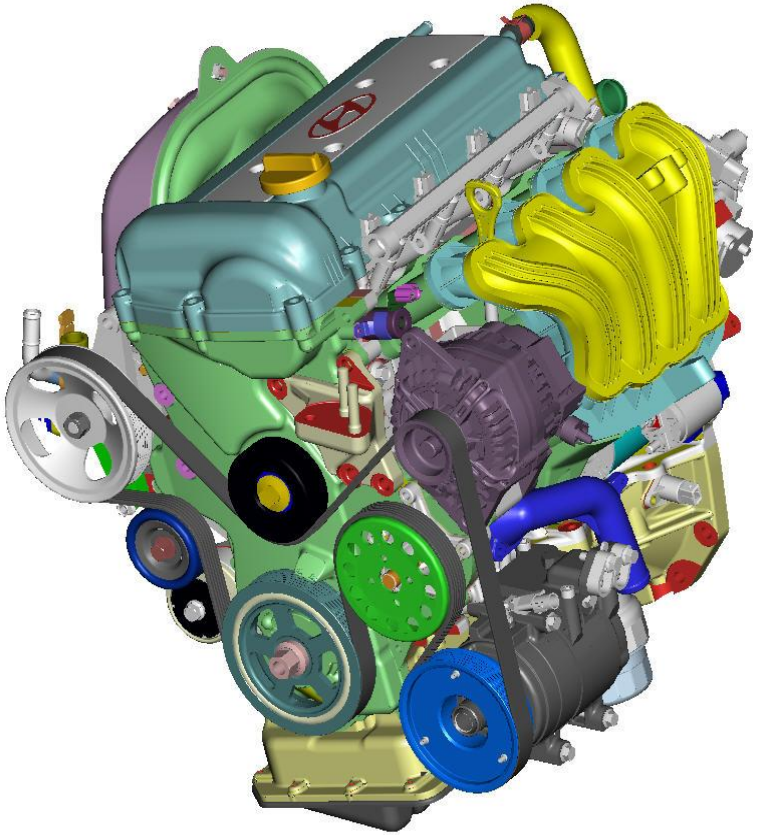
HD Engine



Engine Line-up

HD : Full model change of XD Elantra

Powertrain Lineup

Engine	T/M		Max. Power (PS) - Target value	GEN (May, '06)	* East Europe (Aug, '06)	Korea (May, '06)	NA (July, '06)
Gamma 1.6	M/T	M5CF1	118	●	●	●	-
	A/T	A4CF1					
Beta 2.0	M/T	M5CF2	143	●	●	●	●
	A/T	A4CF2					
U-1.6	M/T	M5CF3	117	●	●	●	-
	A/T	A4CF2					

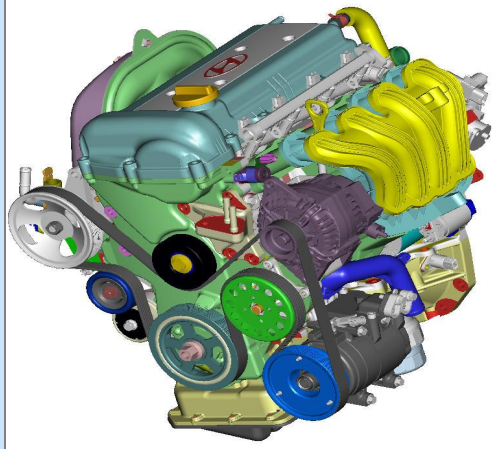
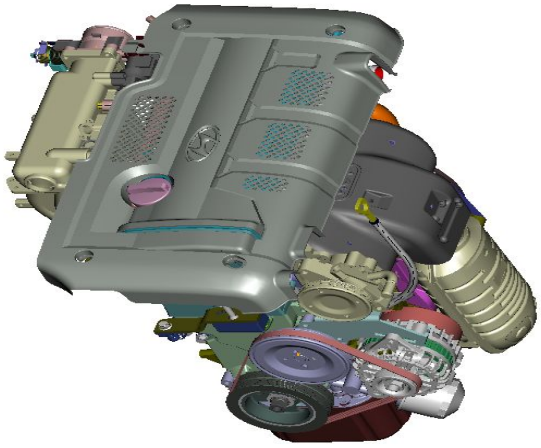
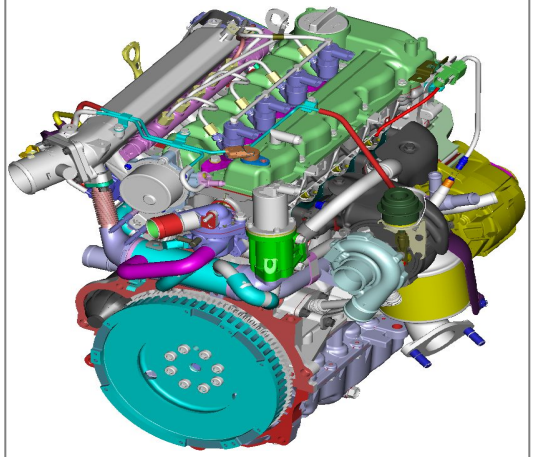
Gamma 1.6L : Newly developed 4 cylinder gasoline engine

A4CF1, 2 : New Alpha Automatic Transaxle

Not applied in West EU market □ FD will be launched from April, 07.

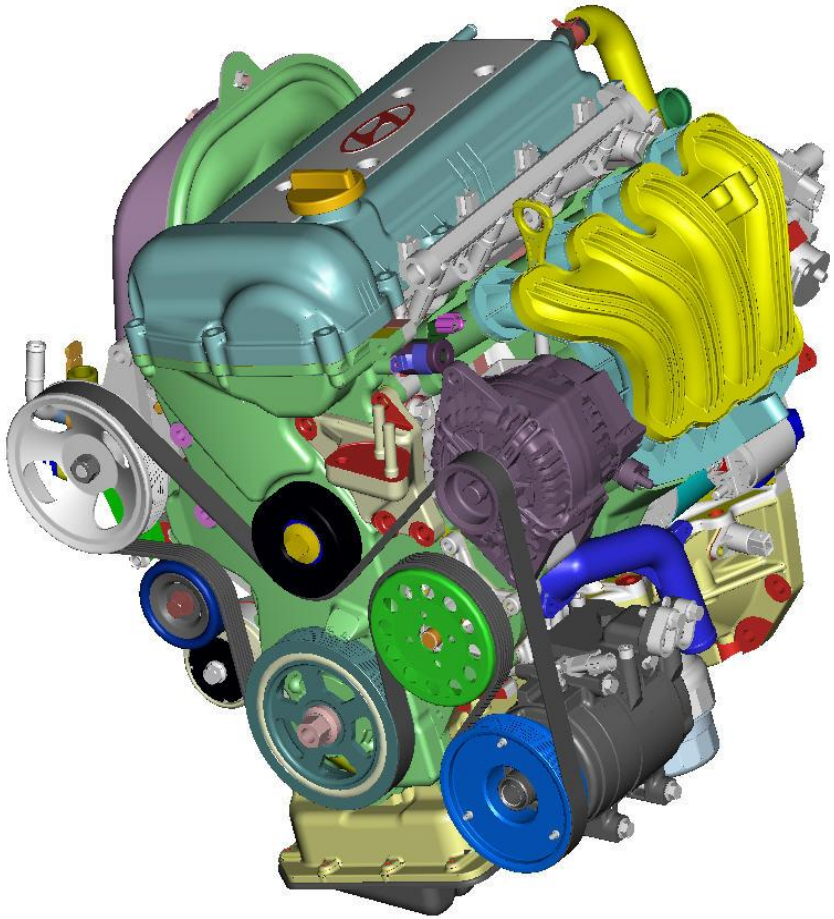
***: East Europe: 3 countries only (Russia, Ukraine, Kazahstan)**

Engine Line-up

Engine	γ1.6 CVVT	β 2.0 CVVT	U-1.6 VGT
Overview			
displacement	1,591 cc	1,975 cc	1,582 cc
H/P	118 PS	143 PS	117 PS
Torque	15.4 kg·m	19.0 kg·m\	26.5 kg·m
Feature	Timing Chain Individual Ignition Shimless MLA CVVT standard Plastic Intake manifold BOSCH PCM	ULEV Emission 2 layer metal head gasket Timing belt auto tensioner CVVT Siemens PCM CAN Diagnosis	VGT Turbo Charger Euro 4 Emission Swirl Control Valve Timing Chain Electrical EGR & EGR cooler

Gamma 1.6L

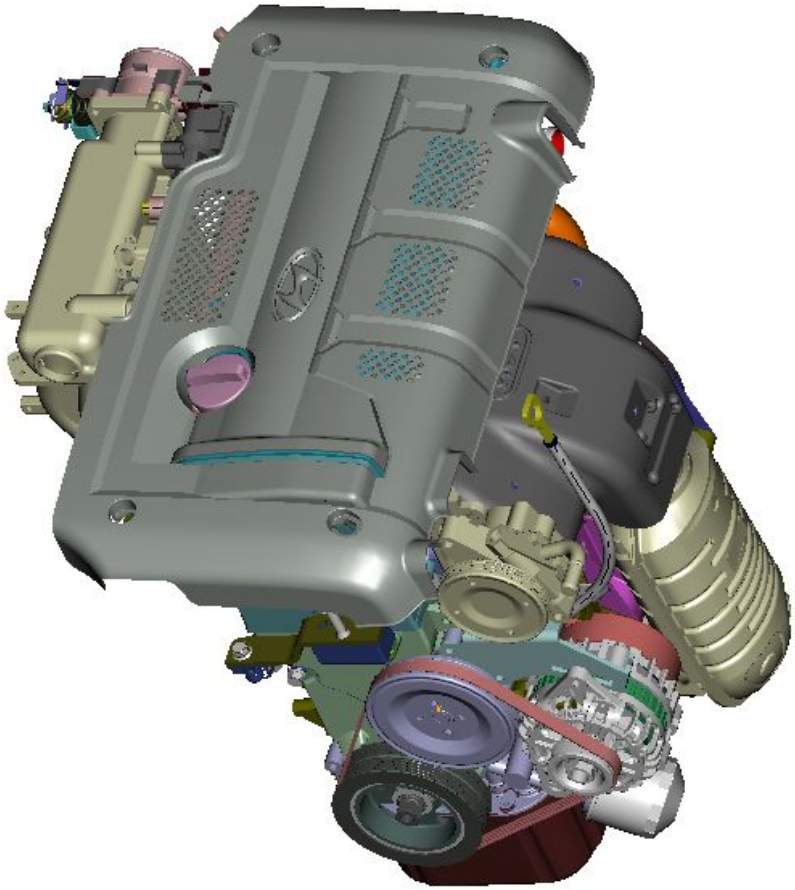
Gamma 1.6L engine (`Alias Alpha-III`)



1. Reverse position for intake, exhaust manifold
2. Offset crank shaft applied by 10mm
3. High pressure casting aluminum block and ladder frame
4. Serpentine belt
5. Timing chain
6. CVVT
7. Direct driven valve train [solid tappet]
8. Plastic intake manifold
9. Stainless steel exhaust manifold

Beta 2.0L

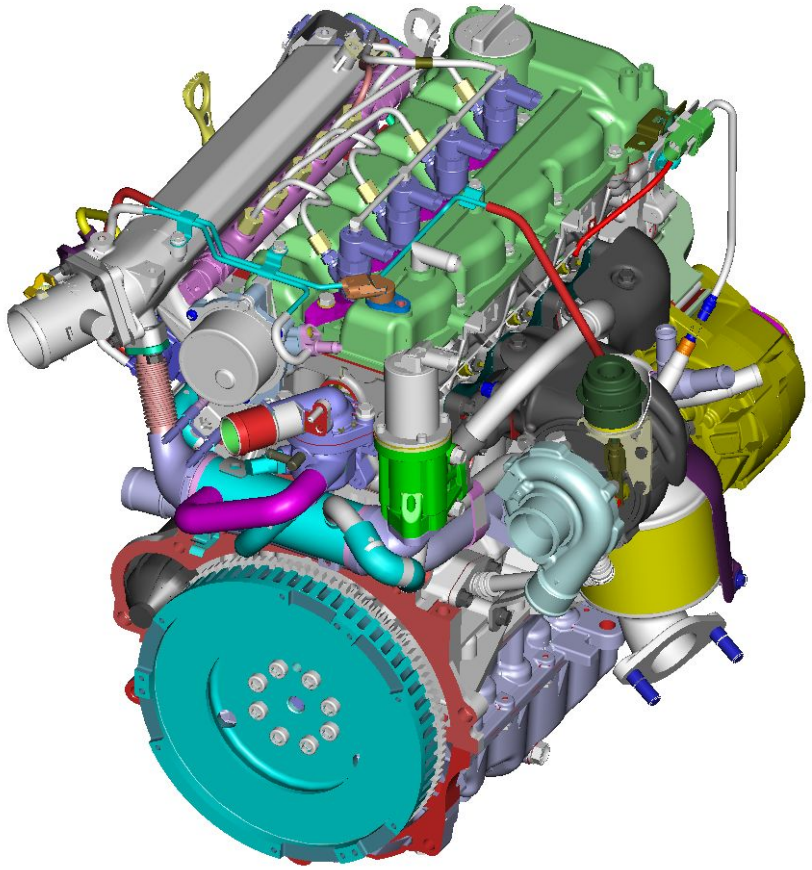
Beta 2.0L engine



1. Engine 3˚ tilting at forward
2. Aluminum oil pan
3. Dual layer metal cylinder head gasket
4. CVVT
5. Timing belt auto tentioner
6. SULEV

U 1.6L

U 1.6L engine



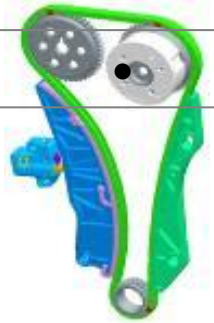
1. DOHC I type 4valve Cylinder Turbo intercooler
2. CRDi system (1600bar)
3. Electrical EGR & EGR cooler

- VGT (Variable Geometry Turbo
- Timing chain
- Serpentine belt
- Bed plate
- SCV (Swirl control Valve)
- Throttle flap
- Lambda sensor

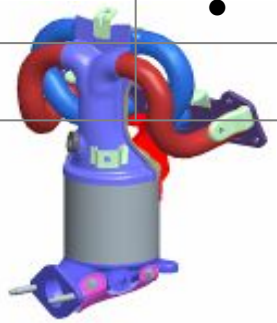
Gamma 1.6L engine main feature

Item	Effect						Remark
	Performance	Emission	NVH	Weight	Cost	Endurance	
Al cylinder block	•			•			
Reverse In/Ex Mani	•	•	•	•			
CVVT	•	•					
Solid Tappet	•				•		
Timing Chain						•	
Serpentine belt			•	•		•	
Integrated ECM/TCM					•		
SUS Ex/Mani	•	•				•	
Ladder Frame			•				
Offset crank	•						

Serpentine belt

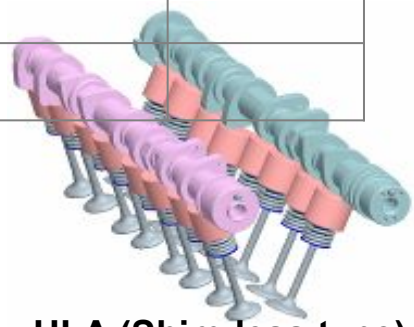


Timing chain



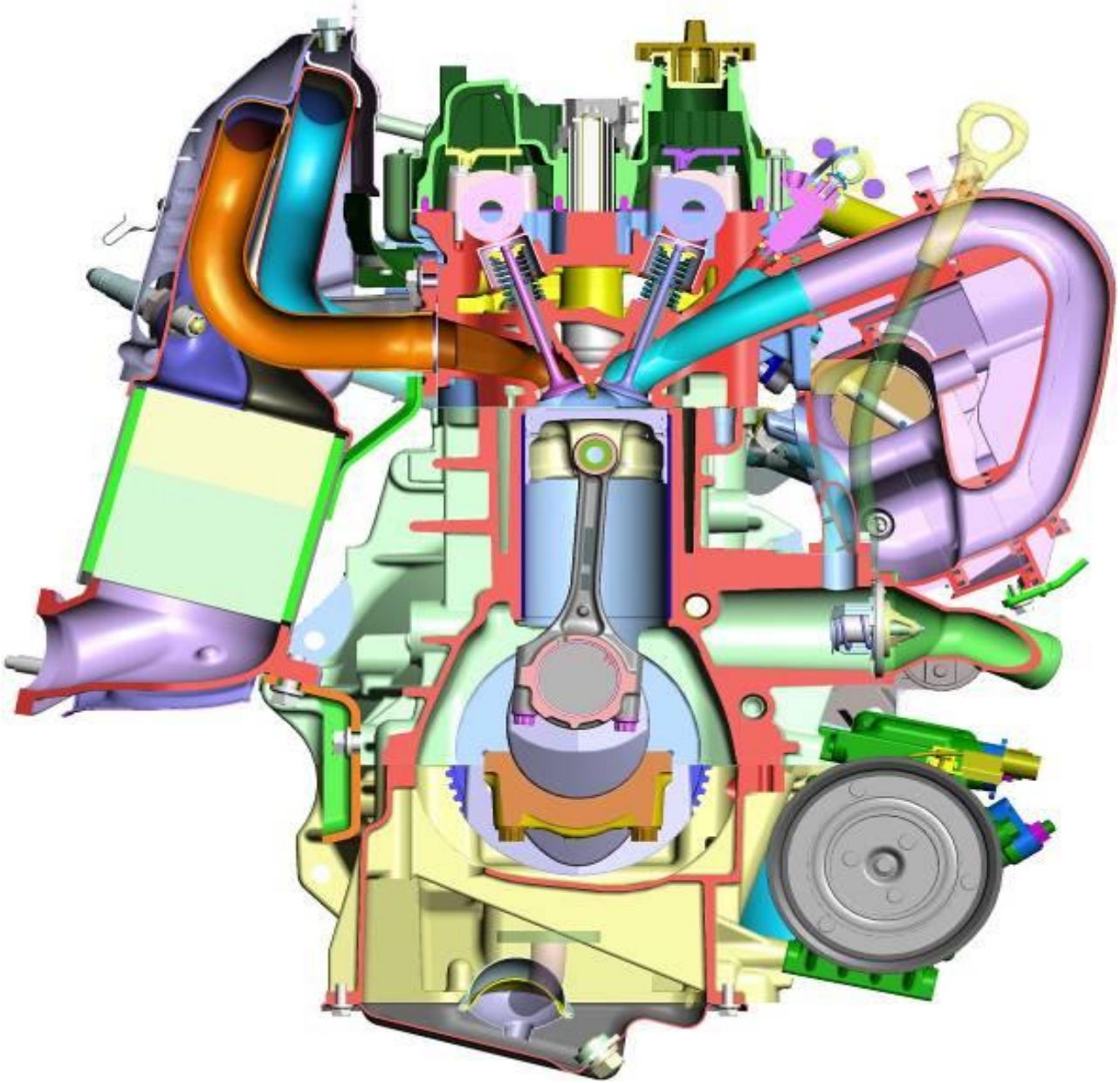
EX manifold

CVVT

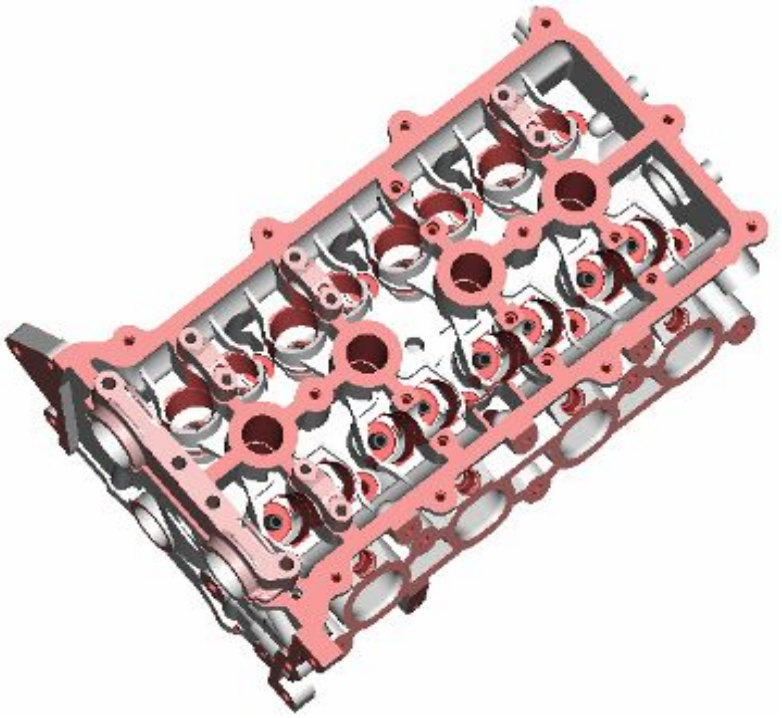


HLA (Shim-less type)

