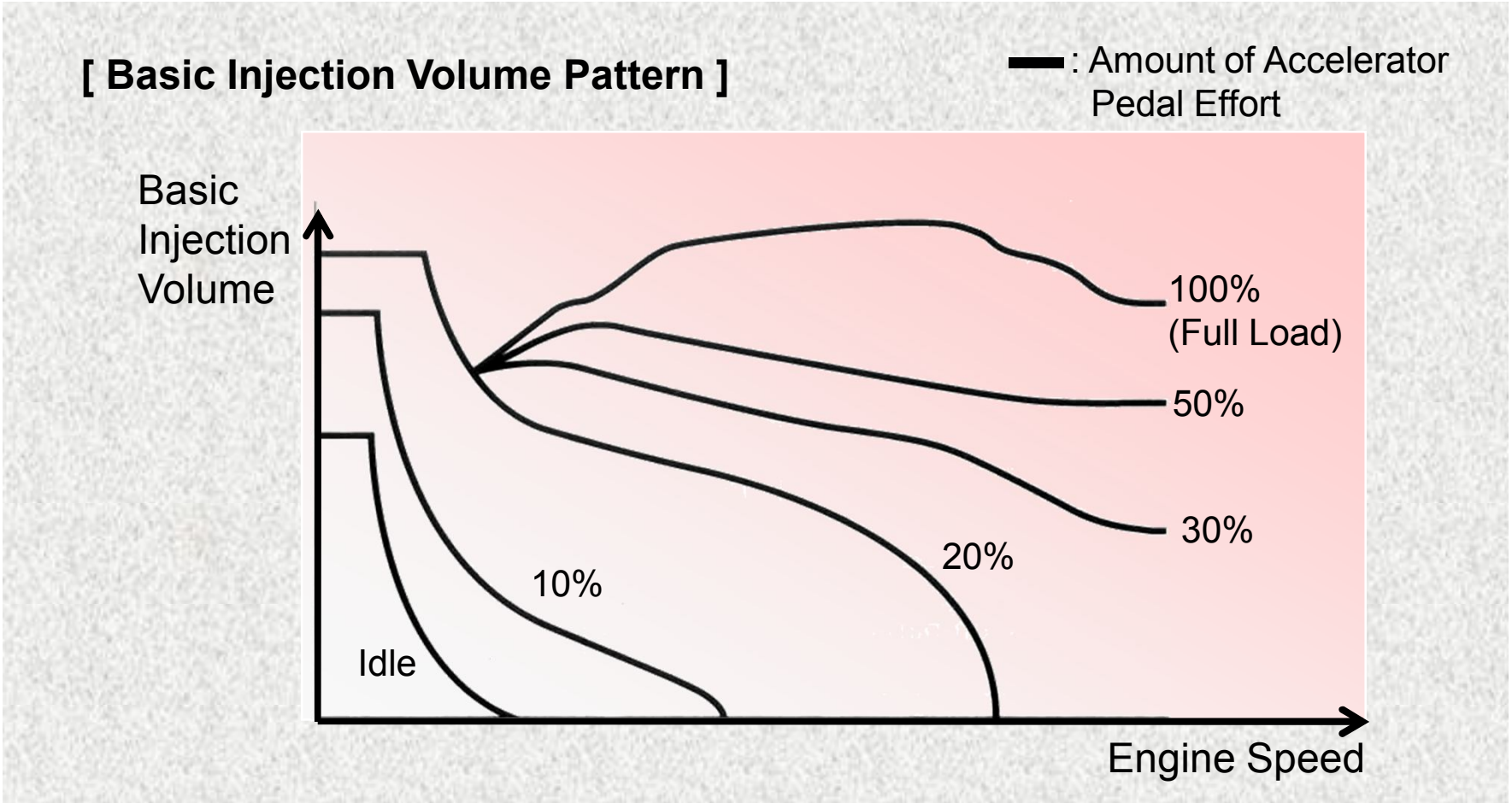


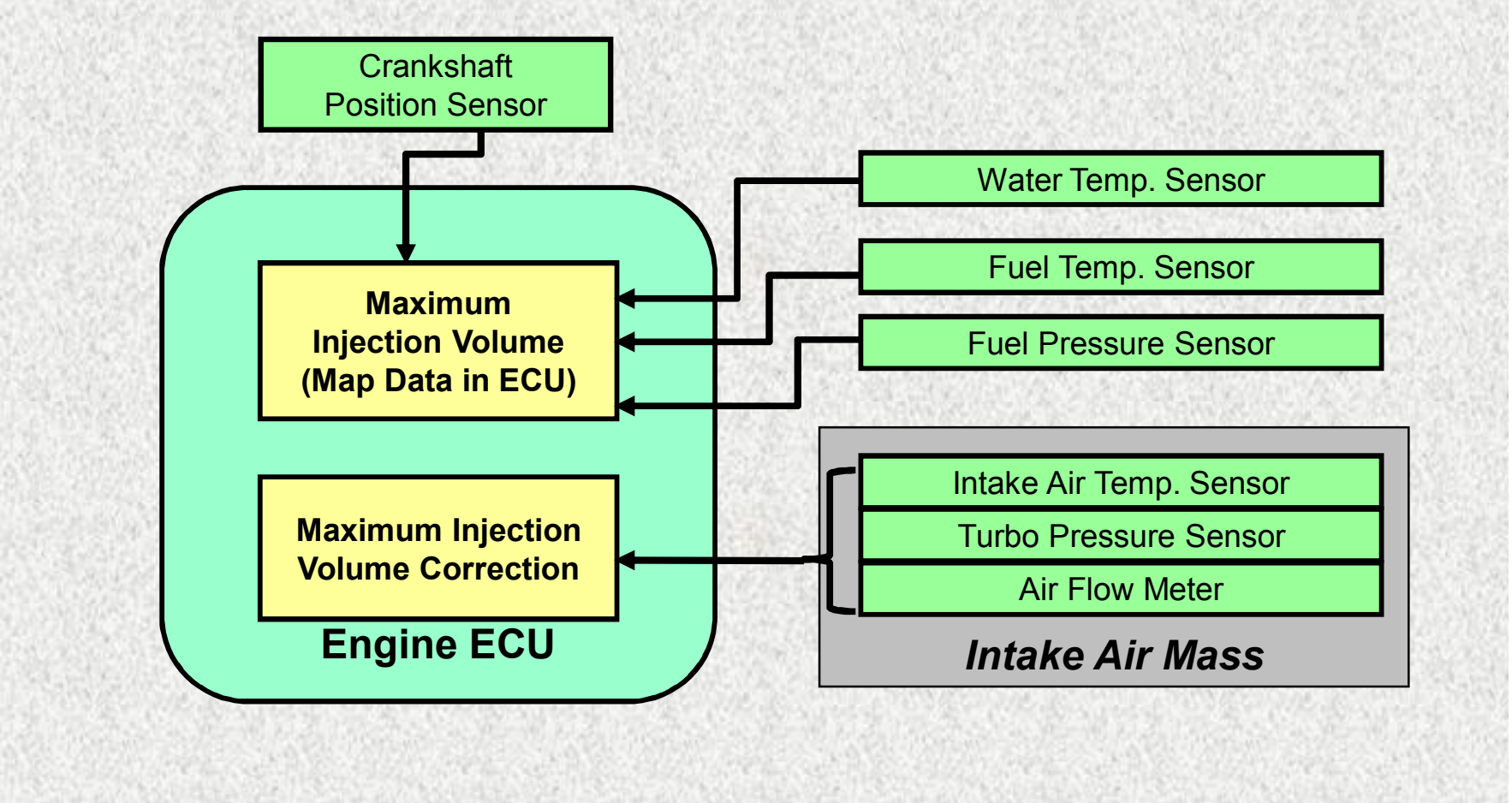
Engine Control

- Fuel Injection Volume Control
  - Basic injection volume



Engine Control

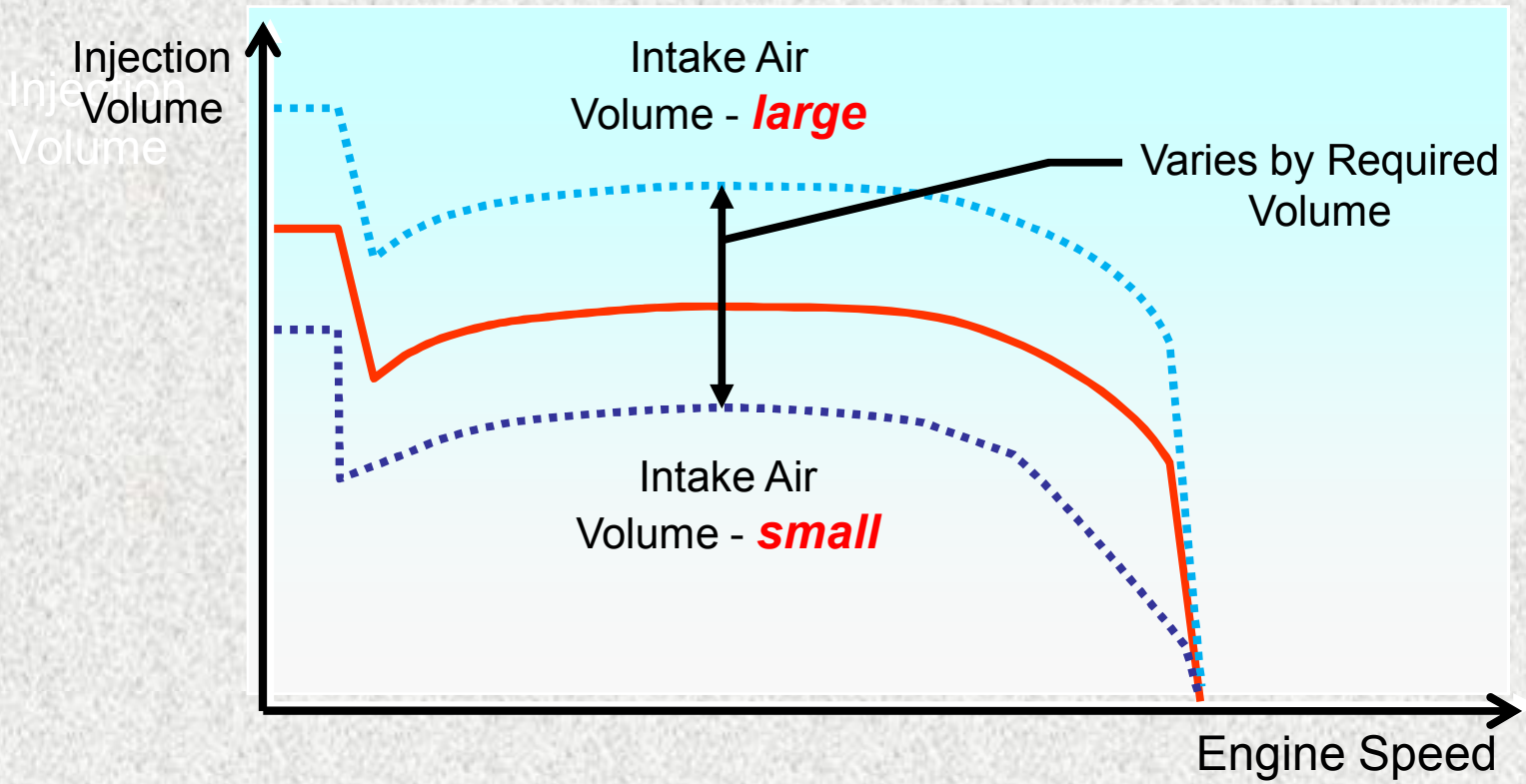
- Fuel Injection Volume Control
  - Maximum injection volume



