Engine Overall

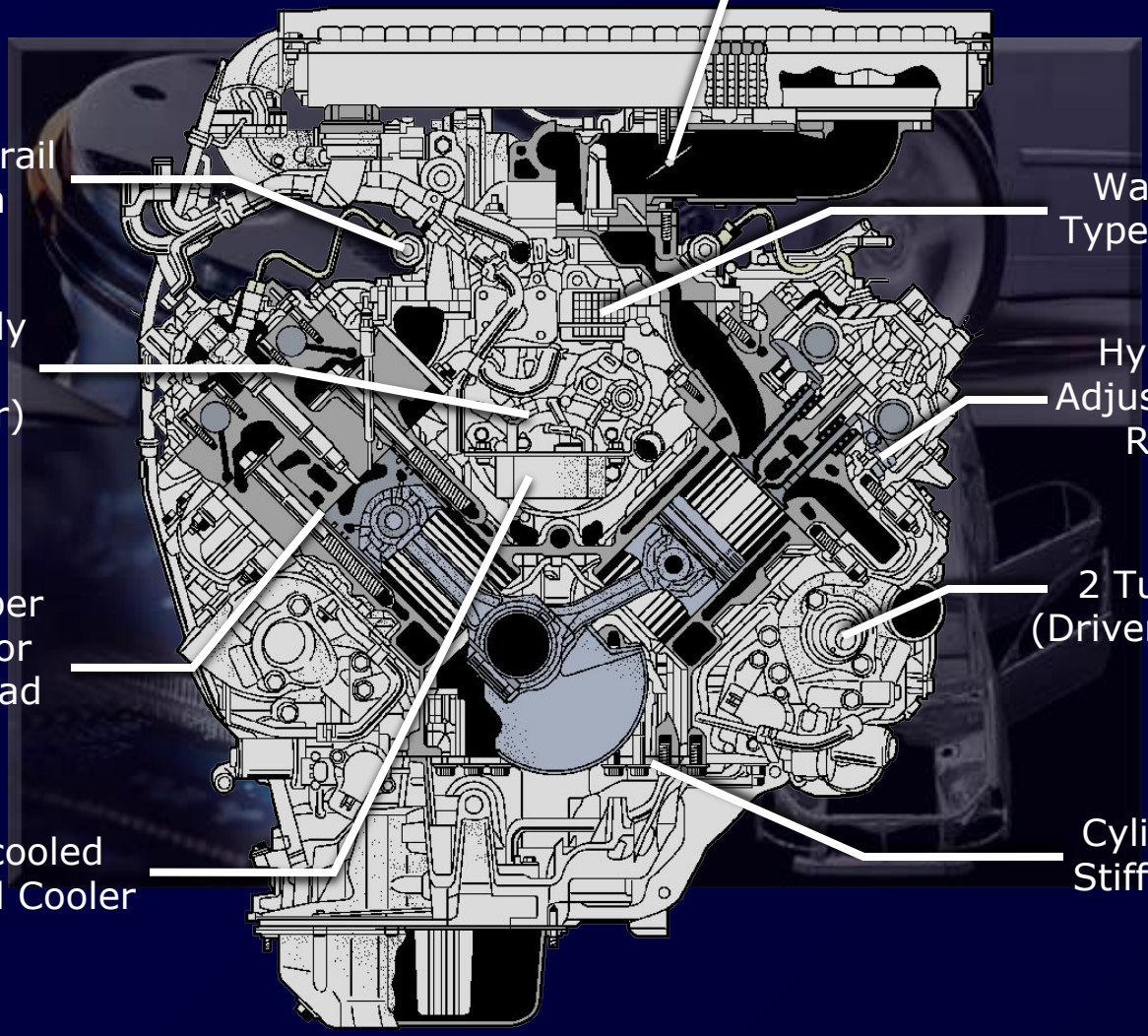
	-W	-Q	-V		-_

- 1VD-FTV Engine
  - 4.5-liter, V-type 8-cylinder, 32-valve DOHC, TOYOTA D-4D with turbocharged diesel engine

Engine Overall

	-W	-Q	-V		-_

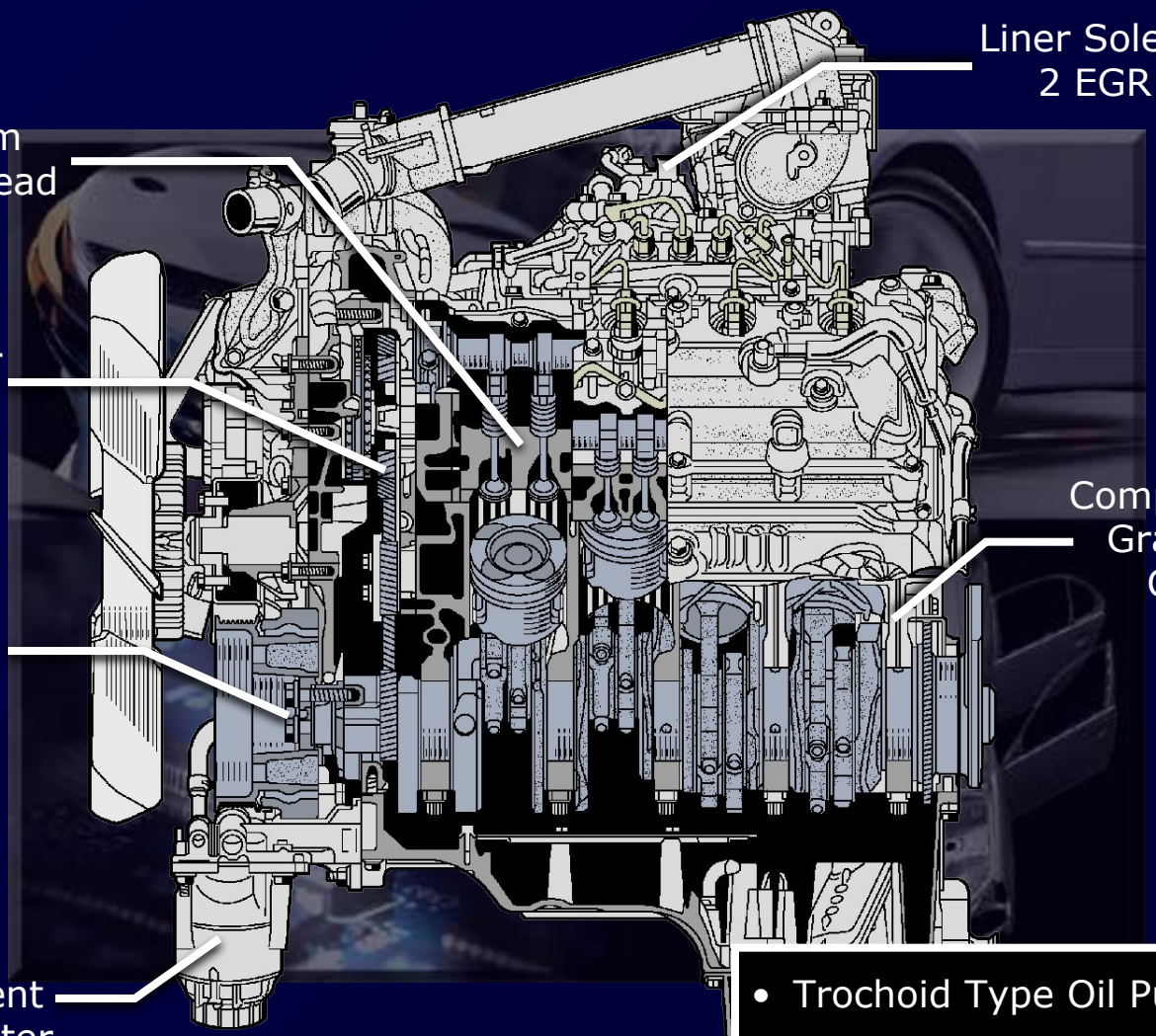
- Features



Engine Overall

	-W	-Q	-V		-_

- Features



- Trochoid Type Oil Pump (2 Rotors)
- Scavenging Pump

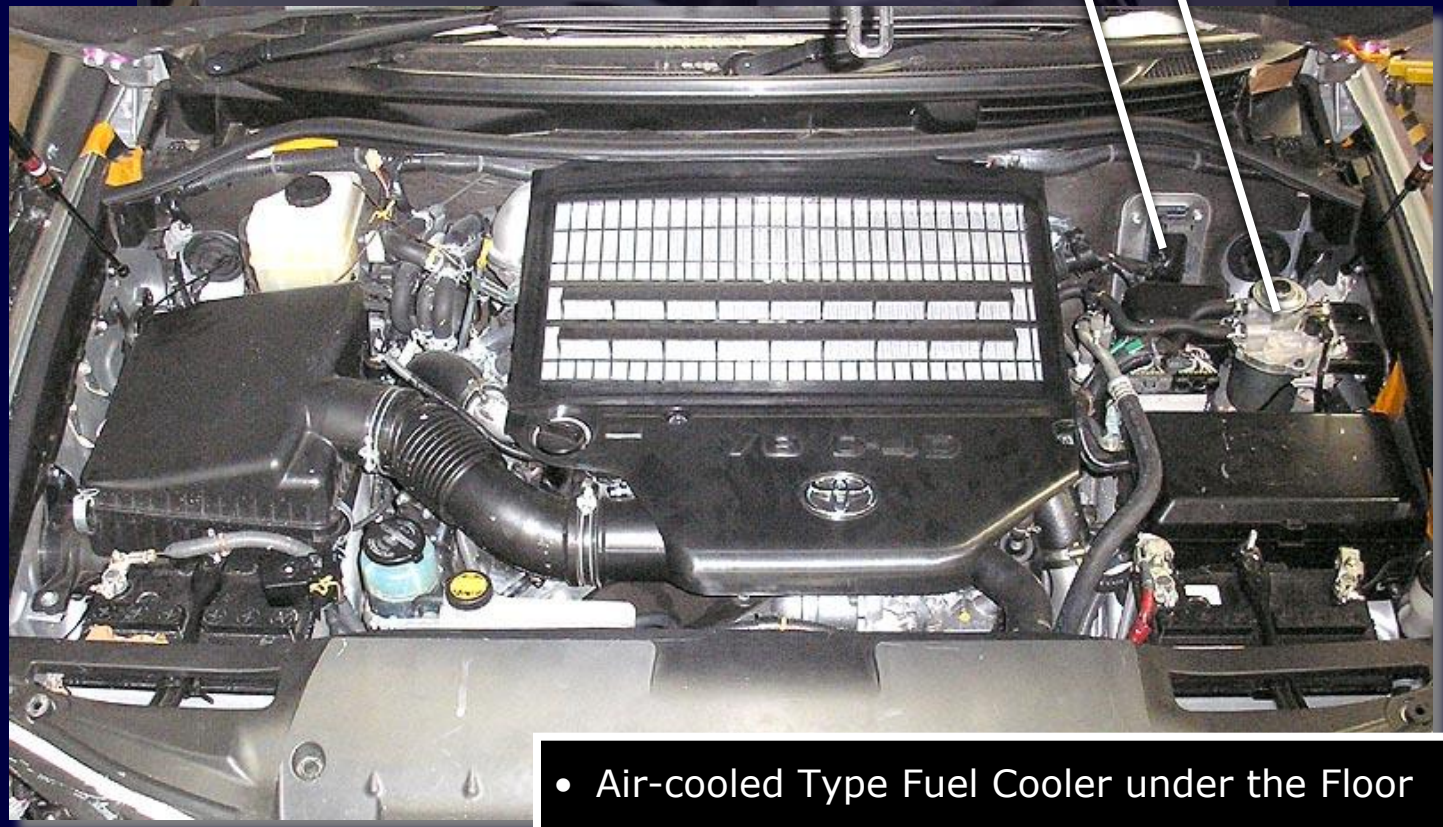
Engine Overall

	-W	-Q	-V		-_

- Features

•Element Replacement Type Fuel Filter
•Fuel Filter Warning Switch

Dash Panel Penetration Installation for ECM



- Air-cooled Type Fuel Cooler under the Floor
- Fuel Pump in the Fuel Tank (*Dual Tank Model Only*)

Engine Overall

	-W	-Q	-V		-_

- Specifications

Item		1VD-FTV	1VD-FTV	1HD-FTE
Model		New LAND CRUISER	LAND CRUISER (70 Series)	Previous Model
Destination		-W, -Q, -V, Gen	-Q	-W, -Q, Gen
No. of Cylinders and Arrangement		8-Cylinder, V type	←	6-Cylinder, In-line
Valve Mechanism		32-valve, DOHC, Chain and Gear Drive	←	24-valve, OHC, Belt and Gear Drive
Displacement cm^3 (cu. in.)		4461 (272.2)	←	4164 (254.0)
Bore x stroke mm (in.)		86.0 x 96.0 (3.39 x 3.78)	←	94.0 x 100.0 (3.70 x 3.94)
Compression Ratio		16.8 : 1	←	18.8 : 1
Emission Regulation	-W	EUROIV, EUROIII (Except Europe)	-	EURO III
	-Q	EUROIV	←	EURO II
	-V	N.A.		-
	Gen	EUROIII or EUROII or N.A. *	-	N.A.

*: It is different depending on the countries

Engine Overall

	-W	-Q	-V		-_

- Specifications

Item			1VD-FTV	1VD-FTV	1HD-FTE
Model			New LAND CRUISER	LAND CRUISER (70 Series)	Previous Model
Destination			-W, -Q, -V, Gen	-Q	-W, -Q, Gen
Combustion Chamber			Direct Injection Type	←	←
Fuel System			Common-rail Type	←	Distributor Type
Turbocharger			VN type 2 Turbochargers	VN Type Turbocharger	Conventional Type Turbocharger
Max. Output kW @ rpm	-W	AT	210 @ 3600	-	150 @ 3400
	-W*, -Q	AT	195 @ 3400		
		MT	-	151 @ 3400	
	-V, Gen	AT	173 @ 3200	-	
		MT	162 @ 3600		
Max. Torque N·m @ rpm	-W	AT	650 @ 1600 – 2800	-	430 @ 1400 - 3200
	-W*, -Q	AT	650 @ 1600 – 2600		
		MT	-	430 @ 1200 – 3200	
	-V, Gen	AT	615 @ 1800 – 2200	-	
		MT	430 @ 1200 – 3600		

*: Only for -W models equipped with a pre-cleaner

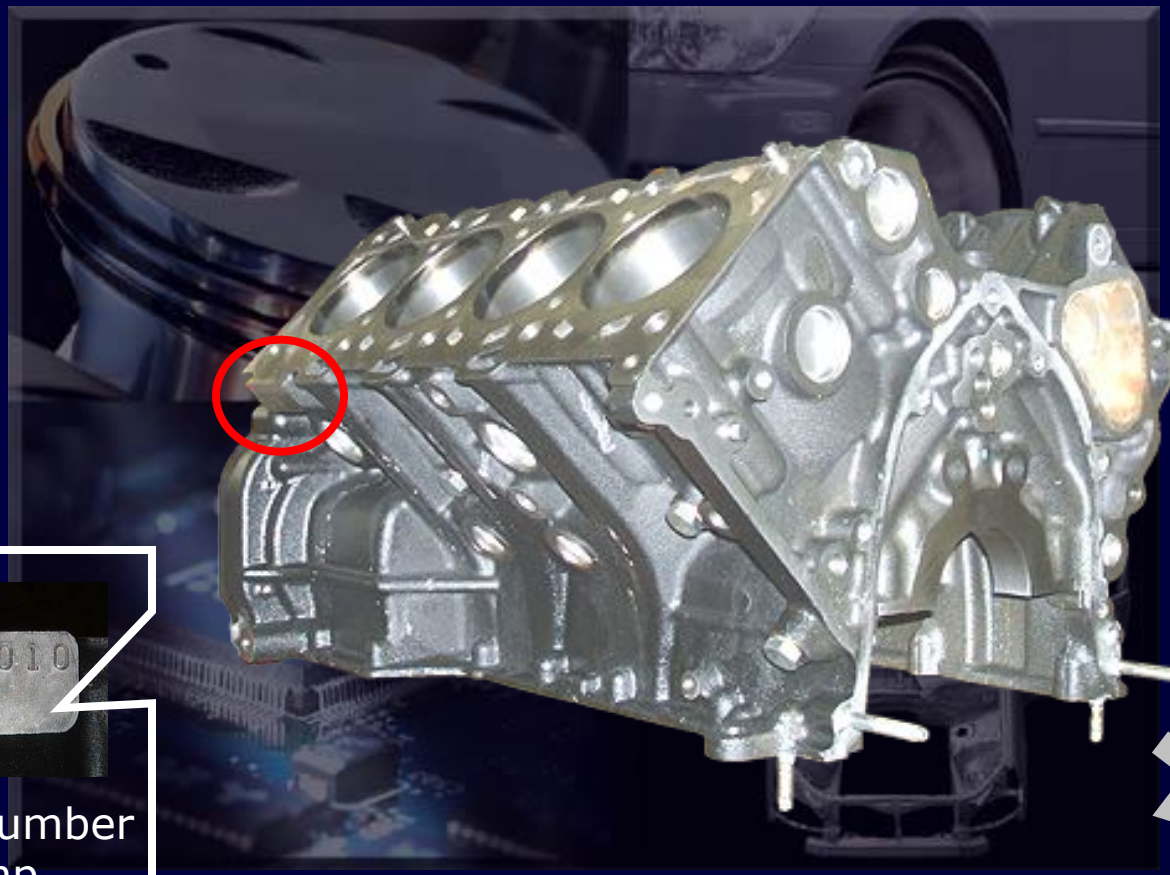
Reference (Engine Overall)

- Major Difference From LAND CRUISER (VDJ70)

Item	1VD-FTV	1VD-FTV
Model	New LAND CRUISER (VDJ200)	LAND CRUISER 70 Series (VDJ7#)
Timing Gear	Scissors gear for idle gear	N.A.
Oil Filter	Plastic made filter cap with drain plug	Aluminum made filter cap without drain plug
	Located at engine front side	Located at engine rear side
Turbocharger	2 turbochargers	1 turbocharger
	Nozzle-vane is driven by DC motor	Nozzle-vane is driven by vacuum actuator
Scavenging Pump	1 Rotor	2 Rotors
Injector	Hole Diameter: 0.113 mm	Hole Diameter: 0.105 mm
Fuel Tank (Dual Fuel Tank Model Only)	Fuel pump in the main tank for fuel transfer	Fuel tank select valve
Front Engine Mount	2 Electrical Hydraulic Type	Conventional Type
Cranking Hold Function	With	N.A.
Diagnosis Communication	CAN	Serial

Engine Proper

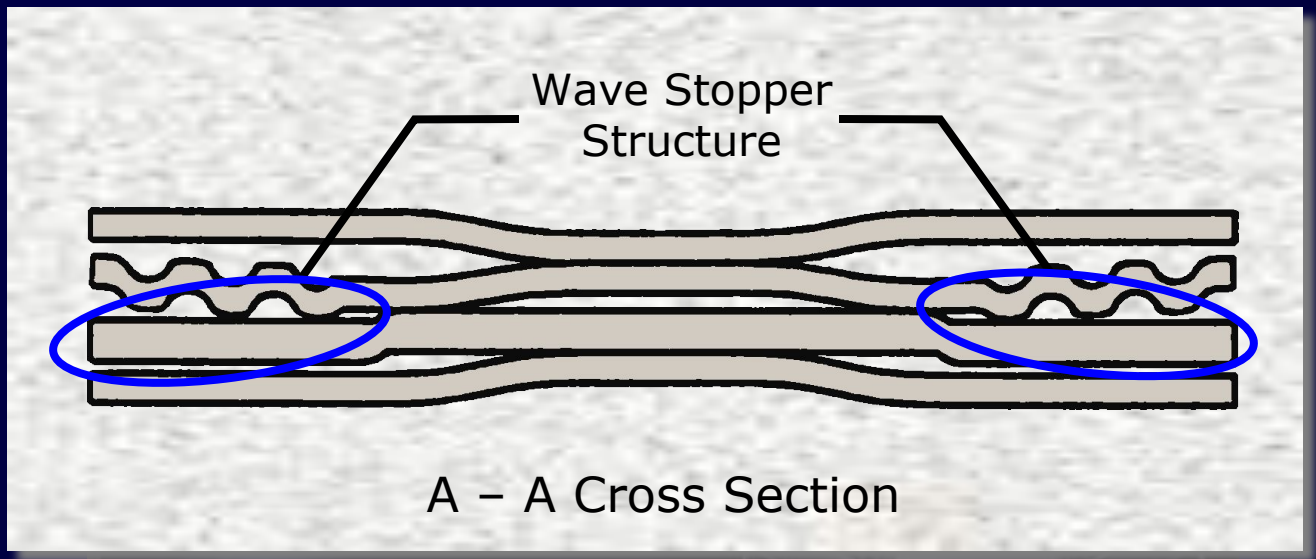
- Cylinder Block
  - High strength compacted vermicular graphite cast iron is used for weight reduction