Section view

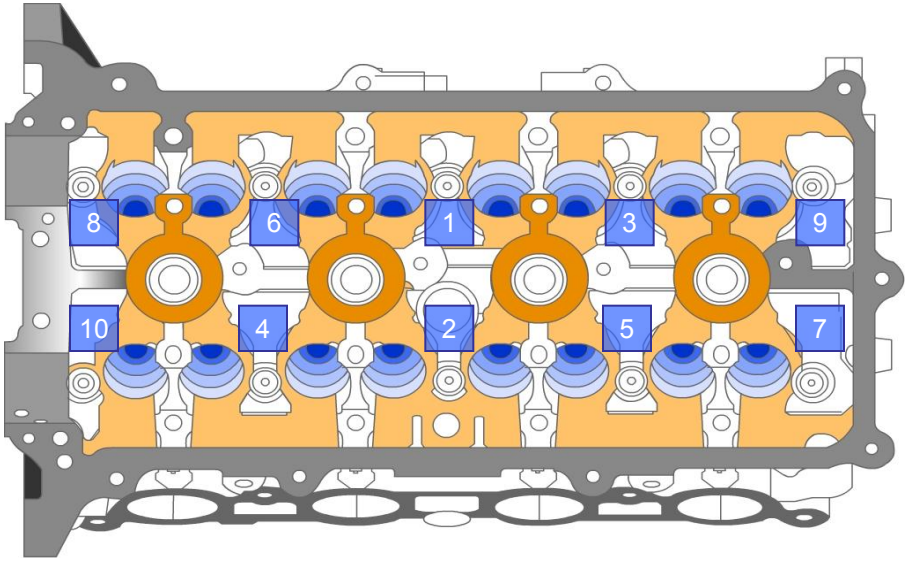


Cylinder head



❑ CYLINDER HEAD

- AC2B-T7 aluminum
- Weight : 9.5kg



<Tightening sequence>

Tightening torque : 2.0kgf-m + 90˚ + 100˚

Cylinder head volt

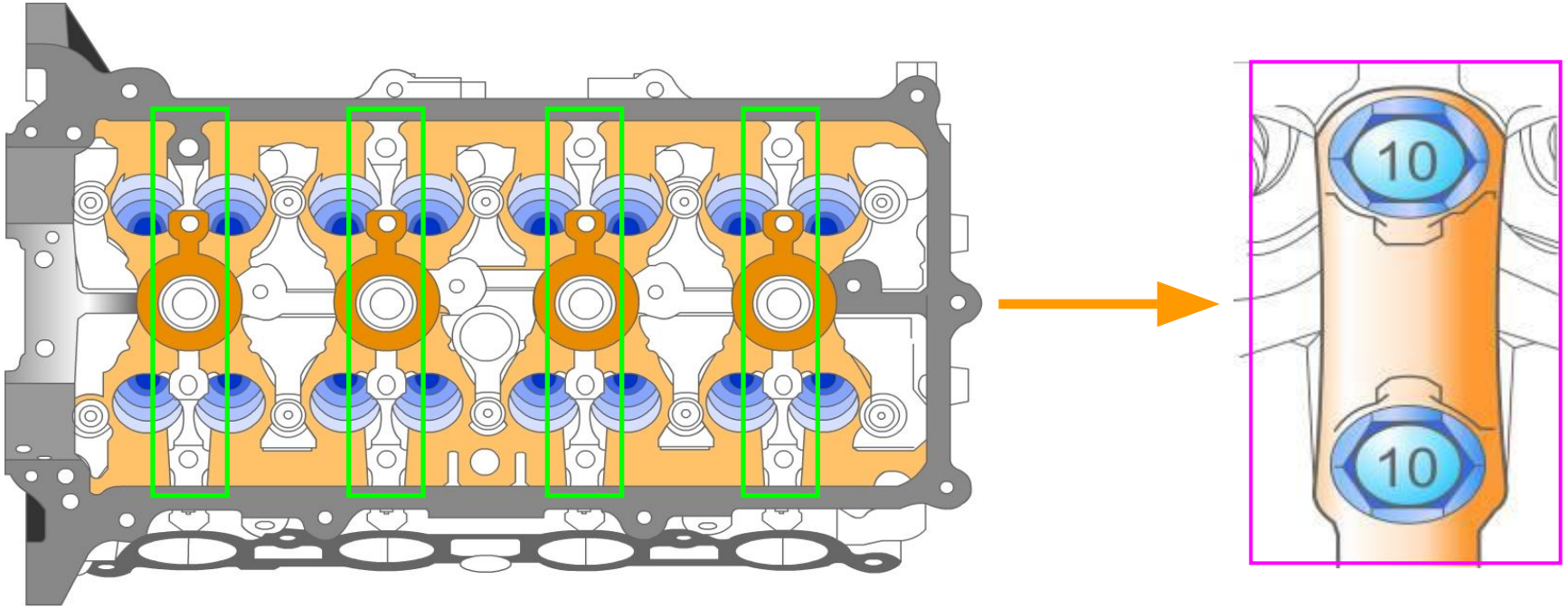
Cylinder head volt

CAUTION

Tightening torque : 2.0kgf-m + 90˚ + 100˚

Cylinder head volt

Camshaft cap direction



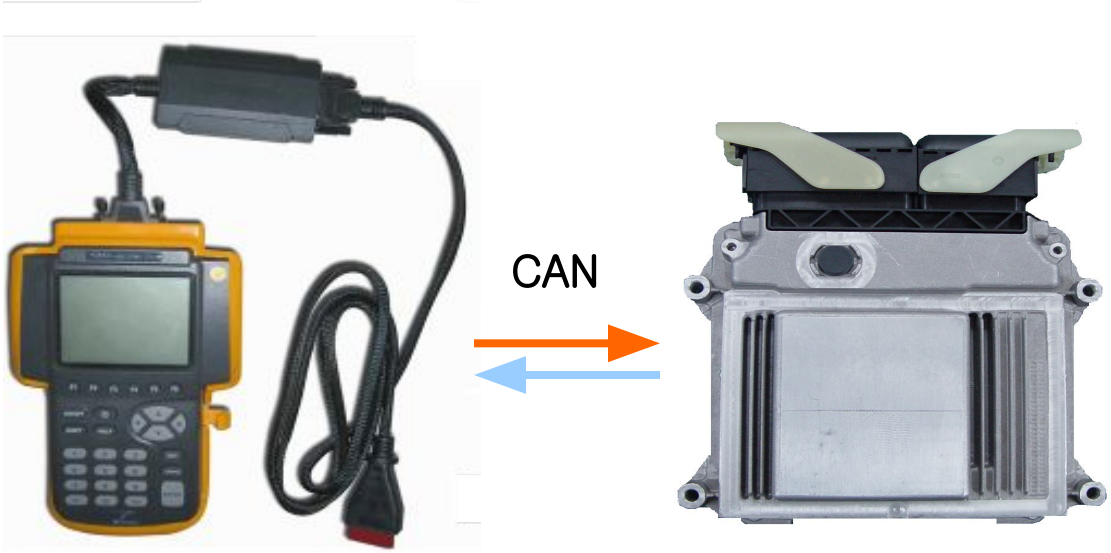
Cap marking

NO	IN	EX
1	I1	E1
2	I2	E2
3	I3	E3
4	I4	E4

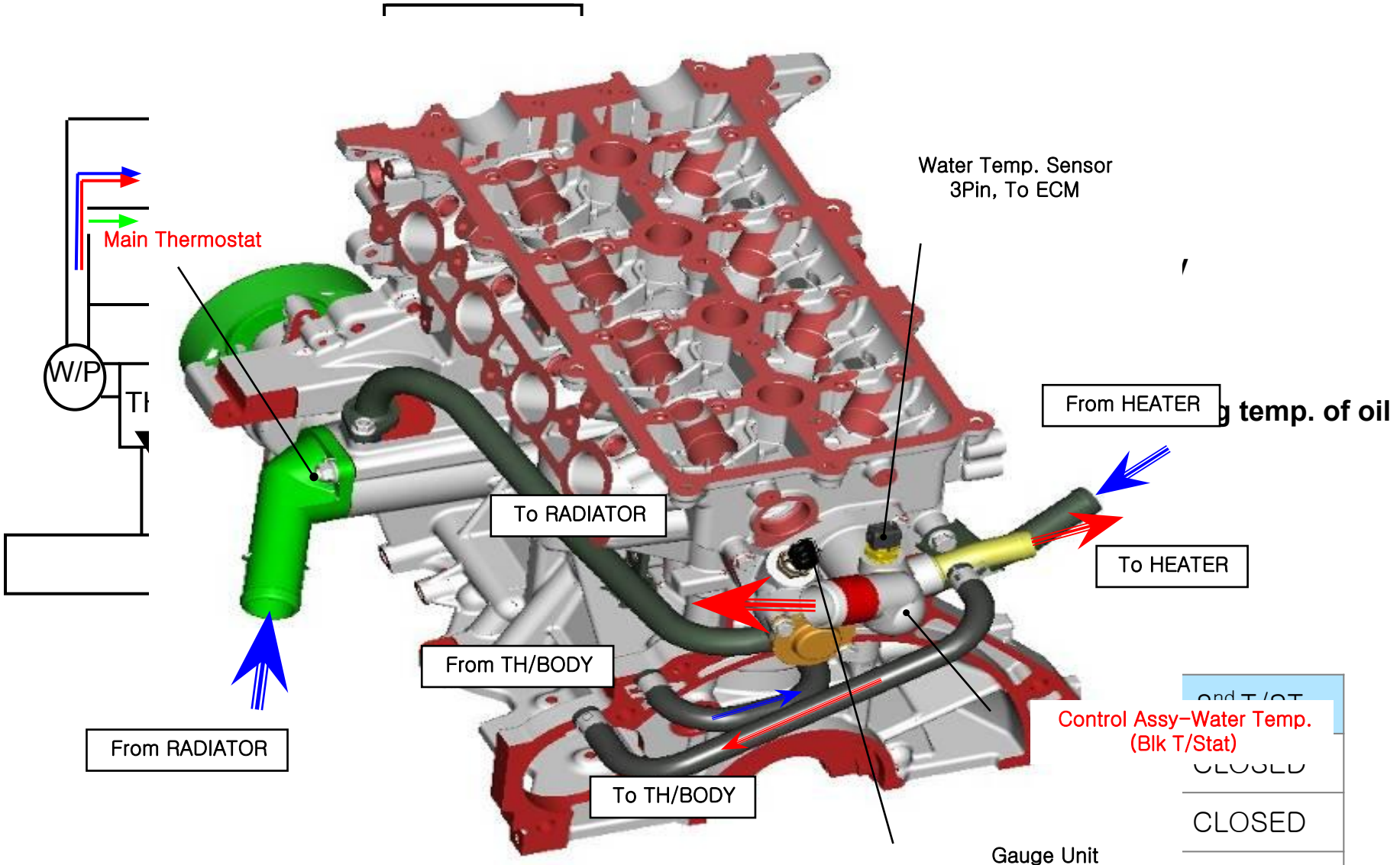
PCM (M 7.9.8)

- Memory:
  Flash EEPROM: 768 Kbyte / External EEPROM: 2Kbyte
  RAM: 36 Kbyte
- CAN & KW2000 Communication
- Integrated Unit: ECM + TCM
- Watchdog CPU
- Internal Igniter
- Pin : 154 pin (94 + 60 Pin)
- Waterproof Connector
- Aluminum Cast Housing & Plate
- Weight: 0.92Kg
- Operation voltage : 6.3 V ~ 16 V
- CAN communication

HD PCM is BOSCH M7.9.8 same as alpha-II (MC).



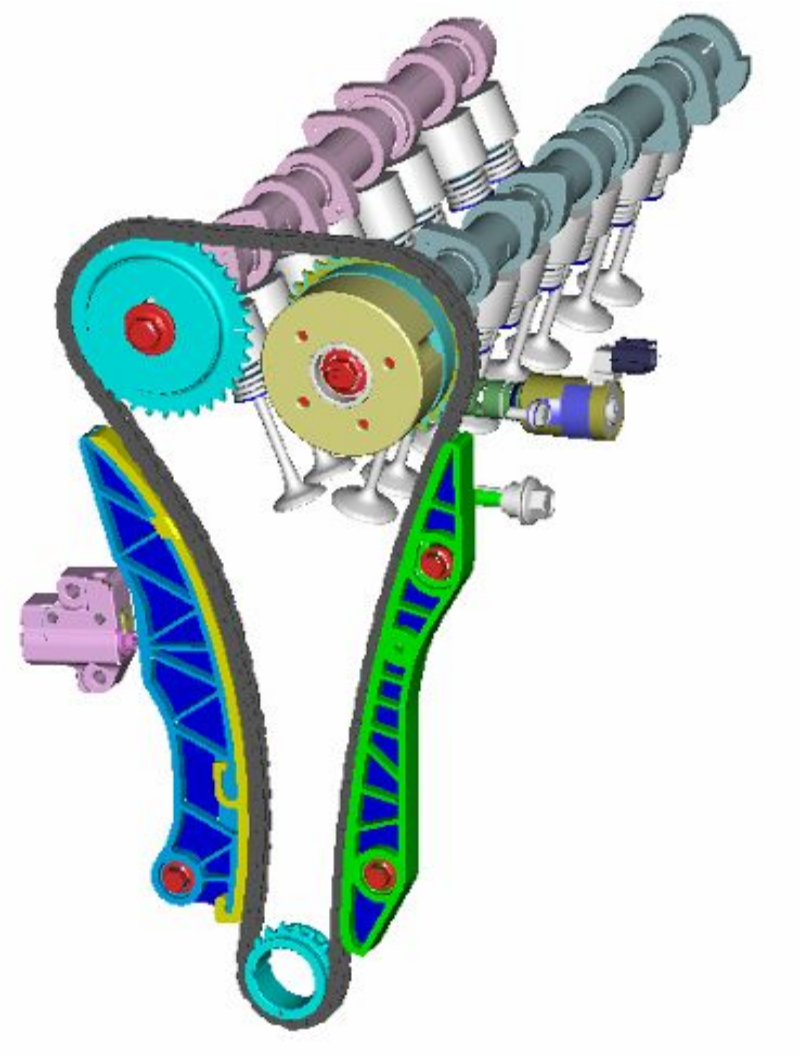
Split cooling system



temp. of oil

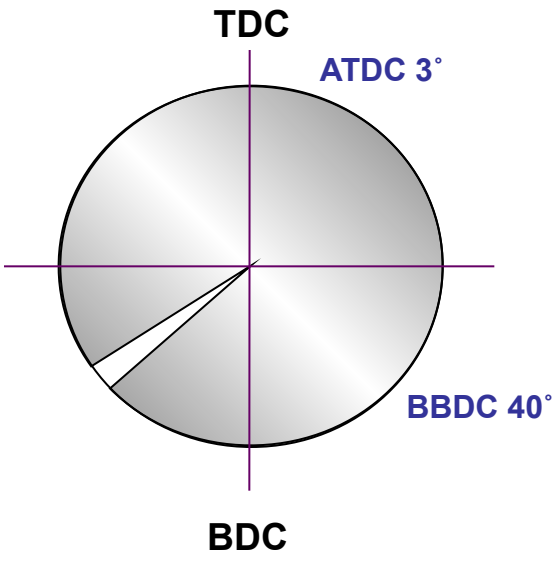
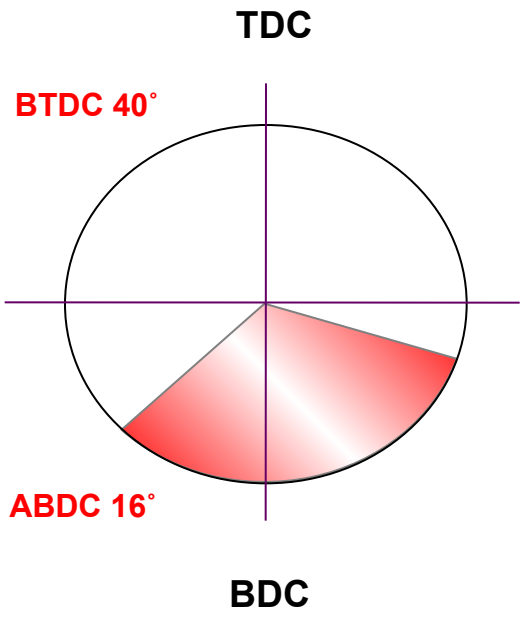
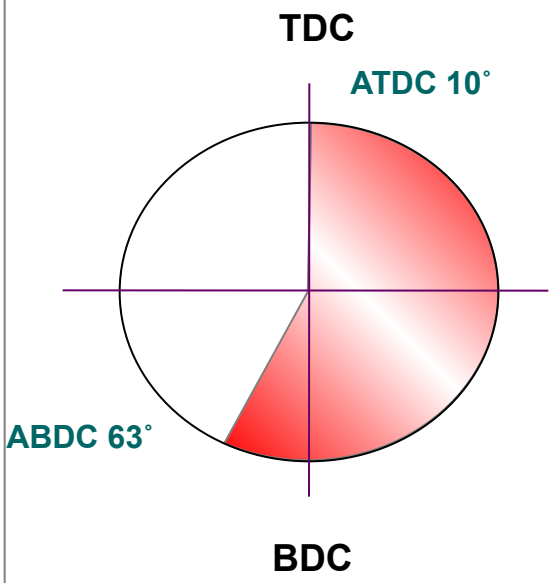
Water temp.>95 ^{0}			OPEN
			CLOSED
			CLOSED

Valve train



- **CVVT**
  - Type : vane type
  - Angle : 50˚(Retard ~ Advanced)
  - CVVT common using (alpha, beta. Theta)
- **TIMING DRIVE**
  - Timing chain
    (Bush chain, pitch:8mm)
  - Ratchet type oil pressure auto tensioner
- **CAMSHAFT**
  - Weight : 1.700kg (Intake)
  - Hollow camshaft
- **TAPPET**
  - Shim-less mechanical tappet

CVVT

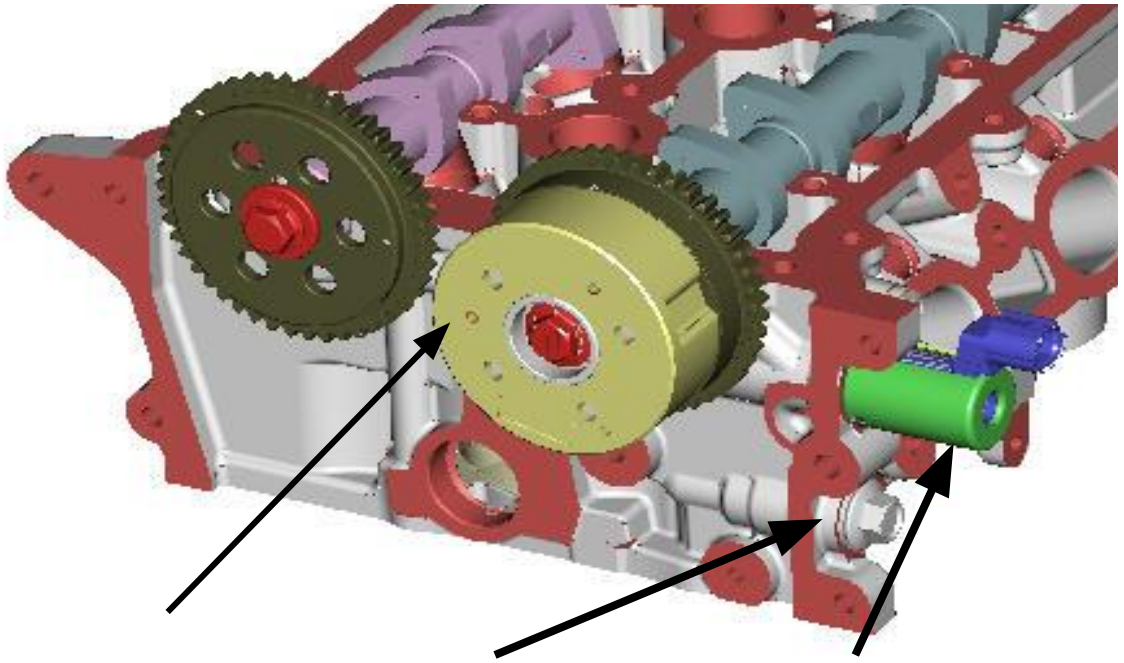
Exhaust Valve	Intake Valve	
Duration : 223˚	Duration : 236˚	
	Full Advance	Full Retard
		

CVVT for Gamma & Beta

OCV (Oil Control Valve)

Filter

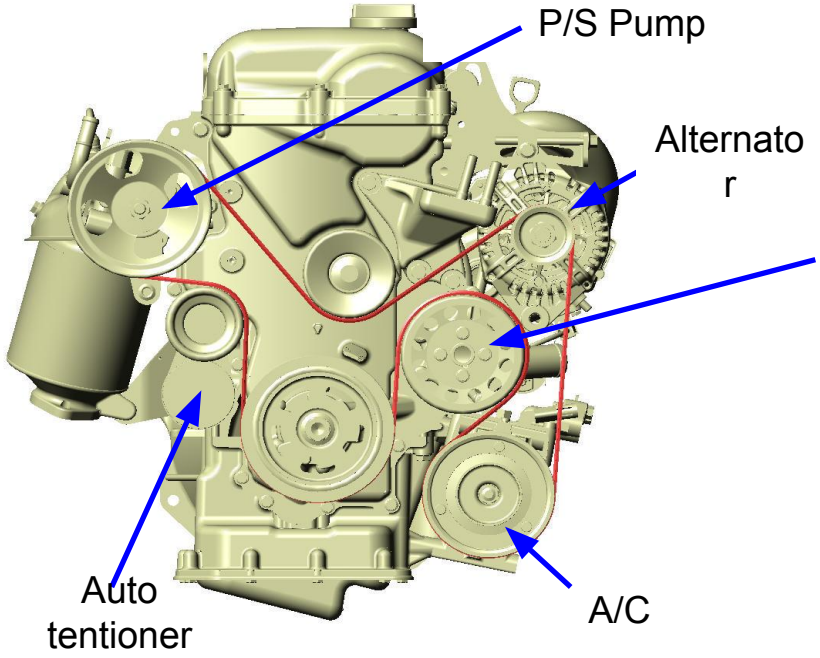
CVVT



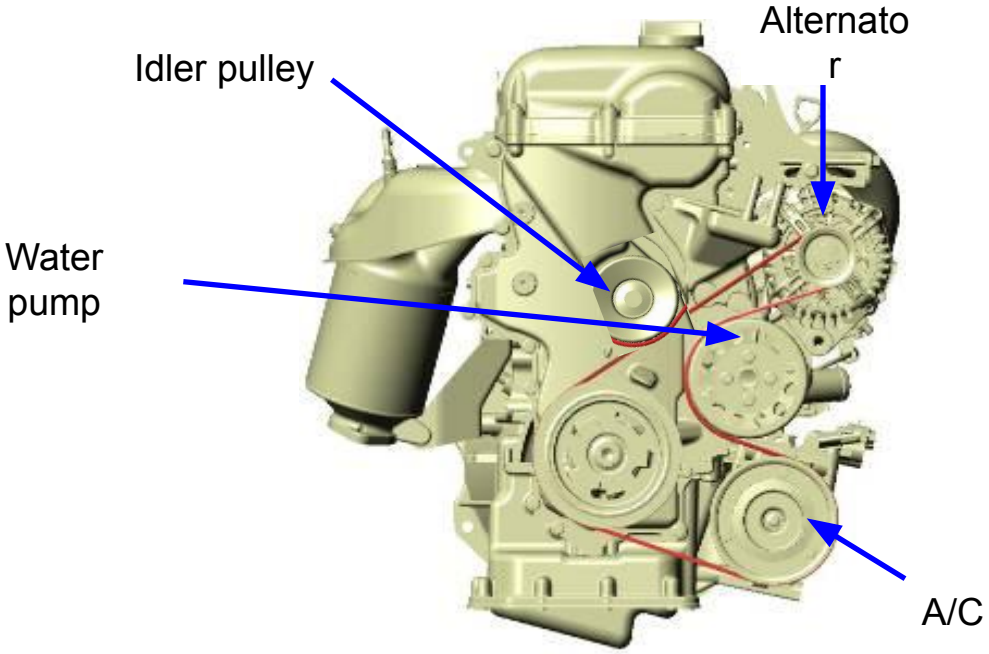
OCV (Oil Control Valve)