Engine Control

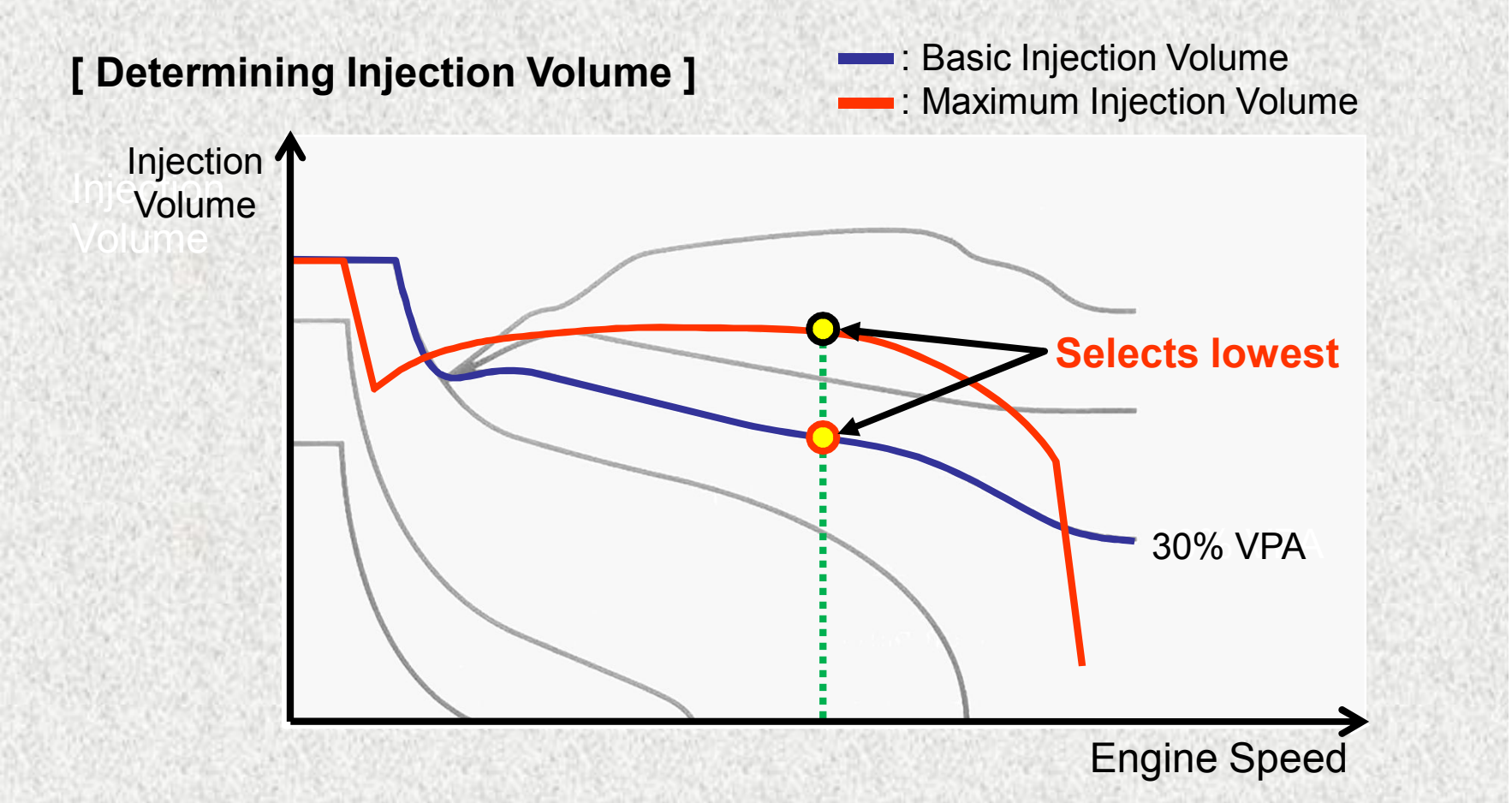
- Fuel Injection Volume Control
  - Maximum injection volume

[Maximum Injection Volume Pattern]



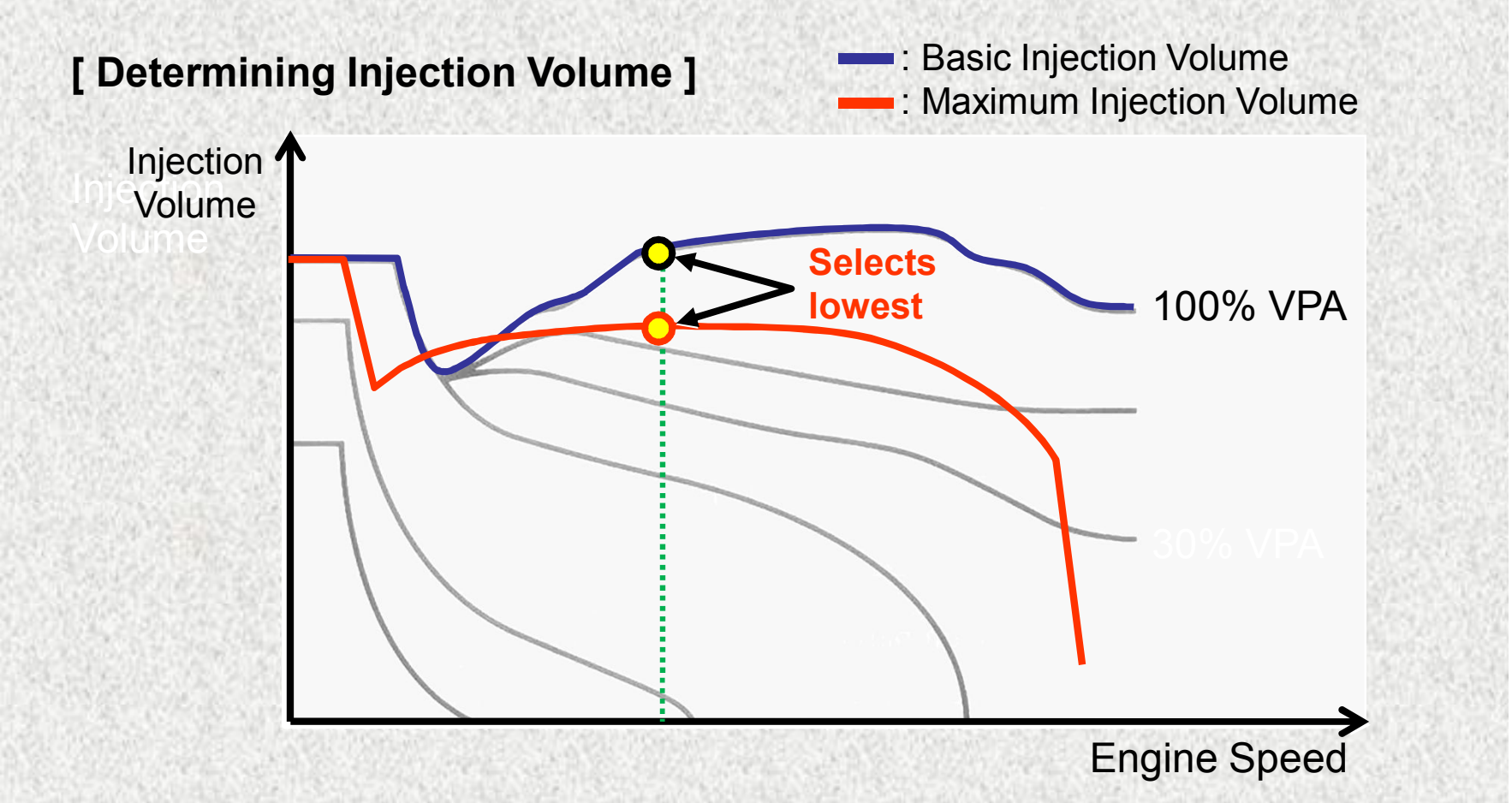
Engine Control

- Fuel Injection Volume Control
  - Case of VPA 30% → Selects basic injection volume



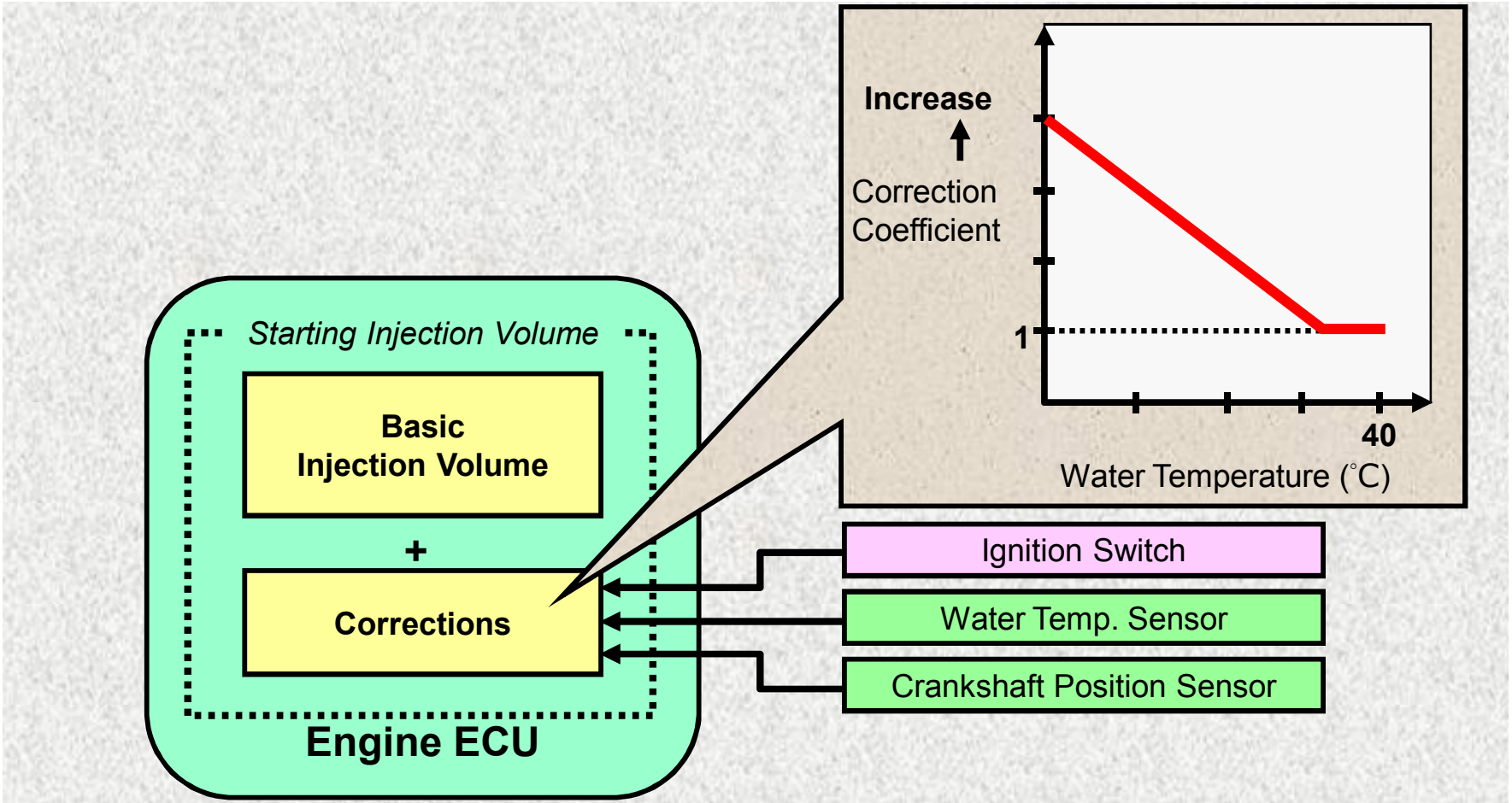
Engine Control

- Fuel Injection Volume Control
  - Case of VPA 100% → Selects maximum injection volume