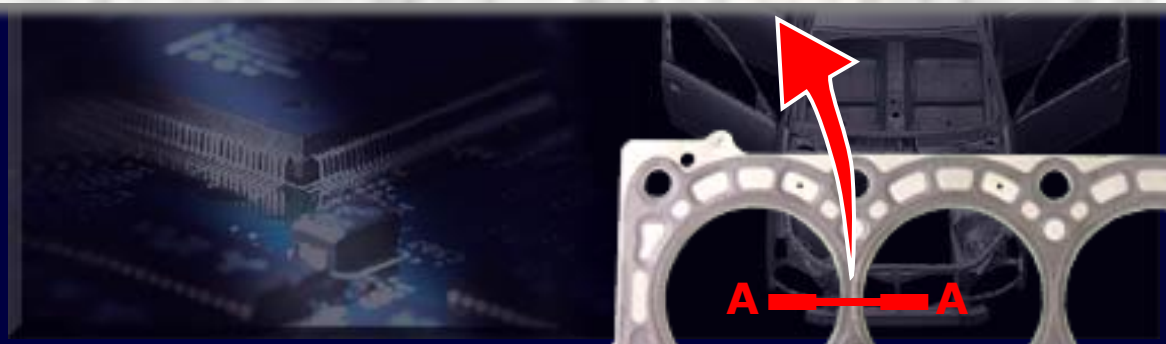


Engine Number Stamp

Engine Proper

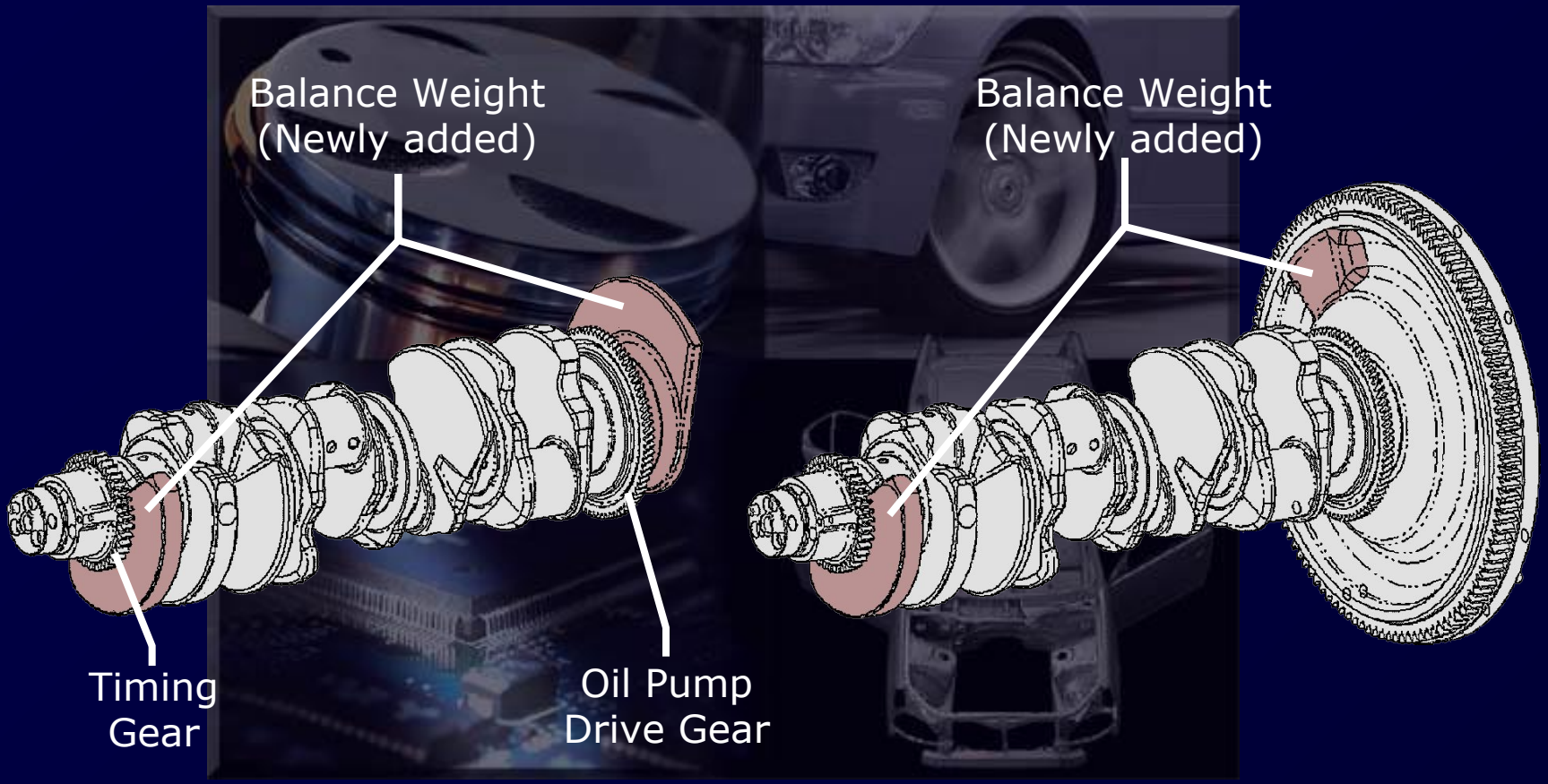
- Cylinder Head Gasket
  - Wave stopper structure is used around the cylinder bore to improve sealing performance





Engine Proper

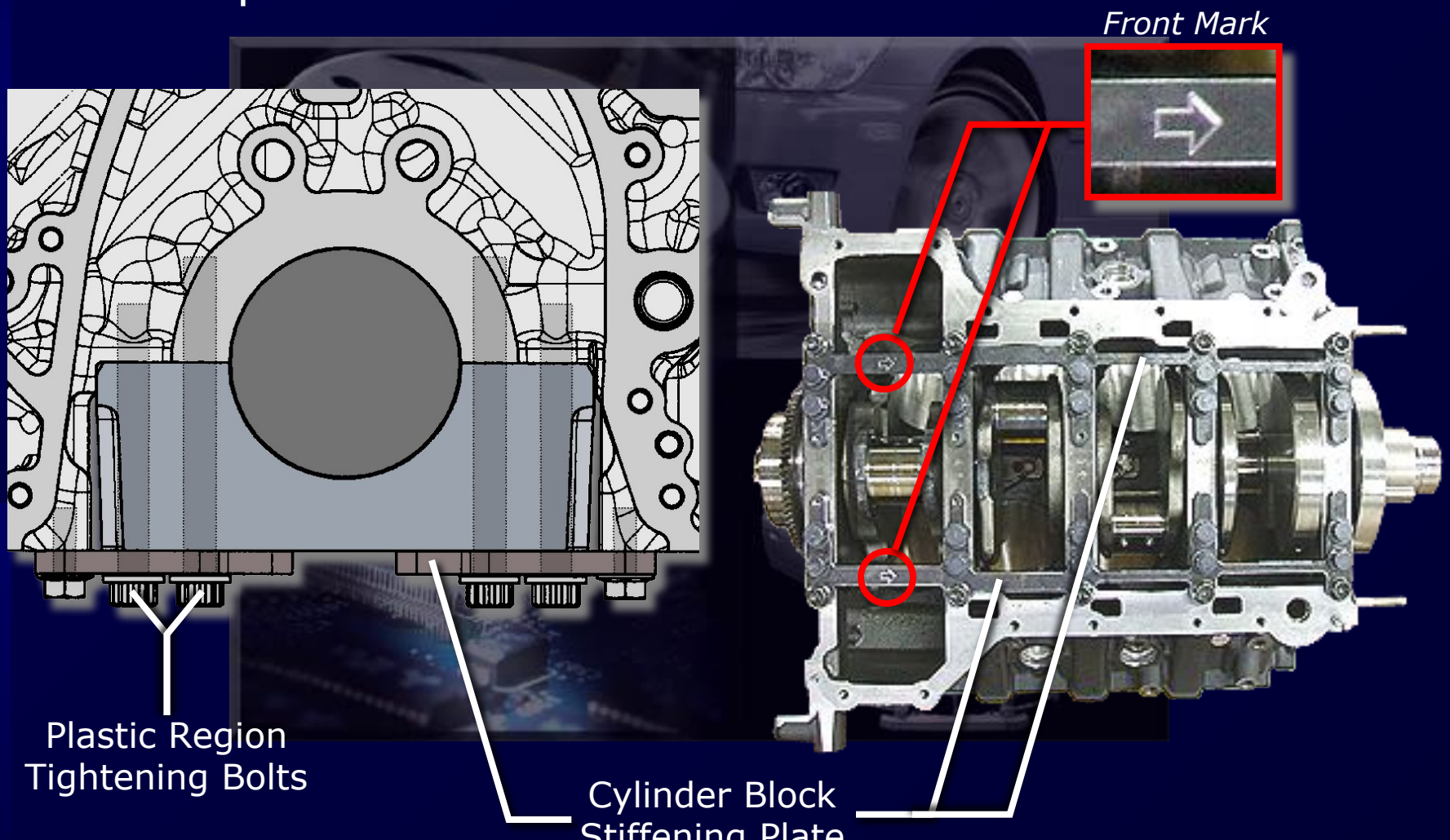
- Crankshaft and Flywheel
  - Balance weight is appropriately provided to reduce vibration



AT Model **MT Model**

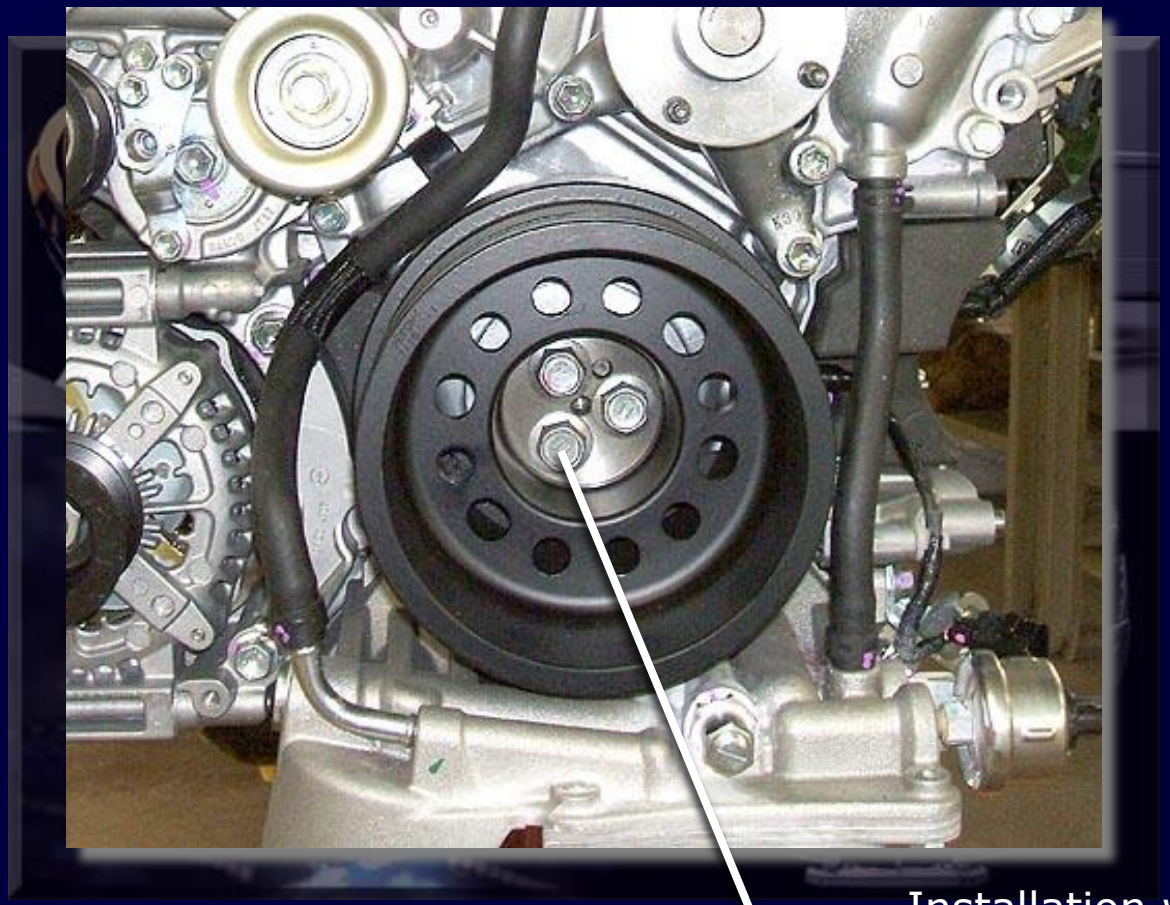
Engine Proper

- Cylinder Block Stiffening Plate
  - This plate connects the bearing cap and cylinder block skirt portion to reduce noise and vibration



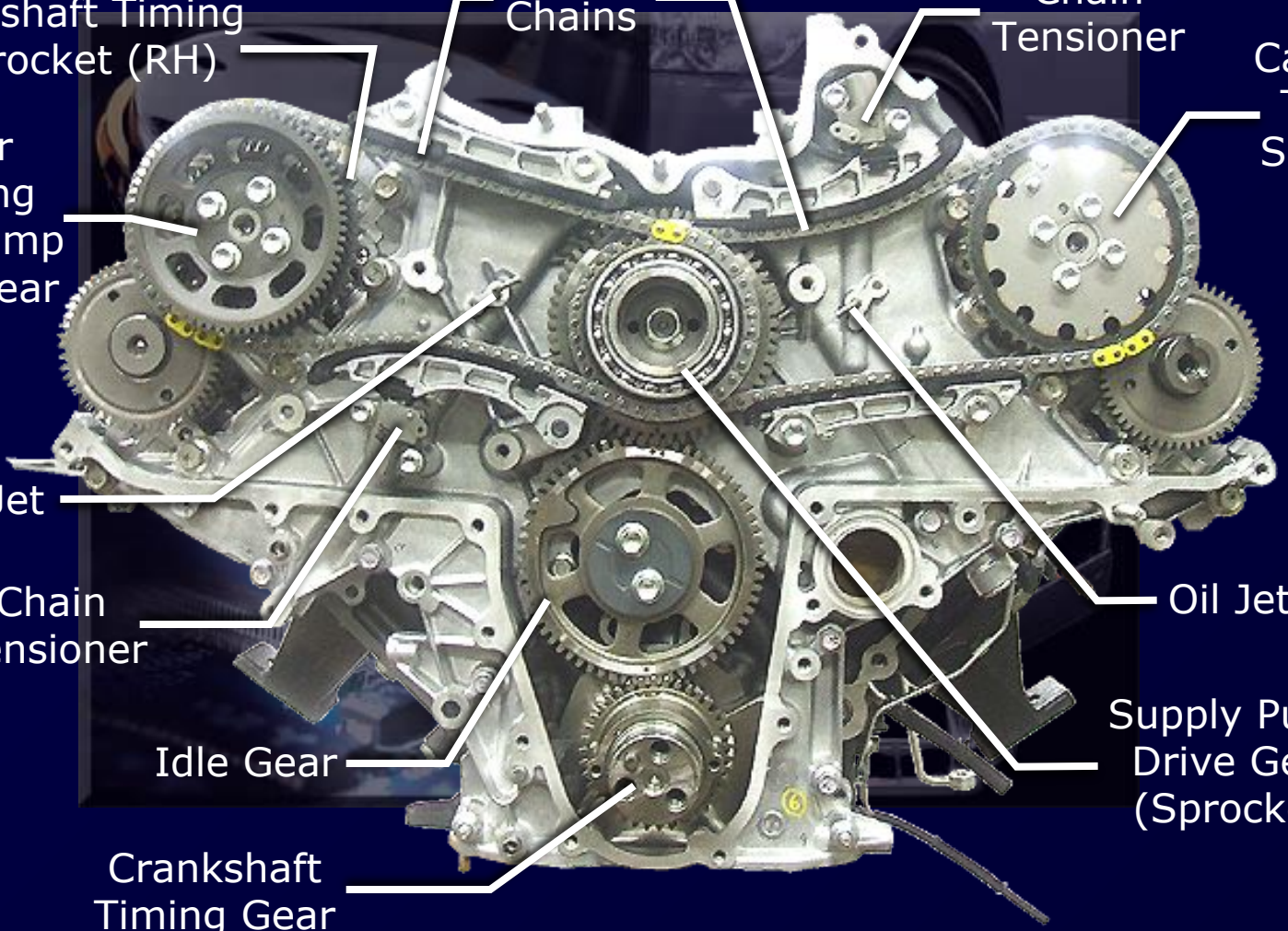
Engine Proper

- Crankshaft Pulley
  - Installed by 3 bolts to reduce tightening torque



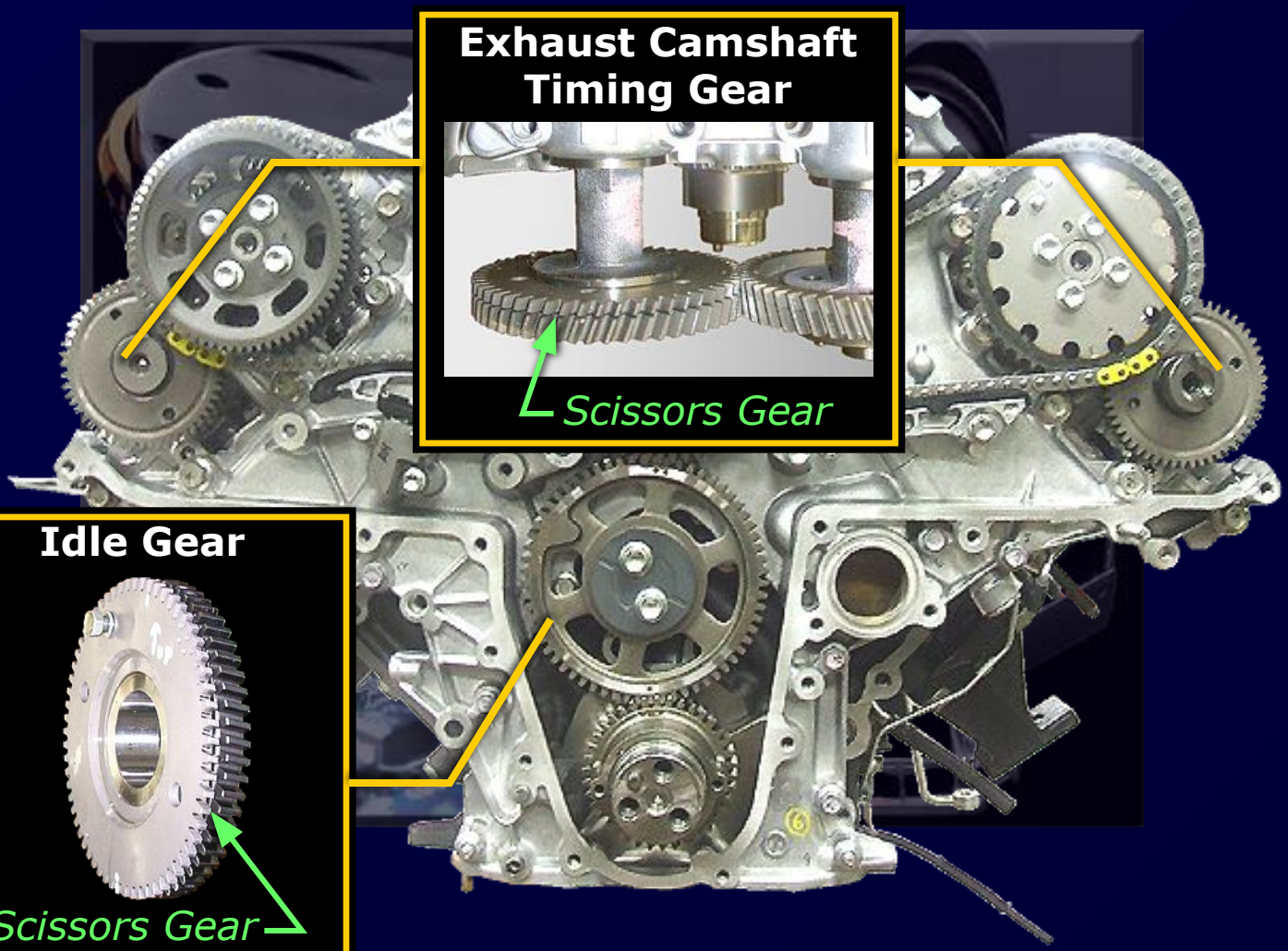
Valve Mechanism

- Timing Gear and Chain
  - Timing gear and chain is used to realize maintenance-free



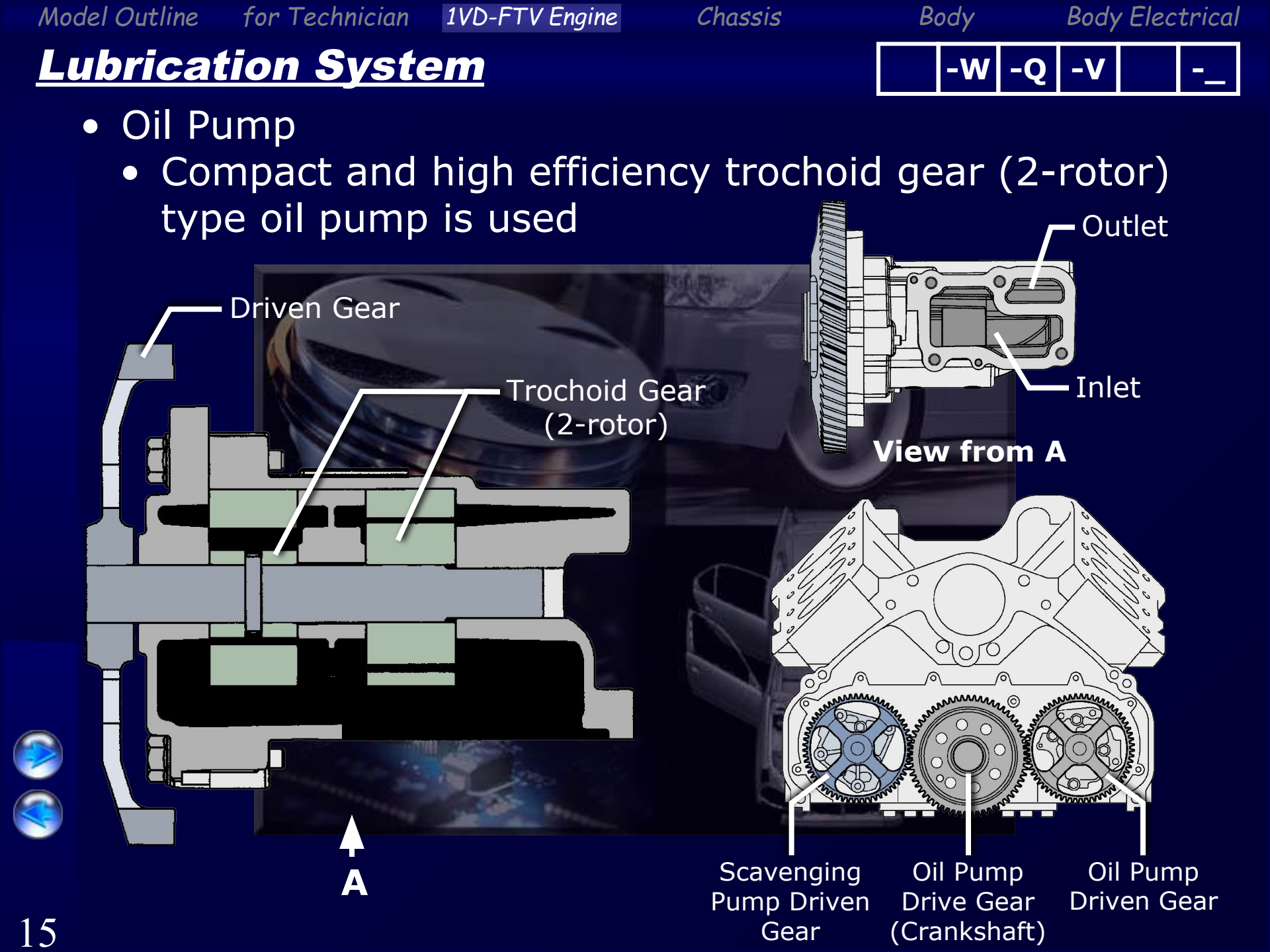
Valve Mechanism

- Timing Gear and Chain
  - Scissors gear is used for exhaust camshaft timing gear and idle gear to reduce gear noise