Filter

Driving belt

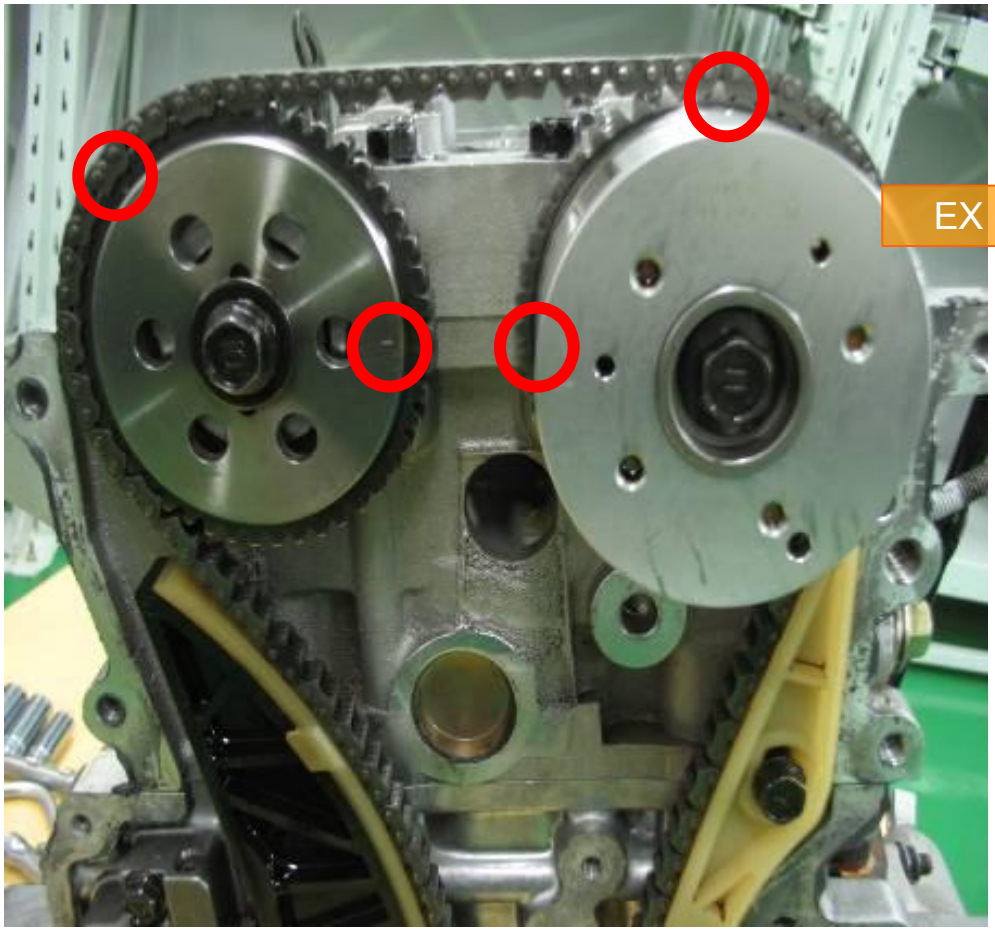


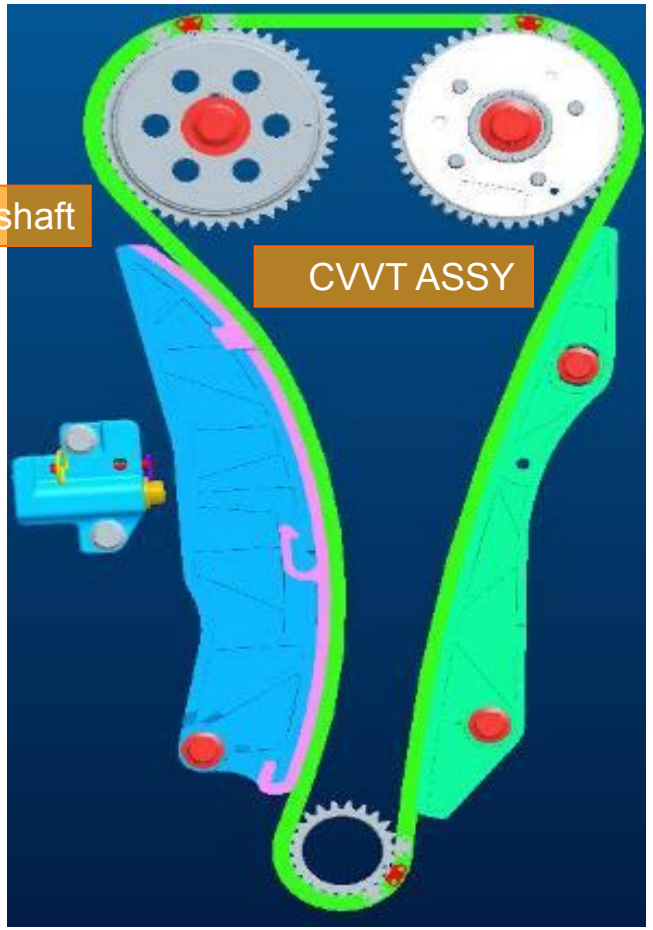
Without MDPS



With MDPS

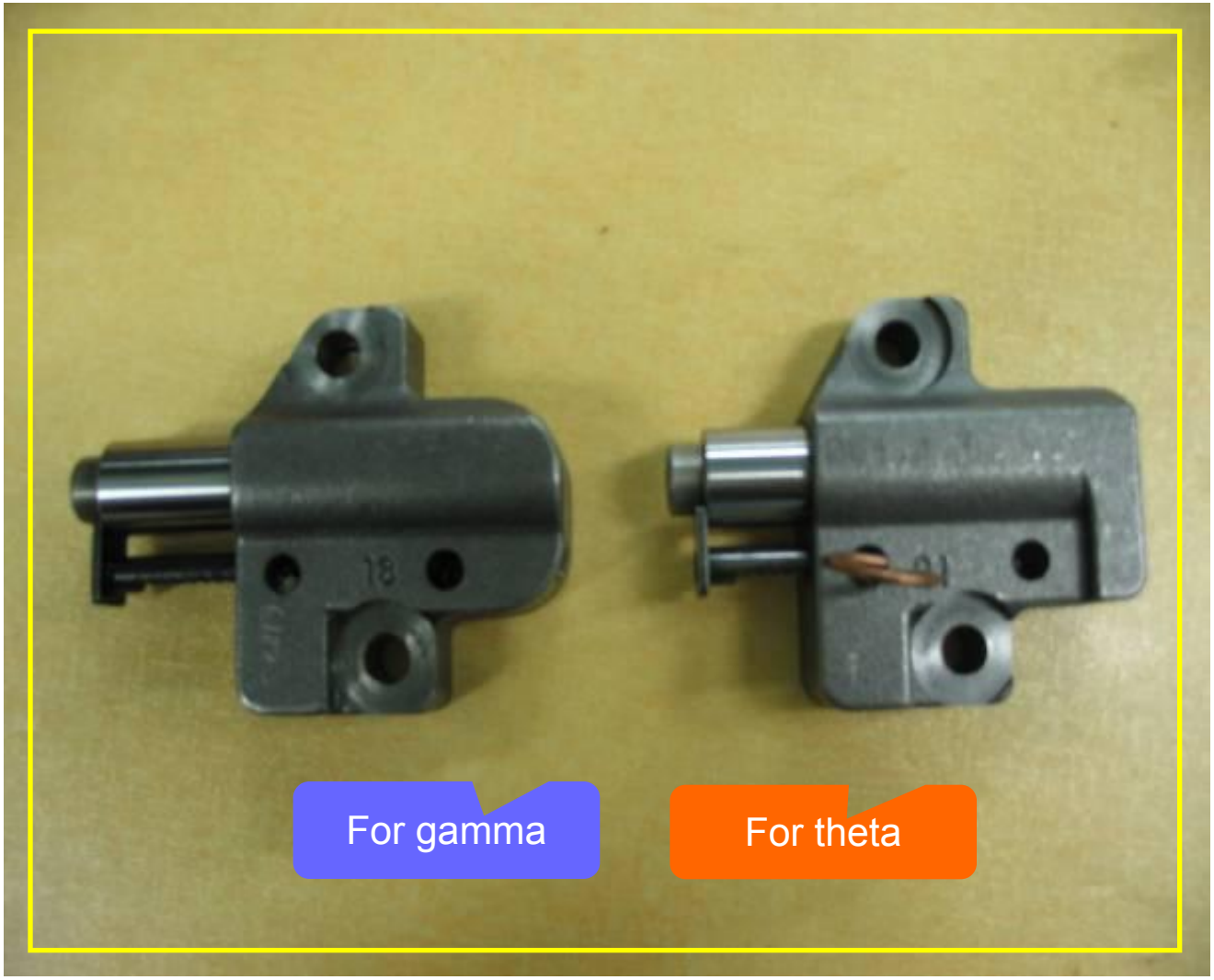
Timing align





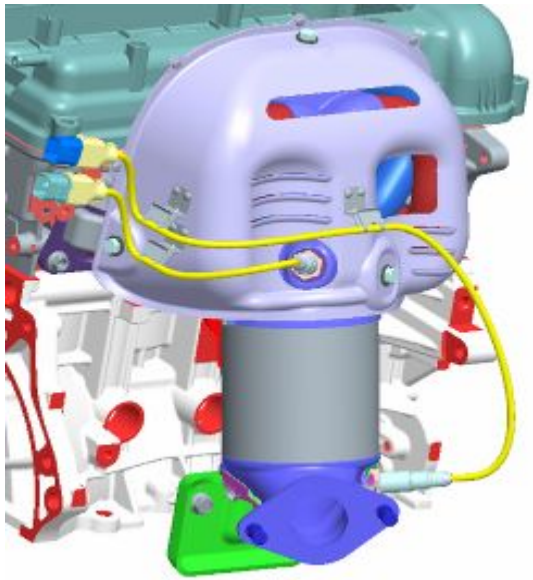
Aligning is same as theta timing aligning.

Auto tensioner



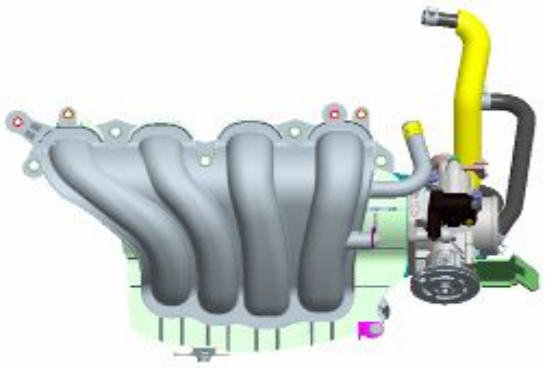
In theta and gamma engine timing system ratchet type auto tensioner is used. Right is for theta and left is for gamma. Mounting position is same but length of piston is different.

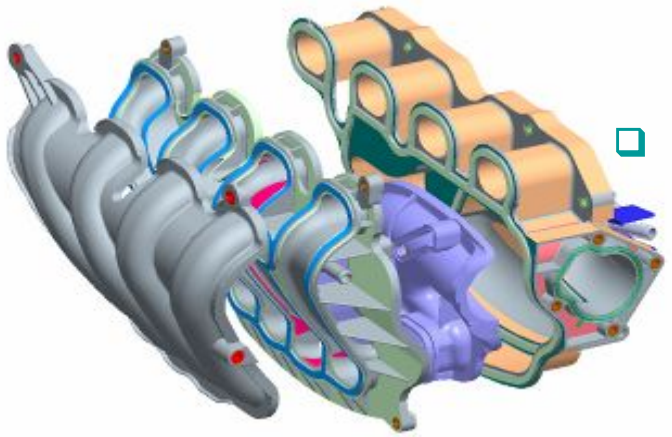
Intake and Exhaust manifold



- Reversed intake manifold

  - Decreasing intake air temp.
  - Easy to repair injector
  - Increasing Impact absorb area





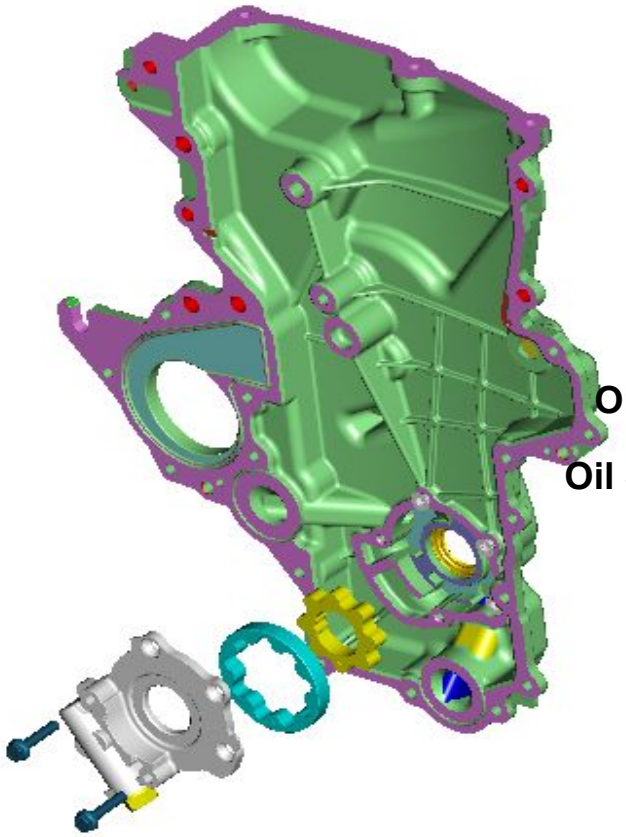
- Intake Manifold

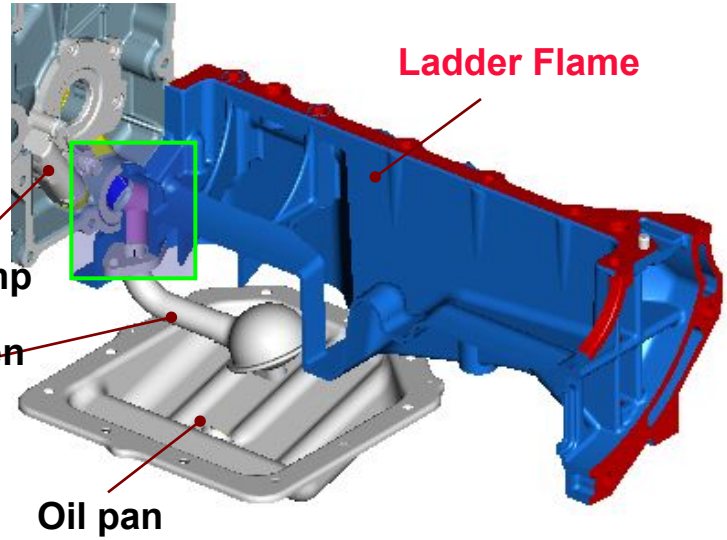
  - Plastic Intake Manifold (improve flow resistance)
  - Intake resonator (reduce pulsation resistance,noise)

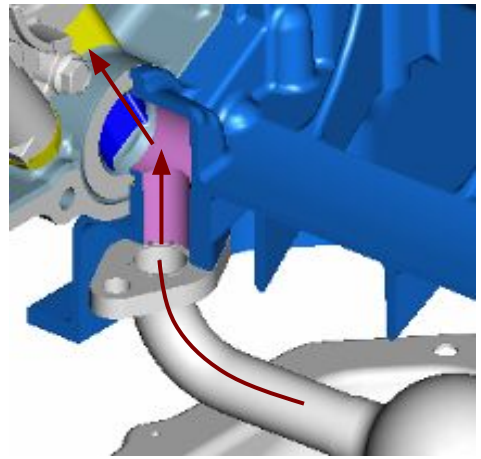
- Exhaust Manifold

  - Type : 4-1
  - WCC
  - SUS

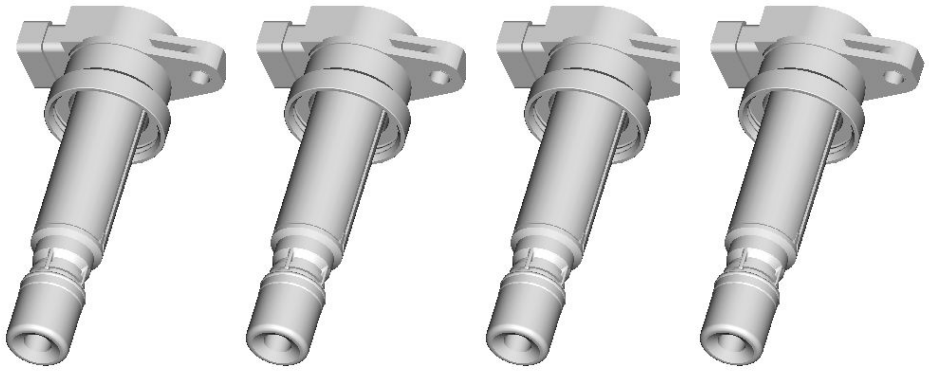
Oil pump







EMS



- Individual ignition control
- Throttle Body

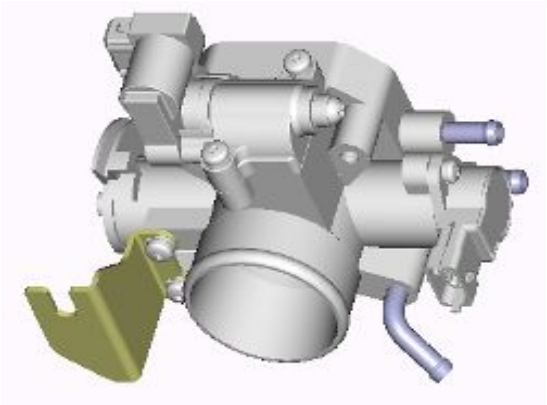
- Combined I.S.C.A and Throttle Body

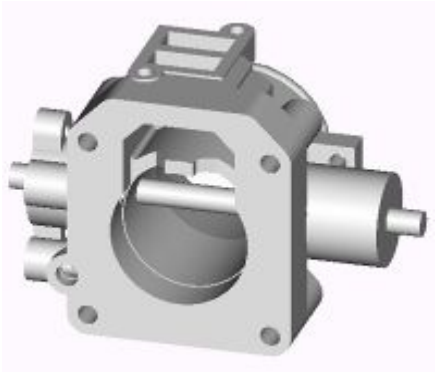
- Computer Assembly

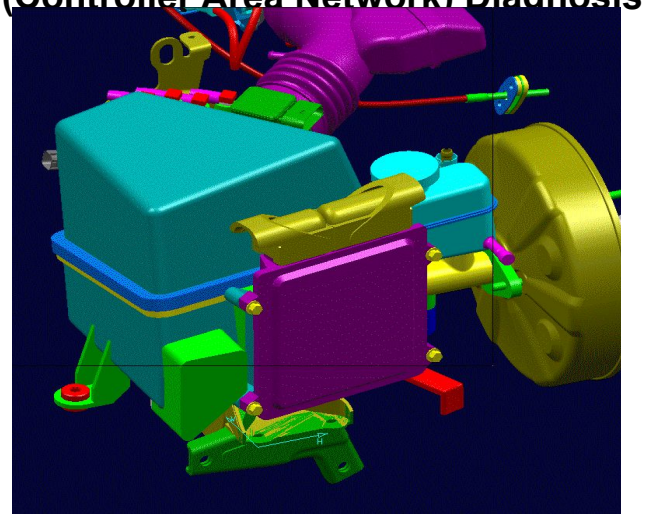
- Integrated PCM (Power train Control Unit)