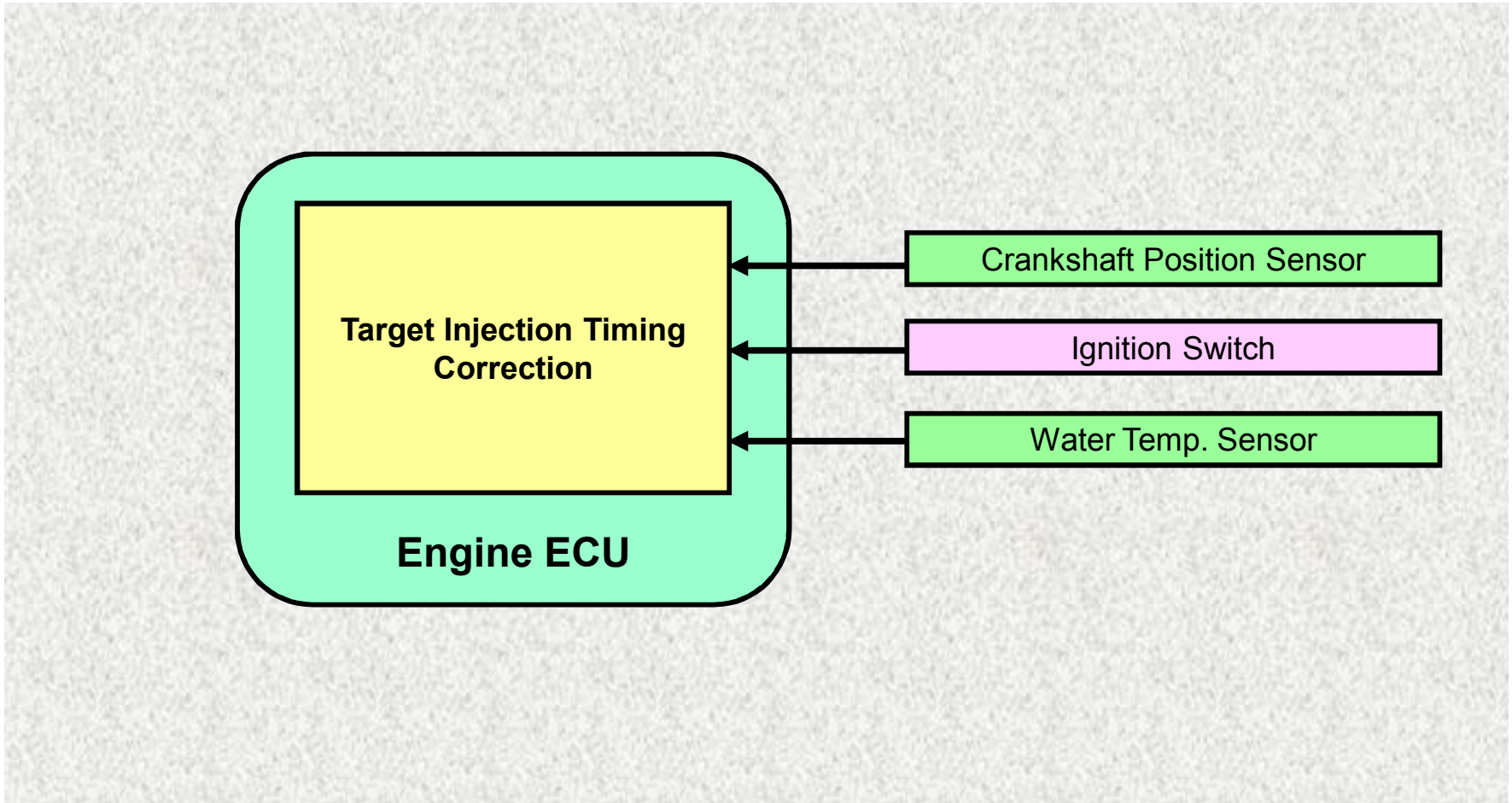
Engine Control

- Fuel Injection Volume Control
  - Injection volume control during starting



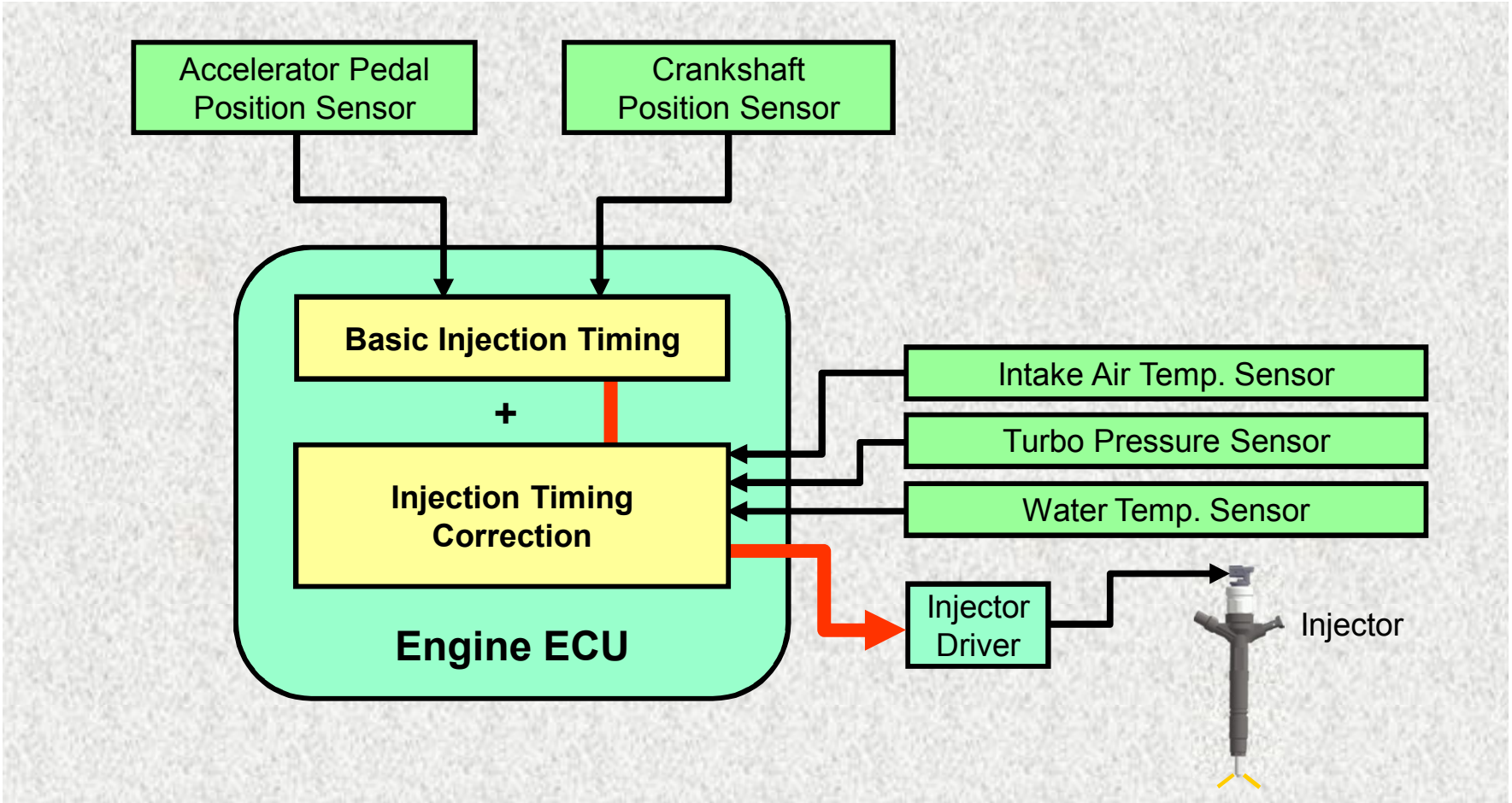
Engine Control

- Fuel Injection Timing Control
  - Injection timing control during starting



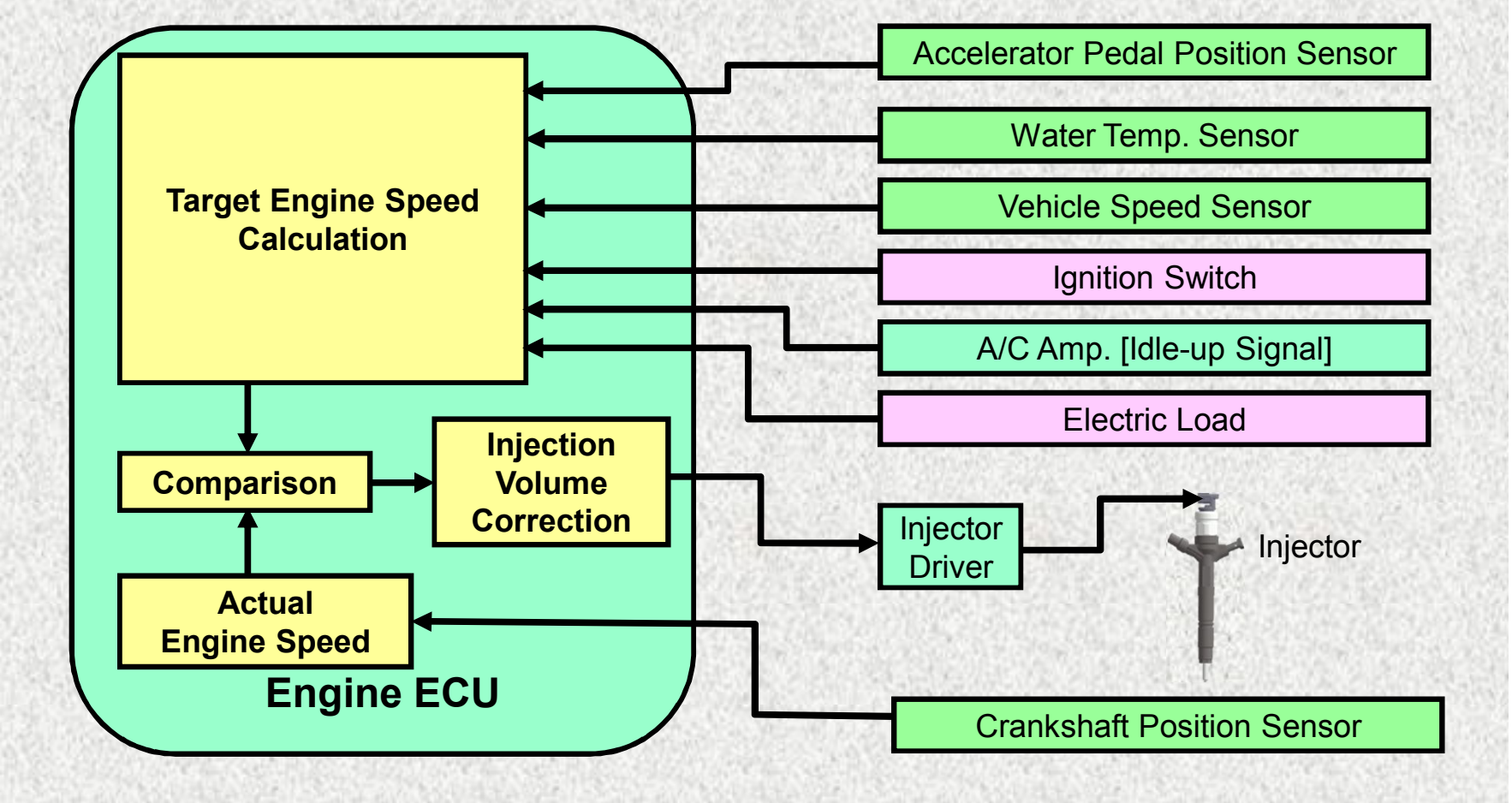
Engine Control

- Fuel Injection Timing Control
  - Basic injection timing (injection timing control after started)