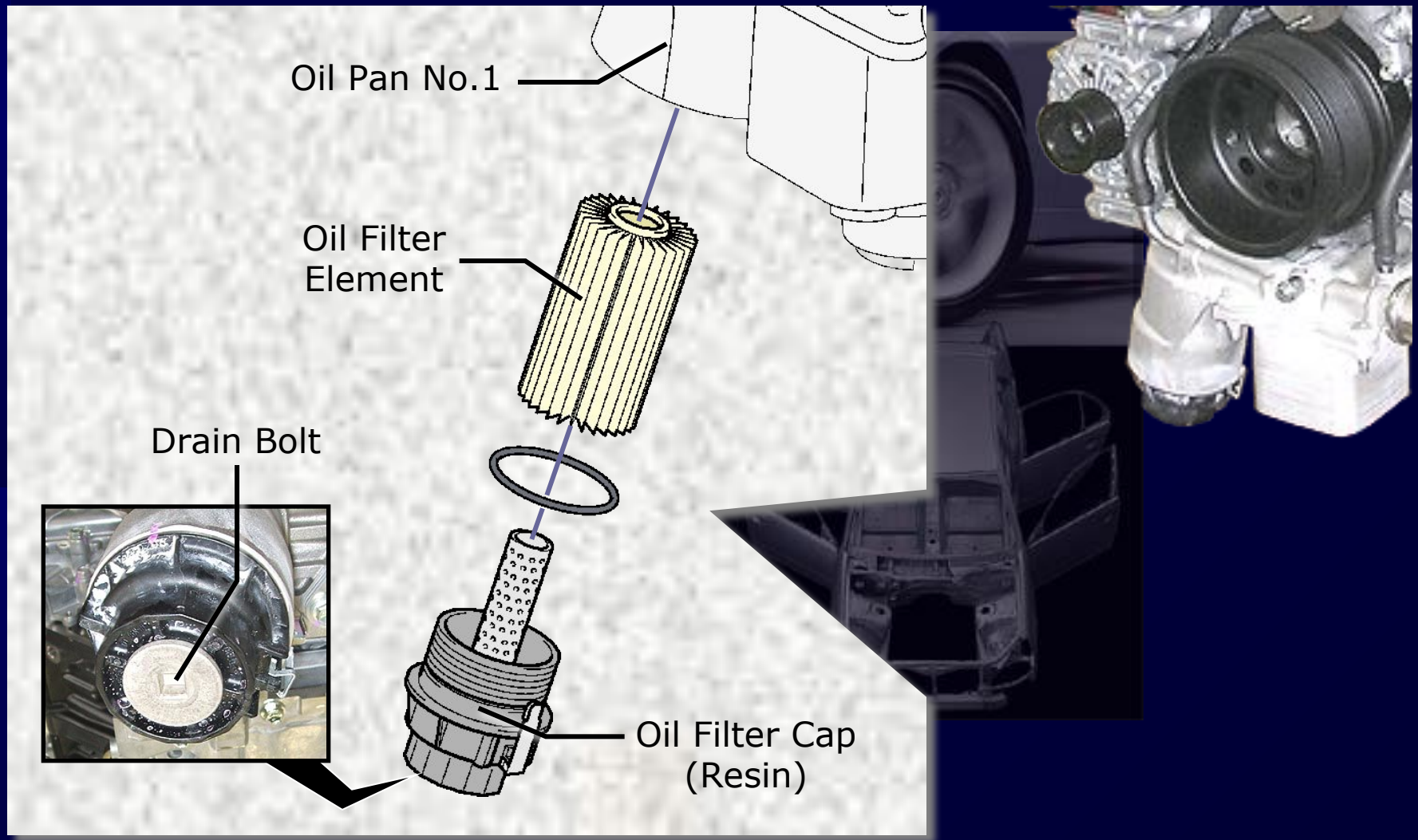
Lubrication System

- Oil Pump
  - Compact and high efficiency trochoid gear (2-rotor) type oil pump is used



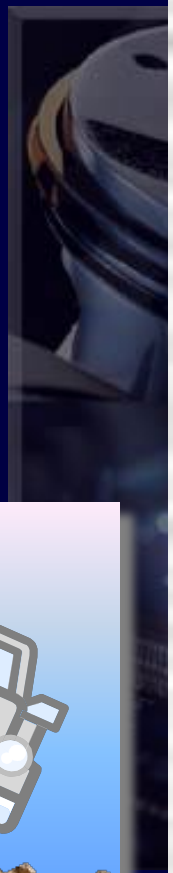
Lubrication System

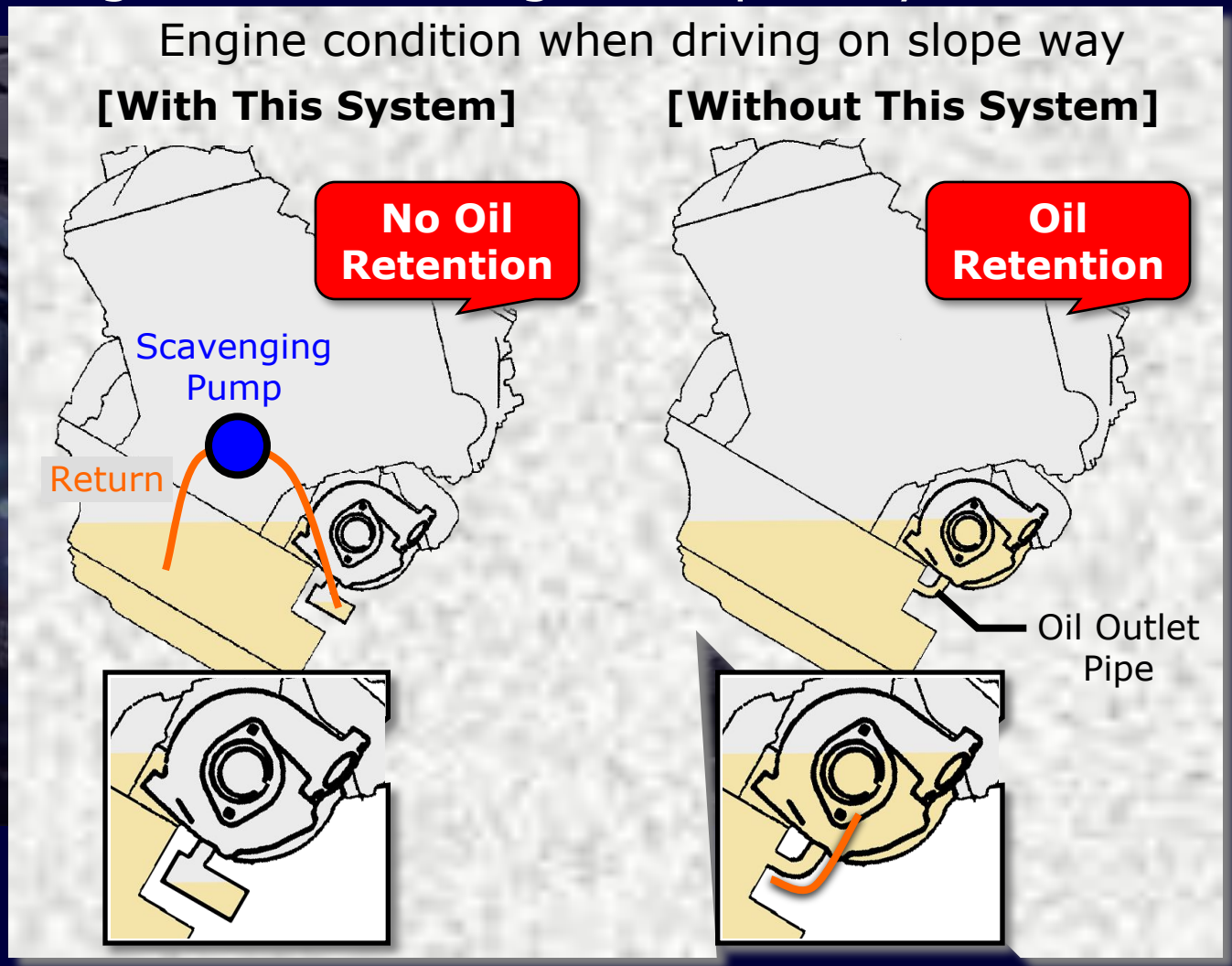
- Oil Filter
  - Element replacement type oil filter is used



Lubrication System

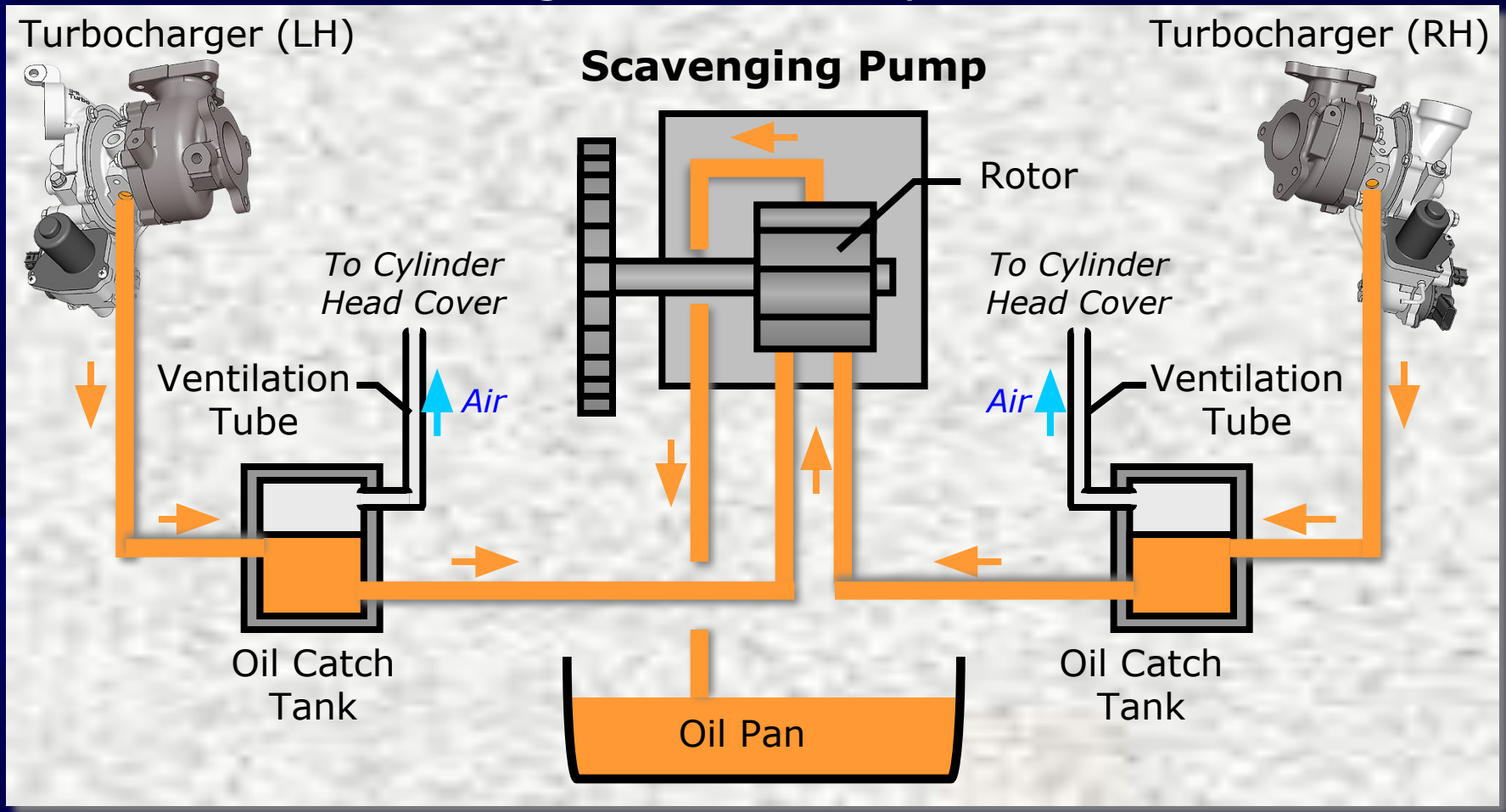
- Scavenging Pump
  - This system is used to prevents oil from retaining in the turbocharger when driving on slope way





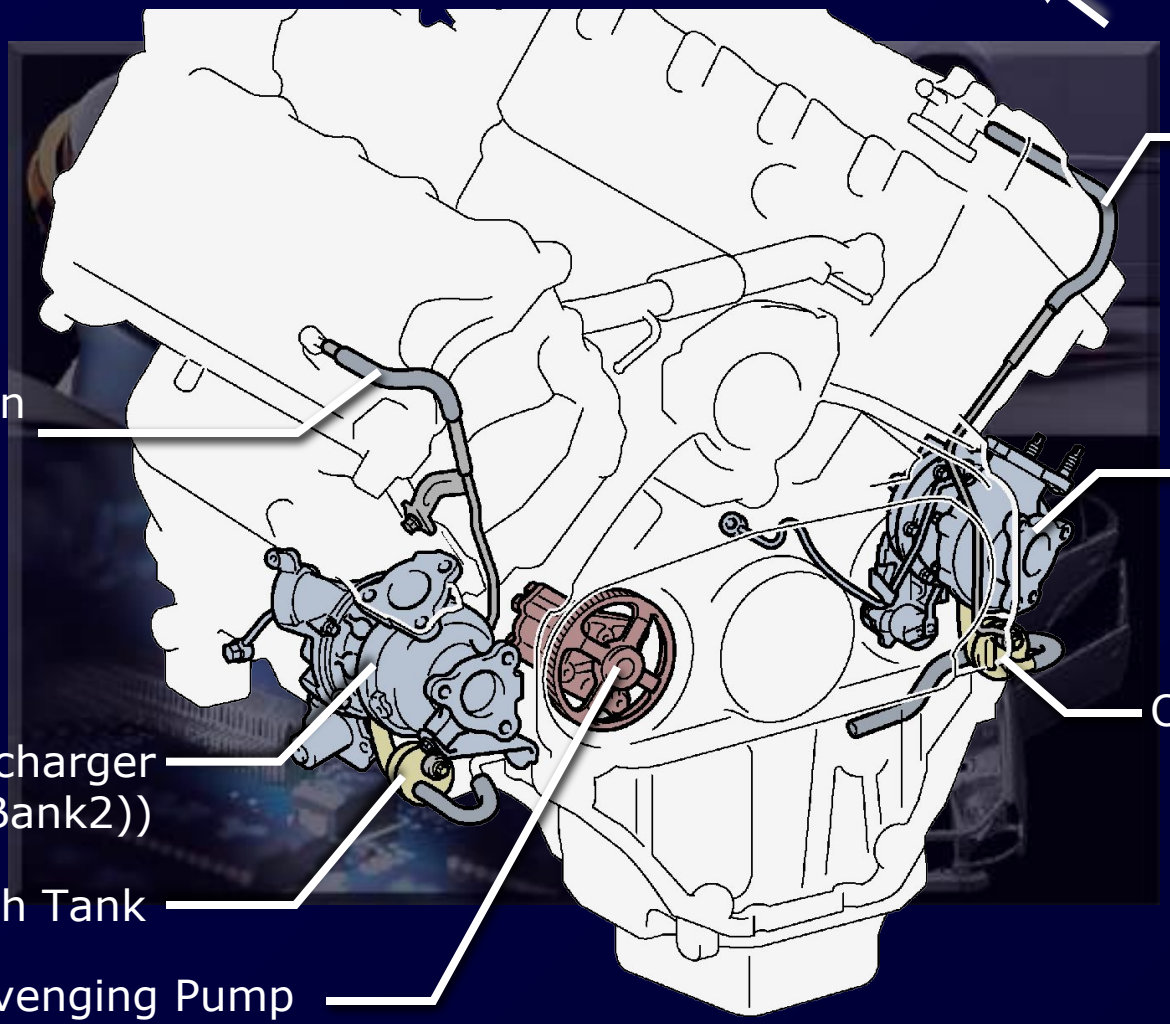
Lubrication System

- Scavenging Pump
  - Scavenging pump sucks the engine oil in the catch tank and discharge it to the oil pan