- Waterproof computer Assembly

- CAN(Controller Area Network) Diagnosis





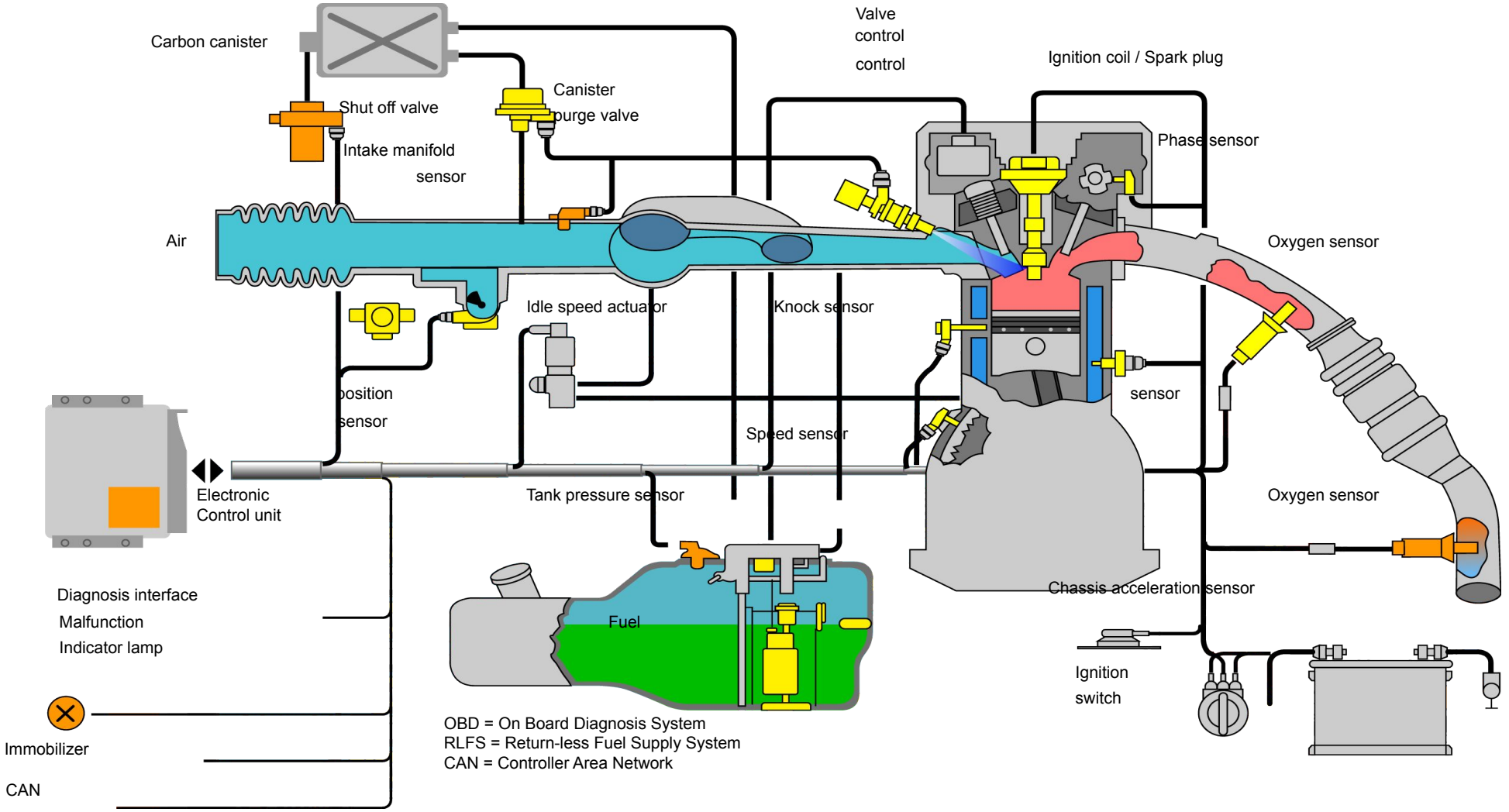


EMS parts list

	Part	Content
1	Ignition coil	-Cigar type, Individual ignition
2	Condenser	-250V, 0.47㎌F
3	Spark Plug	-Projection type (2.0mm projection)
4	MAP sensor	-Combined air temperature sensor
5	Purge Control Solenoid Valve	-TEV5 type, built-in filter
6	Throttle body	-Bore : φ53
7	Idle Speed Actuator	_Rosa type, 250Hz
8	Throttle Position Sensor	-Lever type
9	Fuel Injector	-EV6 long type
10	PCM	-Waterproof M(G)7.9.8
11	Crankshaft position Sensor	-VR type
12	Camshaft Position Sensor	-Hall IC type
13	Water Temperature Sensor	
14	Oxygen Sensor	-LSF type (binary type)
15	Knock Sensor	-KS-4 (non-resonating)
16	Oil Pressure Switch	-waterproof type

EMS diagram (BOSCH)

Power train Management System Overview



OBD = On Board Diagnosis System
RLFS = Return-less Fuel Supply System
CAN = Controller Area Network

Input and Output

Frt. Right side WSS

M/T		Input Variable	ECM PIN NO.
With OBD-II	With ABS	ABS Signal	K 64
	Without ABS	Wheel Speed Sensor	K 79, K 58 (K 64 open)
Without OBD-II	With ABS	Vehicle Speed Sensor	K 64
	Without ABS		K 64
Auto		**Input Variable**	**PCM PIN NO.**
With OBD-II	With ABS	ABS Signal	K 20
	Without ABS	Wheel Speed Sensor	A 60, A 45
Without OBD-II	With ABS	Vehicle Speed Sensor	K 20
	Without ABS		K 20

Vehicle sensor signal recognition is a little different. When ABS or OBD system are applied to the vehicle, there isn't any vehicle speed sensor in T/M side. Wheel speed sensor is used for vehicle speed instead of VSS. This sensor is also used for misfiring detection like typical acceleration.

Signal input lines are also quite different by vehicle specification. Refer to above table for input pin assignment.

- **Direction : same as MC**

DTC lists

GAMMA-Engine Fault Code(DTC) & MIL List

2005.12.16

● : MIL ON & Fault Code Memory
▲ : MIL OFF & Fault Code Memory
●* : MIL ON & Fault Code Memory for Option
▲* : MIL OFF & Fault Code Memory for Option

Item			GAMMA Engine Fault Code(DTC) & MIL List				
			EURO	DOM KOBD	GEN	LEADED	Remarks
CVVT	P0011	"A" Camshaft Position-Timing Over-Advanced or System Performance	●	●	▲	▲	
CVVT	P0012	"A" Camshaft Position-Timing Over-Retarded	●	●	▲	▲	
CMP	P0016	Crankshaft Position – Camshaft Position Correlation(Bank 1 Sensor A)	▲	▲	▲	▲	
O2 Sensor	P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)		●			
O2 Sensor	P0031	HO2S Heater Circuit low (Bank 1 Sensor 1)	●	●	▲		
O2 Sensor	P0032	HO2S Heater Circuit high (Bank 1 Sensor 1)	●	●	▲		
O2 Sensor	P0036	HO2S Heater Control Circuit (Bank 1 Sensor 2)	●	●			
O2 Sensor	P0037	HO2S Heater Circuit low (Bank 1 Sensor 2)	●	●			
O2 Sensor	P0038	HO2S Heater Circuit high (Bank 1 Sensor 2)	●	●			
TPS	P0068	MAP/MAF – Throttle Position Correlation	▲				
CVVT	P0075	Intake Valve Control Solenoid Circuit	●	●	▲	▲	
CVVT	P0076	Intake Valve Control Solenoid Circuit Low	●	●	▲	▲	
CVVT	P0077	Intake Valve Control Solenoid Circuit High	●	●	▲	▲	
MAP	P0106	Manifold Absolute Pressure/Barometric Pressure Circuit Range/Performance	●	●			
MAP	P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	●	●	●	●	
MAP	P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	●	●	●	●	
ATS	P0111	Intake Air Temperature Sensor1 Circuit Range/Performance		●			
ATS	P0112	Intake Air Temperature Sensor1 Circuit Low Input	●	●	▲	▲	
ATS	P0113	Intake Air Temperature Sensor1 Circuit High Input	●	●	▲	▲	
WTS	P0115	Engine Coolant Temperature Circuit					
WTS	P0116	Engine Coolant Temperature Circuit Range / Performance	●	●			
WTS	P0117	Engine Coolant Temperature Circuit Low Input	●	●	●	●	
WTS	P0118	Engine Coolant Temperature Circuit High Input	●	●	●	●	
TPS	P0121	Throttle/Pedal Position Sensor/Switch "A" Circuit Range/Performance	●	●			
TPS	P0122	Throttle/Pedal Position Sensor/Switch "A" Circuit Low Input	●	●	●	●	
TPS	P0123	Throttle/Pedal Position Sensor/Switch "A" Circuit High Input	●	●	●	●	

DTC lists

● : MIL ON & Fault Code Memory
▲ : MIL OFF & Fault Code Memory
●* : MIL ON & Fault Code Memory for Option
▲* : MIL OFF & Fault Code Memory for Option

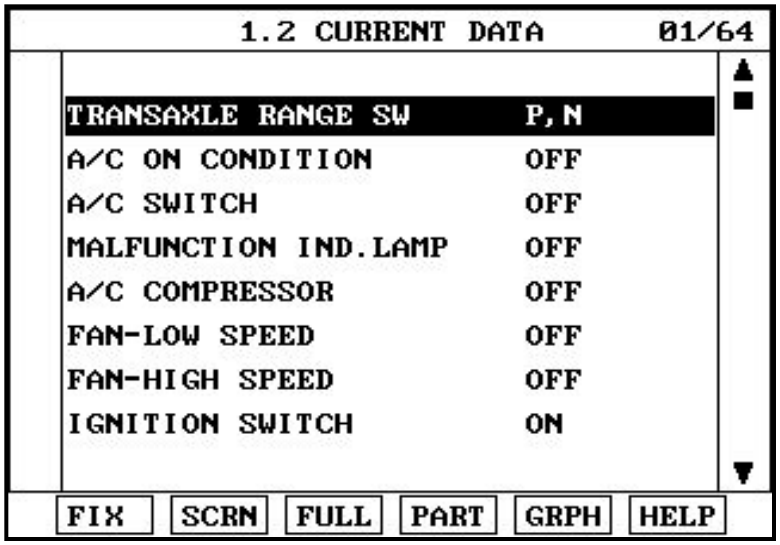
Item			GAMMA Engine Fault Code(DTC) & MIL List				
			EURO	DOM KOBD	GEN	LEADED	Remarks
TPS	P0124	Throttle/Pedal Position Sensor/Switch "A" Circuit Intermittent	▲				
WTS	P0128	Coolant Thermostat (Coolant Temp. below Thermostat Regulating Temp.)		●			
O2 Sensor	P0130	O2 Sensor Circuit(Bank 1 Sensor 1)	●	●	▲		
O2 Sensor	P0131	O2 Sensor Circuit Low Voltage(Bank 1 Sensor 1)	●	●	▲		
O2 Sensor	P0132	O2 Sensor Circuit High Voltage(Bank 1 Sensor 1)	●	●	▲		
O2 Sensor	P0133	O2-Sensor Circuit Slow Response (Bank 1 Sensor 1)	●	●	▲		
O2 Sensor	P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	●	●	▲		
O2 Sensor	P0135	O2 Sensor Heater Circuit(Bank 1 Sensor 1)	●	●	▲		
O2 Sensor	P0136	O2 Sensor Circuit(Bank 1 Sensor 2)	●	●			
O2 Sensor	P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	●	●			
O2 Sensor	P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	●	●			
O2 Sensor	P0139	O2 Sensor Circuit Slow Response	●	●			
O2 Sensor	P0140	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 2)	●	●			
O2 Sensor	P0141	O2 Sensor Heater Circuit(Bank 1 Sensor 2)	●	●			
Fuel Trim	P0171	System Too Lean (Bank 1)	●	●	▲		
Fuel Trim	P0172	System Too Rich (Bank 1)	●	●	▲		
Injector	P0201	Injector Circuit/Open – Cylinder 1	●	●	●	●	
Injector	P0202	Injector Circuit/Open – Cylinder 2	●	●	●	●	
Injector	P0203	Injector Circuit/Open – Cylinder 3	●	●	●	●	
Injector	P0204	Injector Circuit/Open – Cylinder 4	●	●	●	●	
Fuel Pump	P0230	Fuel Pump Primary Circuit	▲	▲	▲	▲	
Fuel Pump	P0231	Fuel Pump Secondary Circuit Low	▲	▲	▲	▲	
Fuel Pump	P0232	Fuel Pump Secondary Circuit High	▲	▲	▲	▲	
Injector	P0261	Cylinder 1 - Injector Circuit Low	●	●	●	●	
Injector	P0262	Cylinder 1 - Injector Circuit High	●	●	●	●	
Injector	P0264	Cylinder 2 - Injector Circuit Low	●	●	●	●	
Injector	P0265	Cylinder 2 - Injector Circuit High	●	●	●	●	
Injector	P0267	Cylinder 3 - Injector Circuit Low	●	●	●	●	

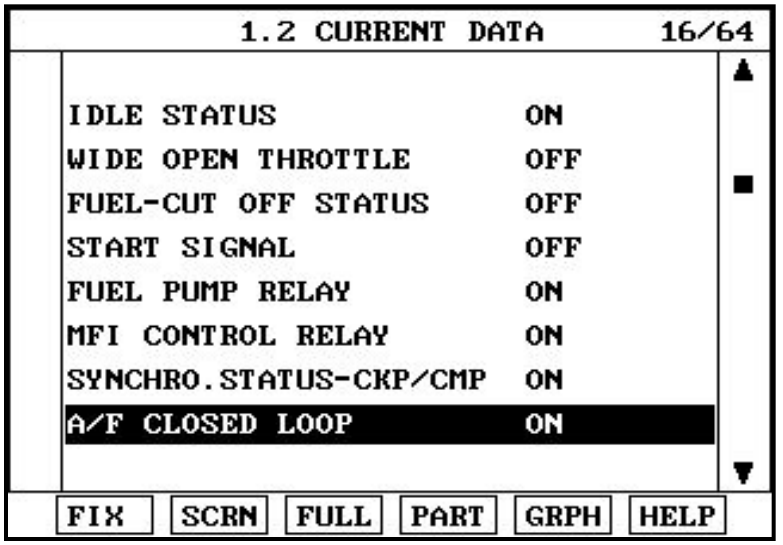
DTC lists

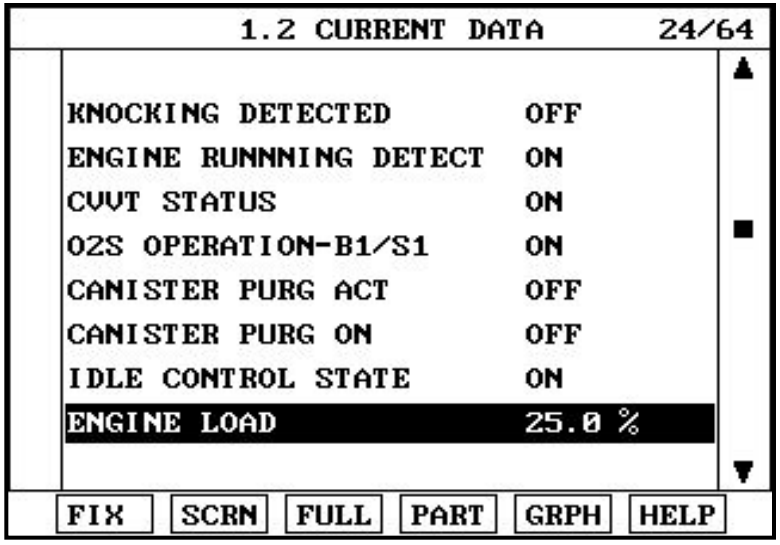
● : MIL ON & Fault Code Memory
▲ : MIL OFF & Fault Code Memory
●* : MIL ON & Fault Code Memory for Option
▲* : MIL OFF & Fault Code Memory for Option

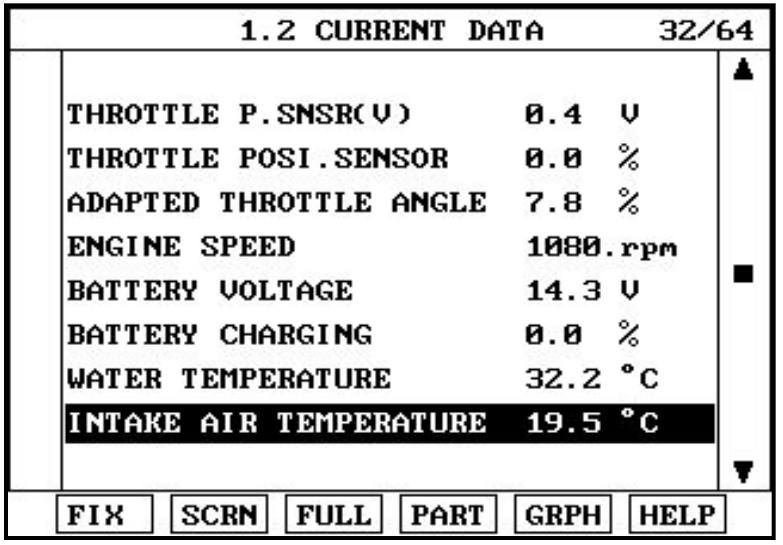
Item			GAMMA Engine Fault Code(DTC) & MIL List				
			EURO	DOM KOBD	GEN	LEADED	Remarks
Injector	P0268	Cylinder 3 - Injector Circuit High	●	●	●	●	
Injector	P0270	Cylinder 4 - Injector Circuit Low	●	●	●	●	
Injector	P0271	Cylinder 4 - Injector Circuit High	●	●	●	●	
Misfire	P0300	Random/Multiple Cylinder Misfire Detected	●	●			
Misfire	P0301	Cylinder 1 - Misfire detected	●	●			
Misfire	P0302	Cylinder 2 - Misfire detected	●	●			
Misfire	P0303	Cylinder 3 - Misfire detected	●	●			
Misfire	P0304	Cylinder 4 - Misfire detected	●	●			
Knock Sensor	P0326	Knock Sensor 1 Circuit Range/Performance	▲	▲	▲		
Knock Sensor	P0327	Knock Sensor 1 Circuit Low Input	▲	▲	▲		
Knock Sensor	P0328	Knock Sensor 1 Circuit High Input	▲	▲	▲		
CKP	P0335	Crankshaft Position Sensor A Circuit	●	●	▲	▲	
CKP	P0336	Crankshaft Position Sensor A Circuit Range/Performance	●	●	▲	▲	
CKP	P0337	Crankshaft Position Sensor A Circuit Low Input	●	●	▲	▲	
CKP	P0338	Crankshaft Position Sensor A Circuit High Input	●	●	▲	▲	
CMP	P0340	Camshaft Position Sensor A Circuit Malfunction(Single Sensor)	●	●	▲	▲	
CMP	P0341	Camshaft Position Sensor A Circuit Range/Performance(Single Sensor)	●	●	▲	▲	
CMP	P0342	Camshaft Position Sensor A Circuit Low Input	●	●	▲	▲	
CMP	P0343	Camshaft Position Sensor A Circuit High Input	●	●	▲	▲	
Catalyst Aging	P0420	Catalyst System Efficiency below Threshold (Bank 1)	●	●			
Evap.	P0442	Evap. Emission System - Leak detected (small leak)		●			
Evap.	P0444	Evap. Emission System - Purge Ctrl. Valve Circuit Open	●	●			
Evap.	P0446	Evap. Emission System - Vent Control circuit		●			
Evap.	P0449	Evap. Emission System - Vent valve / Solenoid circuit		●			
Evap.	P0450	Evaporative Emission System Pressure Sensor/Switch		●			
Evap.	P0451	Evap. Emission System - Pressure Sensor Range / Performance		●			
Evap.	P0452	Evap. Emission System - Pressure Sensor Low Input		●			
Evap.	P0453	Evap. Emission System - Pressure Sensor High Input		●			

Current data









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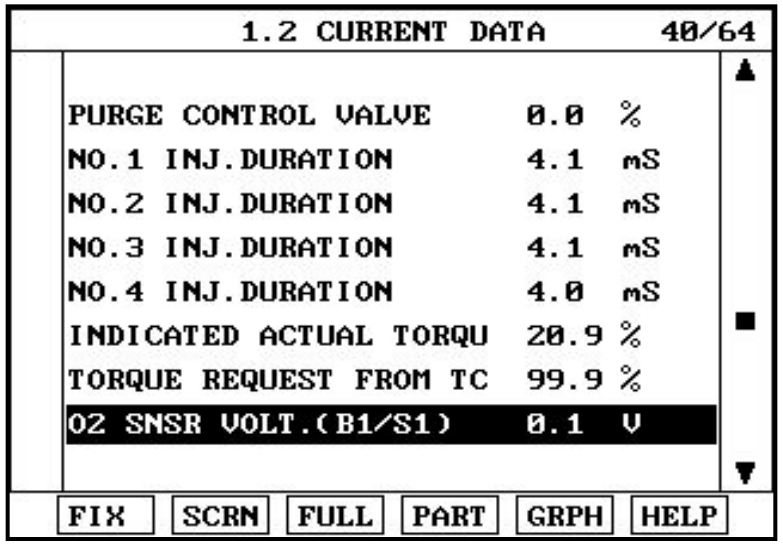
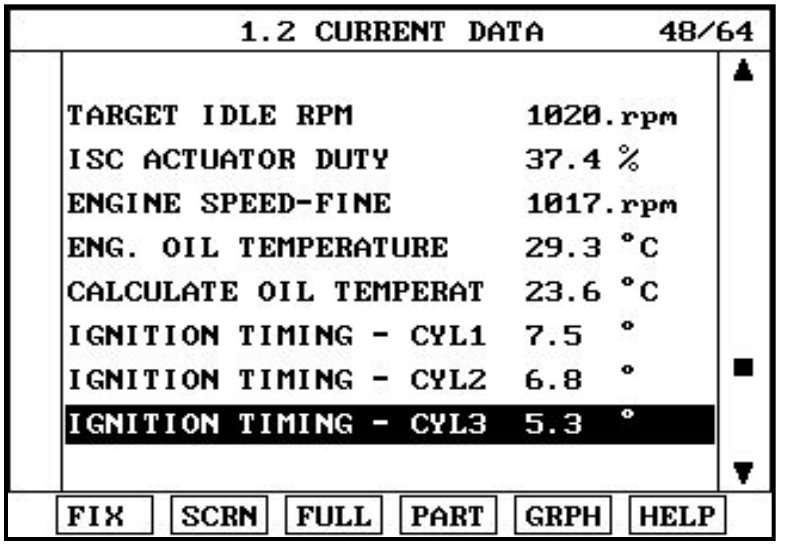
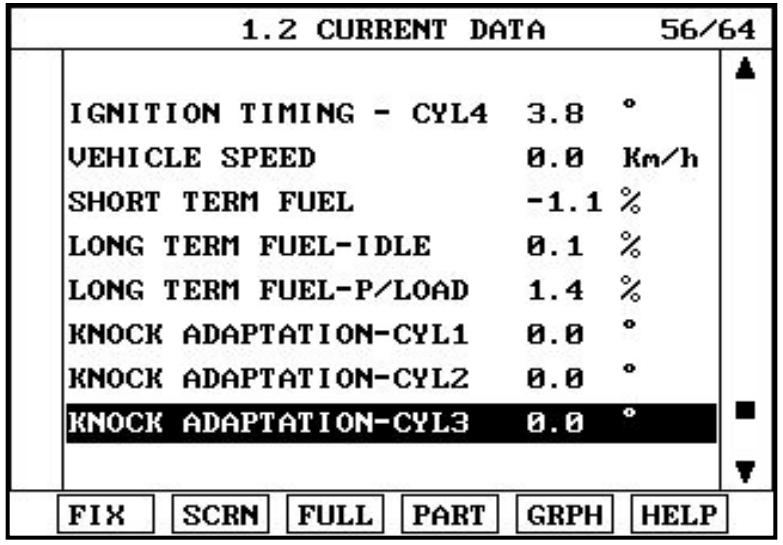
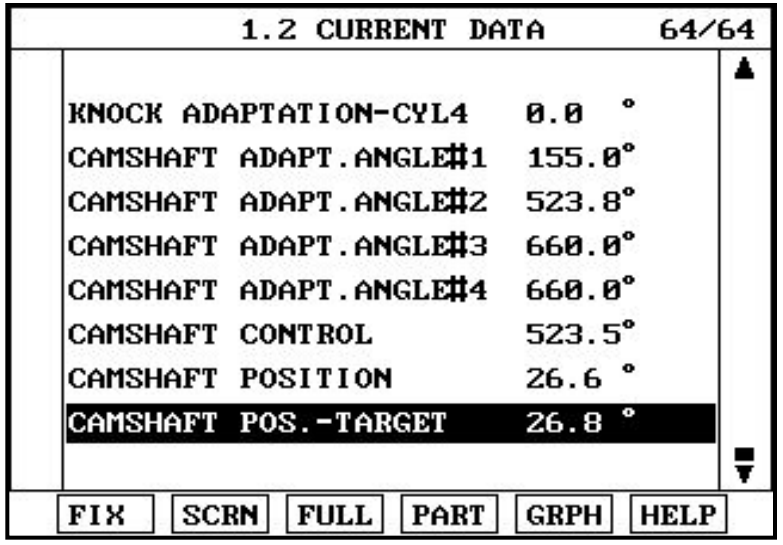
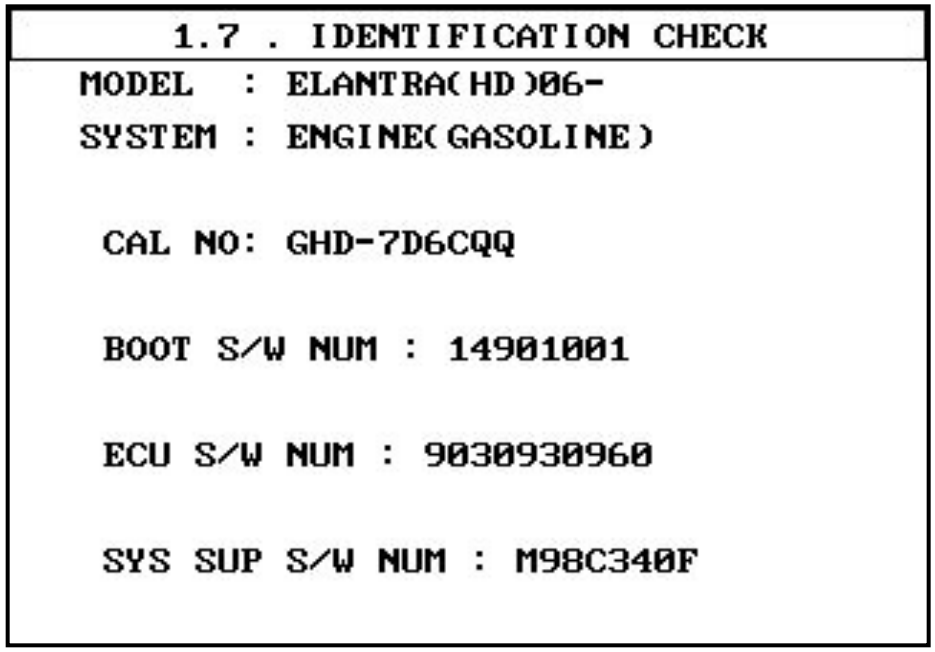