Engine Control

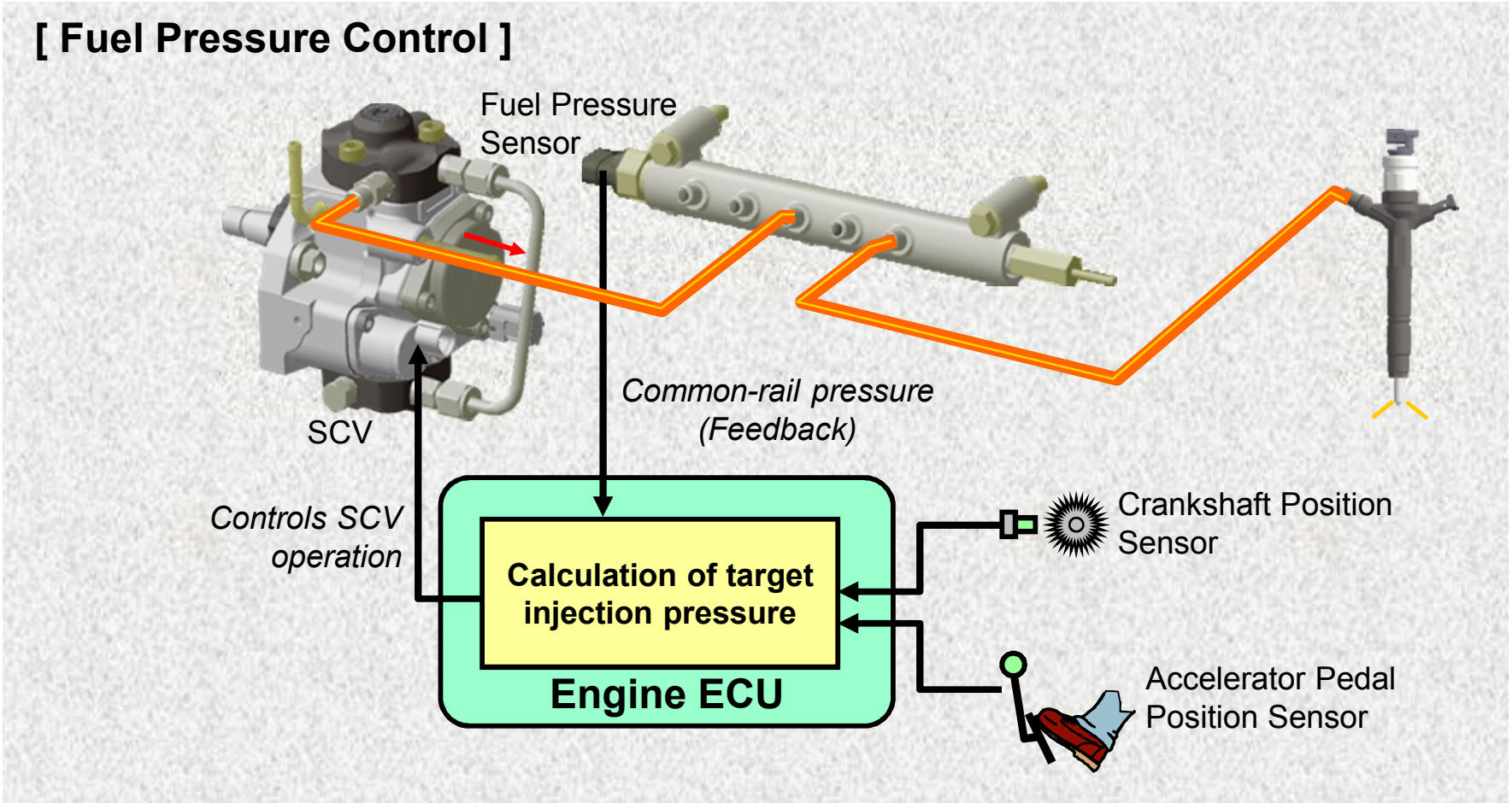
- Idle Speed Control
  - Target idle speed control



Engine Control

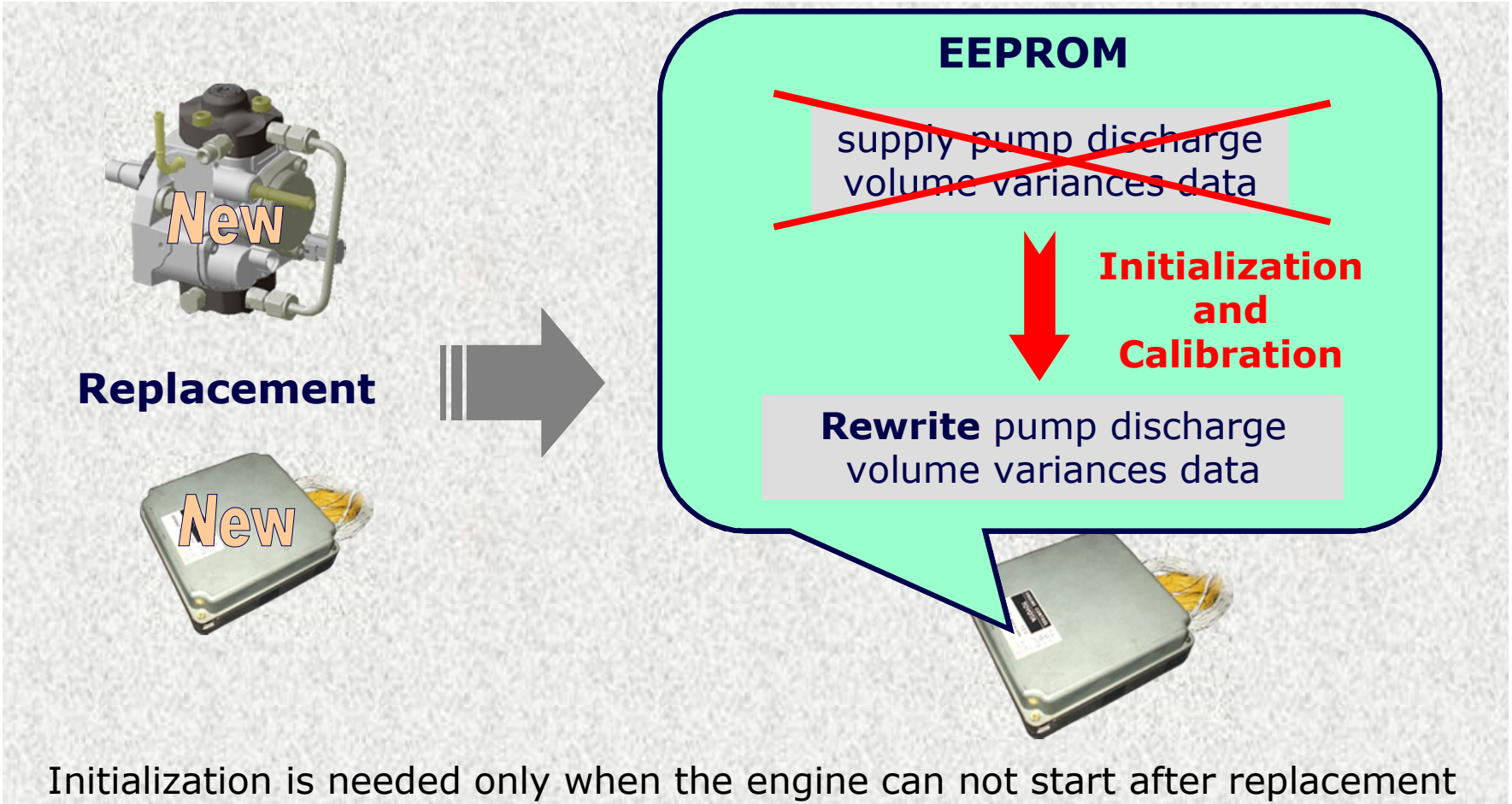
- Fuel Pressure Control
  - Target injection fuel pressure

[Fuel Pressure Control]



Service Point (Common-rail)

- Supply Pump Initialization and Calibration
  - Procedure



Initialization is needed only when the engine can not start after replacement

Service Point (Common-rail)

- Supply Pump Initialization and Calibration
  - Procedure

After replacement,

STRAT

Engine can't start

Initialization

CG TC

DLC3

Short

IG ON

for 3 min.

Resetting

IG OFF

Start engine

Start engine

Calibration

Water Temp **> 60 ˚C**
Intake Air Temp **> 20 ˚C**

Warm-up

Learning

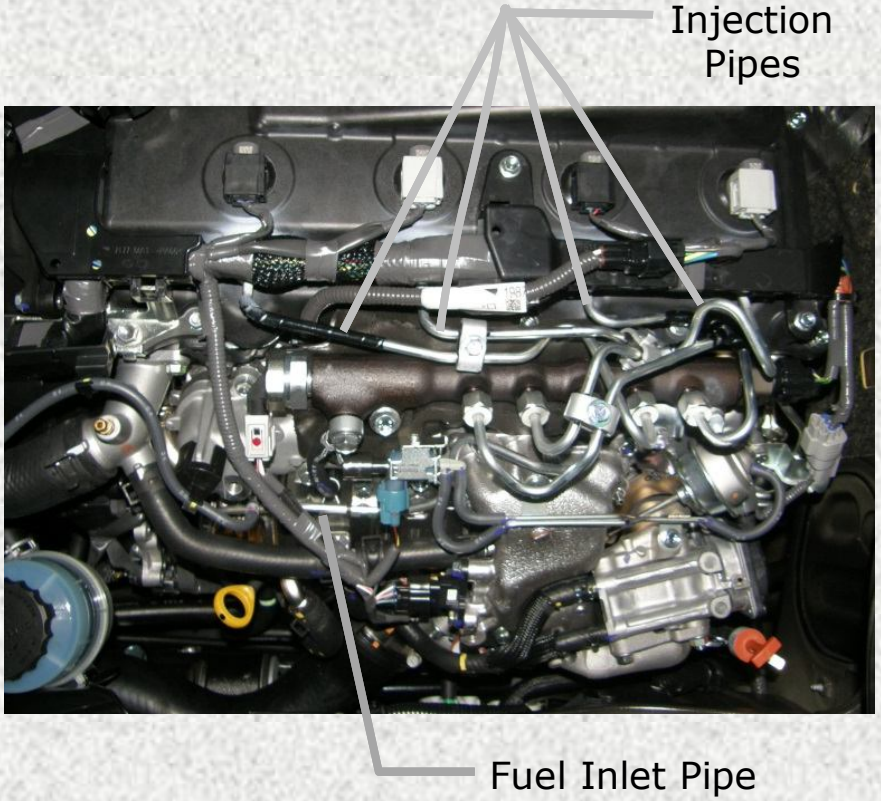
Idling for 1 min.

IG OFF

Service Point (Common-rail)

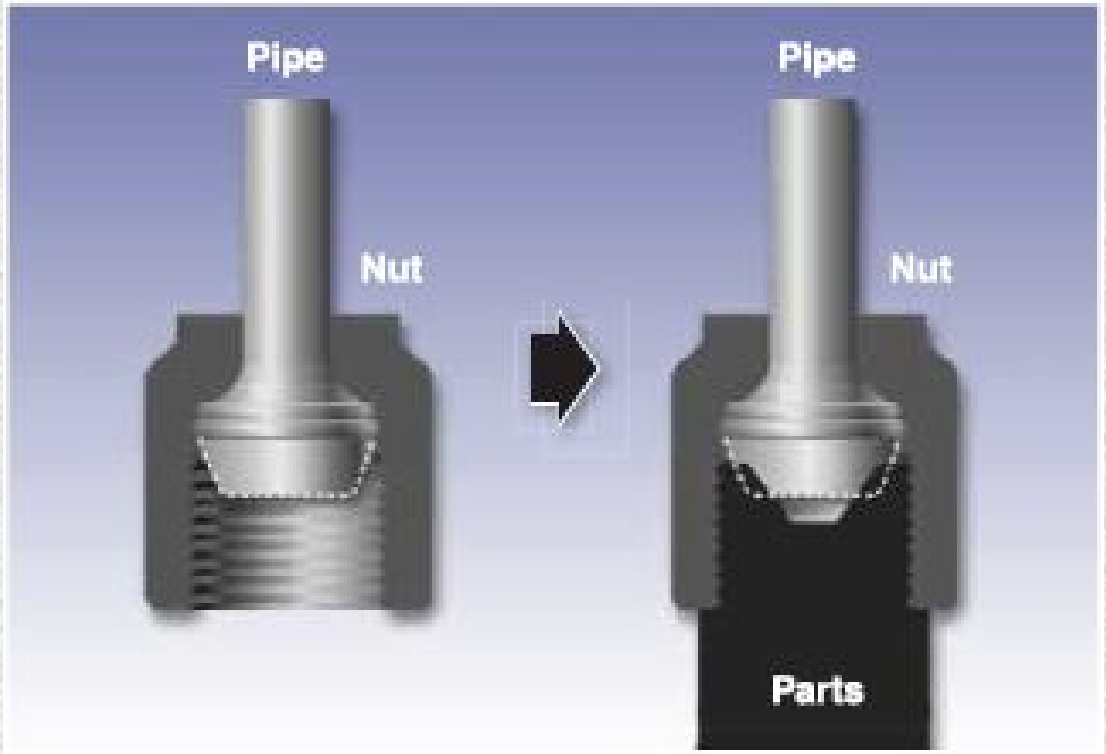
- Replace New Pipe
  - Replace new pipe when the following parts are replaced