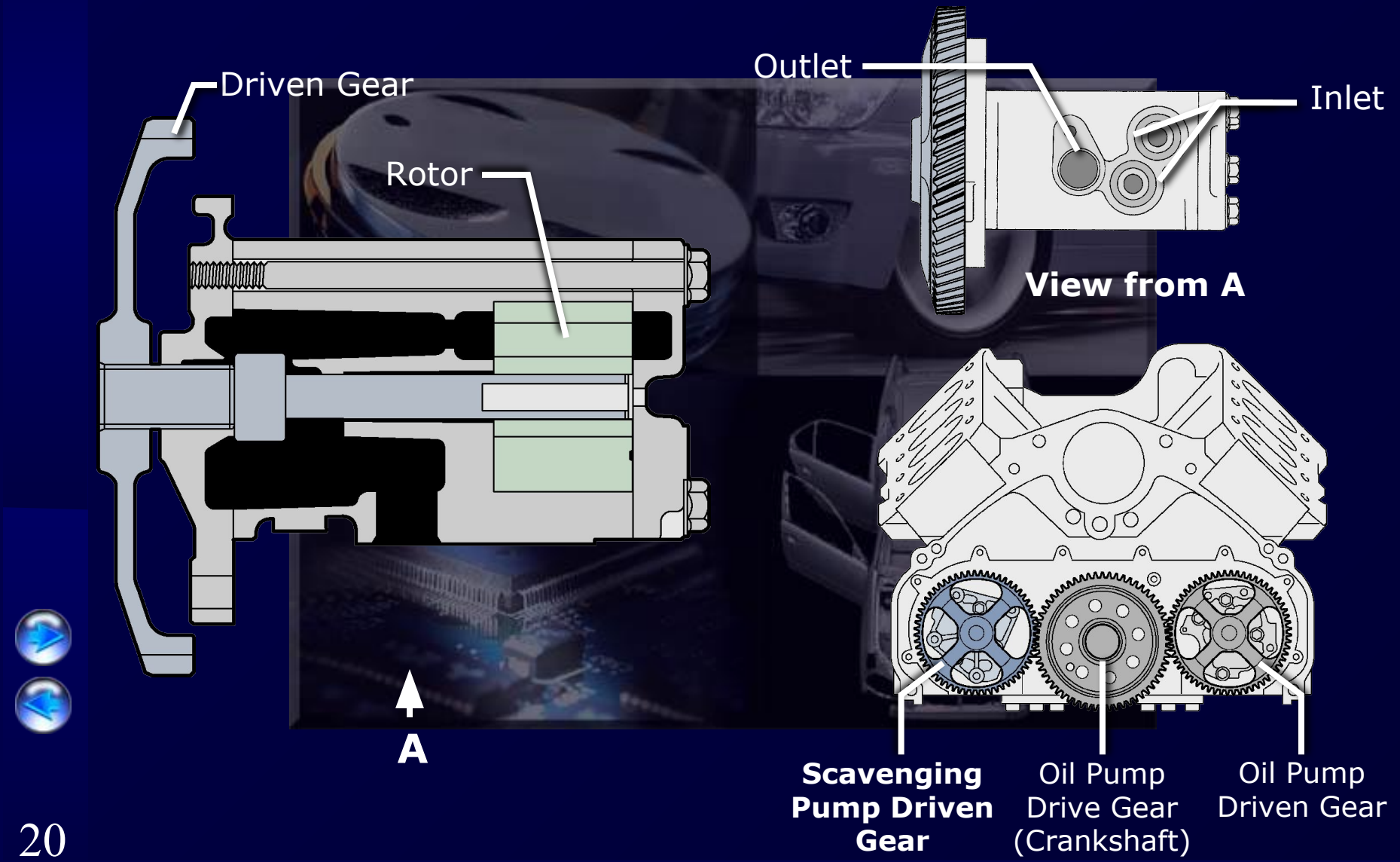
Lubrication System

- Scavenging Pump
  - Parts Location



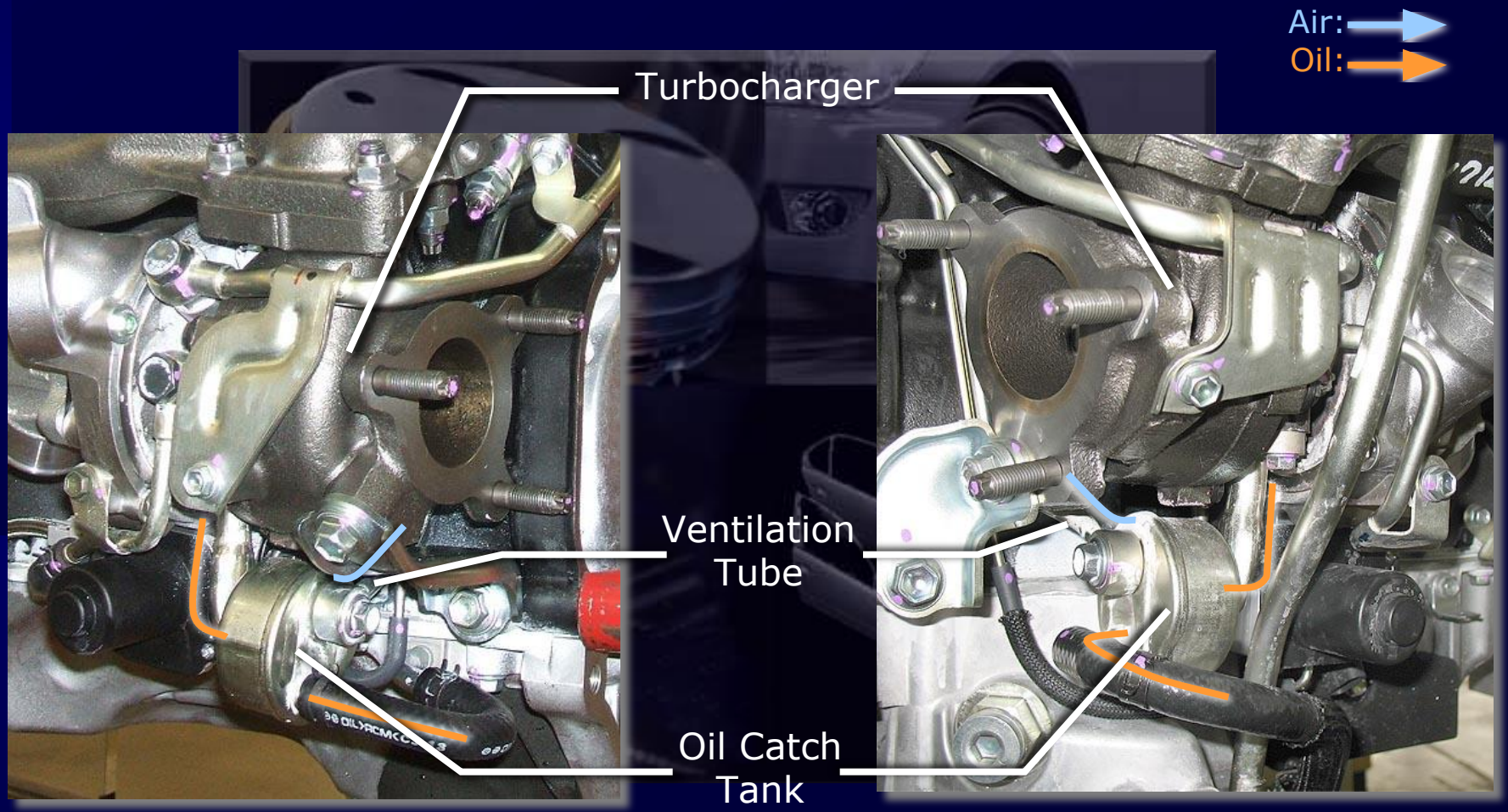
Lubrication System

- Scavenging Pump
  - Scavenging pump is driven by crankshaft



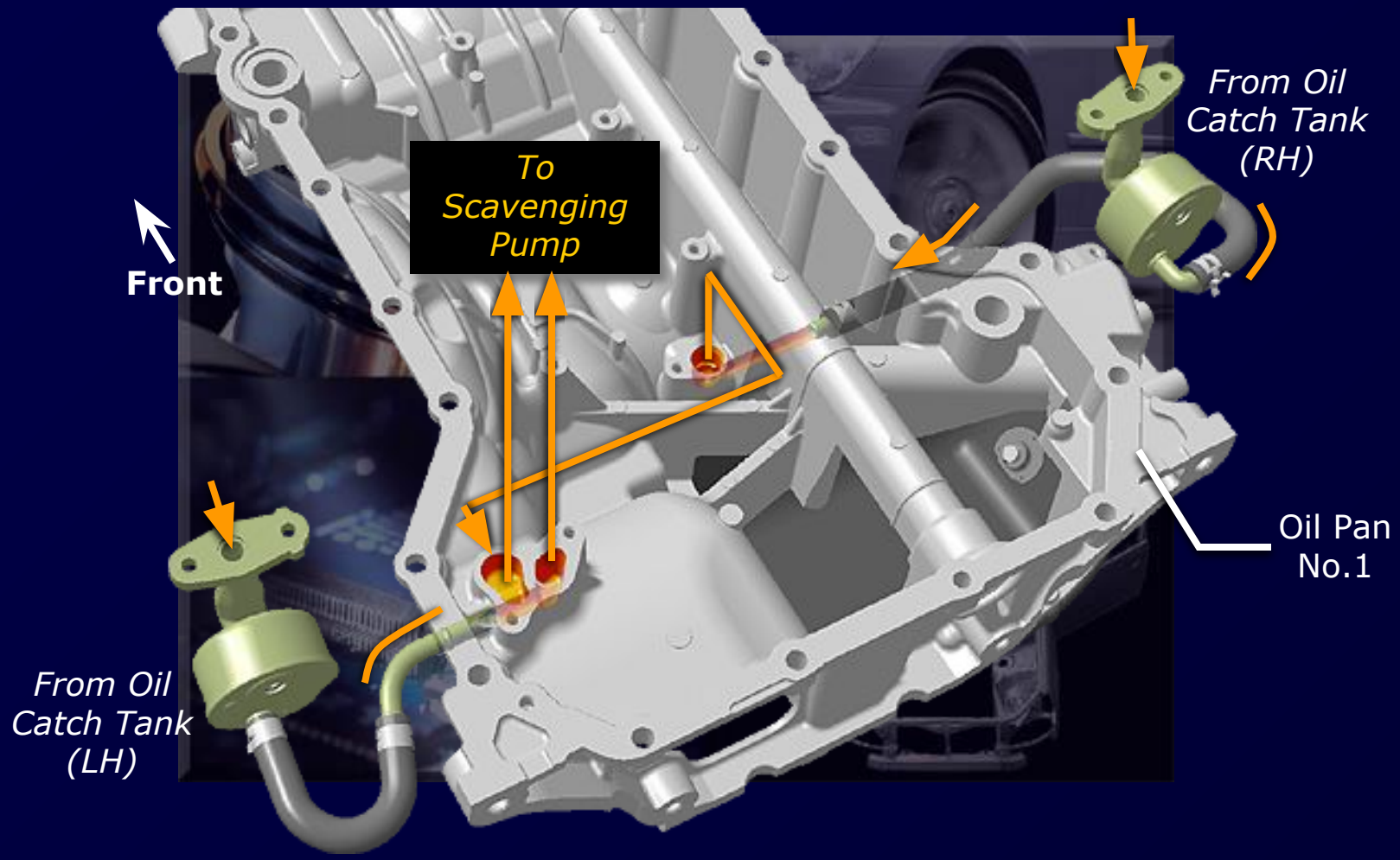
Lubrication System

- Scavenging Pump
  - Oil catch tank separates the engine oil to air-liquid



Reference (Lubrication System)

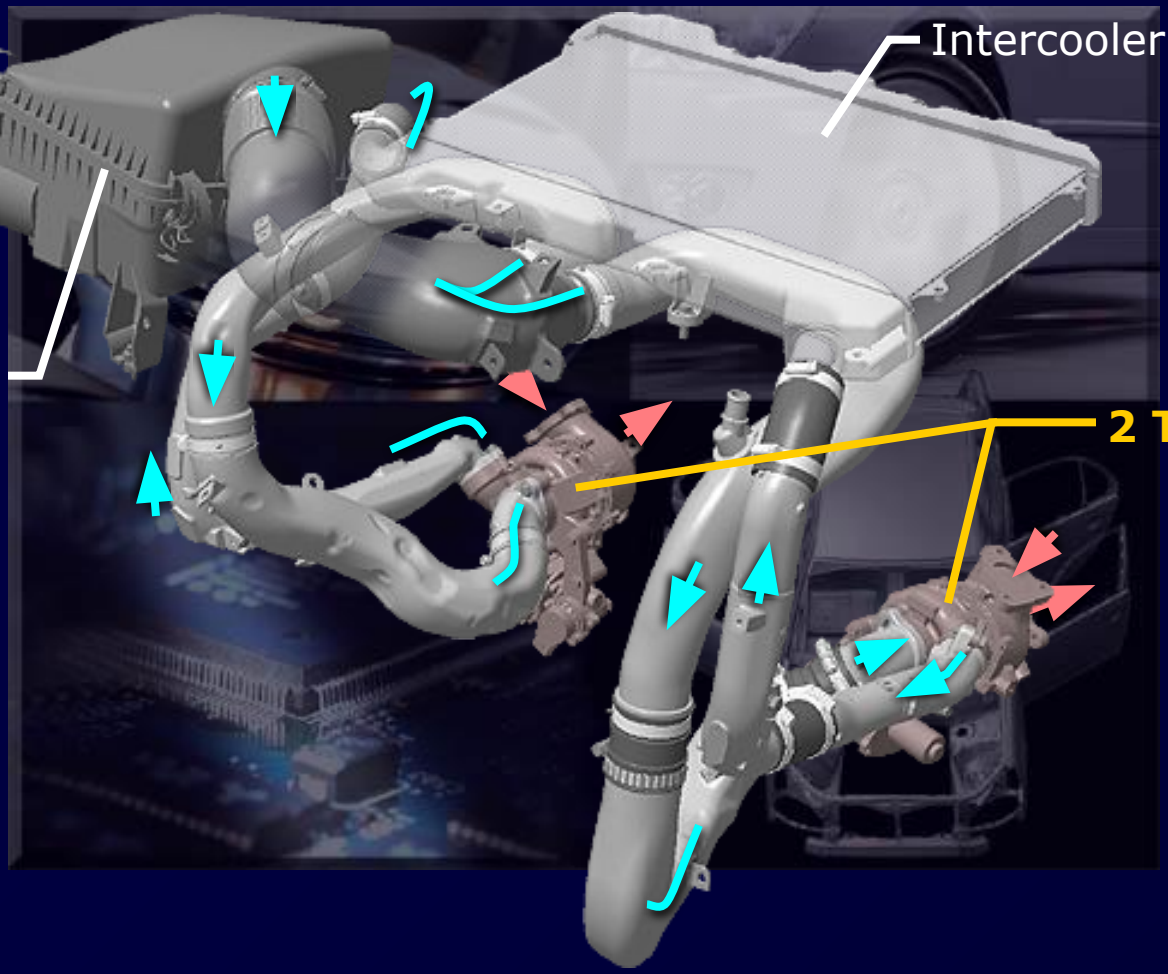
- Scavenging Pump
  - Oil flow from oil catch tank to scavenging pump



Intake and Exhaust System

	-W	-Q	-V		-_

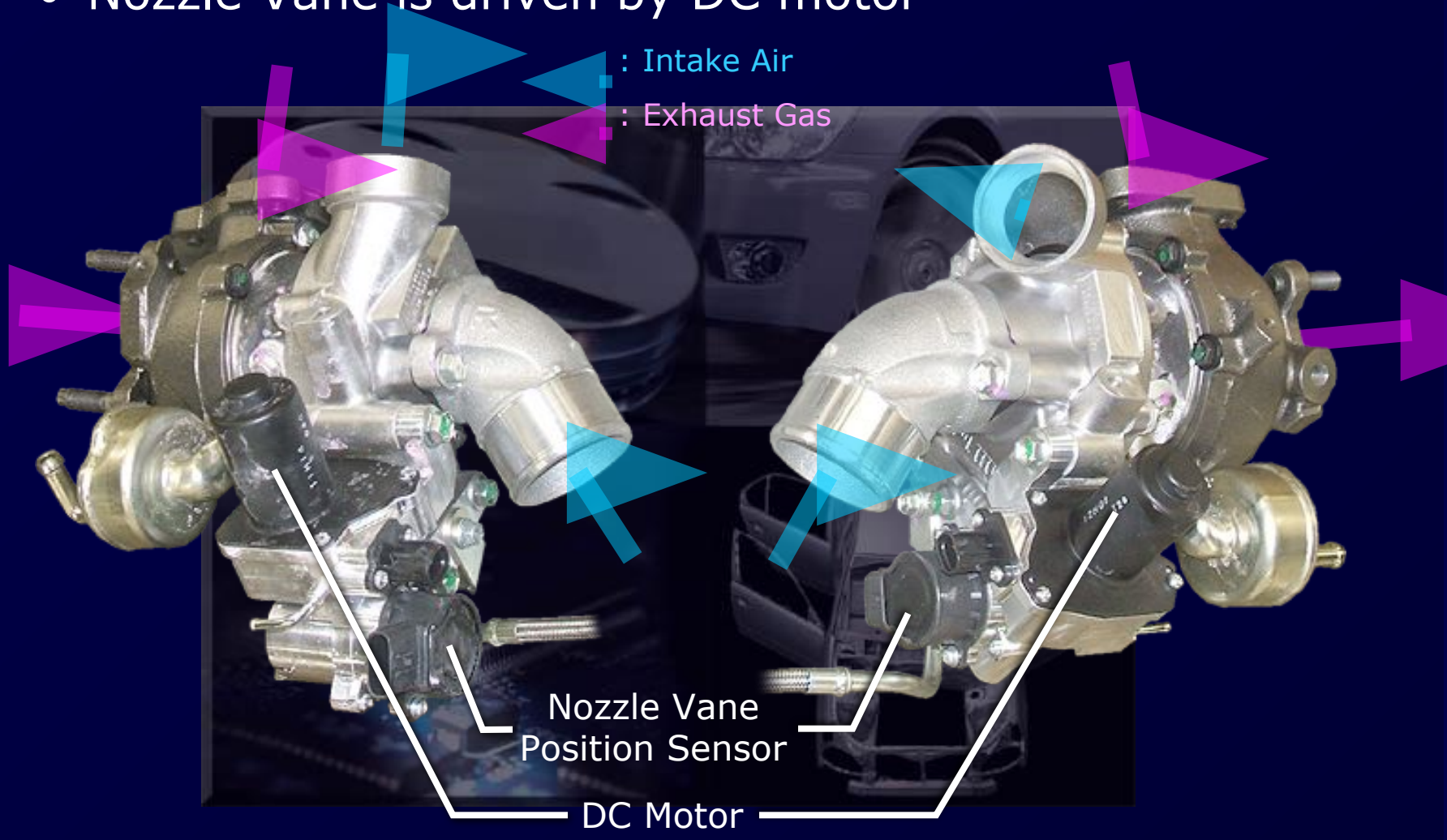
- Variable Nozzle Vane Type Turbocharger
  - VN (Variable Nozzle-vane) type 2 turbochargers



Intake and Exhaust System

	-W	-Q	-V		-_

- Variable Nozzle Vane Type Turbocharger
  - Nozzle Vane is driven by DC motor

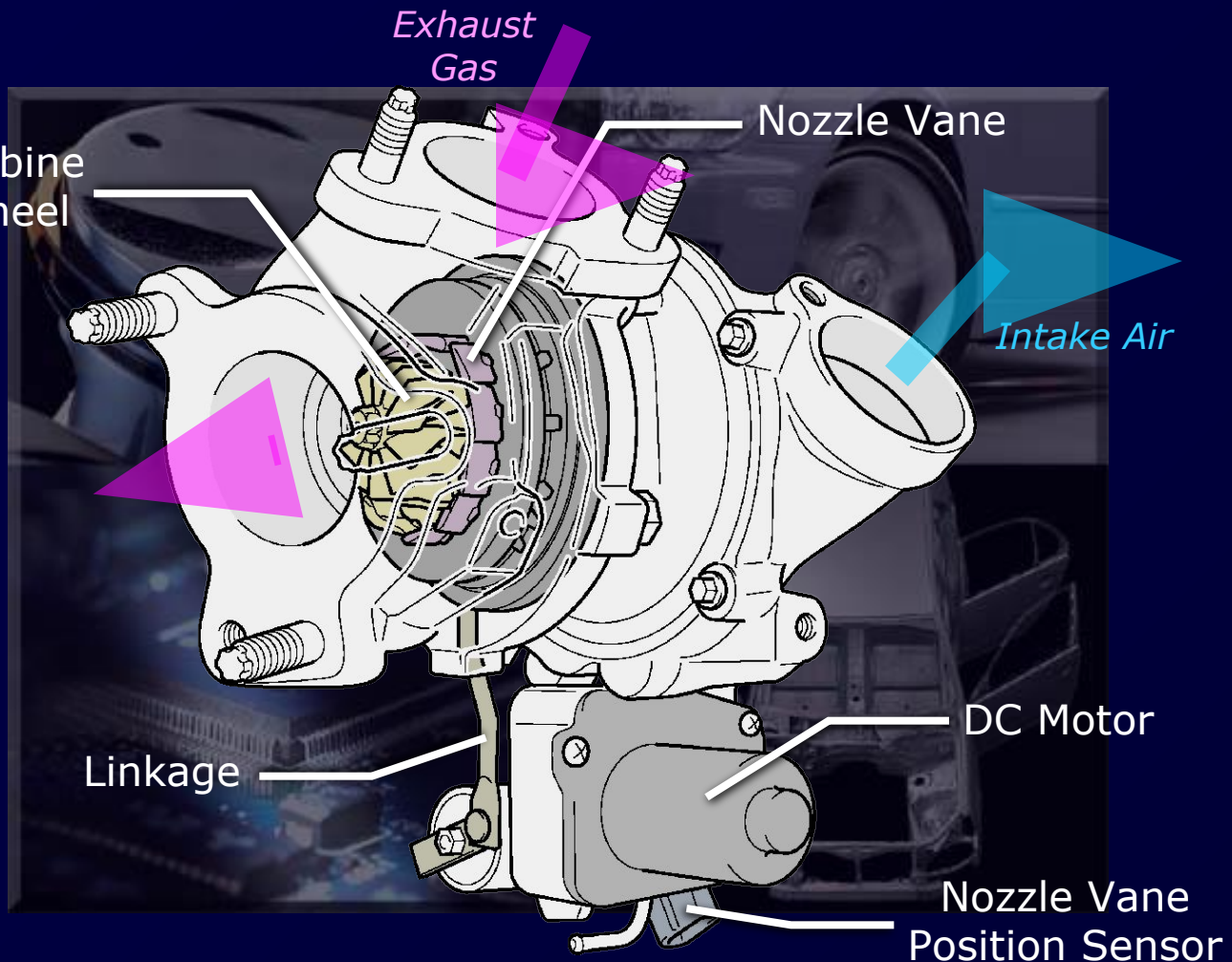


RH Side (Bank1) **LH Side (Bank2)**

Intake and Exhaust System

	-W	-Q	-V		-_

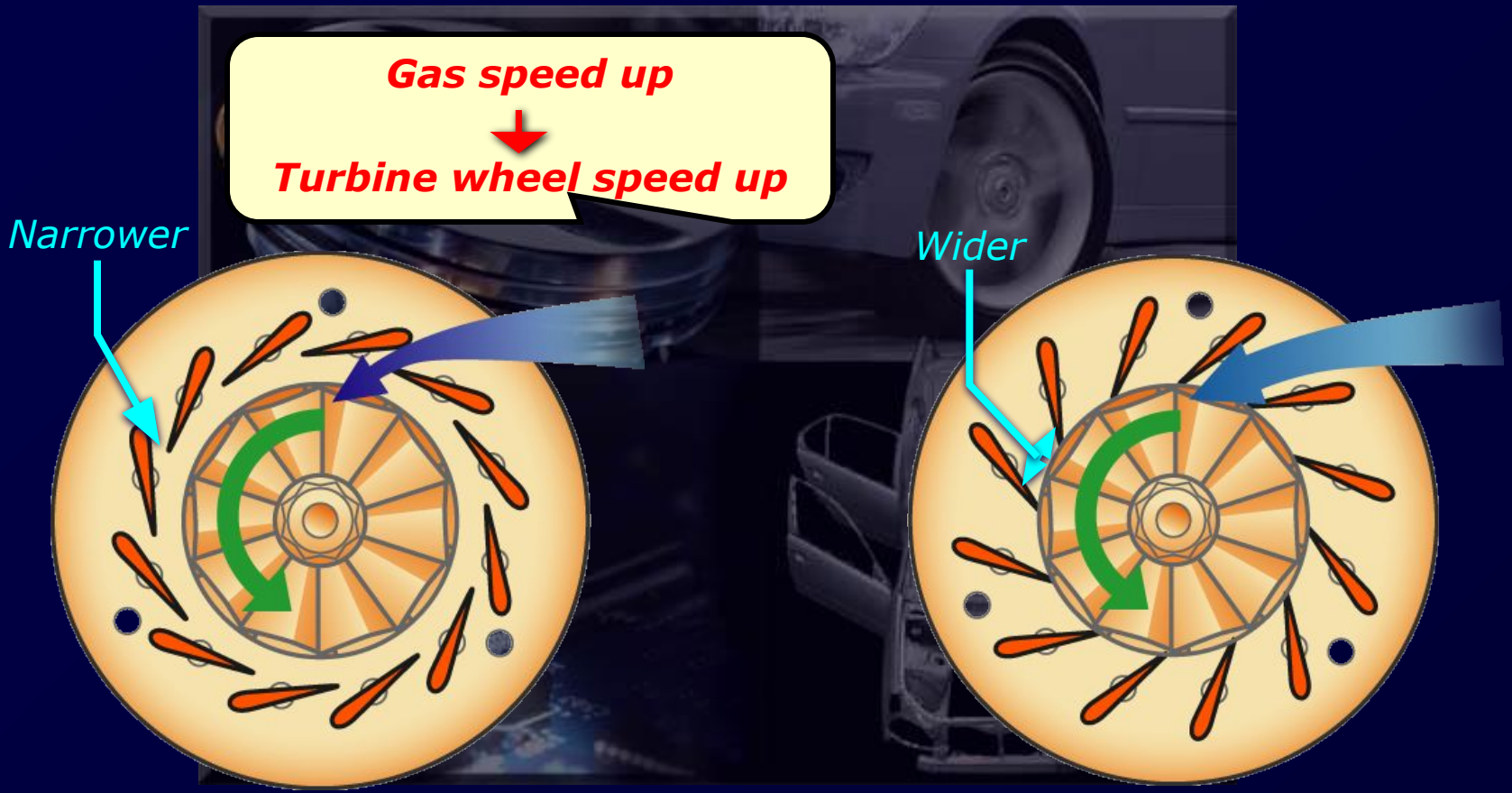
- Variable Nozzle Vane Type Turbocharger
  - Construction (RH Side (Bank1))



RH Side (Bank1)

Intake and Exhaust System

- Variable Nozzle Vane Type Turbocharger
  - Nozzle angle changes to increase exhaust gas speed
  - VN turbo can be effected at lower engine speed