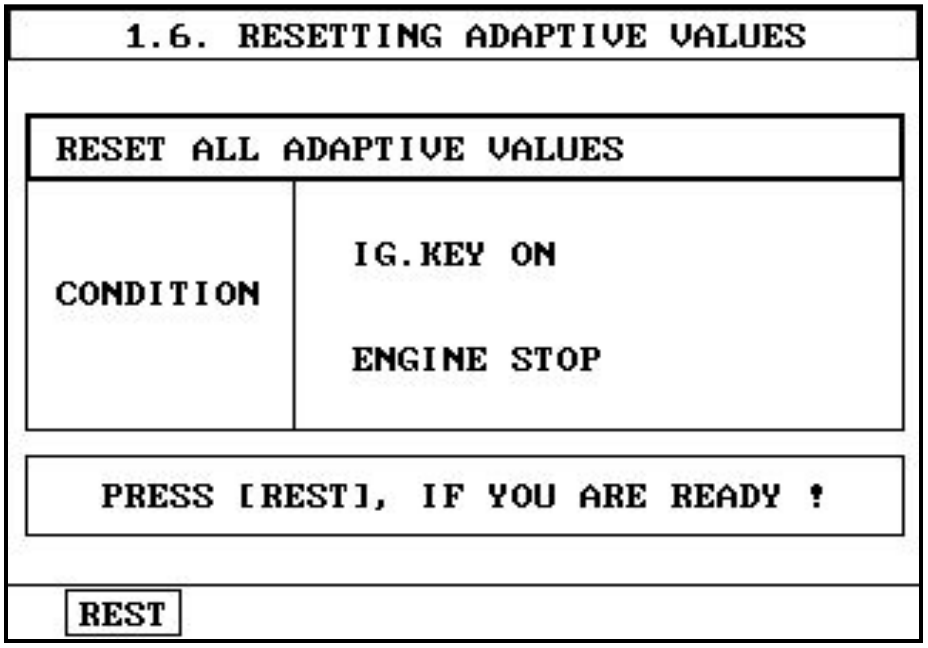






ID check and resetting adaptive values

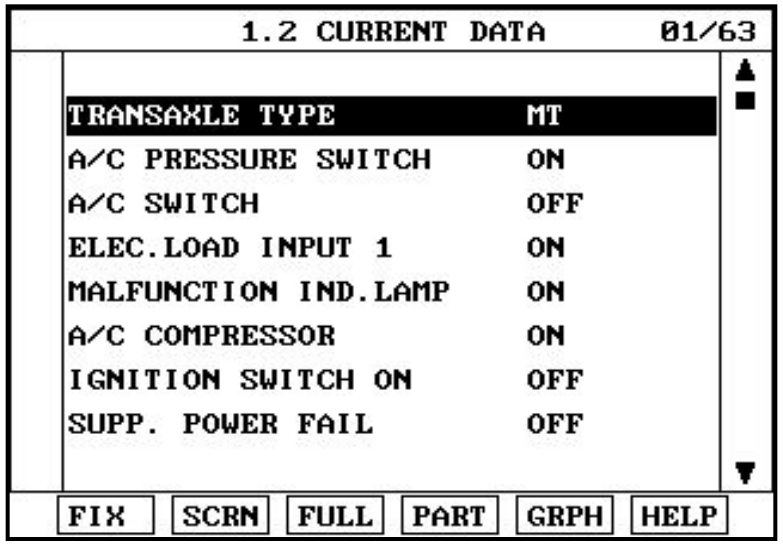


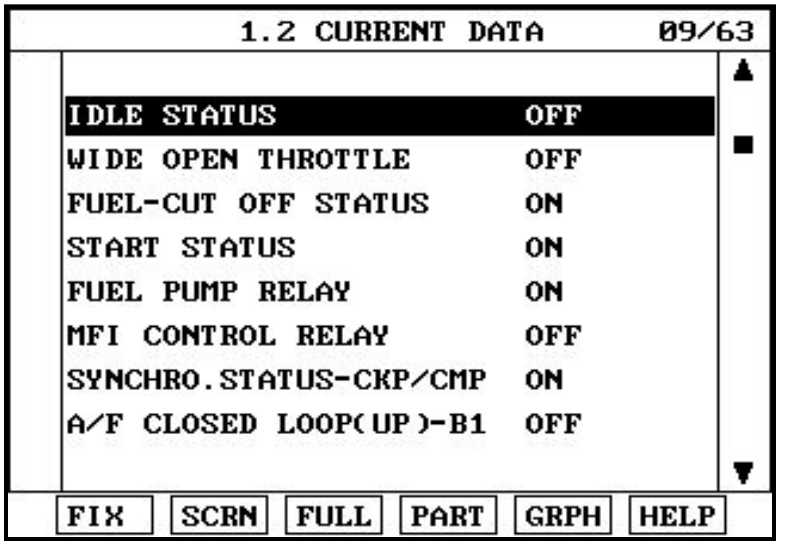


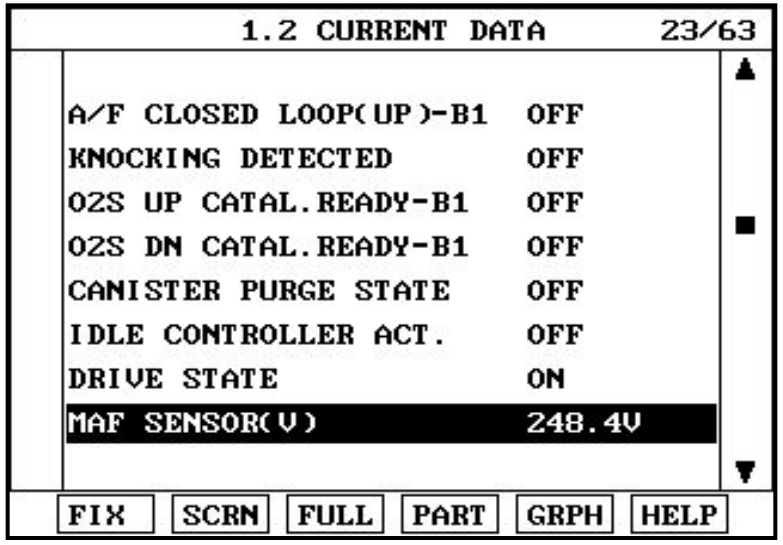
Changed items (HD 2.0 vs XD F/L 2.0)

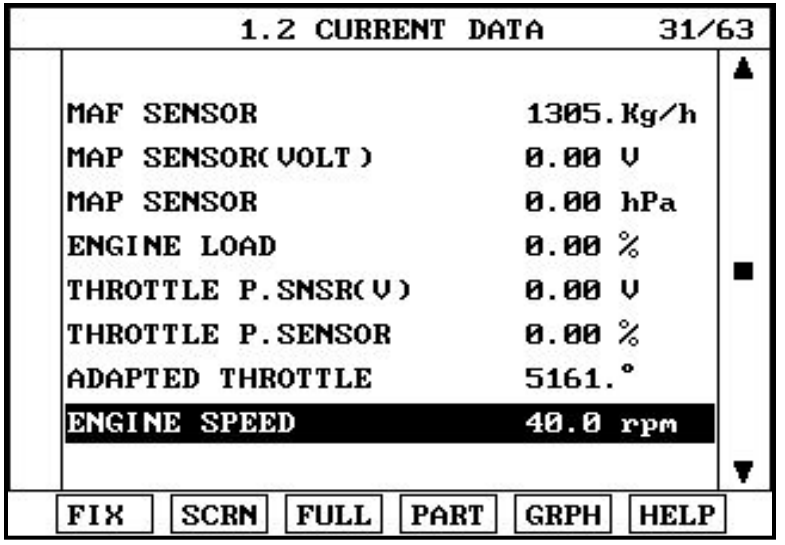
			XD F/L	HD Beta 2.0	Supplier	Remark
ECM/PCM			SIMK 43 (inside) SIEMENS	SIM2K-47 (Engine room) SIEMENS	SIEMENS	
Injector	SULEV		Multi hole (DENSO)	Multi hole short (DENSO)	DENSO	
	-SULEV		EV6(KEFICO)	←	KEFICO	
Knock sensor			KS-2(KEFICO)	KS-4(KEFICO)	KEFICO	
Spark plug	Korea GEN		Nickel	←	Scrim, Woojin	
	NAS,CHN		Pt	←	Scrim, Woojin	
	SULEV		Iridium (NGK)	Iridium + projection (NGK)	Woojin	
PCSV			TEV-2;3cc (KEFICO)	←	KEFICO	
CKP			ATS3610(SIEMENS VDO)	←	SIEMENS	
CMP			ATS631(SIEMENS VDO)	←	SIEMENS	
TPS			Shaft type	Lever type	KEFICO	
MAF			With CVVT	NAS	SIEMENS	
MAP			Without CVVT	Except NAS	SIEMENS	
Throttle body			A/C lever – TH/lever	A/C lever – TH/lever separately	MORTONIC	
02 Sensor	NAS	FR	UEGO sensor	← (Length changed)		
		RR	LSF 4.2 D4	←		
	-NAS	FR	LSF 4.2 D4	←		
		RR	LSF 4.2 D4	←		

Current data

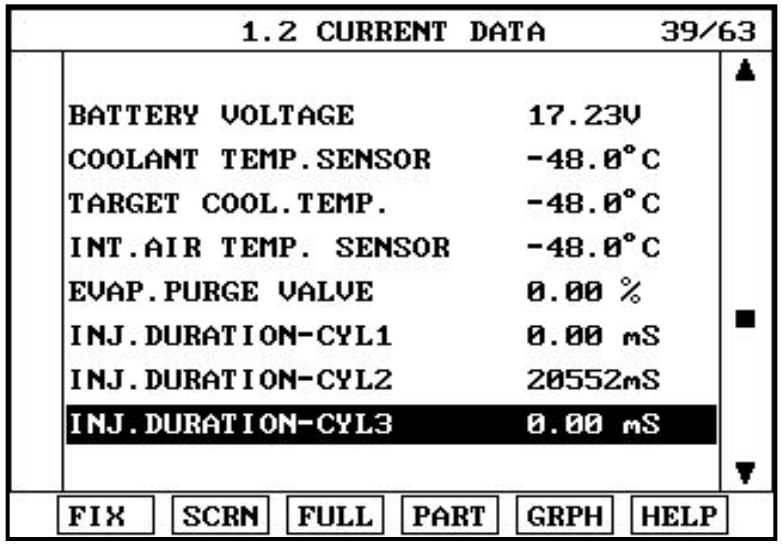








Current data



Actuation test

1.4 ACTUATION TEST 01/21

DIAGNOSTIC LAMP(MIL)	
DURATION	2 SECONDS
METHOD	ACTIVATION
CONDITION	IG.KEY ON ENGINE OFF

PRESS [STRT], IF YOU ARE READY !
SELECT TEST ITEM USING UP/DOWN KEY

STRT

1.4 ACTUATION TEST 02/21

CANISTER CLOSE VALVE-CLOSED	
DURATION	2 SECONDS
METHOD	ACTIVATION
CONDITION	IG.KEY ON ENGINE OFF

PRESS [STRT], IF YOU ARE READY !
SELECT TEST ITEM USING UP/DOWN KEY

STRT

1.4 ACTUATION TEST 03/21

FUEL PUMP RELAY	
DURATION	2 SECONDS
METHOD	ACTIVATION
CONDITION	IG.KEY ON ENGINE OFF

PRESS [STRT], IF YOU ARE READY !
SELECT TEST ITEM USING UP/DOWN KEY

STRT

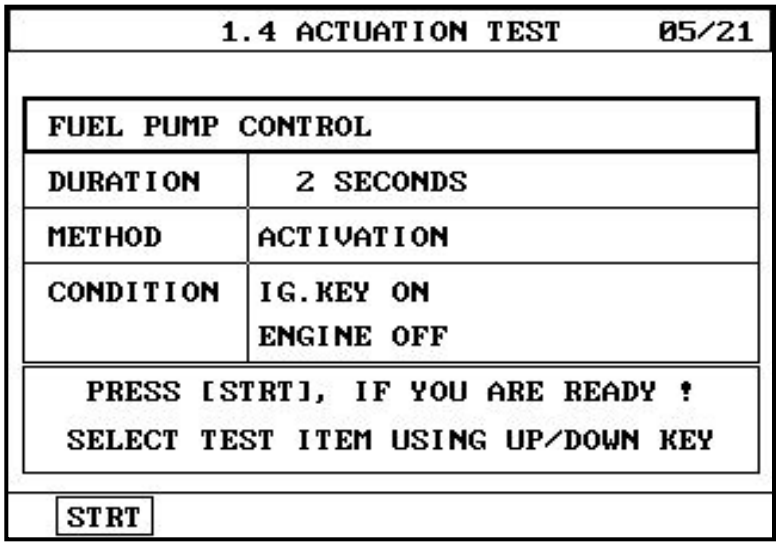
1.4 ACTUATION TEST 04/21

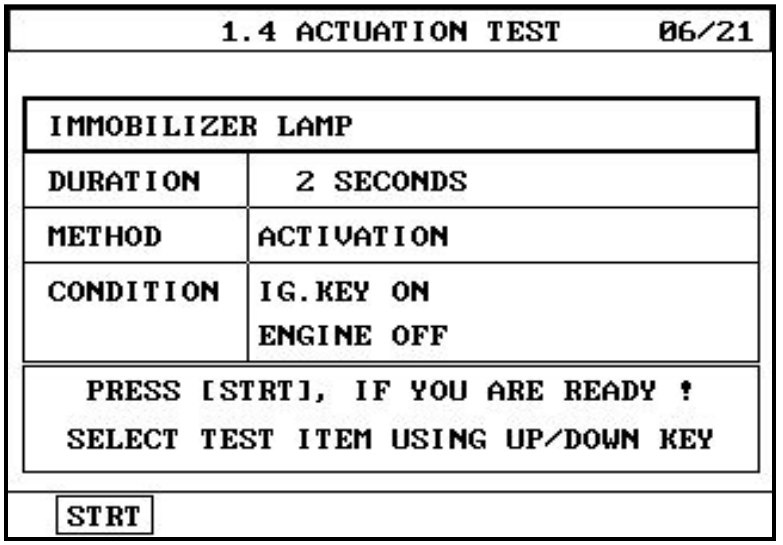
A/C COMPRESSOR RELAY	
DURATION	2 SECONDS
METHOD	ACTIVATION
CONDITION	IG.KEY ON ENGINE OFF