Replace Parts	Replace New Pipe
• Injector • Common-rail • Cylinder Head	Injection Pipes
• Supply Pump • Common-rail • Cylinder Block • Cylinder Head • Cylinder Gasket • Gear Case	Fuel Inlet Pipe



Service Point (Common-rail)

- Replace New Pipe

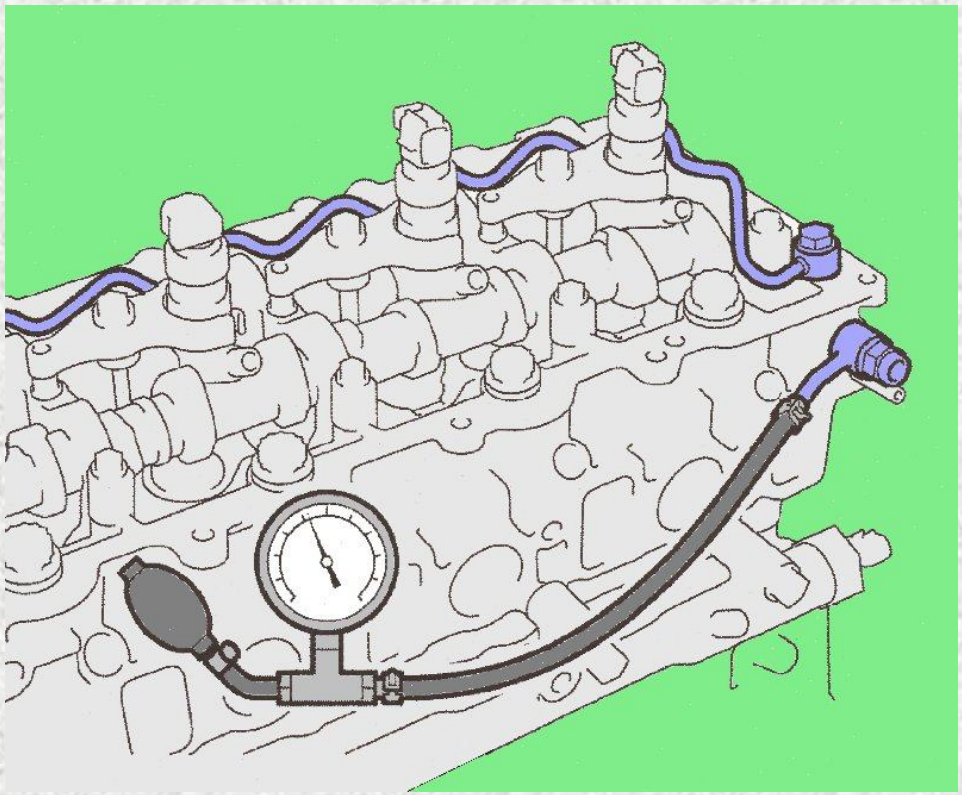


Used Pipe

Reference

Service Point (Common-rail)

- Check Fuel Leakage
  - Maintain 250 kPa pressure for 60 seconds



Service Point (Common-rail)

- Check Fuel Leakage

1. Engine stop

No Leakage

2. Cranking the engine

No Leakage

3. Disconnect the return hose from common-rail
   Cranking the engine

No Leakage (Pressure Discharge Valve)

4. Fully depress the accelerator pedal quickly, make maximum engine speed and keep it for 2 sec., Repeat this operation several times

No Leakage

Fuel system no leakage

Service Point (Common-rail)

- CAUTION:
  - Do not disconnect the injector connector while engine is running because of high voltage

Combination Meter

- Combination meter
  - Warning light

MIL
(Malfunction Indicator lamp)

DPF Sedimentation Bar

Brake Override
System Warning Light

Combination Meter (Hiace GDH201)

- Combination meter
  - Warning light and warning message for Urea SCR System

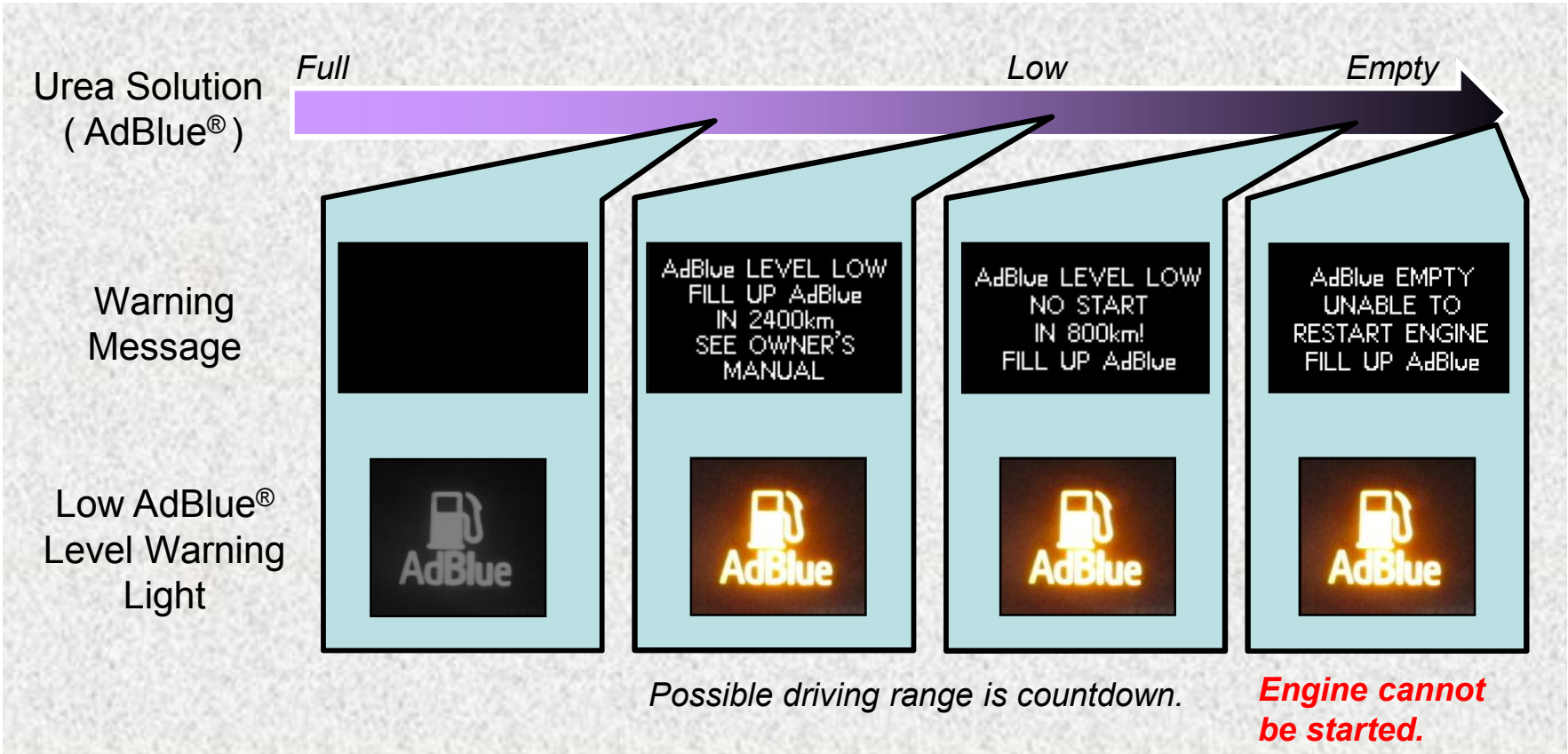
Warning Message (Example)

AdBlue EMPTY
UNABLE TO
RESTART ENGINE
FILL UP AdBlue

Low AdBlue® Level Warning Light

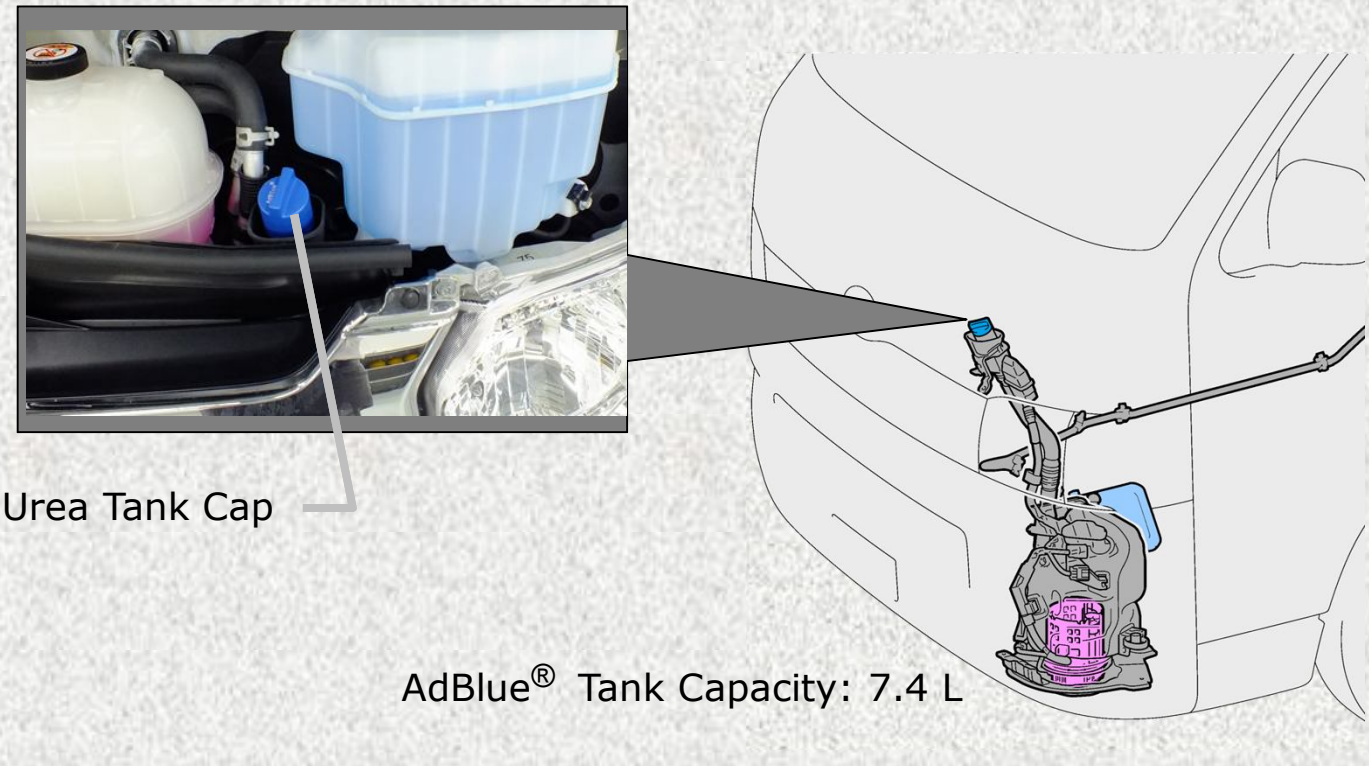
Combination Meter (Hiace GDH201)

- Combination meter
  - When the amount of urea solution becomes low, the Low AdBlue® Level Warning Light turns on and a warning message appears.