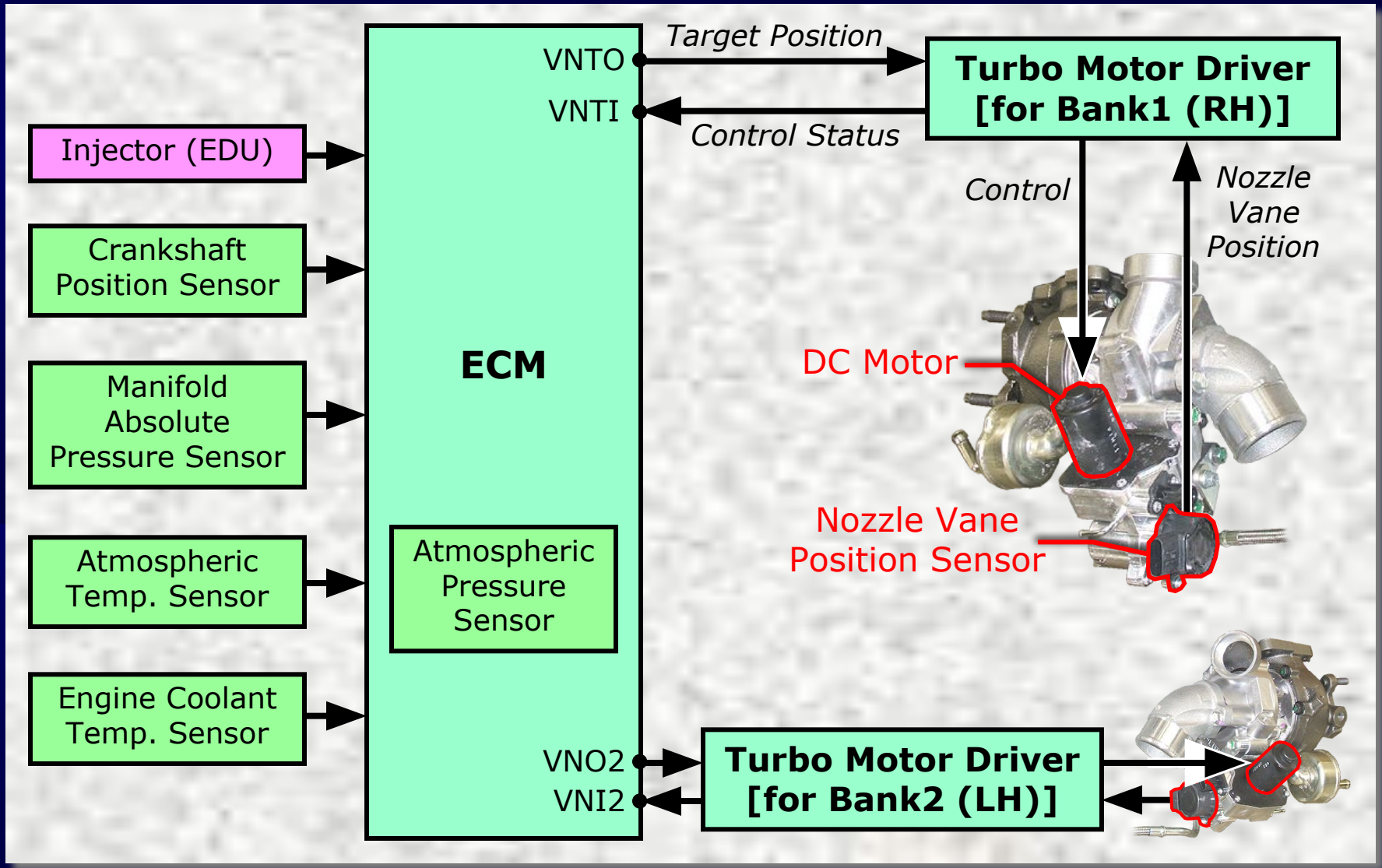
At low engine speed (Exhaust gas pressure is low)

At high engine speed (Exhaust gas pressure is high)

Intake and Exhaust System

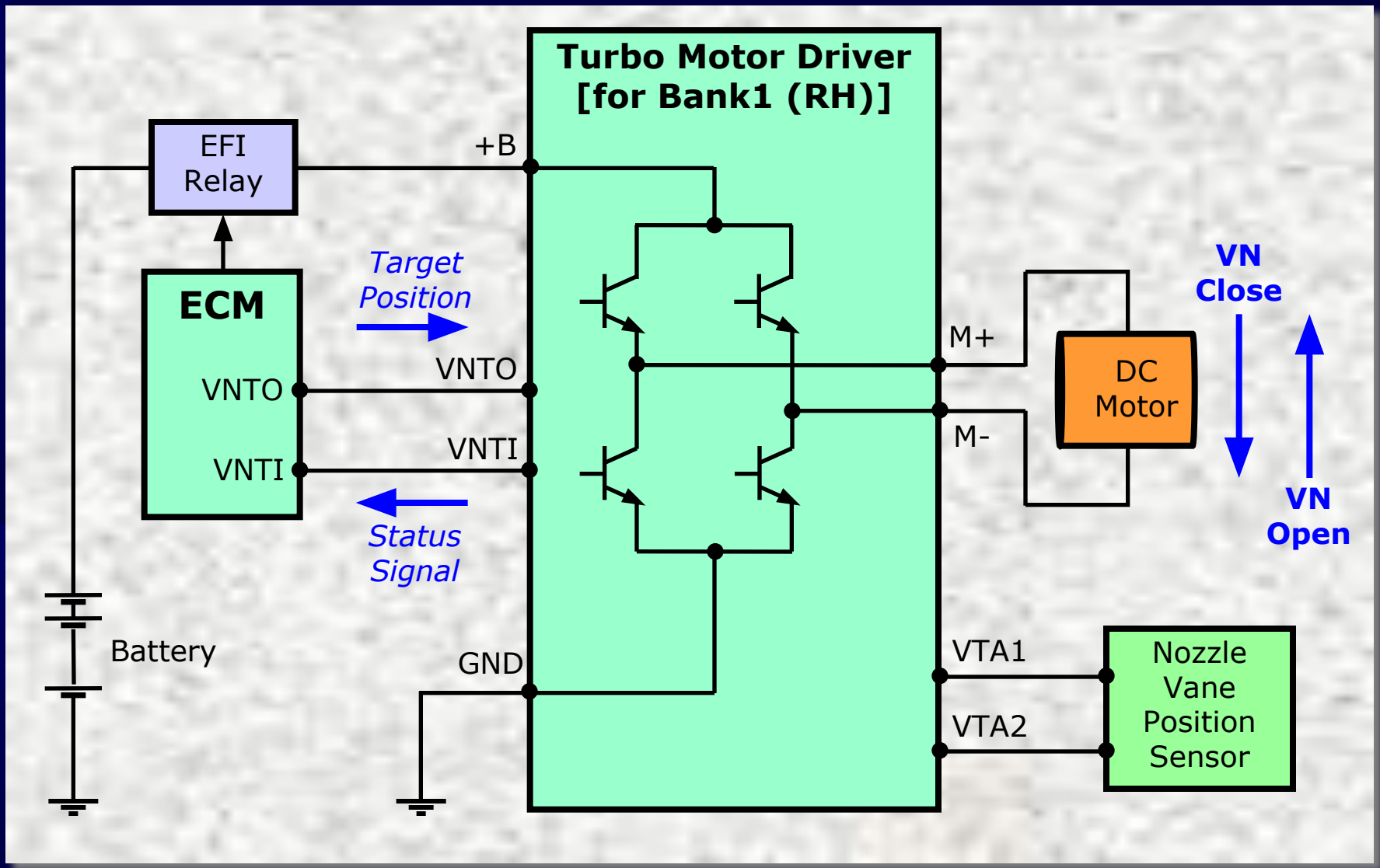
	-W	-Q	-V		-_

- Variable Nozzle Vane Type Turbocharger
  - Control



Reference (Intake and Exhaust System)

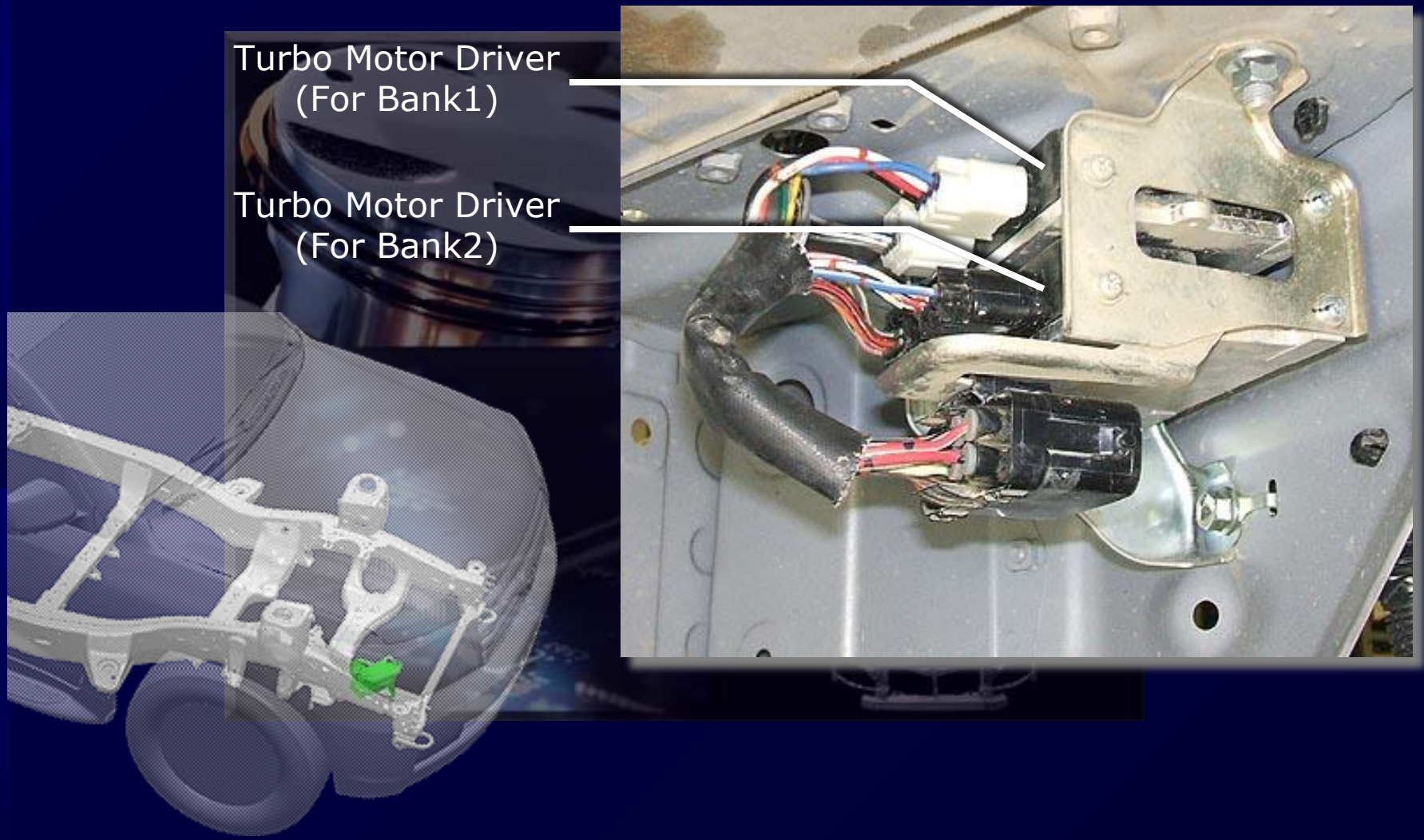
- Variable Nozzle Vane Type Turbocharger
  - System diagram of turbo motor driver



Reference (Intake and Exhaust System)

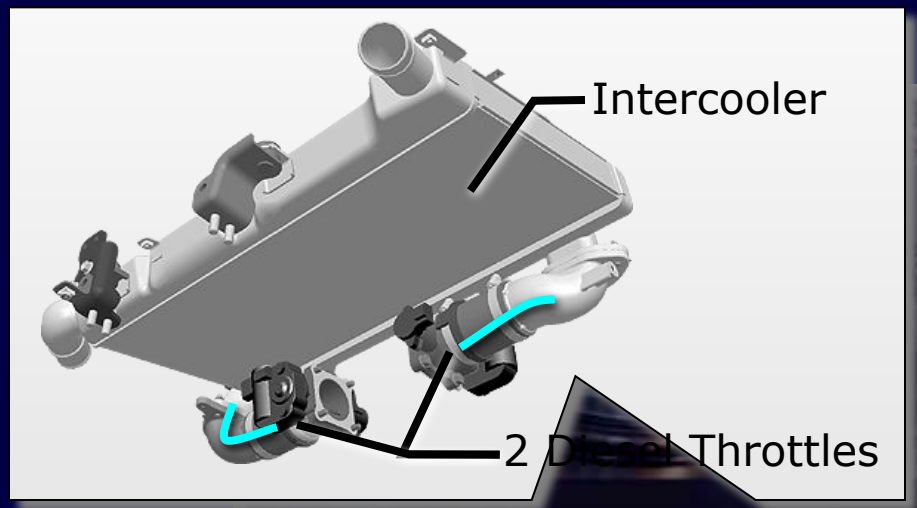
	-W	-Q	-V		-_

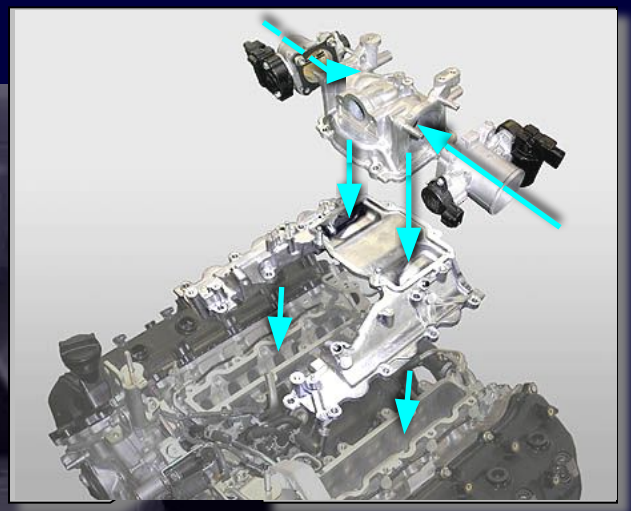
- Variable Nozzle Vane Type Turbocharger
  - Location of turbo motor driver



Intake and Exhaust System

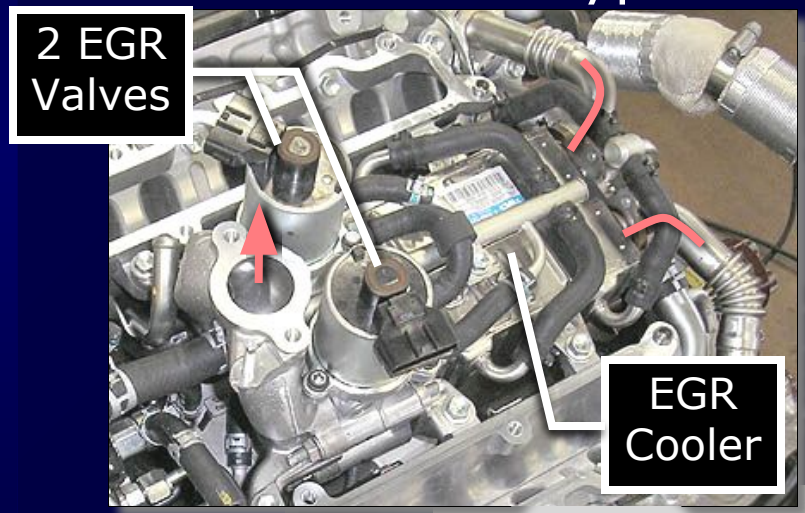
- Diesel Throttle
  - Rotary solenoid type 2 diesel throttles are used





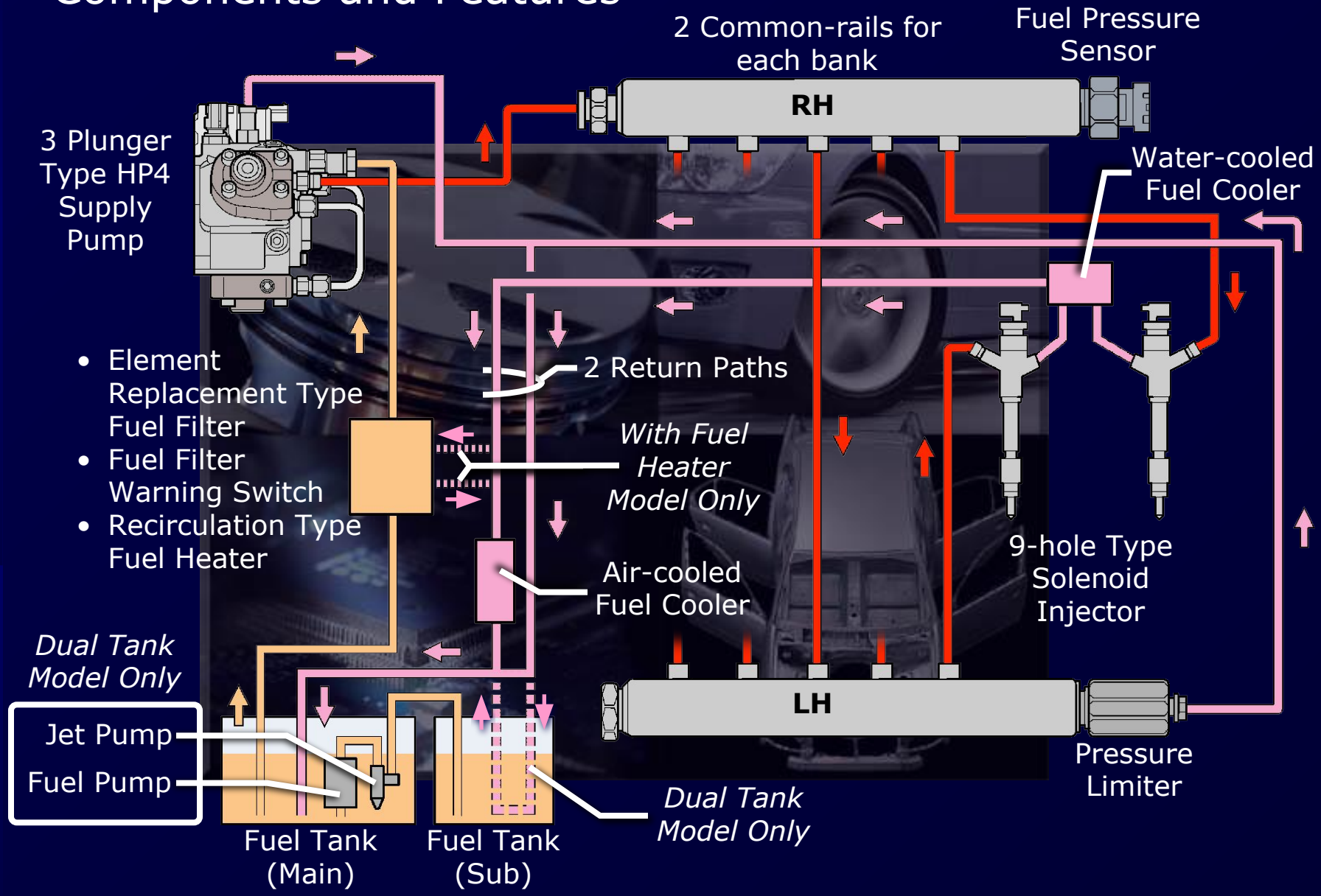
Intake and Exhaust System

- EGR System
  - Liner solenoid type 2 EGR valves
  - Water-cooled type EGR cooler