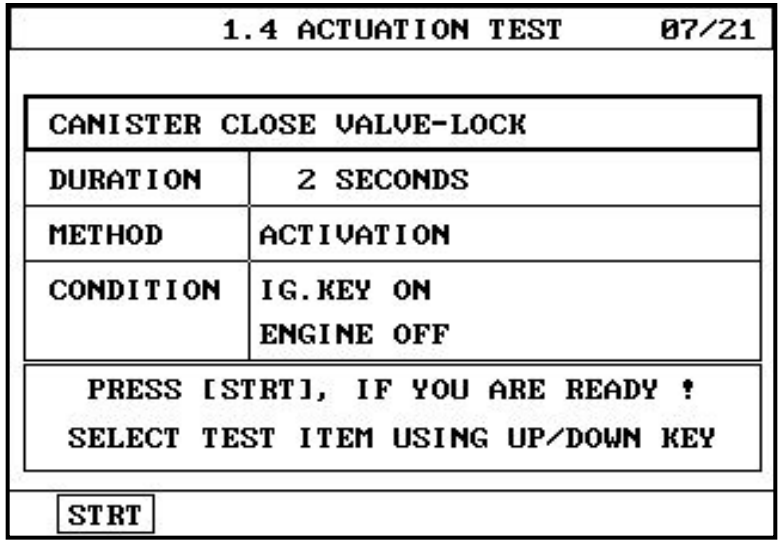
PRESS [STRT], IF YOU ARE READY !
SELECT TEST ITEM USING UP/DOWN KEY

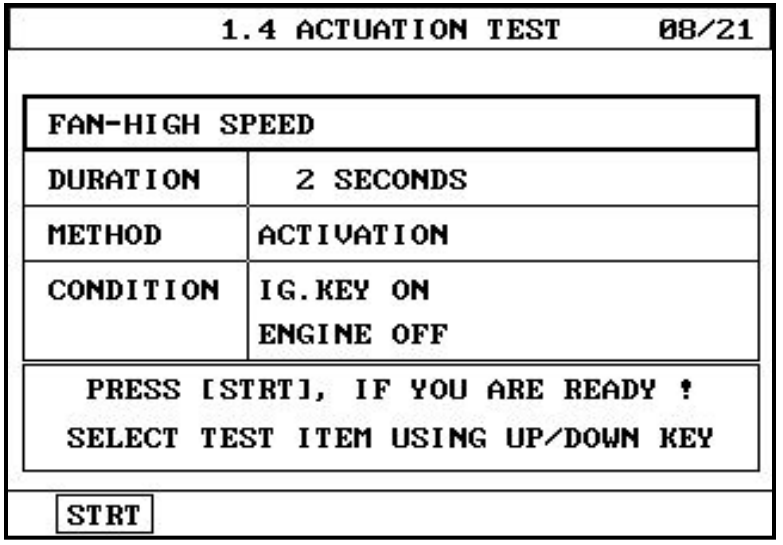
STRT

Actuation test

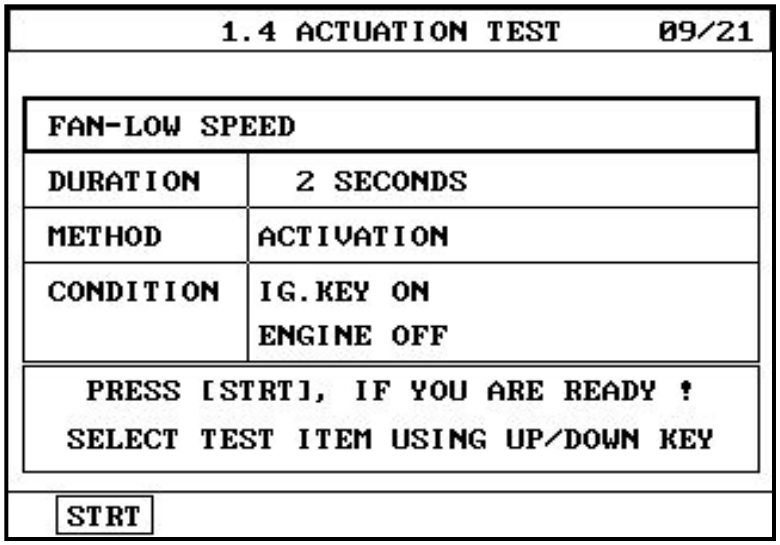


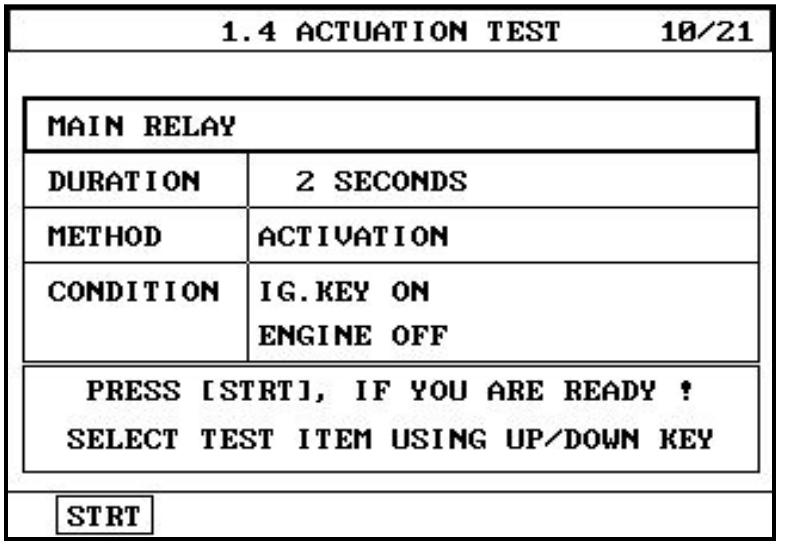


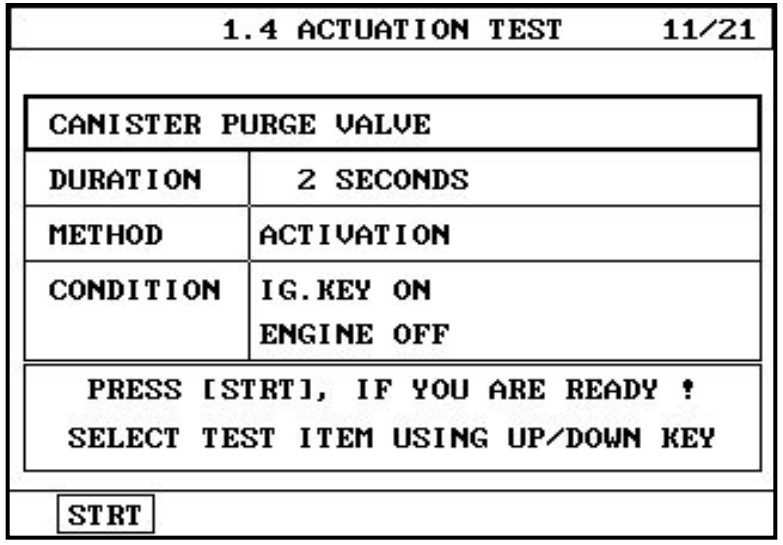


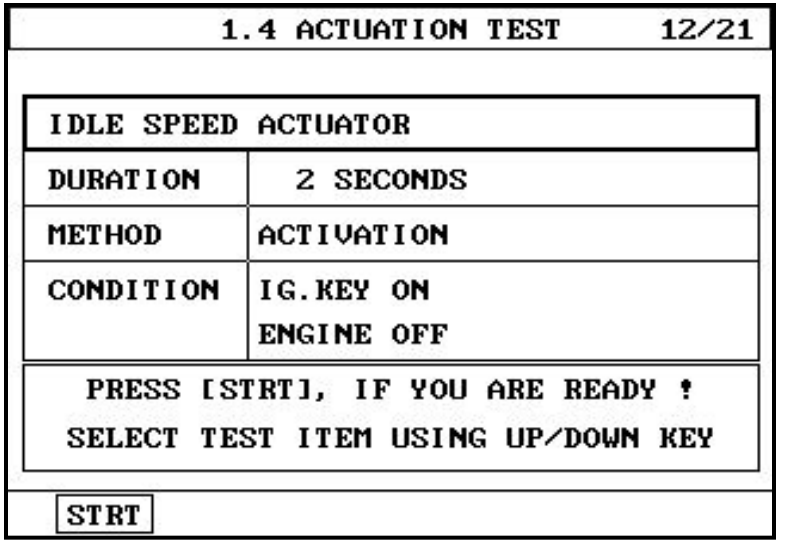


Actuation test









Actuation test

1.4 ACTUATION TEST 13/21	
OIL CONTROL VALVE	
DURATION	2 SECONDS
METHOD	ACTIVATION
CONDITION	IG.KEY ON ENGINE OFF

PRESS [STRT], IF YOU ARE READY !
SELECT TEST ITEM USING UP/DOWN KEY

STRT

1.4 ACTUATION TEST 14/21	
IGNITION COIL - #1	
DURATION	2 SECONDS
METHOD	ACTIVATION
CONDITION	IG.KEY ON ENGINE OFF

PRESS [STRT], IF YOU ARE READY !
SELECT TEST ITEM USING UP/DOWN KEY

STRT

1.4 ACTUATION TEST 15/21	
IGNITION COIL - #2	
DURATION	2 SECONDS
METHOD	ACTIVATION
CONDITION	IG.KEY ON ENGINE OFF

PRESS [STRT], IF YOU ARE READY !
SELECT TEST ITEM USING UP/DOWN KEY

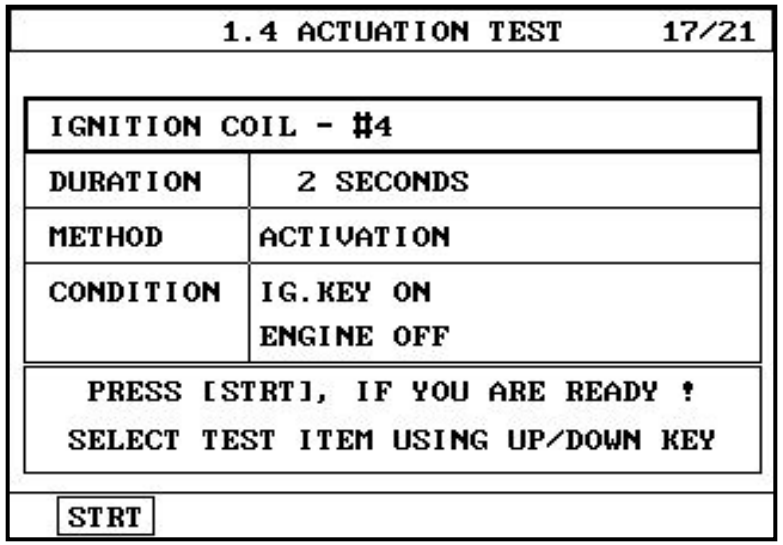
STRT

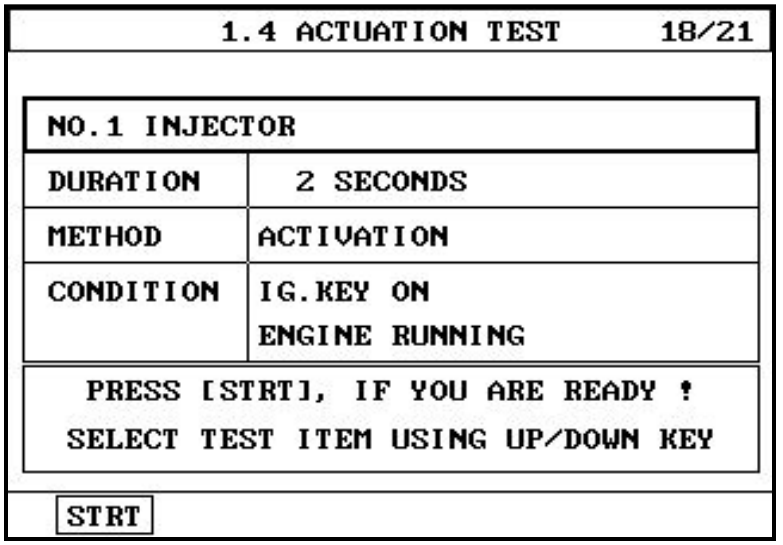
1.4 ACTUATION TEST 16/21	
IGNITION COIL - #3	
DURATION	2 SECONDS
METHOD	ACTIVATION
CONDITION	IG.KEY ON ENGINE OFF

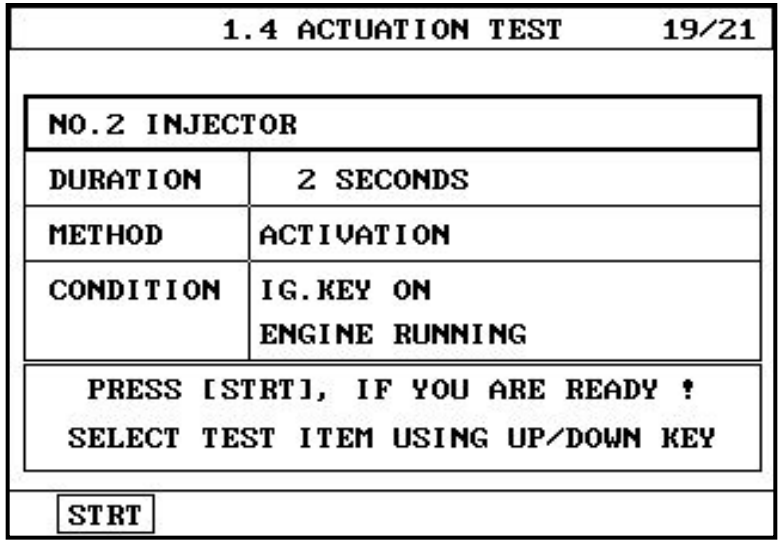
PRESS [STRT], IF YOU ARE READY !
SELECT TEST ITEM USING UP/DOWN KEY

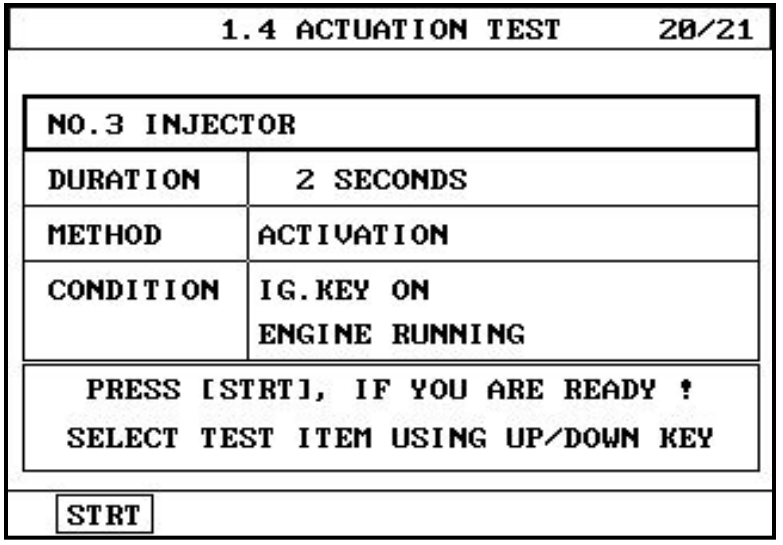
STRT

Actuation test

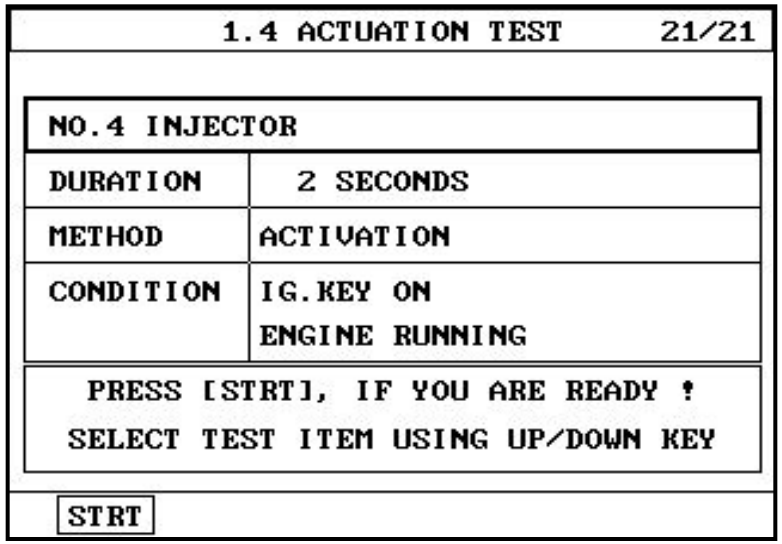






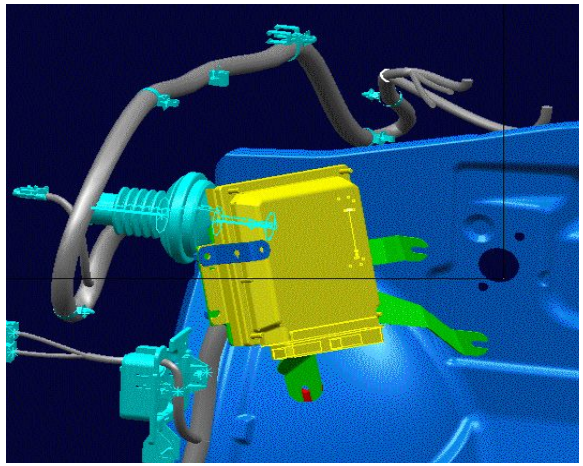
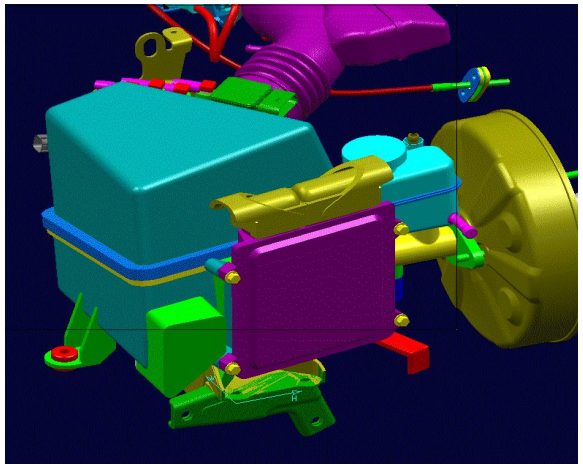


Actuation test



Gasoline EMS : γ/β-ENG

Item	Contents	XD	HD		
			Korea	GEN	N/A
PCM	•Water proof •Air cleaner side located		●	●	●
Air flow sensor type (CVVT)	•Direct→ Indirect detecting (AIR FLOW SENSOR → MAP SENSOR)		●	●	

ECM / PCM	
XD	**HD**
• Inside type  **(WHEEL HOUSING)**	• Engine room type  **(A/CLEANER SIDE)**

Air volume detection sensor (γ/β-ENG)

XD	HD
AIR FLOW sensor	MAP sensor
	
Direct detecting type	Indirect detecting type

type.ppt connector.ppt service ability.ppt

Lever type TPS (γ/β-ENG)

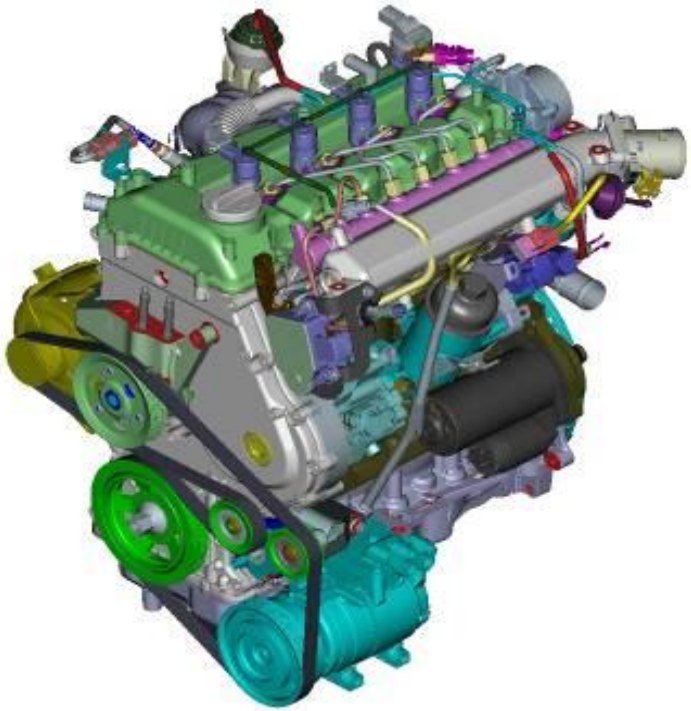
(Insert shaft type → Lever type)

Before

After

Lever type is better than shaft type for engine vibration.

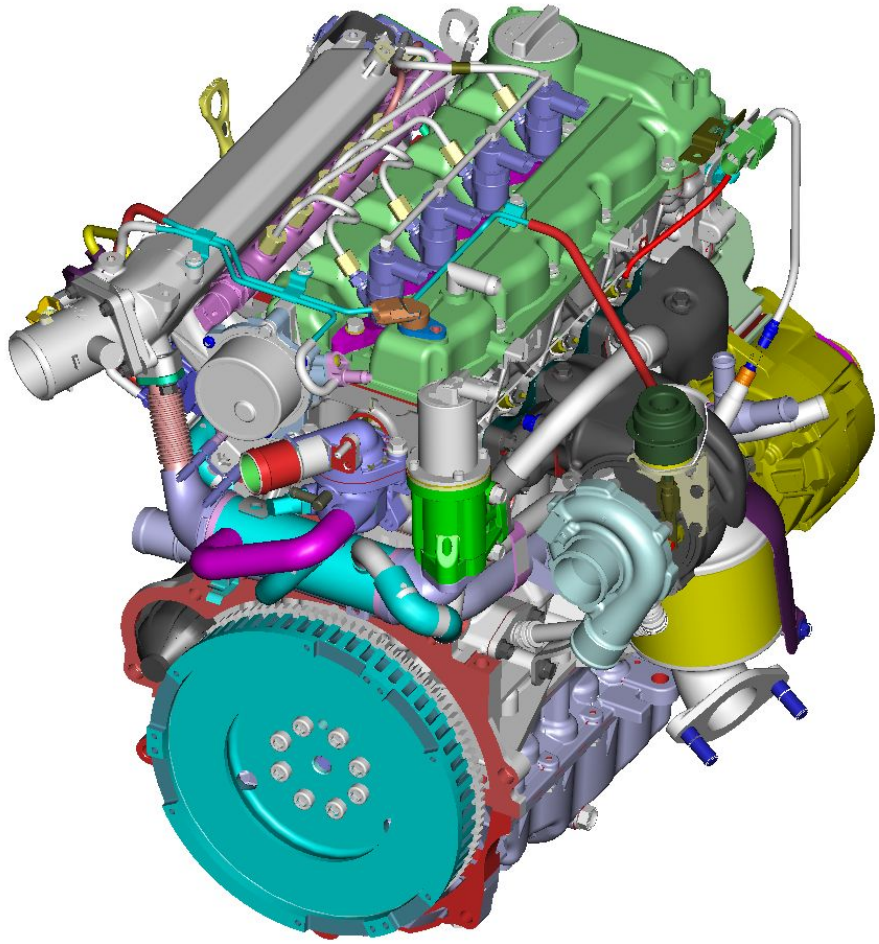
U 1.6L Specification



Engine		U-1.5 (EURO 4)	U-1.6 (EURO 4)
Main feature	Cylinder	4 cylinder	
	Displacement (cc)	1,493	1,582
	Bore (mm)	75	77.2
	Stroke (mm)	84.5	
	Valve type	DOHC-4 valve	
	Cam operating	Chain	
	Injection	CRDi (1600bar)	
Max. output (PS)		112	117
Max. torque (kg.m)		24.5	26.5

Engine main feature

- DOHC I type 4valve Cylinder Turbo intercooler
- CRDi system (1600bar)
- Electrical EGR & EGR cooler
- VGT (Variable Geometry Turbo)
- Timing chain
- Serpentine belt
- Bed plate
- SCV (Swirl control Valve)
- Throttle flap
- Lambda sensor



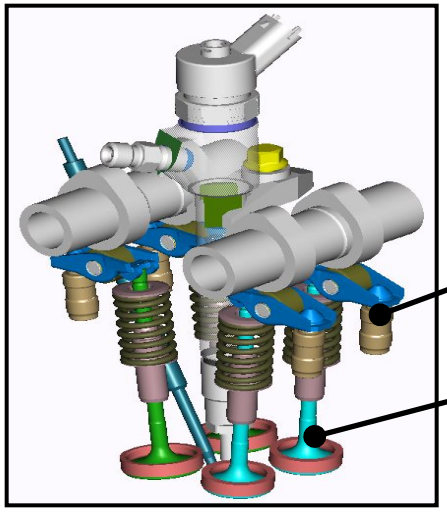
Main components

DOC (Diesel Oxidation Catalyst)

λ sensor

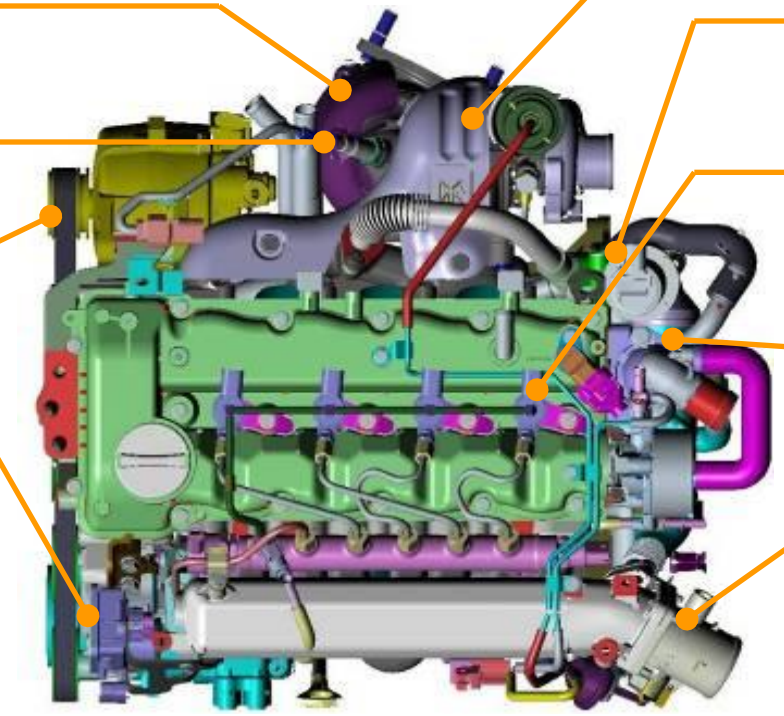
Serpentine belt

SCV (Swirl Control Valve)