Combination Meter (Hiace GDH201)

- Combination meter
  - Refill Urea Solution (AdBlue®)



Testing Tools and Equipment

- AdBlue® Concentration

Refractometer

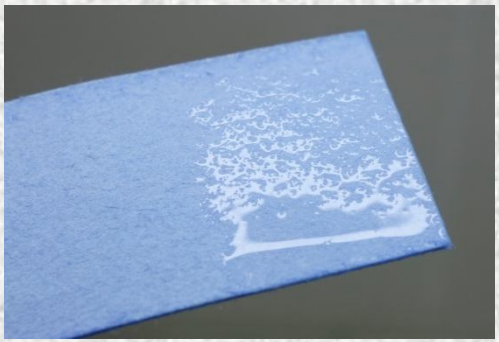
Digital refractometer

Testing Tools and Equipment

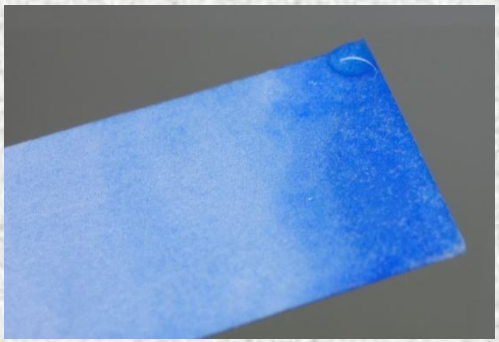
- Test Strips
  - Testing diesel content in AdBlue®. Paper strip changes colour in accordance with level of contamination

Test Strips

OK



NG
Adblue®
with Diesel



Maintenance Data

Specifications

Engine Type		2KD-FTV	1KD-FTV	1KD-FTV (with DPF)	1GD-FTV (with DPF & SCR)
Engine Oil		API: CF-4, CF SAE: 5W-30	←	ACEA C2* SAE:0W-30	←
Transmission Fluid	AT	Toyota Genuine ATF Type T-IV	←		Toyota Genuine ATF WS
	MT	API: GL3 or GL-4 SAE: 75W-90	←		—
Differential Oil		Hypoid Gear Oil API: GL-5 SAE: 90	←		
Brake Fluid		SAE J1703 or FMVSS No. 116 DOT 3	←		
Coolant		Toyota Super Long Life Coolant	←		

*: **NOTICE**: Using engine oil other than ACEA C2 may damage the catalytic converter

←: Same as previous model

Inchcape

Thank You!

TOYOTA COASTER

XZB50, 59

(EURO IV)
2006 / 11

(EURO V)
2009 / 09

XZB60, 70

(EURO V)
2017 / 01

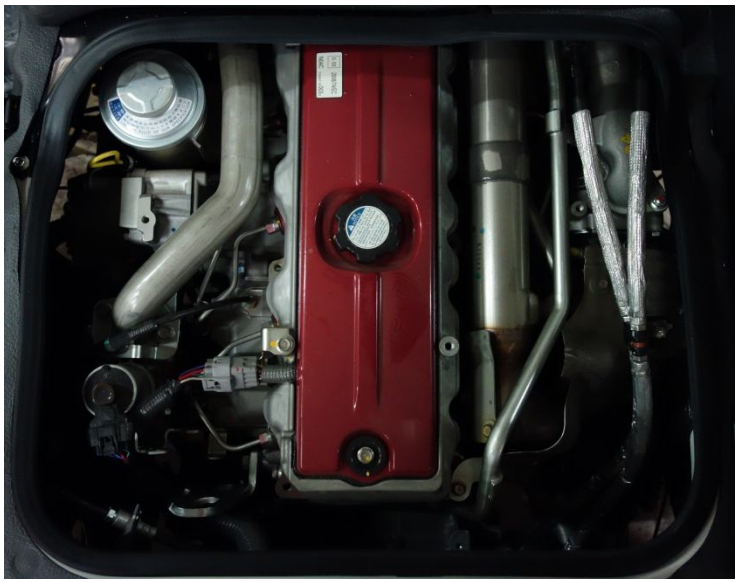
Engine Overall

- Specifications

Model	XZB50, 59		XZB60, 70
Engine	N04C-TQ	N04C-UH	
Emission Regulation	EURO IV	EURO V	
No. of Cylinder and Arrangement	4-Cylinder, In-line		
Valve Mechanism	16-Valve OHV, Gear Drive		
Displacement [cm^3]	4,009		
Bore x stroke [mm]	104.0 x 118.0		
Compression Ratio	18.0 : 1		
Max. Output	110kW @ 2,700rpm		
Max. Torque	397Nm @ 1,800rpm		
Fuel System	Common-rail Type		
EGR	✓		
DPF	✓		

N04C-UH Engine

- N04C-UH Engine
  - A common-rail system and a turbocharger system with intercooler are used to provide high output and good fuel economy
  - DPR (Diesel Particulate Reduction) system is used to realize clean emissions



Service Point (DPR)

- Caution Label for Procedure of Manual Regeneration

CAUTION

Diesel Particulate Reduction System

Diesel Particulate Reduction System Indicator Lamp

Use only diesel fuel with sulfur content less than 50 ppm. In order to maintain proper function of the Diesel Particulate Reduction System, when the indicator lamp starts Blinking, follow the instructions below as soon as possible within a driving distance of 150km. To reduced the risk of fire, be sure to keep flammable materials a safe distance away from the exhaust system.

1. Park the vehicle in a safe place.
2. Firmly apply the parking brake.
3. Put the gearshift in the neutral position.
4. Leave the engine running.
5. Press the switch button with the blinking indicator lamp.
6. Confirm that the indicator lamp now stays lit rather than blinking, and that the idling speed increases.
7. Wait and do not move the vehicle until the indicator lamp goes off and the idling speed decreases.
8. When the indicator lamp has gone off and the idling speed has returned to normal, it is okay to move the vehicle.

* See owner's manual for details

Service Point (DPR)

- Manual cleaning mode

Caution: If do not press DPR switch , MIL lights on and to become a power limit mode

Service Point (DPR)

- Caution: During Regeneration
  - Observe the following precautions. Failure to do so may result in burning injuries caused by the hot exhaust pipe exhaust gases, or may cause a fire
  - Do not place flammable materials near the exhaust

  - Make sure that there are no people near the exhaust pipe

* See owner's manual for details

Service Point (DPR)

- Caution: During Regeneration
  - Do not carry out regeneration when the vehicle is in an enclosed area, such as a garage.
  - Do not touch the exhaust pipe and exhaust gases during regeneration
- If the malfunction indicator lamp comes on:

  The malfunction indicator lamp comes on if you continue driving while the DPF system warning light is flashing. In this event, damage may be caused to the vehicle or an accident may occur. Have the vehicle inspected by your Toyota dealer immediately

* See owner's manual for details

Maintenance Data

- Specifications

Engine Type		N04C-TQ	N04C-UH
Engine Oil		TOYOTA GENUINE LOW ASH OIL	API CJ-4, ACEA E-6 or E-9 is preferred
Transmission Fluid	AT	Toyota Genuine ATF Type DEXRON®II	←
	MT	API: GL-4 or GL-5 SAE: 75W-90	←
Differential Oil		Hypoid Gear Oil API: GL-5 SAE: 90	←
Brake Fluid		SAE J1703 or FMVSS No. 116 DOT 3	←
Coolant		Toyota Super Long Life Coolant	←

←: Same as previous model

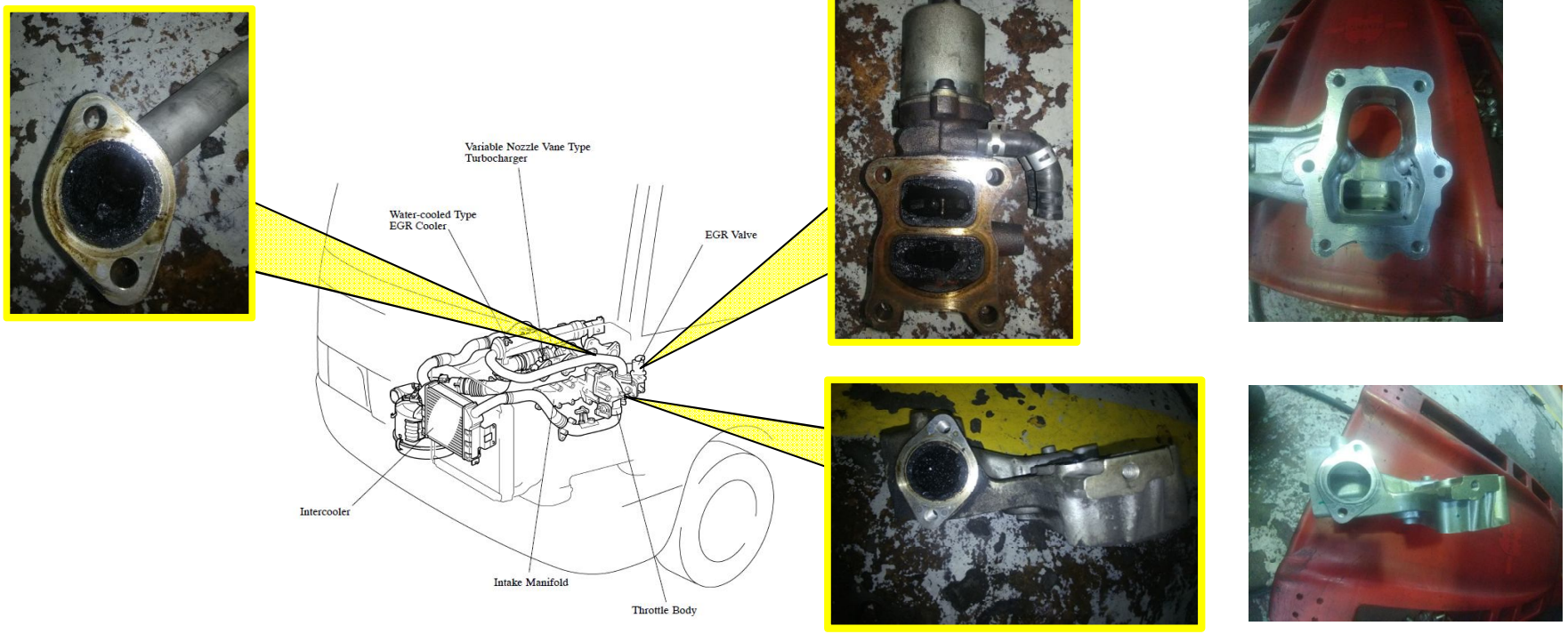
故障案例分享

故障案例分享（Coaster – Case 1）

- 故障: 儀錶板 MIL 警告燈亮著
  - 故障代碼 P2BAC (NOx 超標 - 廢氣再循環) 記錄
  - 故障原因：發現 EGR 內有嚴重積炭，需要拆出 EGR valve 進行清炭
  - 解決方案：清潔 EGR 相關零部件

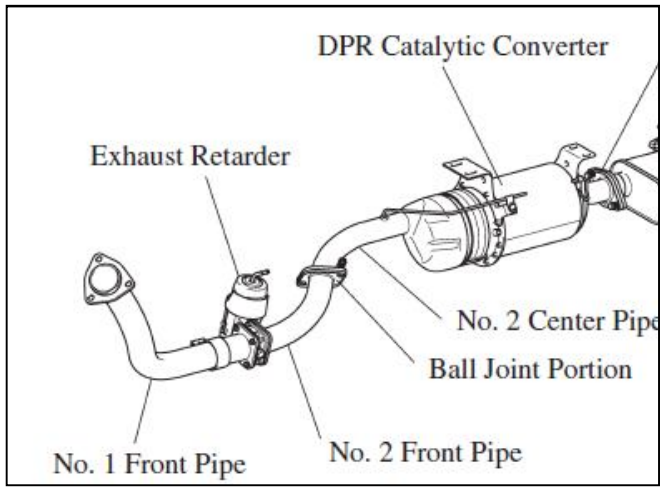
清潔前

清潔後



故障案例分享（Coaster – Case 2）

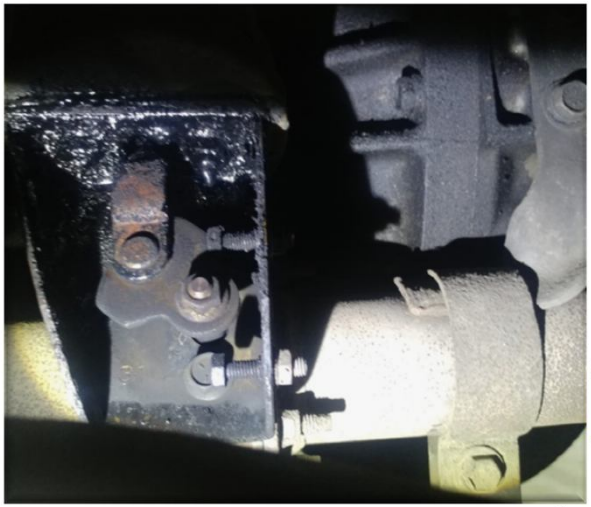
- 故障: 儀錶板 MIL 警告燈亮著
  - 故障代碼 P2002 (顆粒捕集器效率低) 記錄
  - 故障原因：發現廢氣煞車真空鼓漏壓，引致清炭程序未能完成
  - 成因：清炭時間過長和排炭溫度不足導致有 P2002 故障代碼記錄
  - 解決方案：先更換廢氣煞車真空鼓和拆下催化鼓檢查是否需要更換，若不需要更換，請進行一次清炭和留意清炭時引擎轉速在 1,100 - 1,200 rpm 範圍內，如引擎轉速不足夠，便要調較廢氣煞車蝴蝶掩角度