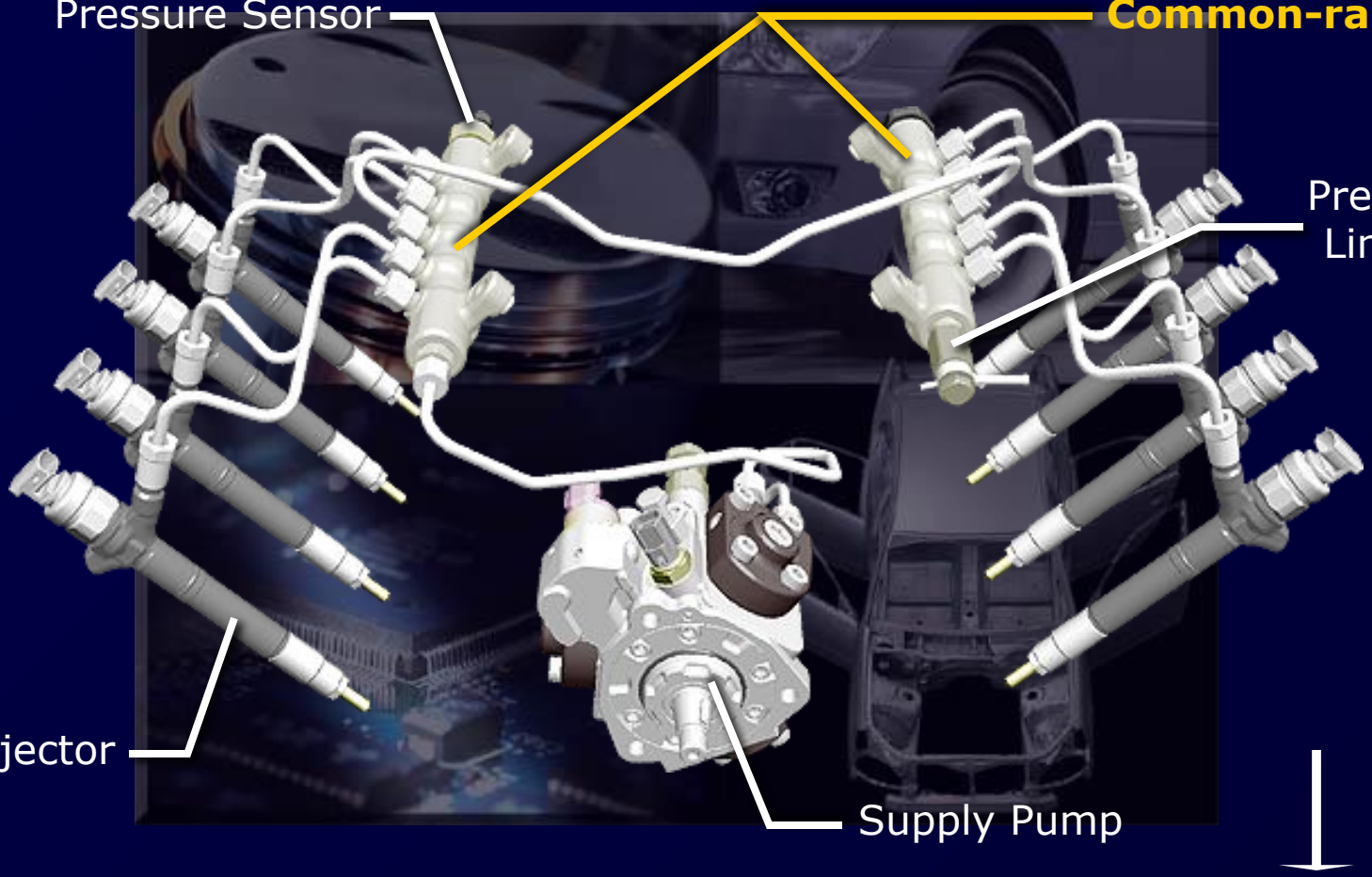
Fuel System

- Components and Features



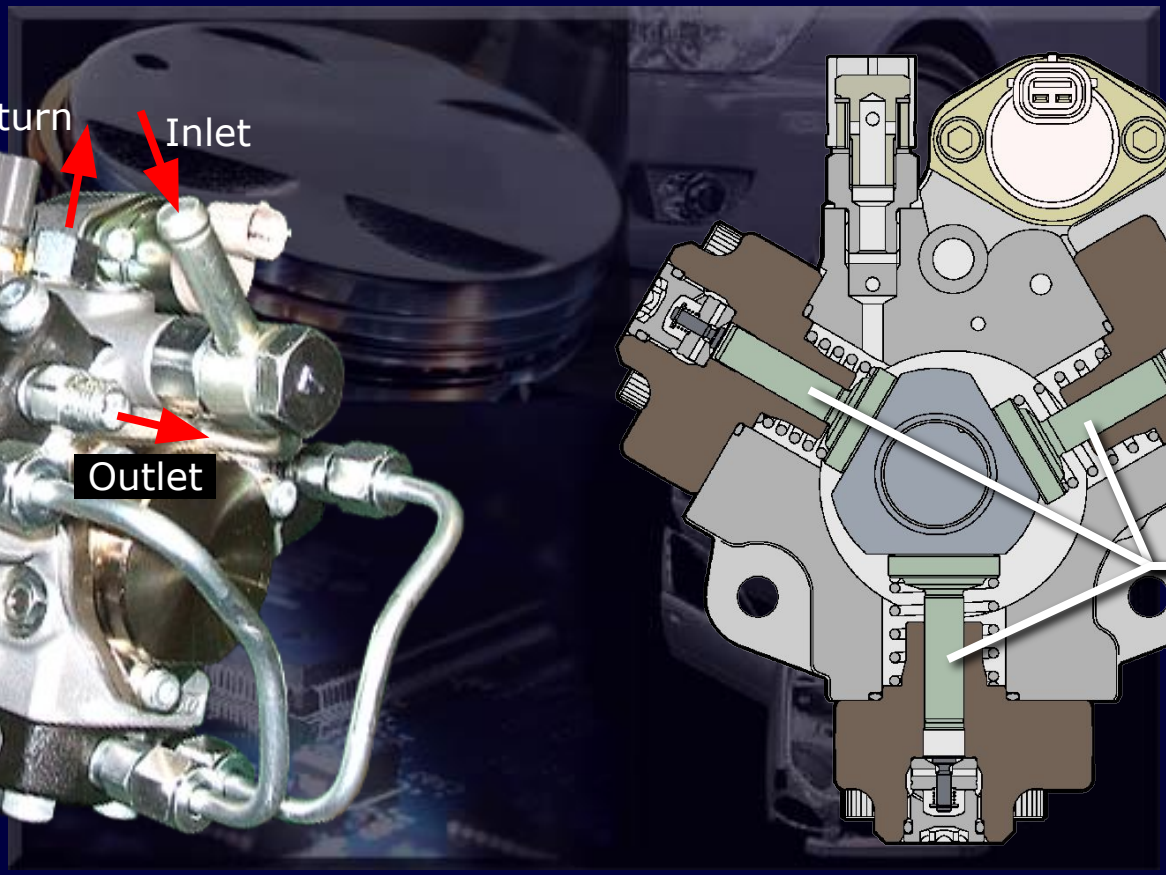
Fuel System

- Common-rail
  - 2 Common-rails for each bank



Fuel System

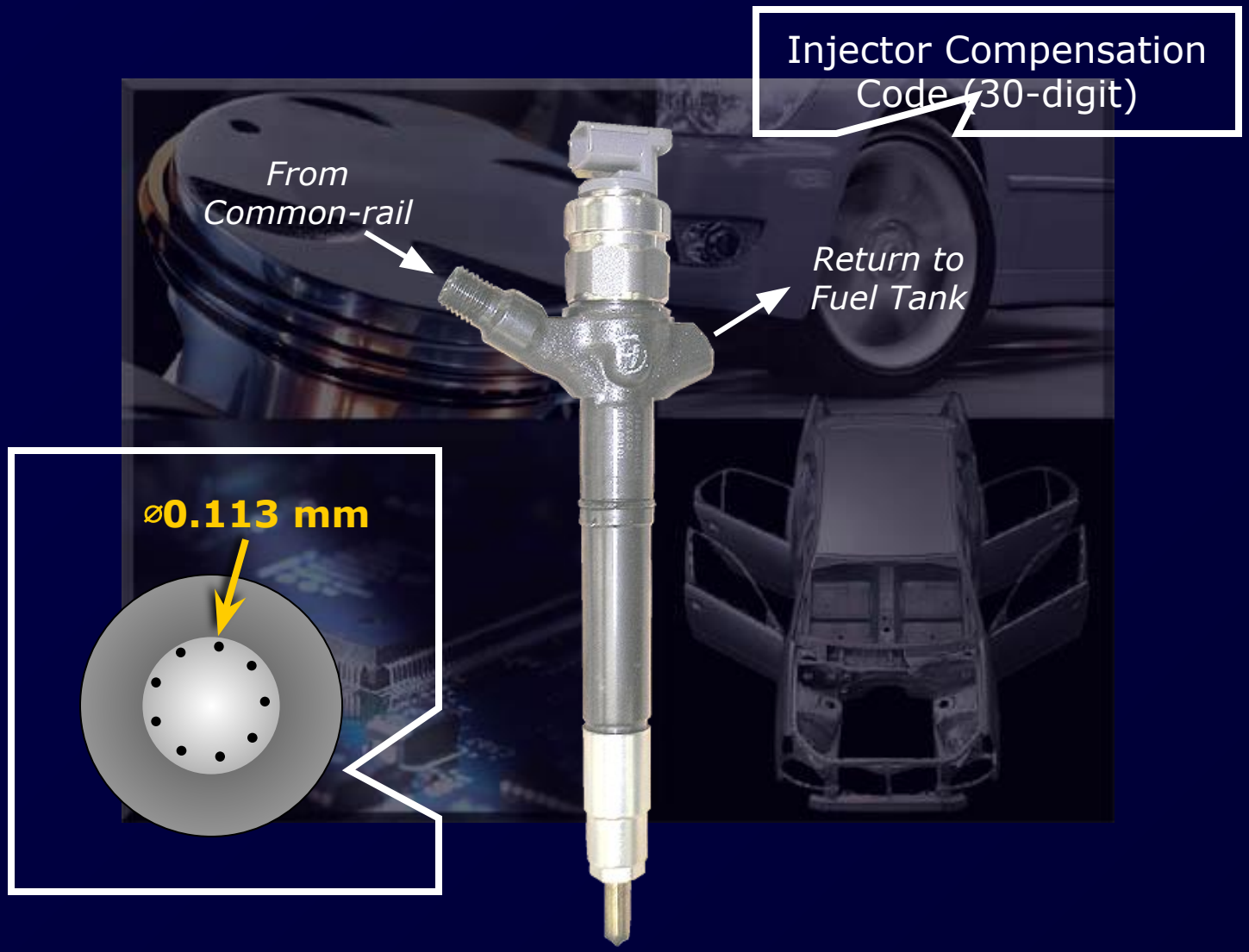
- Supply Pump (HP4)
  - 3 plunger type supply pump is used to correspond to the injection volume increase



Fuel System

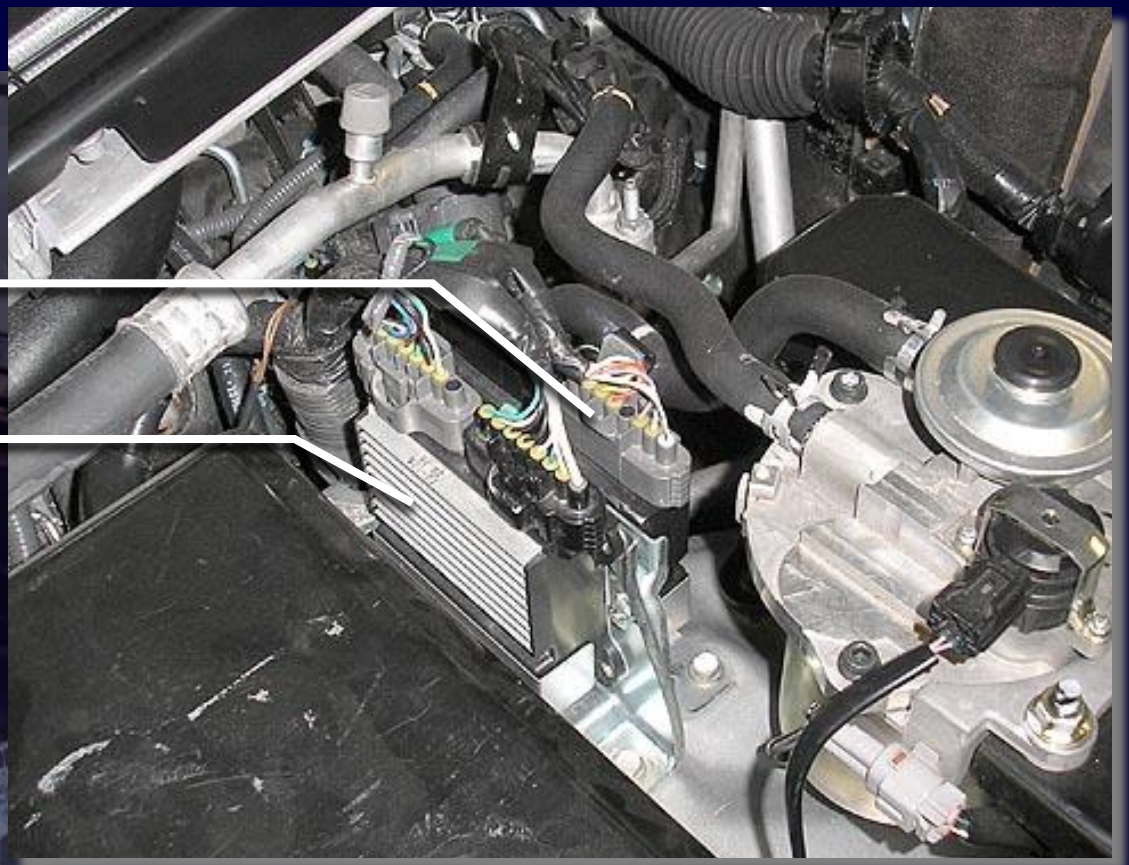
	-W	-Q	-V		-_

- Injector
  - 9-hole type solenoid injector is used



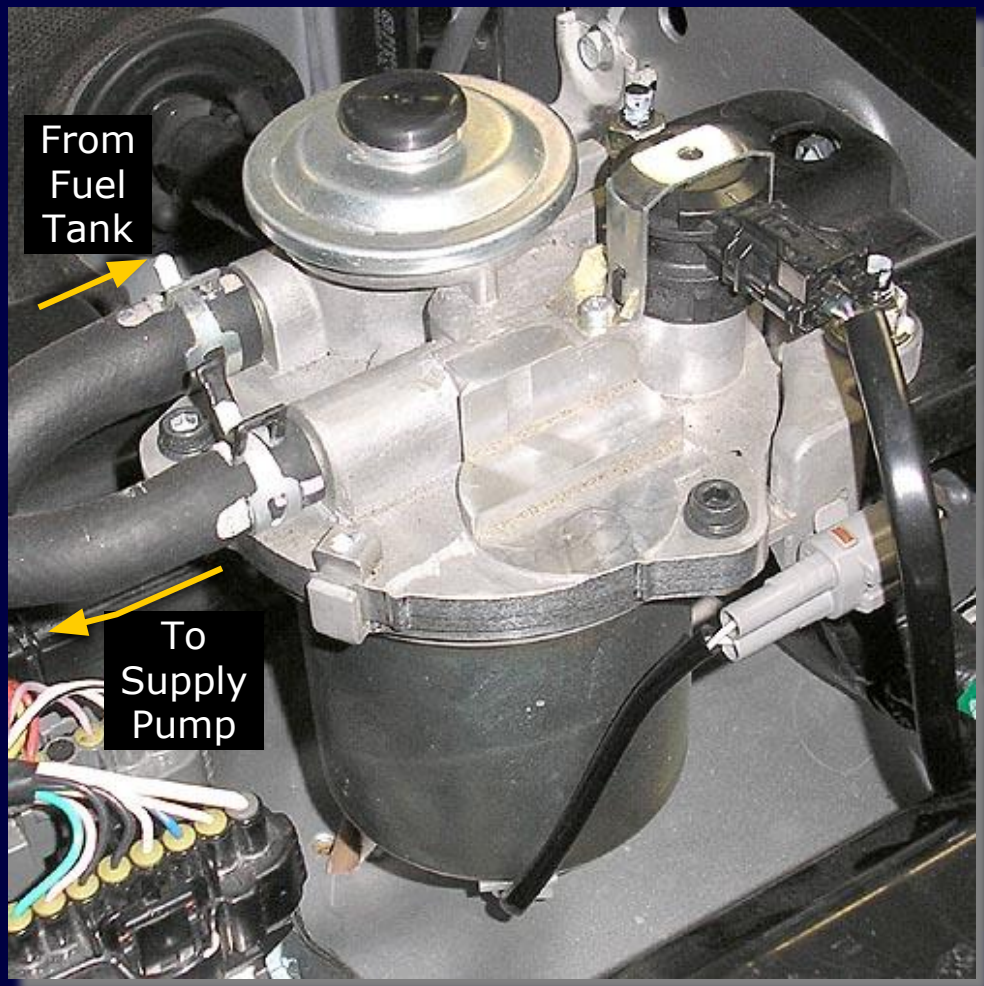
Fuel System

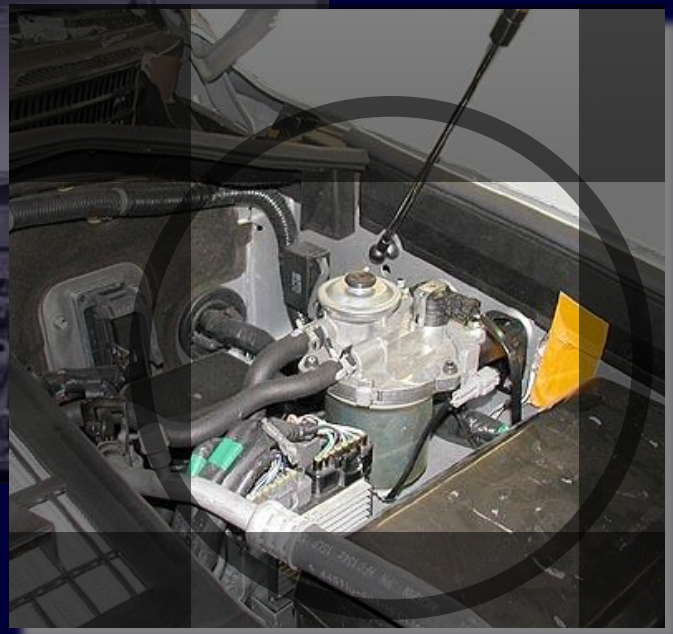
- EDU
  - 2 EDUs are used



Fuel System

- Fuel Filter
  - Element replacement type fuel filter is used

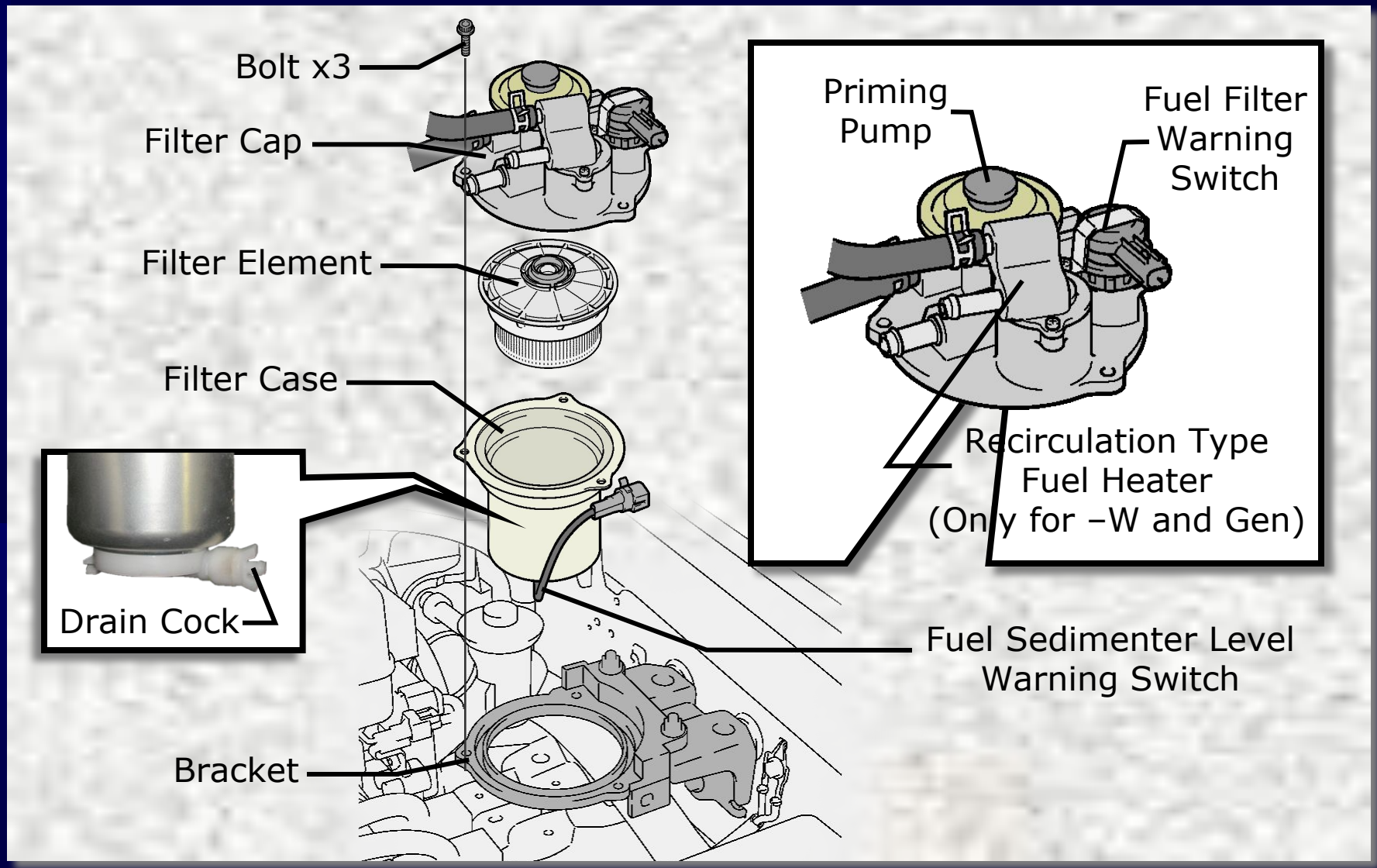




Fuel Filter

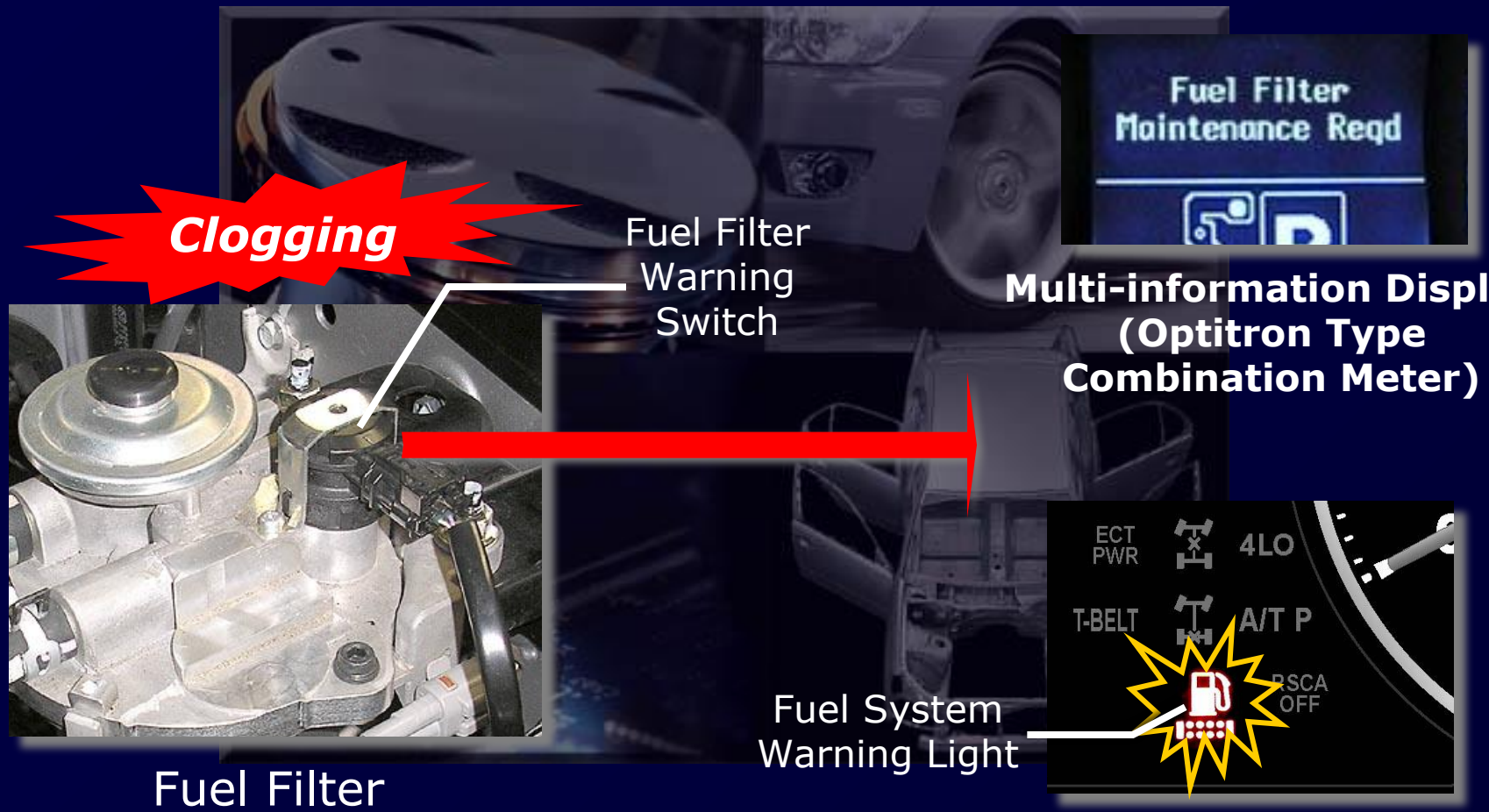
Fuel System

- Fuel Filter
  - Main Components



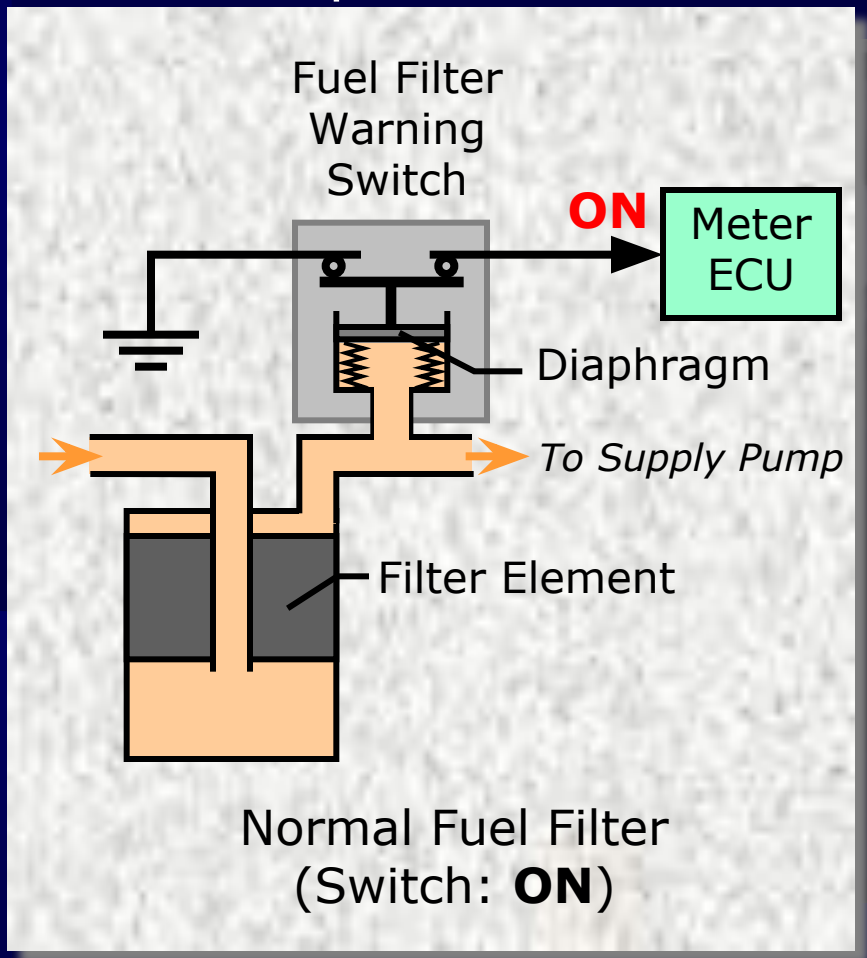
Fuel System

- Fuel Filter
  - When the fuel filter clogging is detected by fuel filter warning switch, fuel filter replacement is required