HLA

4 valve DOHC



VGT

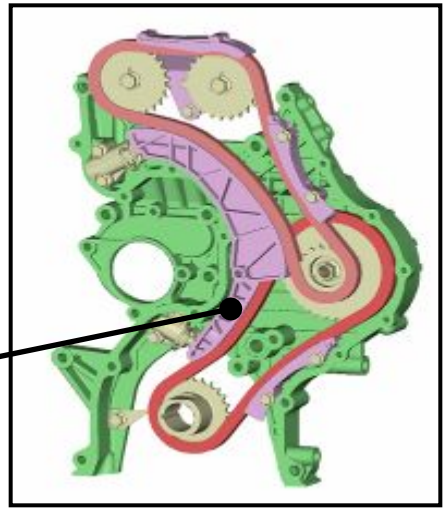
Electrical E.G.R

CRDi system
✔EURO-3:1300bar
✔EURO-4: 1600bar

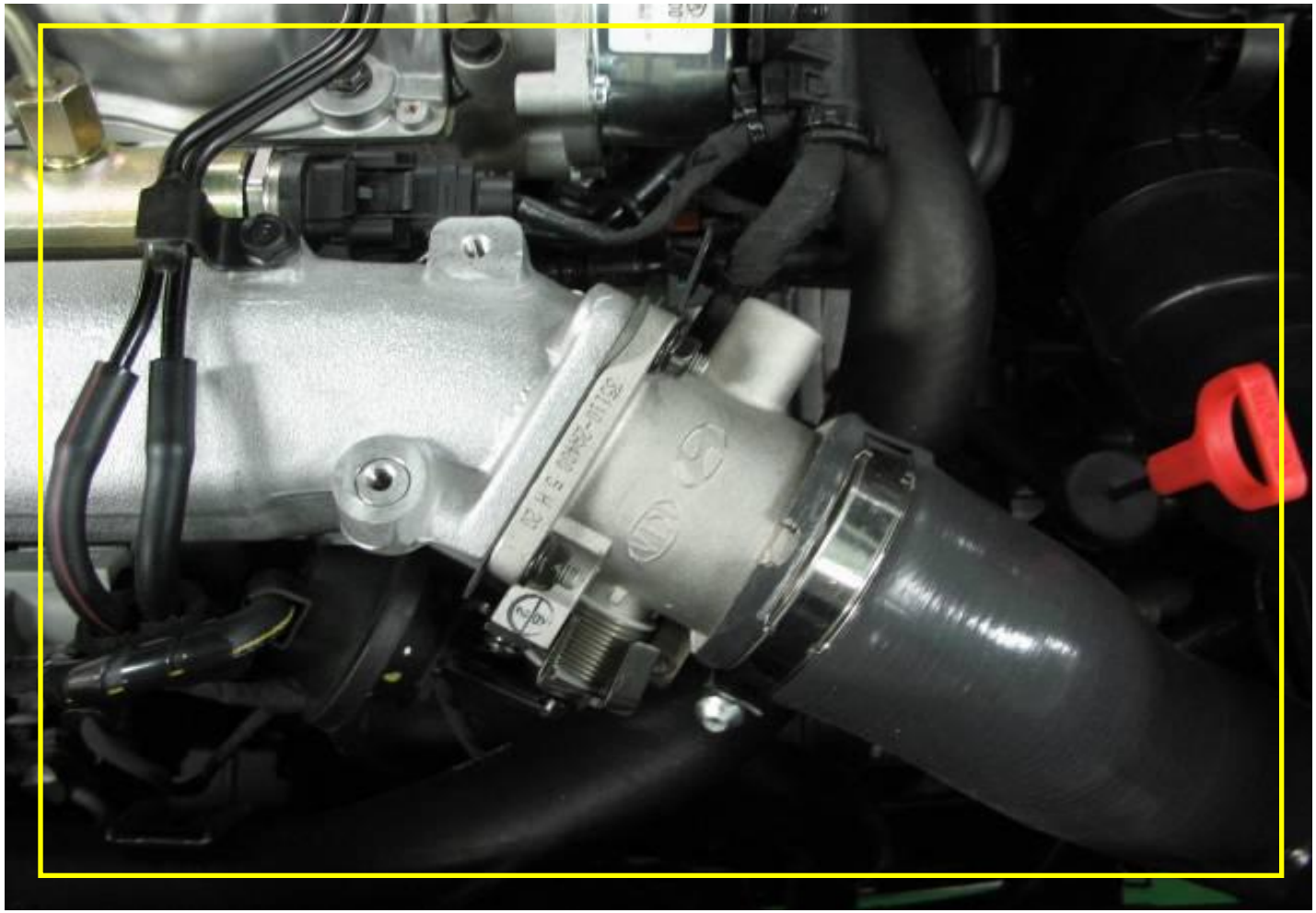
E.G.R cooler

Throttle flap

Timing chain

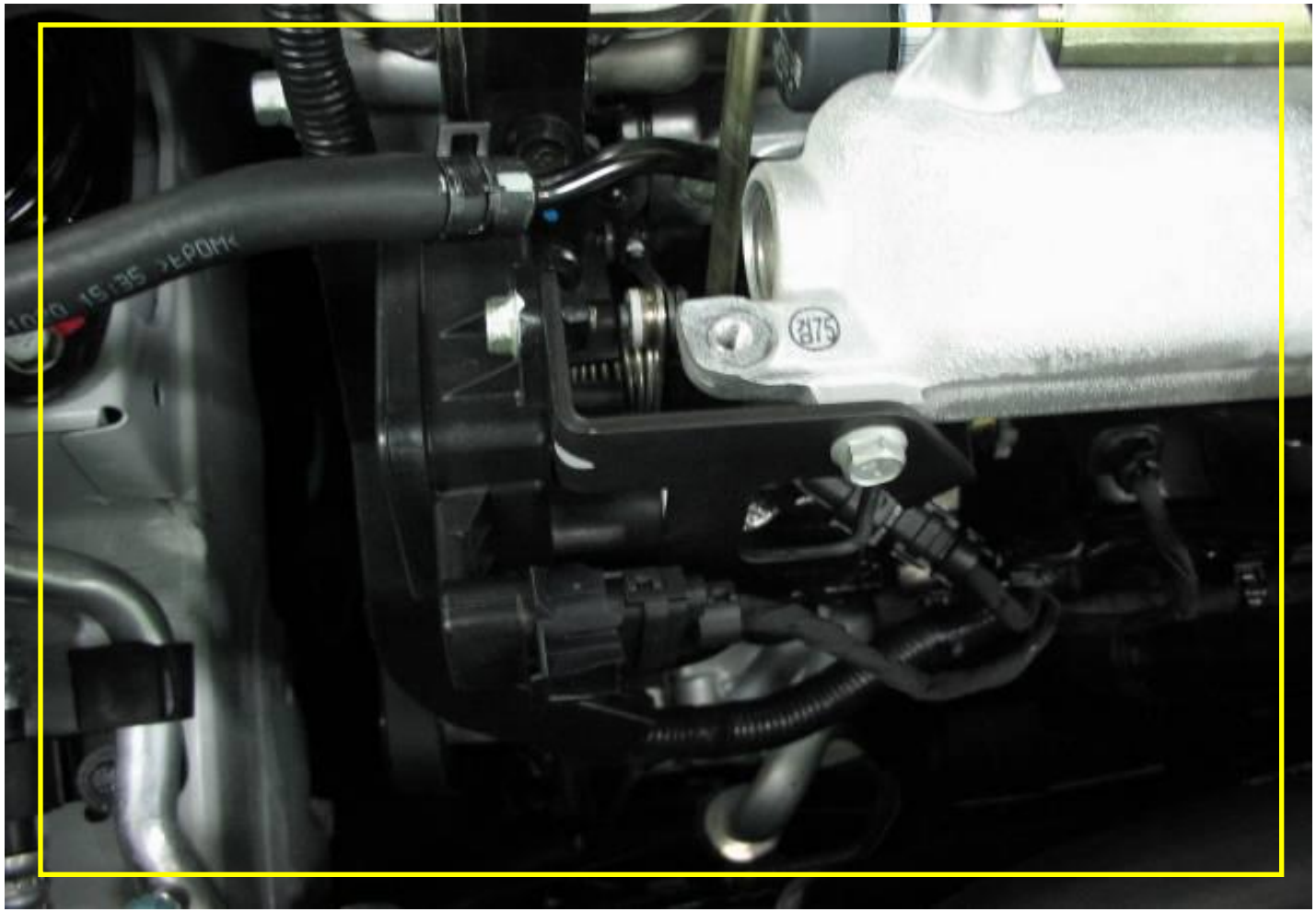


Throttle flap



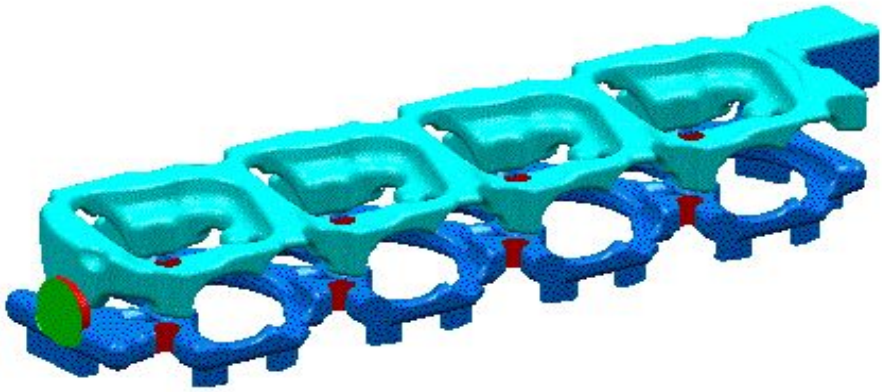
EURO IV IQA injector

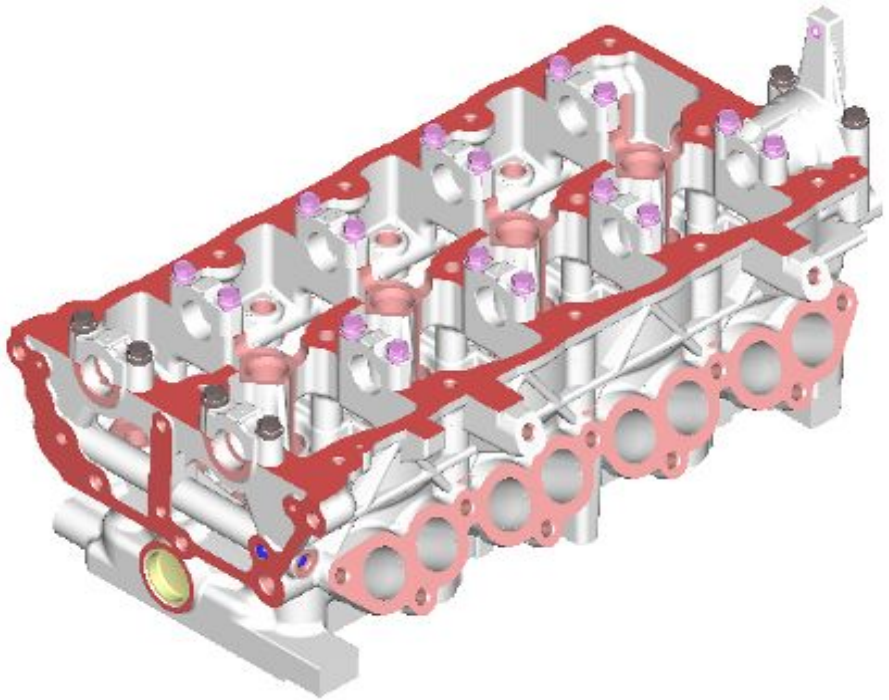
SCV (Swirl Control Valve)



Cylinder head

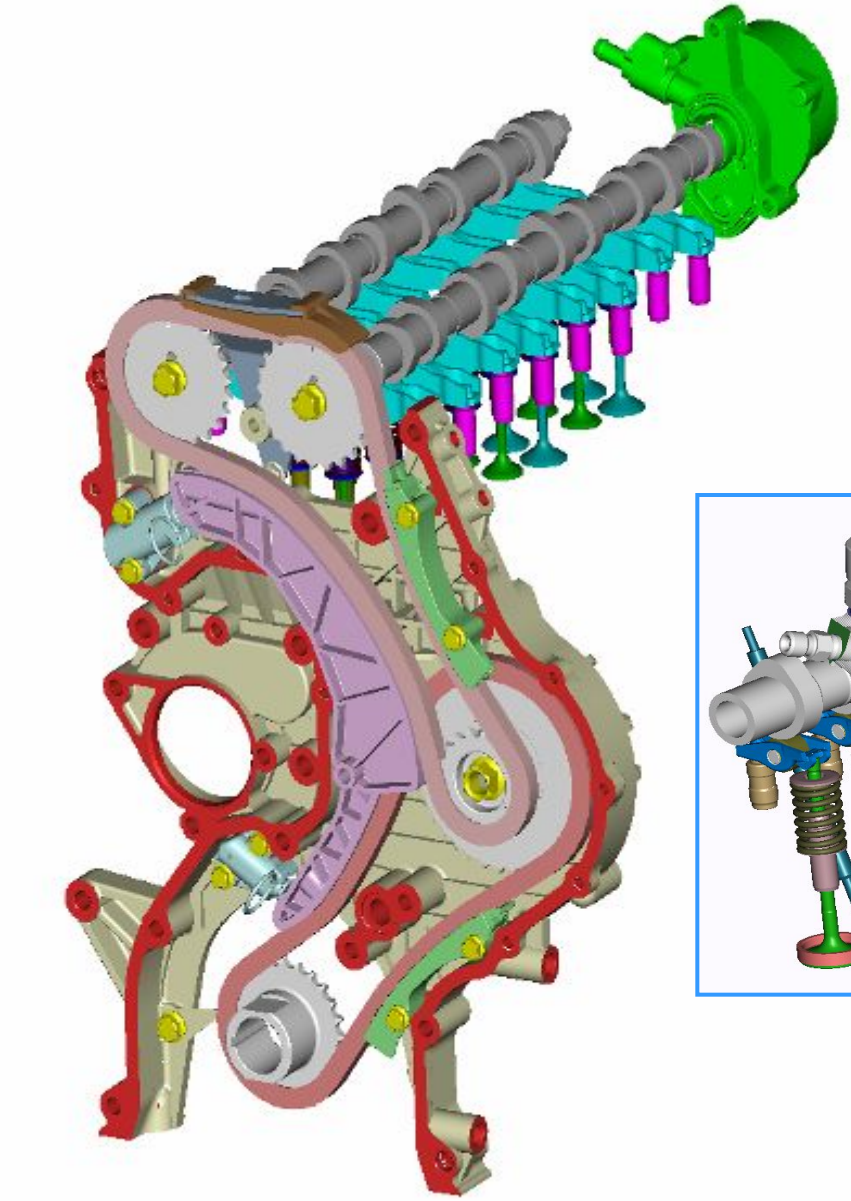
- AL cylinder head
- 4valve / cylinder

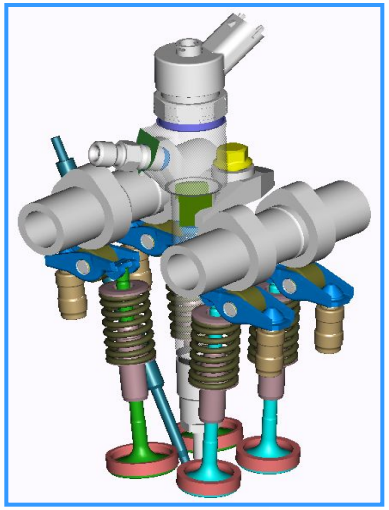




Timing system

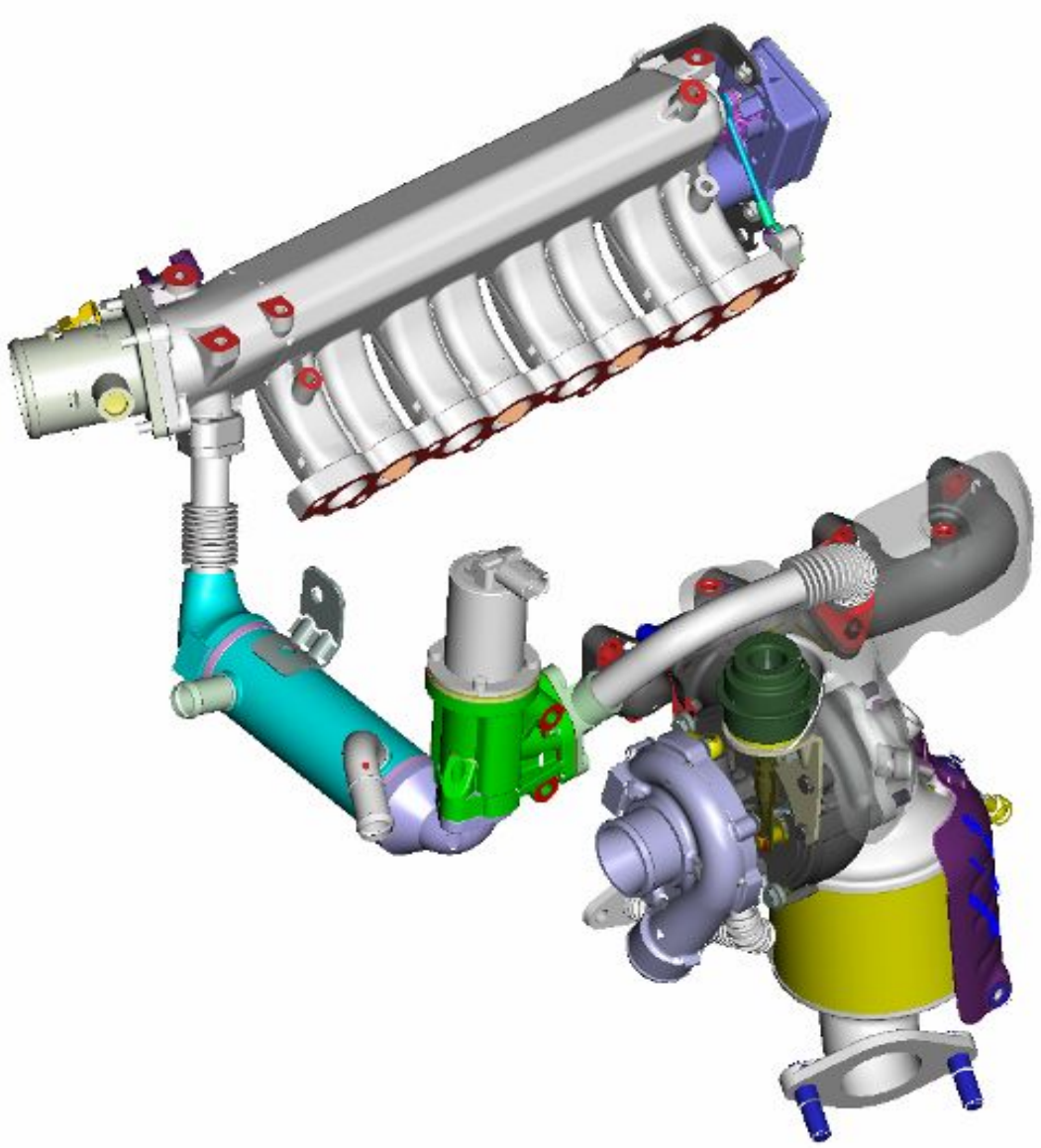
- DOHC 4 Valve
- VALVE operating type:
  - END PIVOT ROLLER SWING AR
- CAM operating type : 2 Chains
- Hollow camshaft



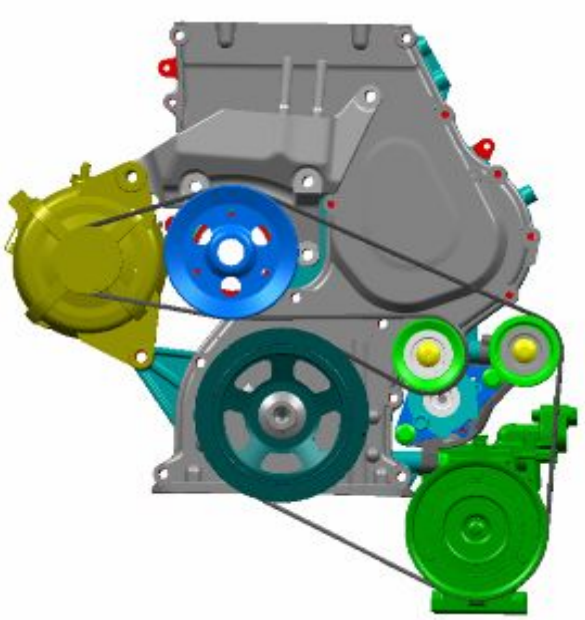
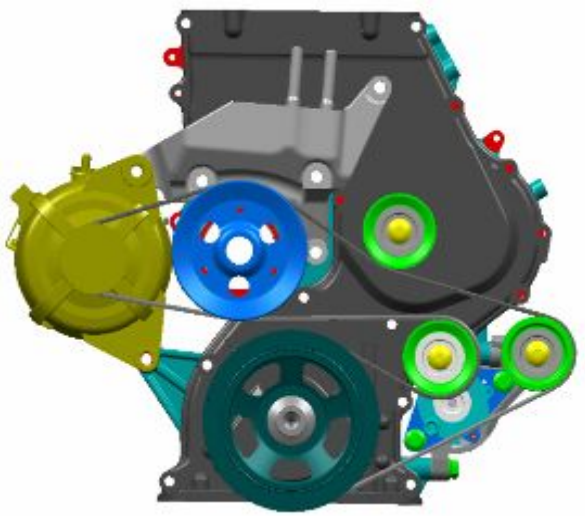