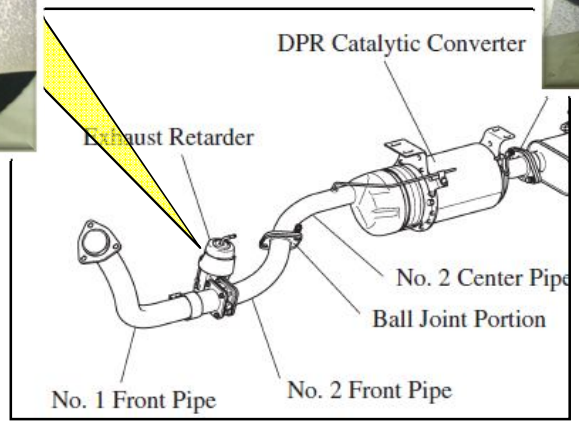
故障案例分享（Coaster – Case 2）

- 故障: 儀錶板 MIL 警告燈亮著

廢氣煞車真空鼓組件



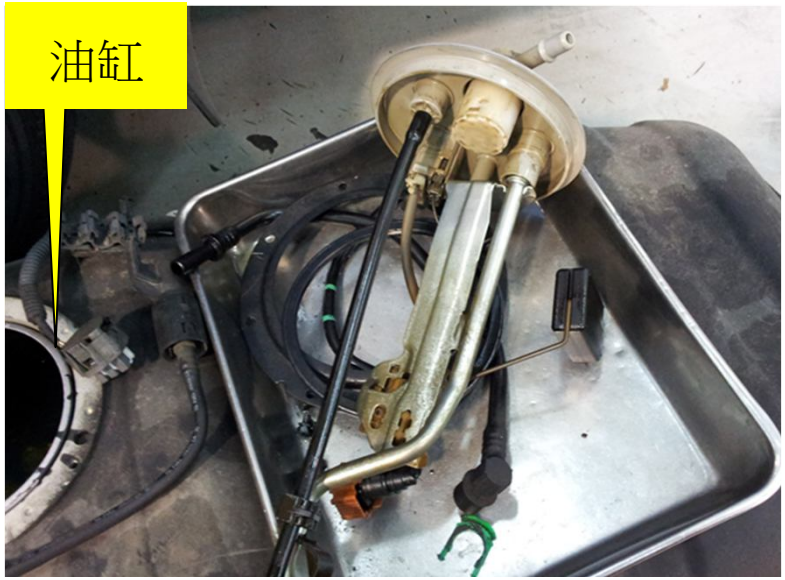
調較引擎轉速至
1,100 - 1,200 rpm 範圍內

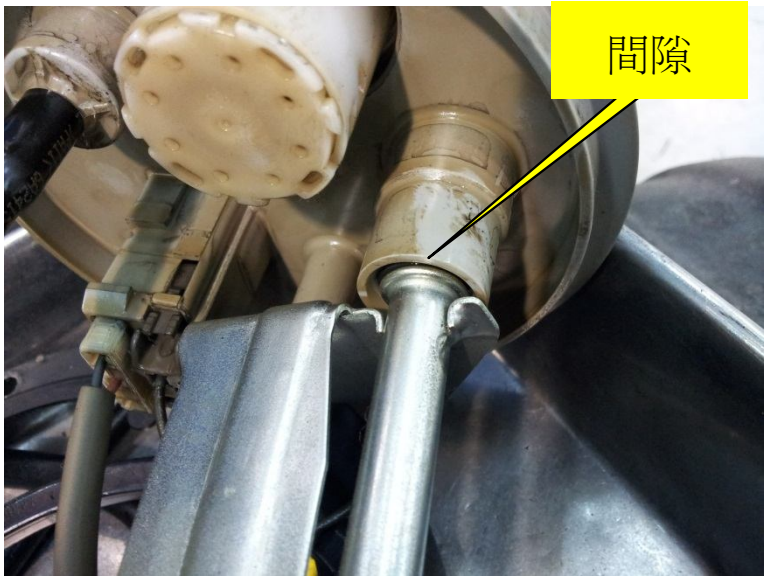


清潔相關零部件

故障案例分享（Hiace – Case 1 KDH201）

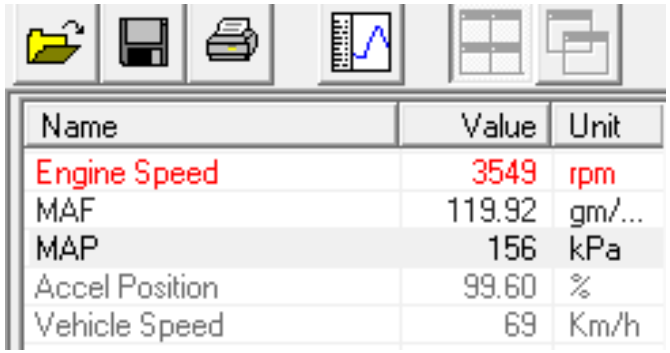
- 故障: 引擎不能起動
  - 啟動引擎時，共軌燃油壓力沒有提昇
  - 按動柴油過濾器上的手動泵，但沒有變成充實感覺
  - 懷疑油缸、油喉管供應至柴油過濾器的油路有故障
  - 故障原因：發現吸油管道近頂部安裝位置不良，接合位置有間隙導致漏氣
  - 解決方案：重新安裝





故障案例分享（Hiace – Case 2 KDH201）

- 故障: 加速乏力
  - 慢速行車和加油沒有異常，較深油門時感覺乏力，上斜更為嚴重
  - 沒有故障代碼記錄
  - 共軌燃油壓力符合電腦預計值



Name	Value	Unit
Engine Speed	3549	rpm
MAF	119.92	gm/...
MAP	156	kPa
Accel Position	99.60	%
Vehicle Speed	69	Km/h

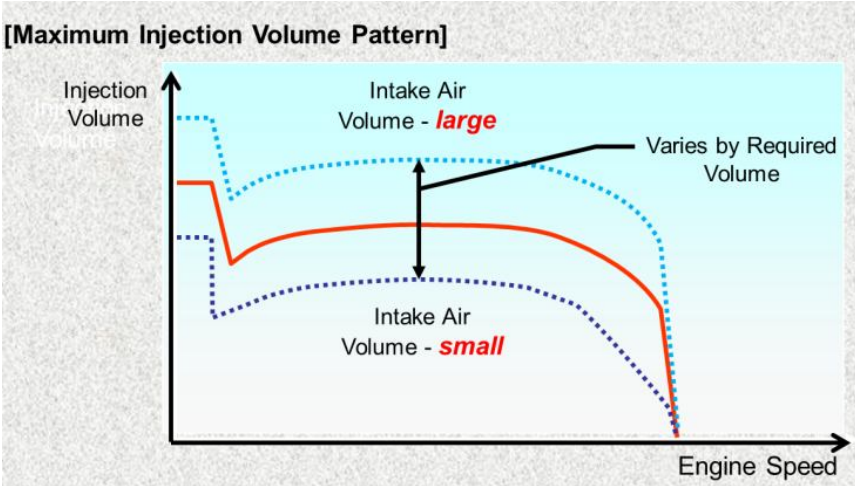
$$MAF = \frac{Ne \times MAP \times Displacement \times Air\ Density}{100 \times 60 \times 2}$$

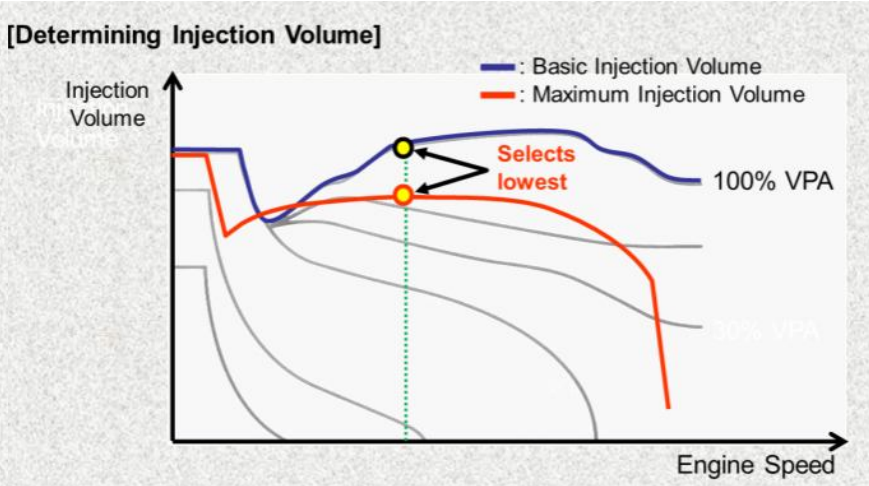
$$MAF = \frac{3{,}549 \times 156 \times 2{,}982 \times 1.15}{100 \times 60 \times 2}$$

MAF = **158.21 gm/sec.** #

故障案例分享（Hiace – Case 2 KDH201）

- 故障: 加速乏力
  - 發現進氣量 MAF 數值較其它同款正常車為低。引擎轉速較低時，電腦會使用 Basic Injection Volume，在較高引擎轉速時會撰擇較低值。
    而 Maximum Injection Volume 是取決於進氣量，所以踏深油門時感覺乏力
  - 故障原因：Air Flow Meter 膠圈變形漏氣



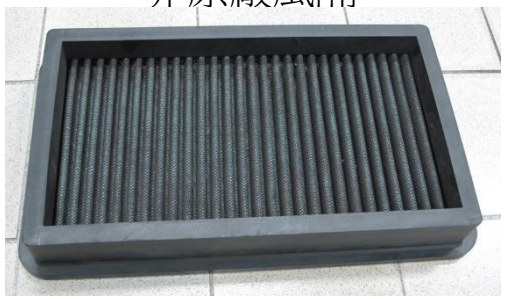


故障案例分享（Hiace – Case 3 KDH201）

- 故障: 加速乏力
  - 故障原因：使用非原廠風隔，並發現 Air Flow Meter 內有污穢
  - 解決方案：清潔 Air Flow Meter

原廠風隔

非原廠風隔



故障案例分享 (Hiace – Case 4 KDH201)

- 故障: 引擎起動困難、怠速間中熄火和乏力

– 啟動引擎時，共軌燃油壓力只有約 10 MPa。規格值：

(規格值: 怠速: 30 - 40 Mpa & 3,000 rpm (沒有負載): 95 - 115 Mpa)

– 故障代碼 P0093 (檢測到燃油系統洩漏 - 大洩漏) 記錄

– 以下是 P0093 的故障範圍：

- Fuel line between fuel supply pump assembly and common rail assembly
- Fuel line between common rail assembly and each injector assembly
- Suction control valve
- Common-rail assembly
- Injector assembly
- Pressure discharge valve (common-rail assembly)
- Fuel pressure sensor (common-rail assembly)
- Crankshaft position sensor
- Fuel filter element sub-assembly
- Open or short in injector driver circuit (P062D stored simultaneously)
- Injector driver (P062D stored simultaneously)
- ECM

故障案例分享 (Hiace – Case 4 KDH201)

- 故障: 引擎起動困難、怠速間中熄火和乏力
  - 這故障可留意和檢查以下數值
  - Suction Control Valve 數值 *(標準怠速時範圍: 923 – 1123 mA)*