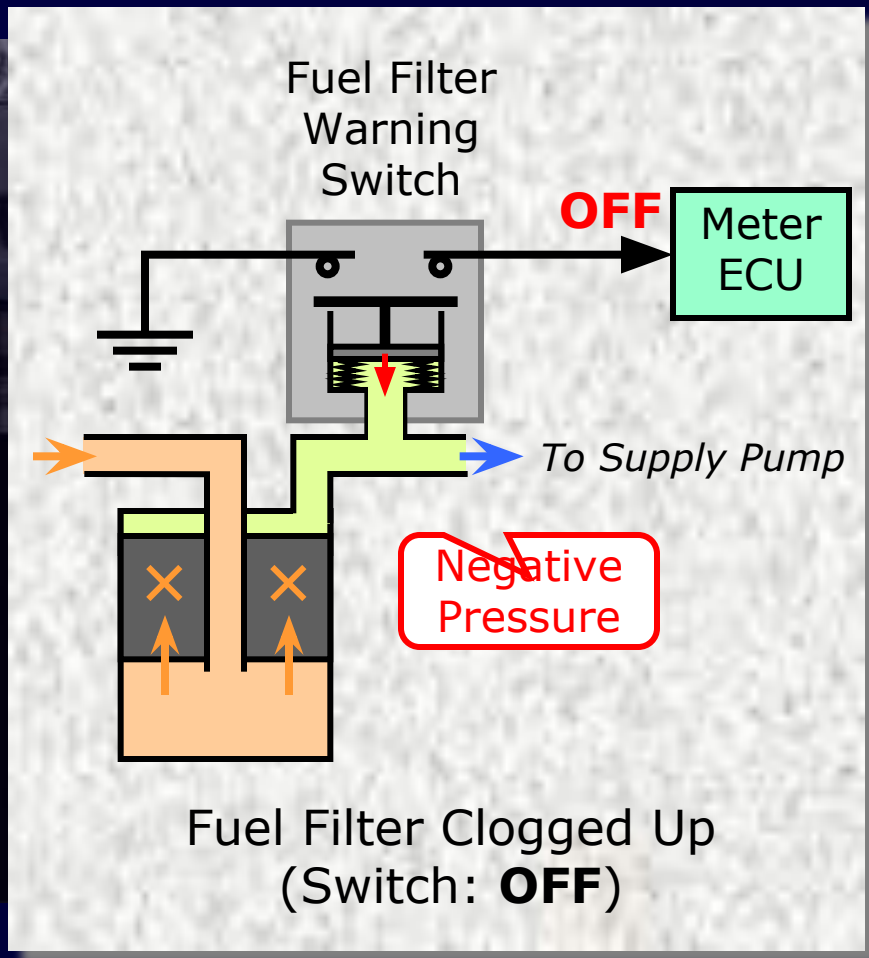


Fuel System

- Fuel Filter
  - Fuel filter warning switch is turned OFF when the filter outlet pressure decreases



Normal Fuel Filter
(Switch: **ON**)

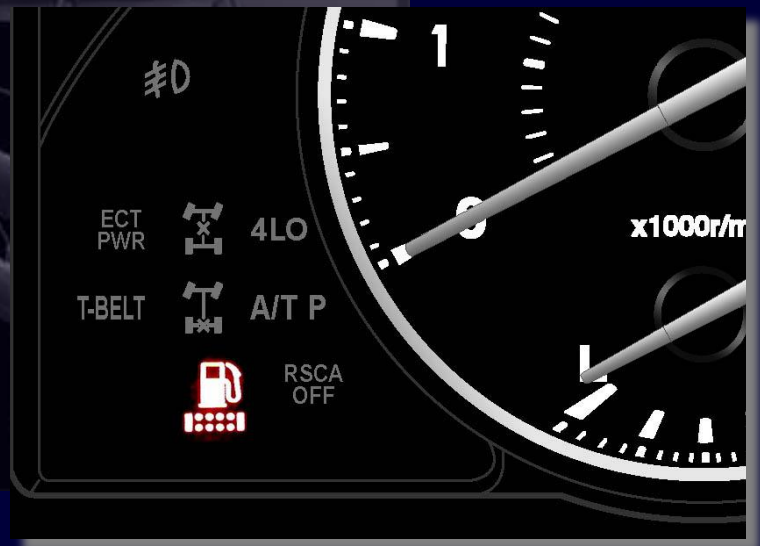


Fuel Filter Clogged Up
(Switch: **OFF**)

Fuel System

- Fuel Filter (Analog Type Combination Meter Only)
  - Warning light condition for fuel filter / fuel sedimenter

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



Analog Type Combination Meter

Fuel System

- Fuel Filter
  - After the fuel filter replacement, perform the reset operation to turn off the warning message/light

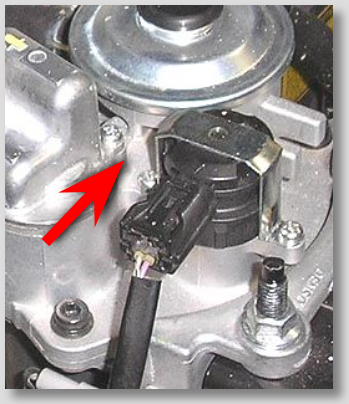
Reset Operation

Fuel Filter Replacement

(fuel filter warning switch connector disconnected)

ON (IG)

Within 3 - 60 sec.



Connect

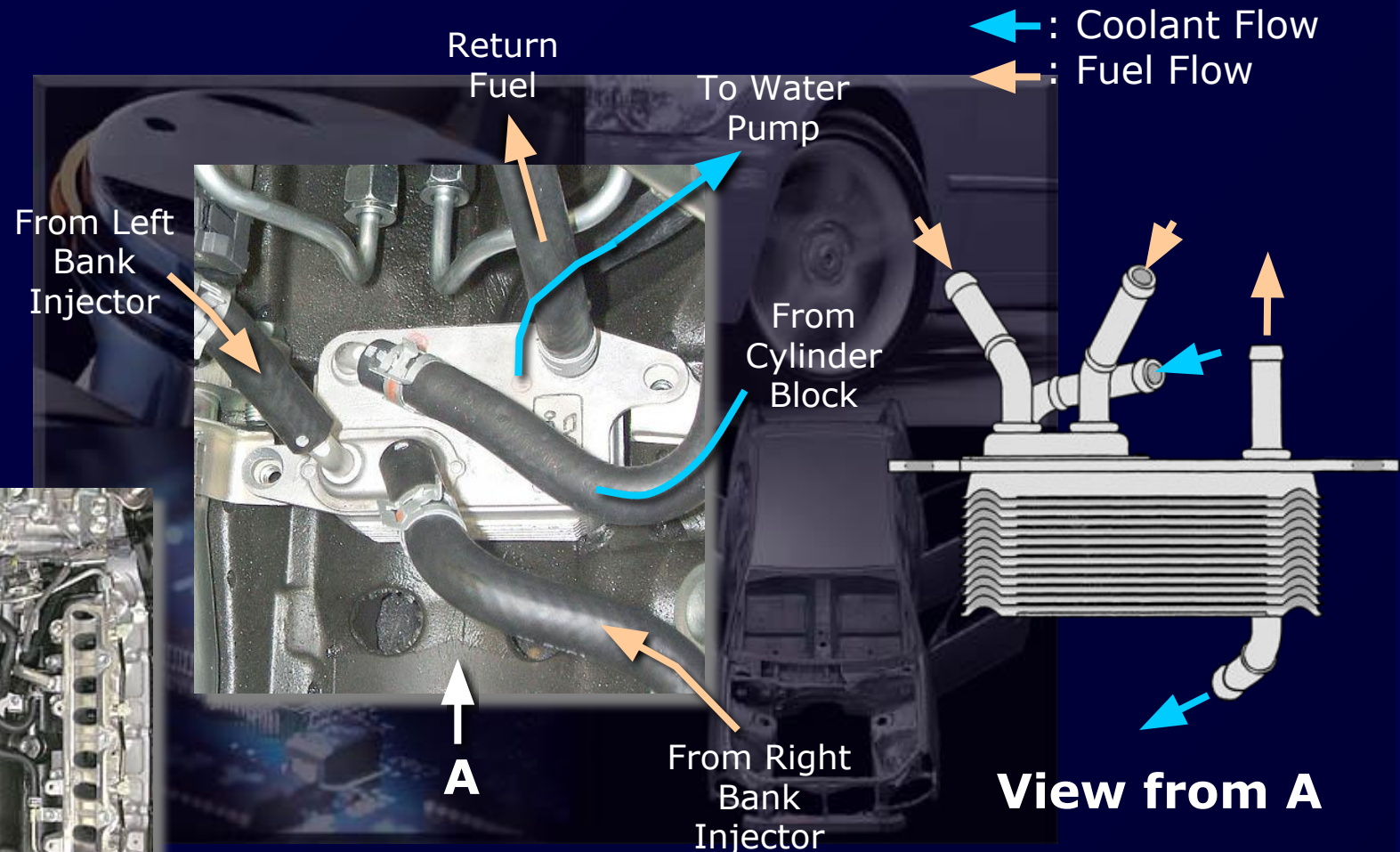
3 sec.

Warning message is turned OFF

Reset operation is same as 1KD/2KD engine on HIACE and IMV

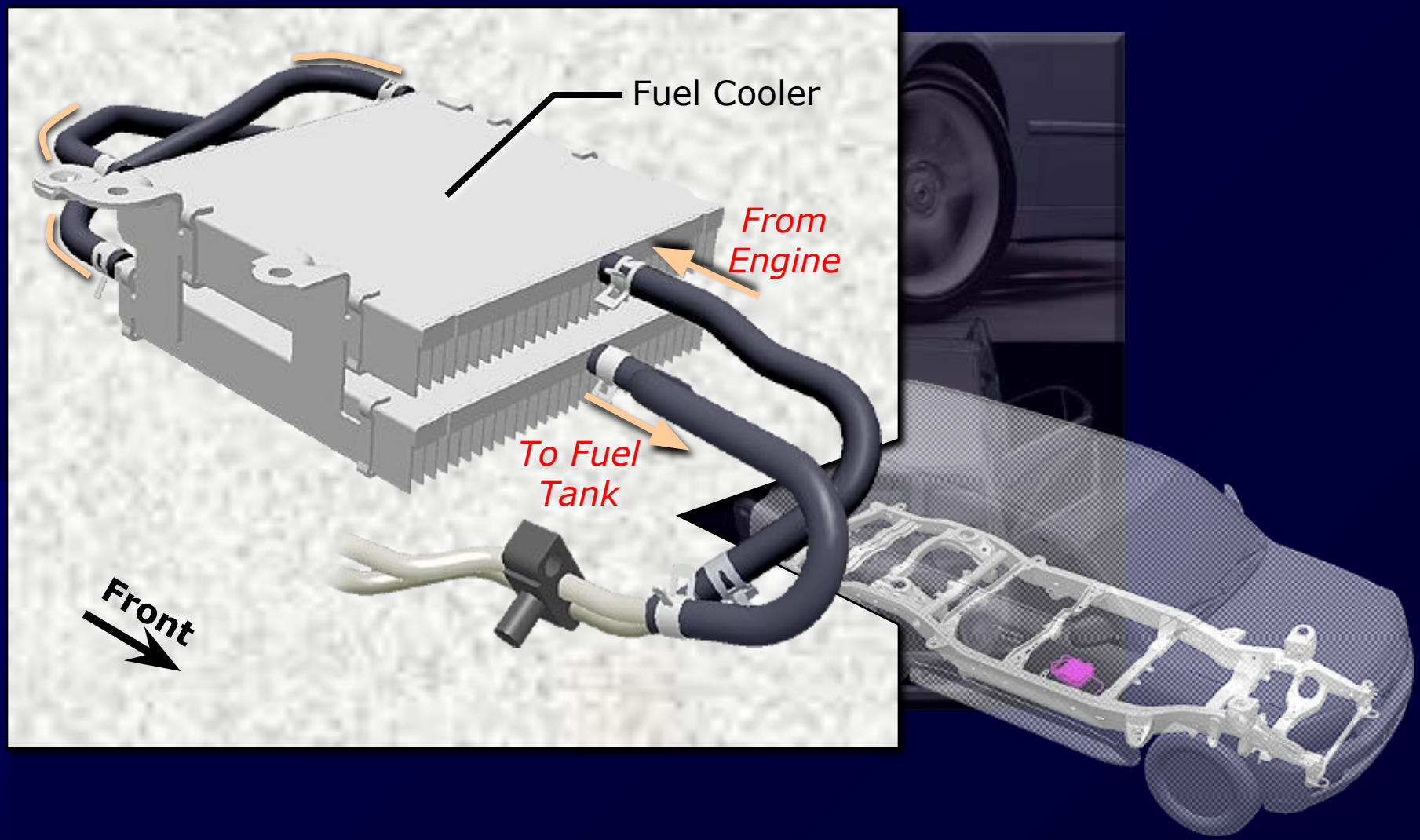
Fuel System

- Fuel Cooler
  - Water-cooled type fuel cooler at the V bank



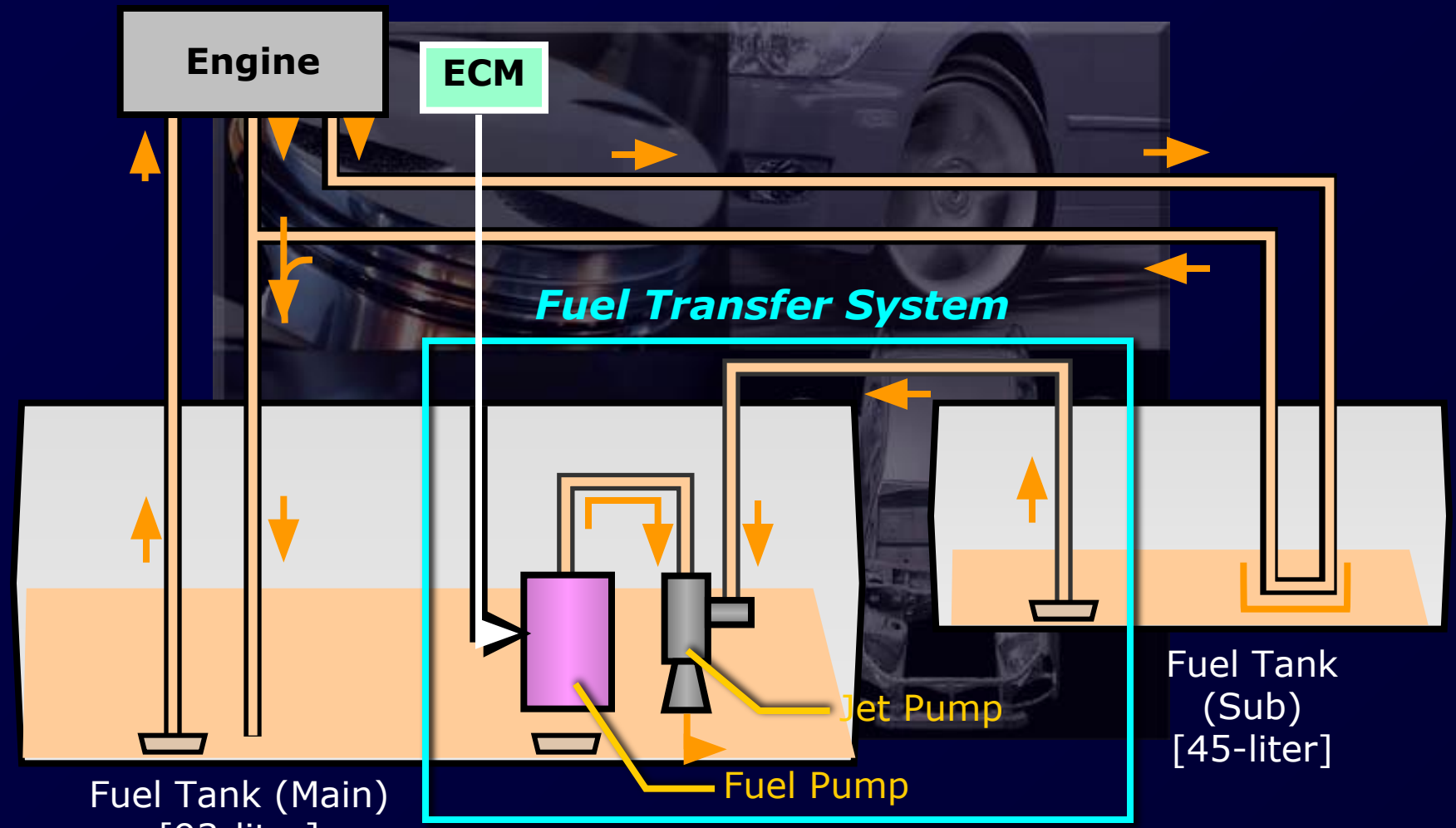
Fuel System

- Fuel Cooler
  - Air-cooled type fuel cooler under the floor



Fuel System

- Fuel Pump (Dual Fuel Tank Model Only)
  - Fuel pump is provided in the main tank to transfer the fuel in sub tank to main tank



Fuel System

- Fuel Pump (Dual Fuel Tank Model Only)
  - Location

Fuel Tank (Sub)
[45-liter]

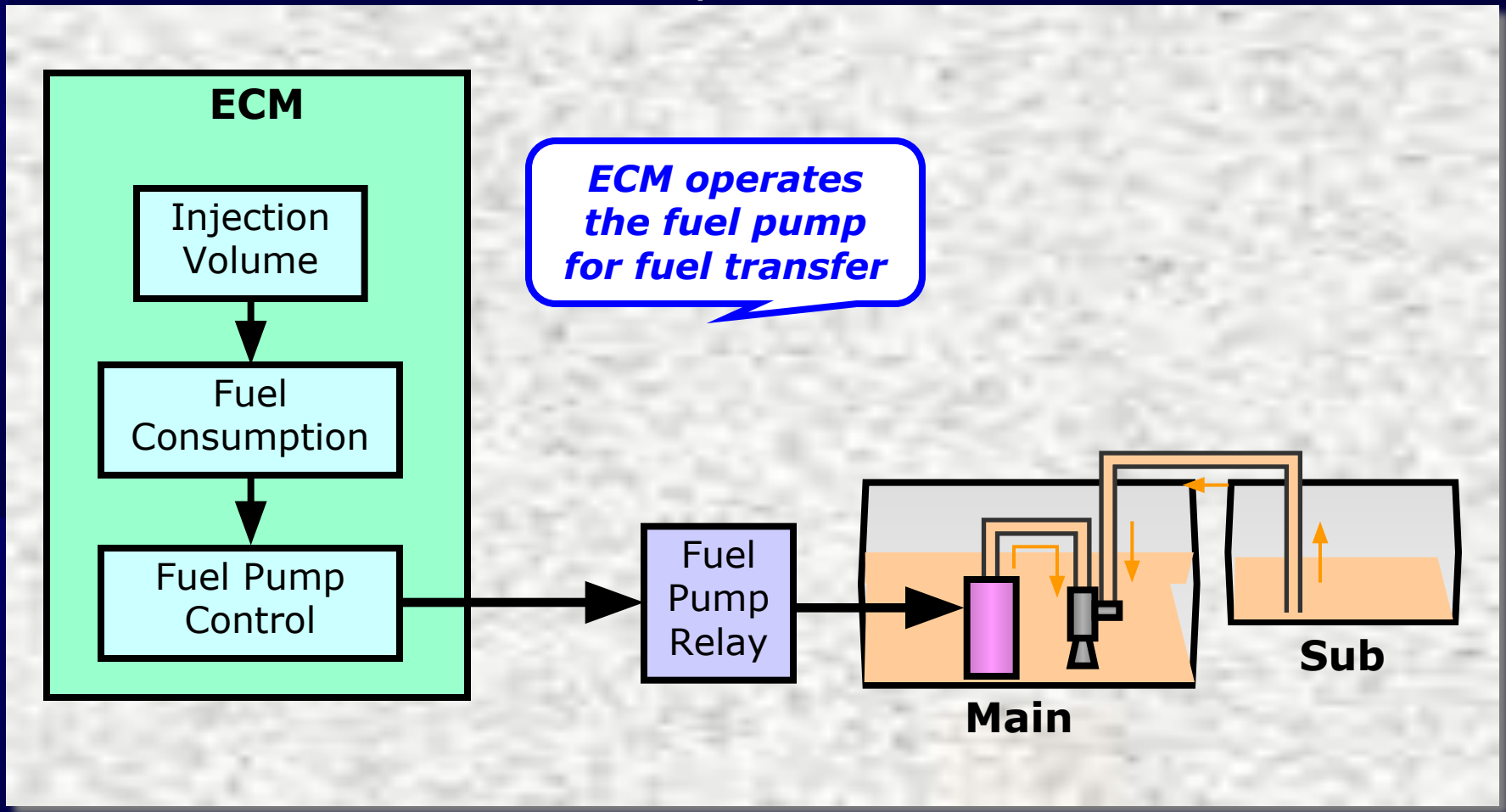
Fuel Line
[Sub Tank to Jet Pump (Main Tank)]