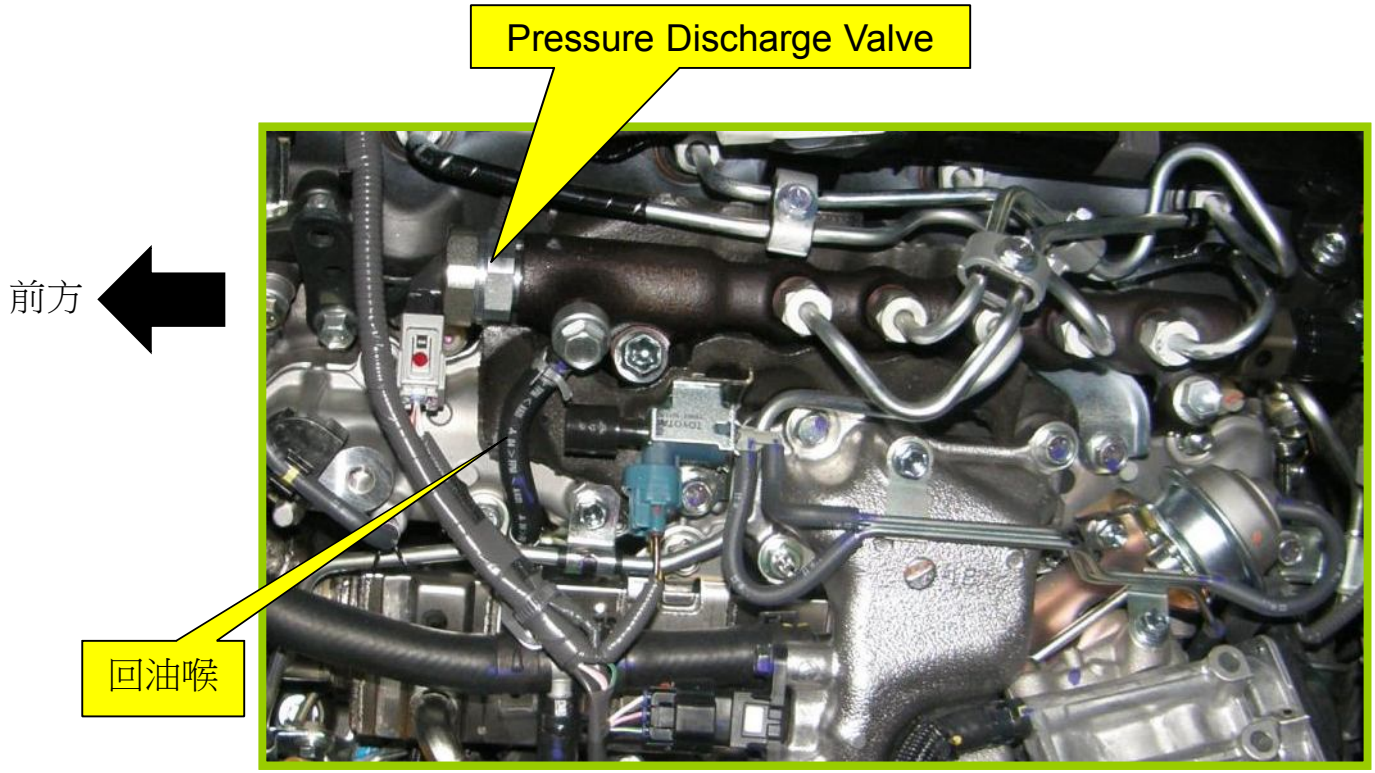
  - 噴油嘴 Feedback Val. #1 - #4 數值 *(正常怠速時範圍如下)*

儀器顯示	引擎情況	正常數值
Injection Feedback Val #1 Injection Feedback Val #2 Injection Feedback Val #3 Injection Feedback Val #4	怠速	-3.0 mm^3/st to 3.0 mm^3/st

  - 檢查 Pressure Discharge Valve 和回油喉情況

故障案例分享 (Hiace – Case 4 KDH201)

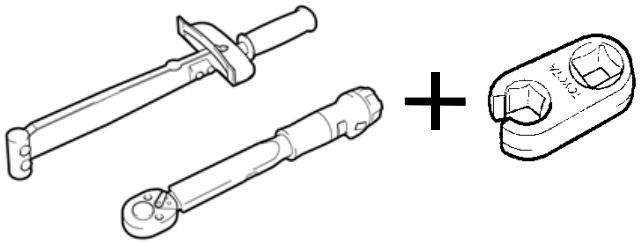
- 故障: 引擎起動困難、怠速間中熄火和乏力
  - 故障原因：發現 Pressure Discharge Valve 有洩漏，導致共軌內燃油壓力不足
  - 解決方案：更換共軌組件 (Common-rail Assembly) 和 5 條燃料鋼喉



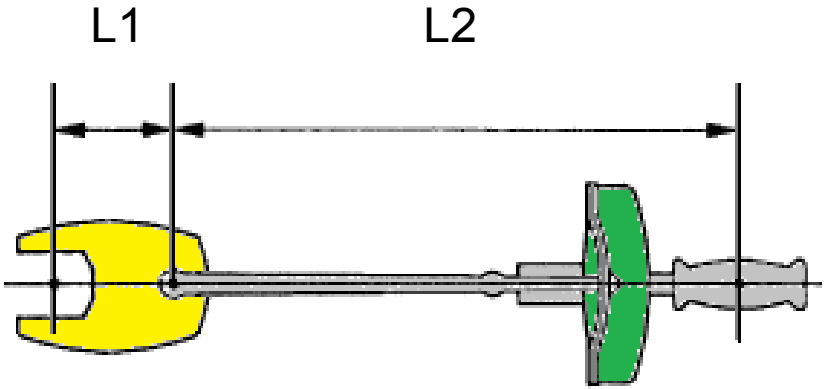
維修注意事項

- 維修: 安裝全新的燃料鋼喉
  - 注意事項：請使用合適的工具和計算所需上緊的扭力值

選取合適範圍磅尺和螺母扳手



量度 L1 和 L2 的距離



$$\text{New T} = \frac{\text{L2}}{(\text{L1} + \text{L2})} \times \text{T}$$

New T = 計算上緊的扭力值

T = 規格扭力值

維修注意事項

- 維修: 安裝全新的燃料鋼喉
  - 注意事項：請使用合適的工具和計算所需上緊的扭力值

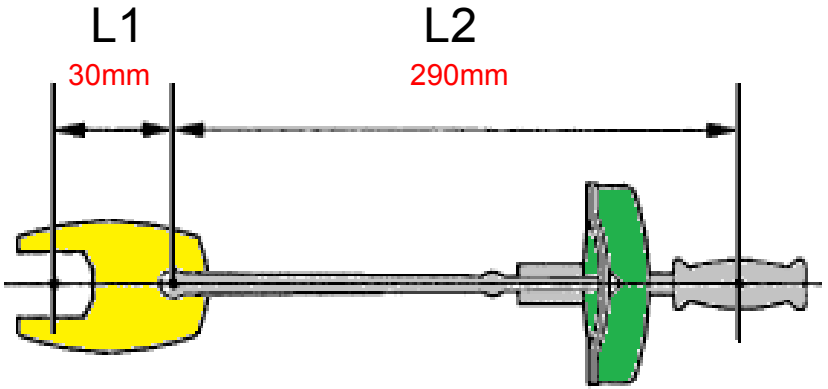
例子：

L1 = 30 mm

L2 = 290 mm

T = 35 N*m

量度 L1 和 L2 的距離



$$\text{New T} = \frac{290}{(30 + 290)} \times 35$$

$$\text{New T} = \frac{L2}{(L1 + L2)} \times T$$

New T = 0.906 x 35

New T = 31.7 N*m #

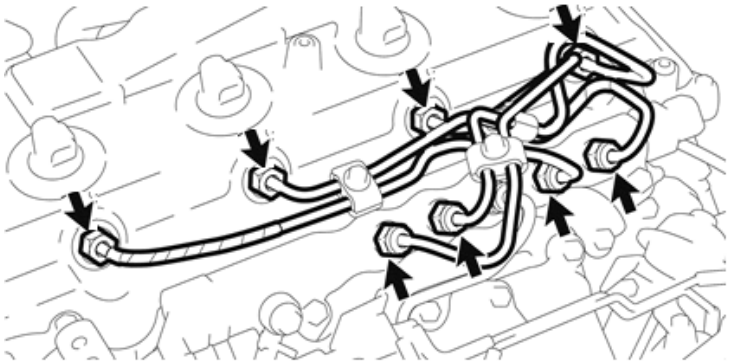
New T = 計算上緊的扭力值

T = 規格扭力值

維修注意事項

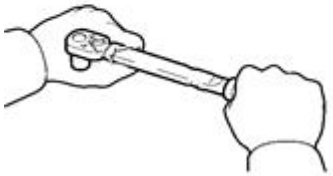
- 維修: 安裝全新的燃料鋼喉
  - 注意事項：**“切勿”** 安裝使用過的燃料鋼喉，**“必須”** 更換全新燃料鋼喉。

燃料鋼喉



OK

慢慢地上緊，達至 “Click” 聲便可以。



NG

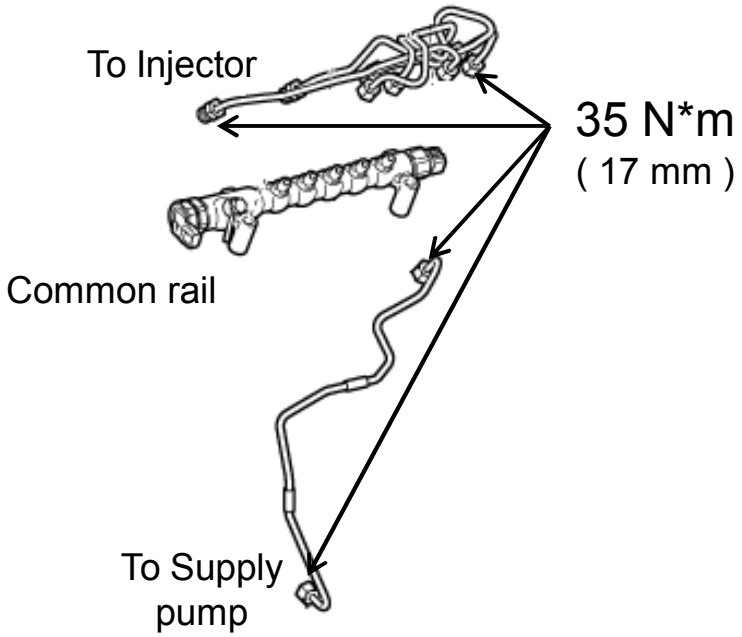
切勿快速上緊　　切勿連續上緊

結果：扭力過多

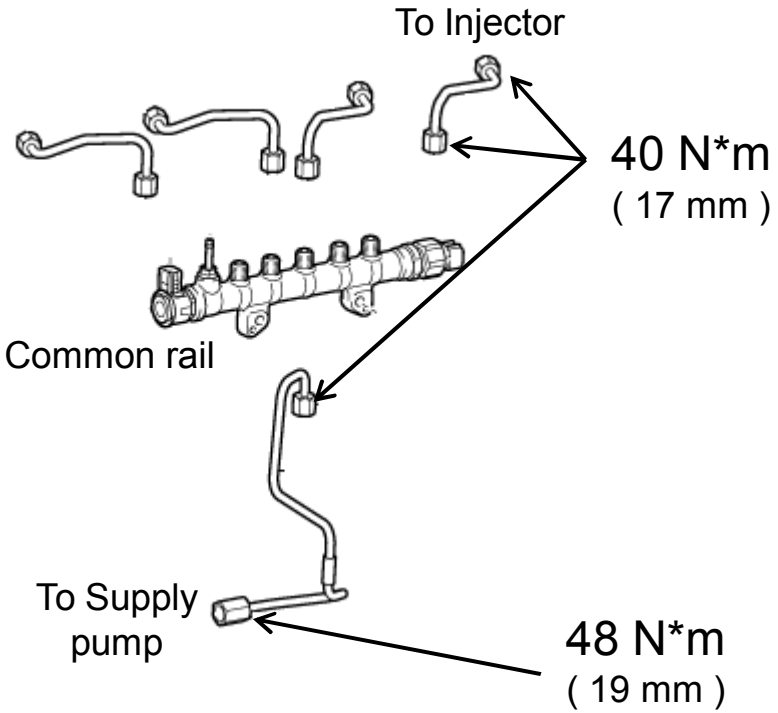
維修注意事項

- 維修: 燃料鋼喉規格扭力值參考
  - 注意事項：使用接駁螺母扳手時，請計算上緊扭力值

1KD - FTV



1GD - FTV



Reference

Inchcape

Thank You!

Q & A