Fuel Tank (Main)
[93-liter]

Front

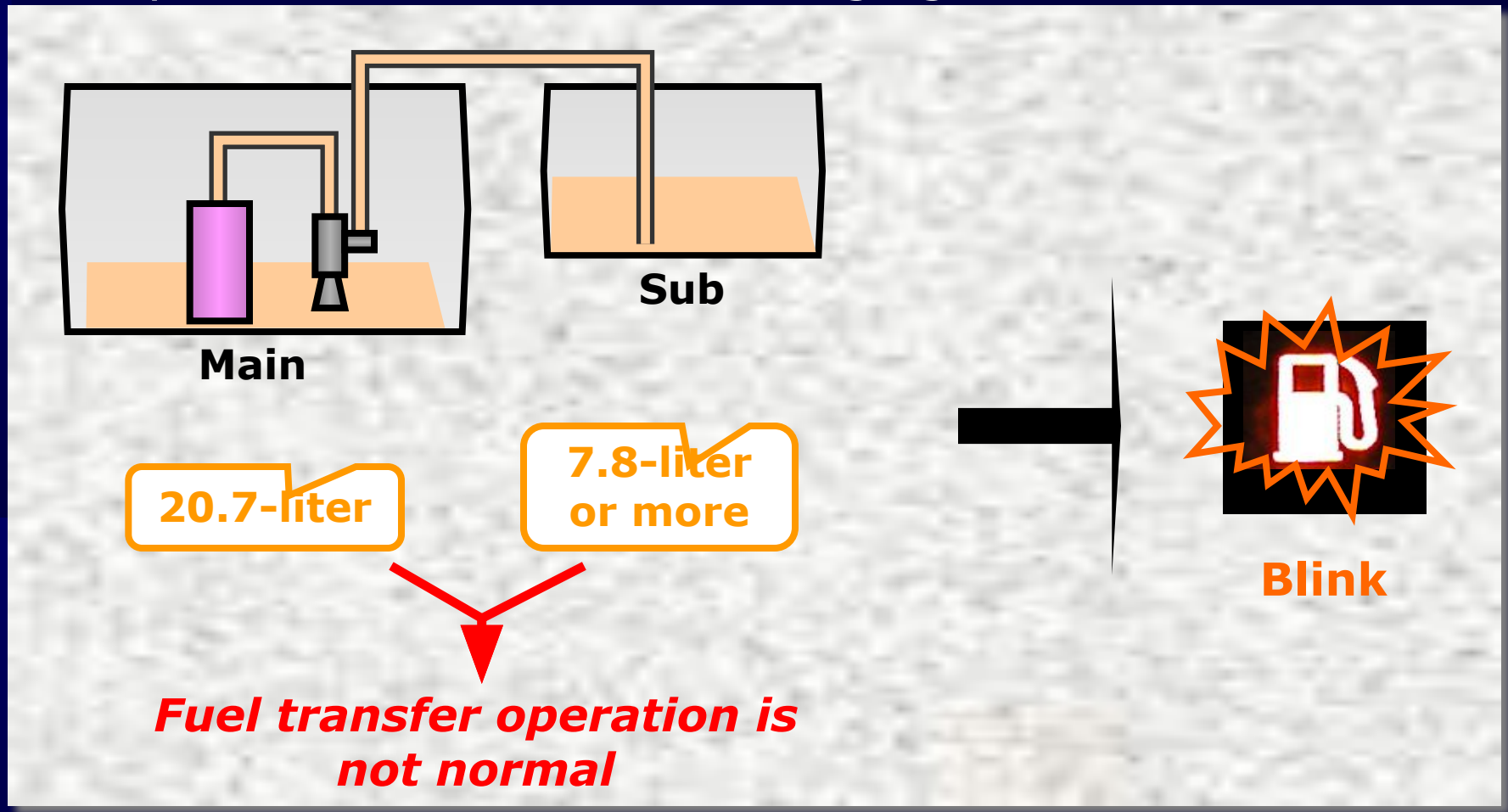
Fuel System

- Fuel Pump (Dual Fuel Tank Model Only)
  - ECM controls a fuel pump in accordance with the amount of fuel consumption



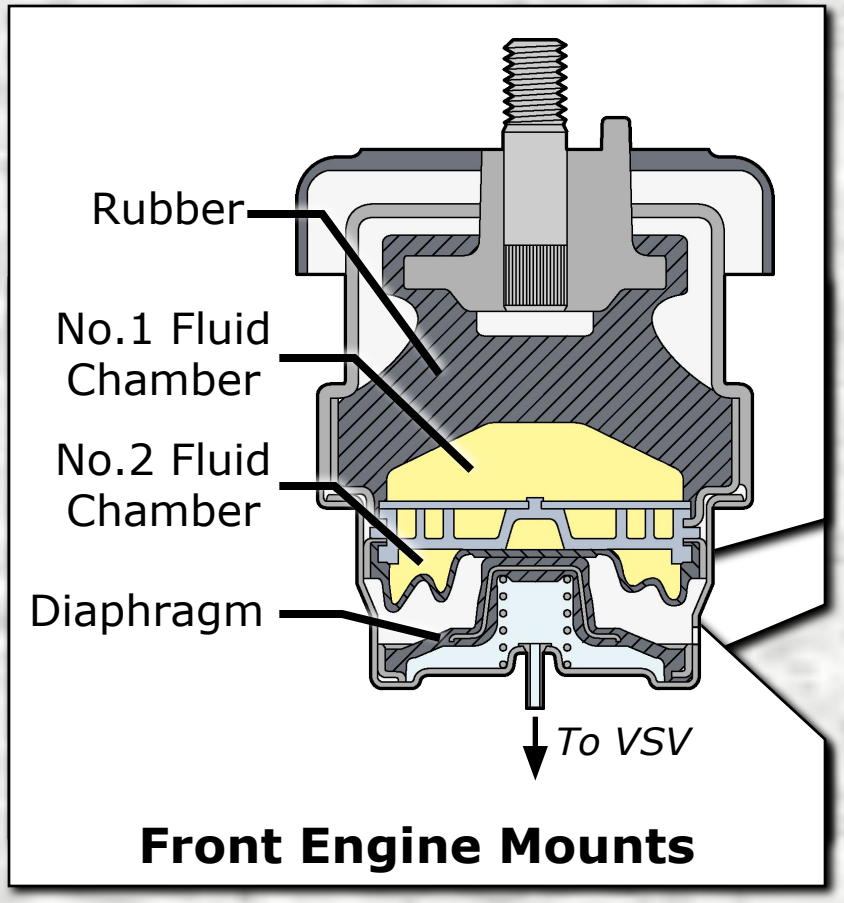
Fuel System

- Fuel Pump (Dual Fuel Tank Model Only)
  - When the malfunction is detected in the fuel transfer system, the fuel level warning light is blinked

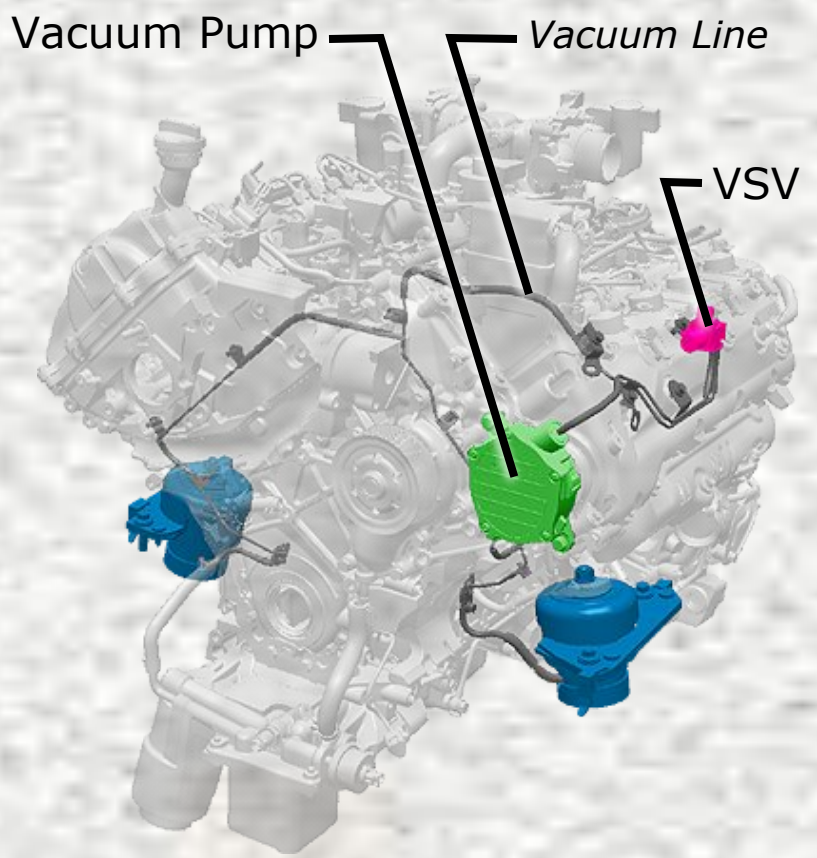


Engine Mount

- Electrical Hydraulic Type Engine Mount
  - The electrical hydraulic type is used for the front engine mounts to reduce the engine vibration at idling

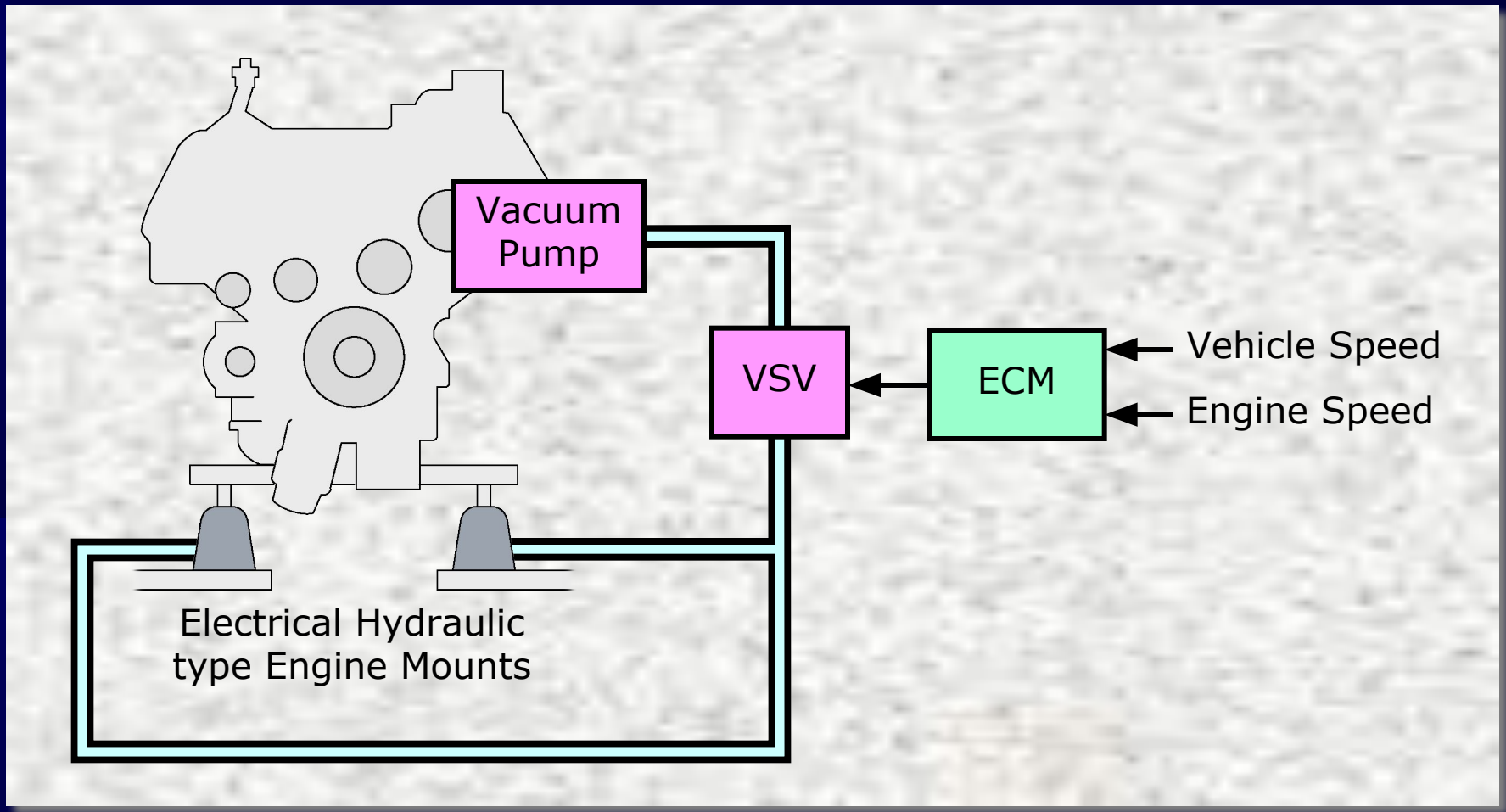


Front Engine Mounts



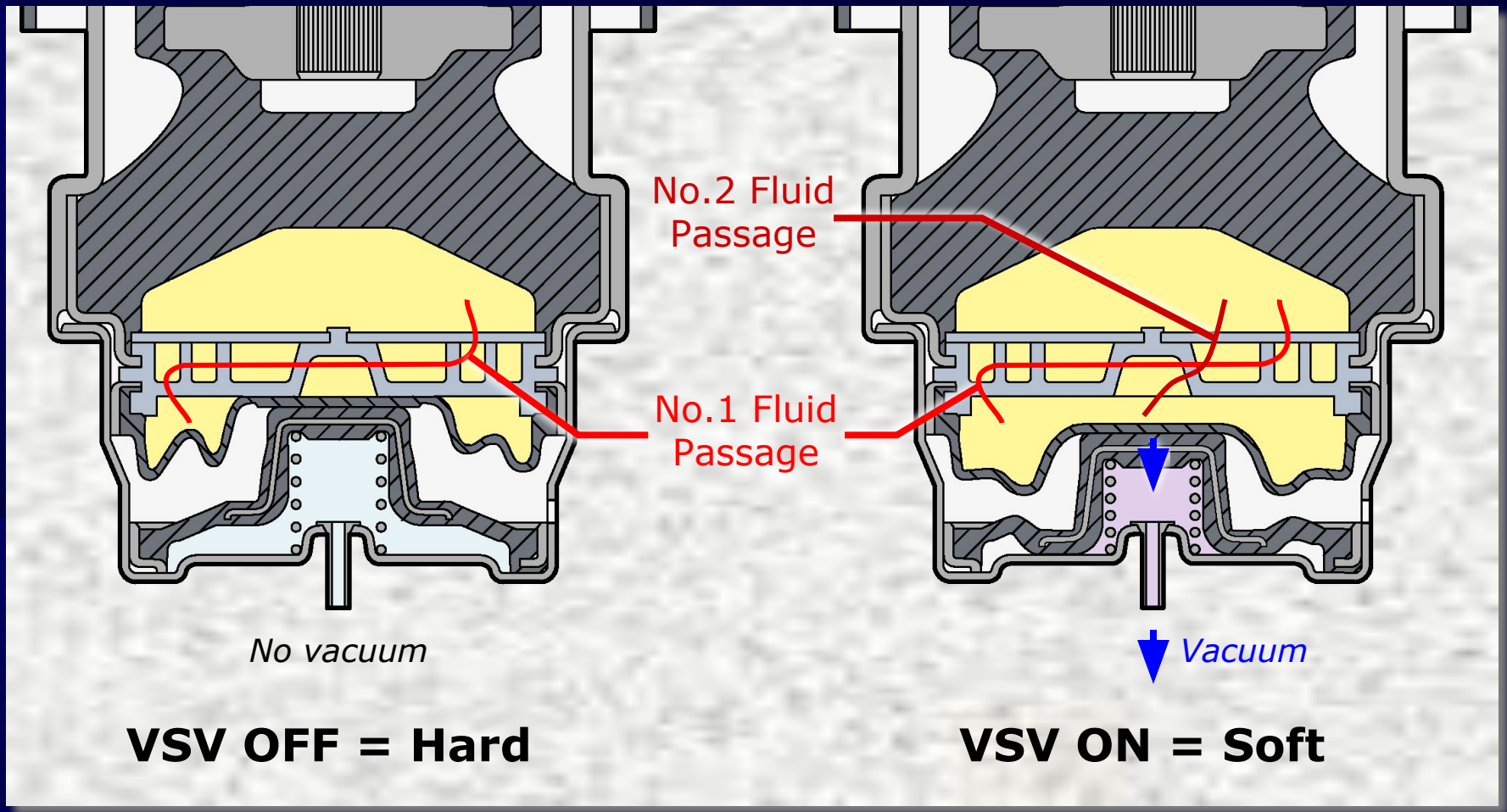
Engine Mount

- Electrical Hydraulic Type Engine Mount
  - System Diagram



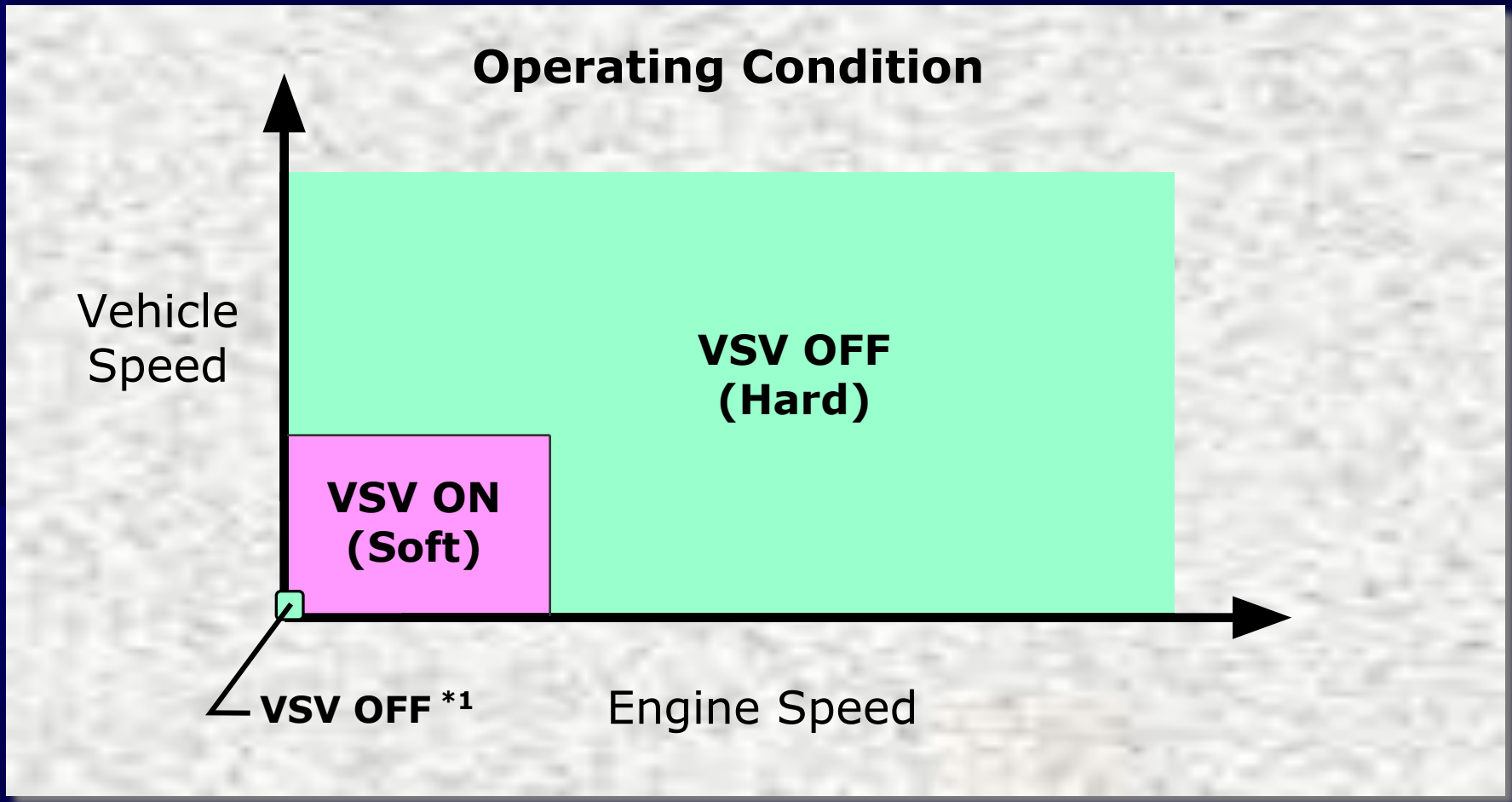
Engine Mount

- Electrical Hydraulic Type Engine Mount
  - Mount characteristic



Engine Mount

- Electrical Hydraulic Type Engine Mount
  - When the engine is idling and vehicle is driving at a low speed, the VSV is turned ON



*1: During engine cranking (vacuum is unstable)

Engine Control System

- ECM
  - Dash panel penetration installation