Intake / Exhaust manifold

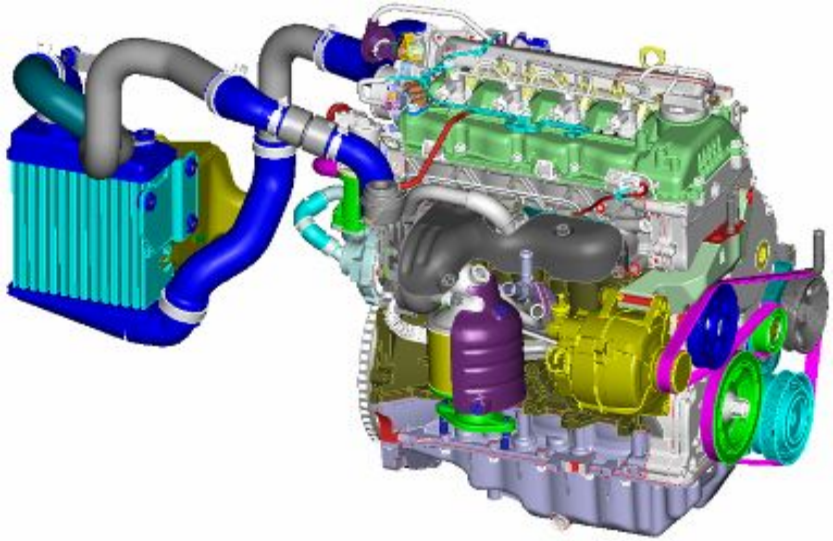
- VGT
- SCV (Swirl Control Valve)
- Electrical EGR VALVE
- WCC (Warm-up Catalytic Converter)
- EGR COOLER



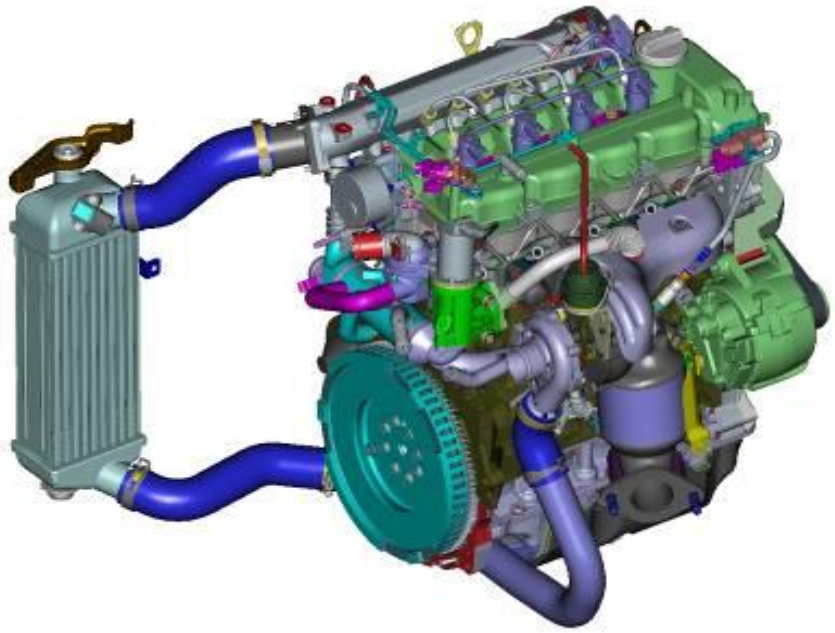
Serpentine belt

	With A/C	Without A/C
Appearance		
Remark	P/S pump is not applied because of MDPS	

Intercooler system



XD U1.5 VGT EURO-3

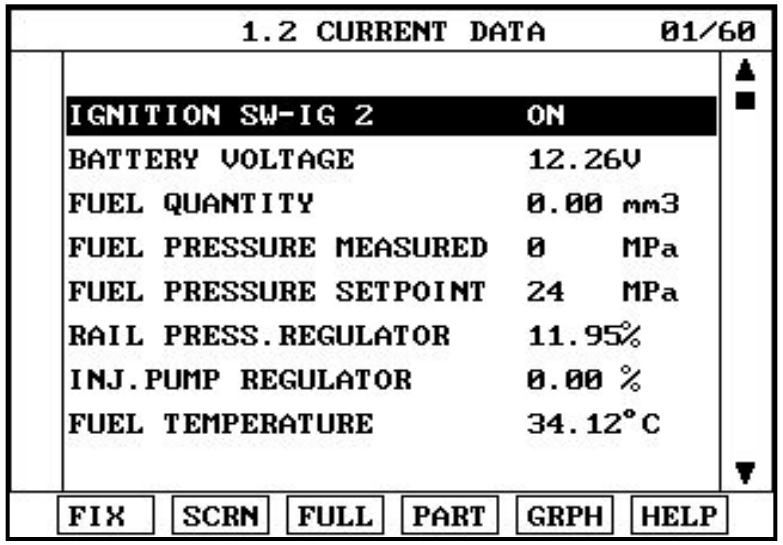


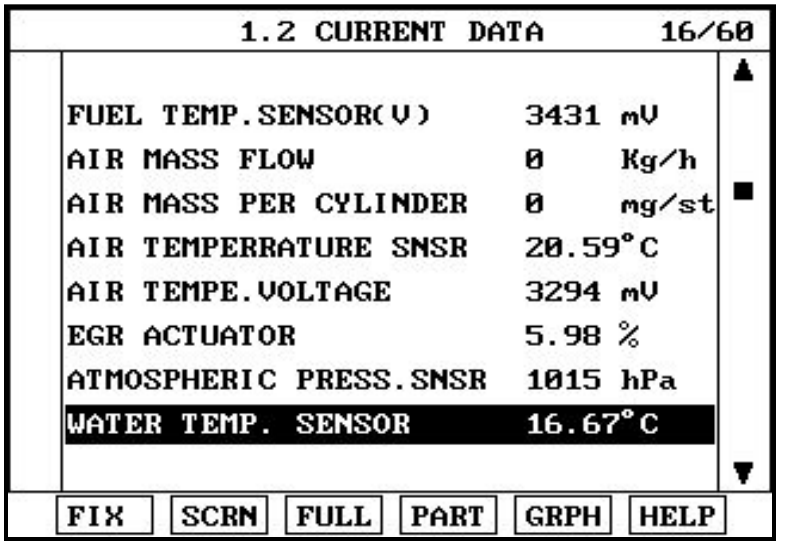
HD U1.6 VGT EURO-4

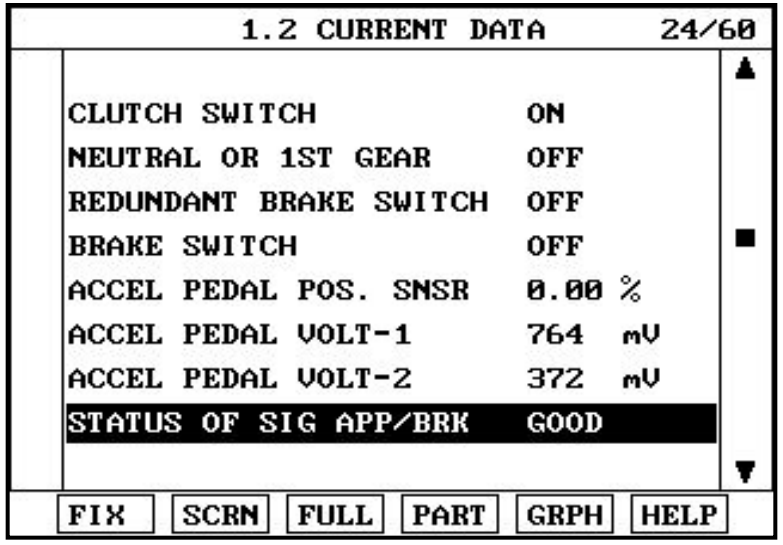
Changed items compared with XD U-1.5 (EURO-3)

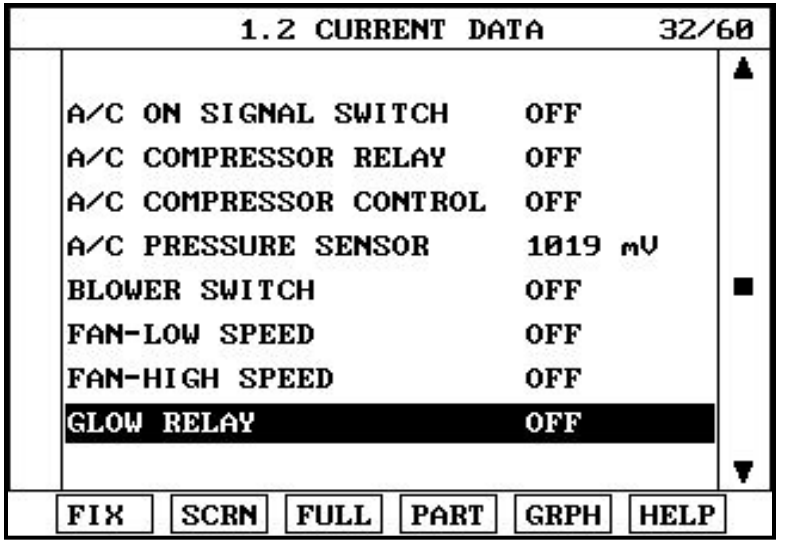
	Item	Changed thing	Remark
Increased displacement	Cylinder block	Bore increased (Φ75 → Φ77.2)	
	Cylinder head gasket	Changed shape	
	Piston	Diameter increased (Φ75 → Φ77.2)	
EURO-4 (Performance, emission)	CRDi	Injection pressure increased (1350bar → 1600bar)	U1.5 EURO-4 Common parts
	EGR cooler	Applied (Φ54)	
	SCV(Swirl Control Valve)	Applied	
	Lambda sensor	Applied	

Current data

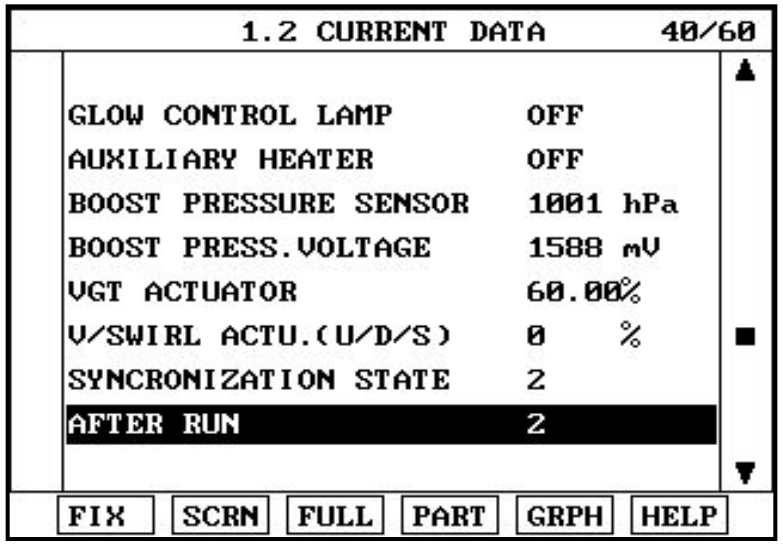


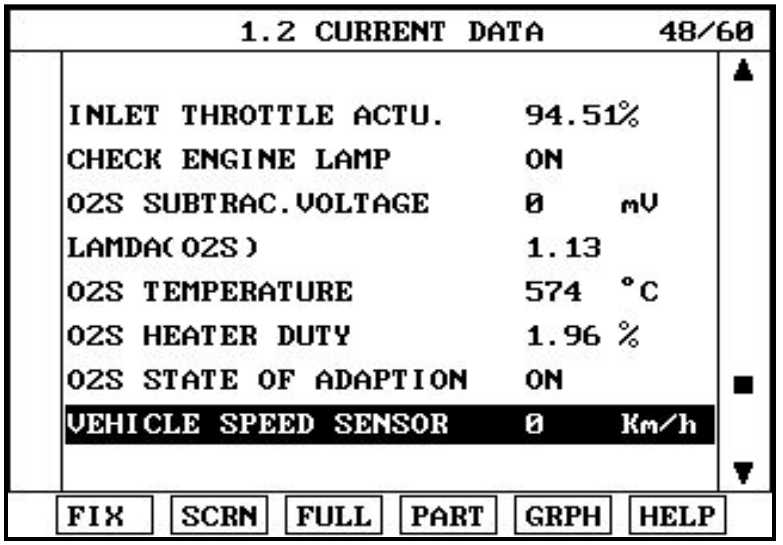


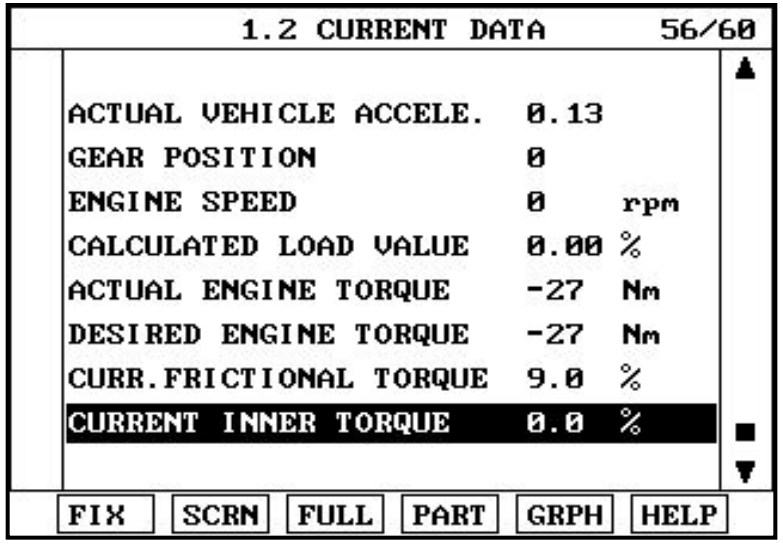


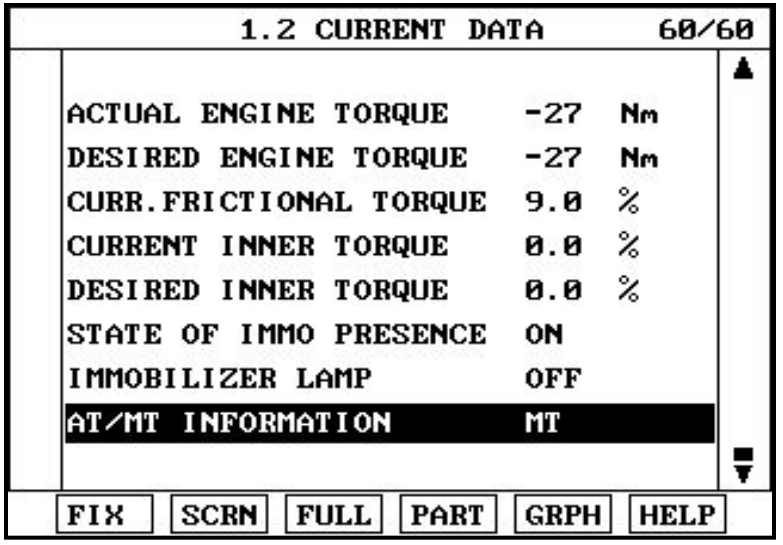


Current data

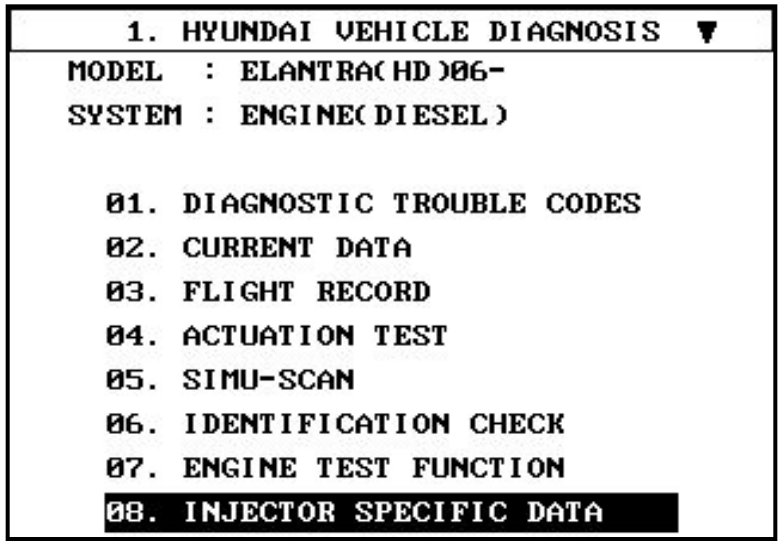


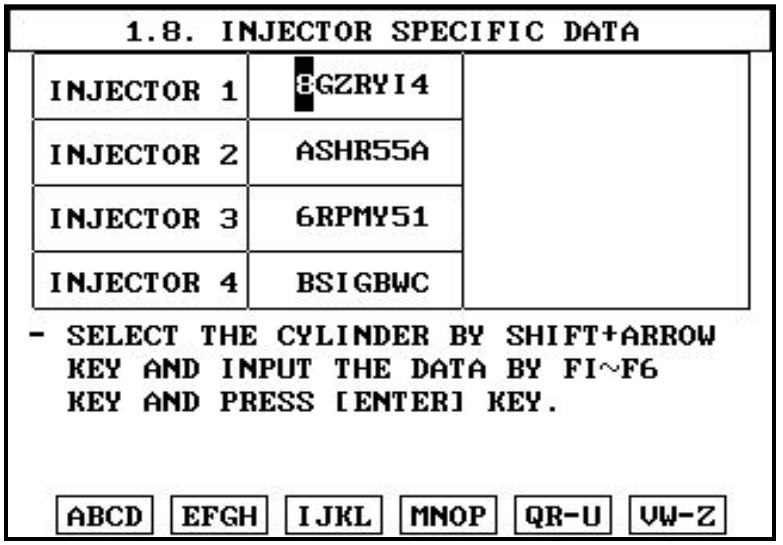


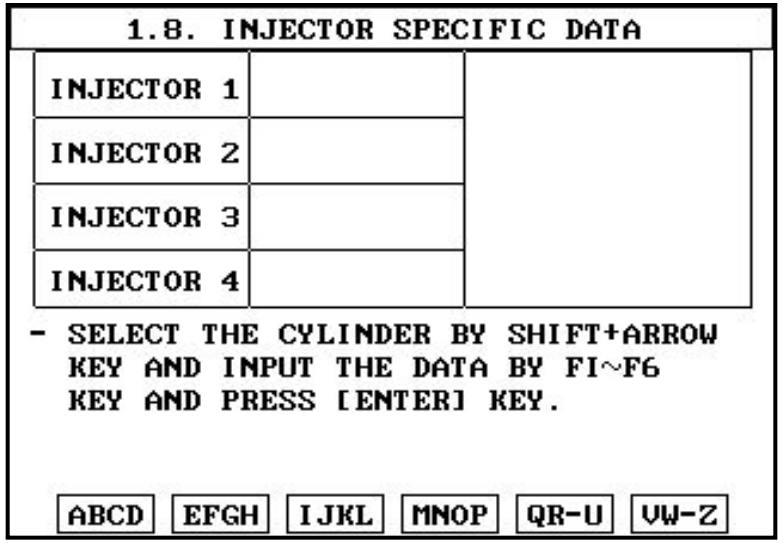


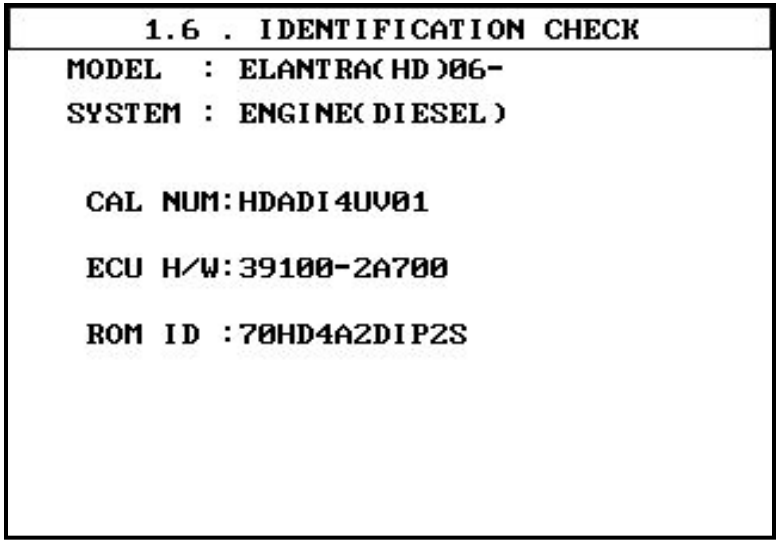


Injector correction & ID check

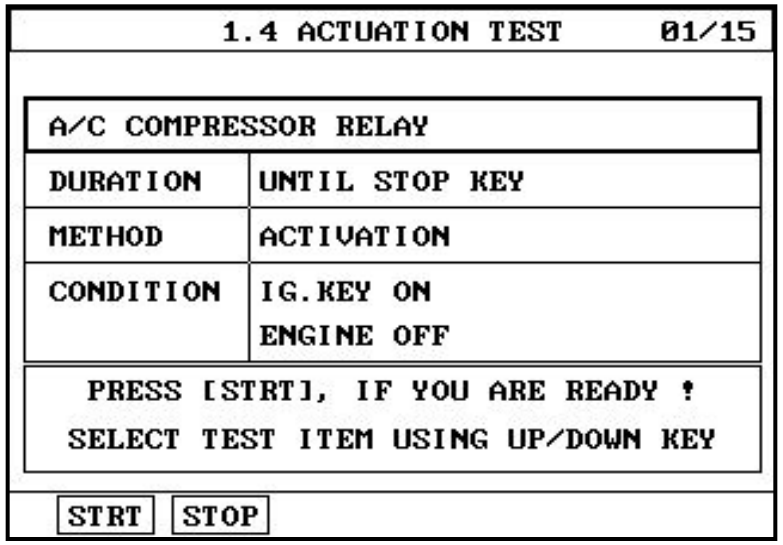


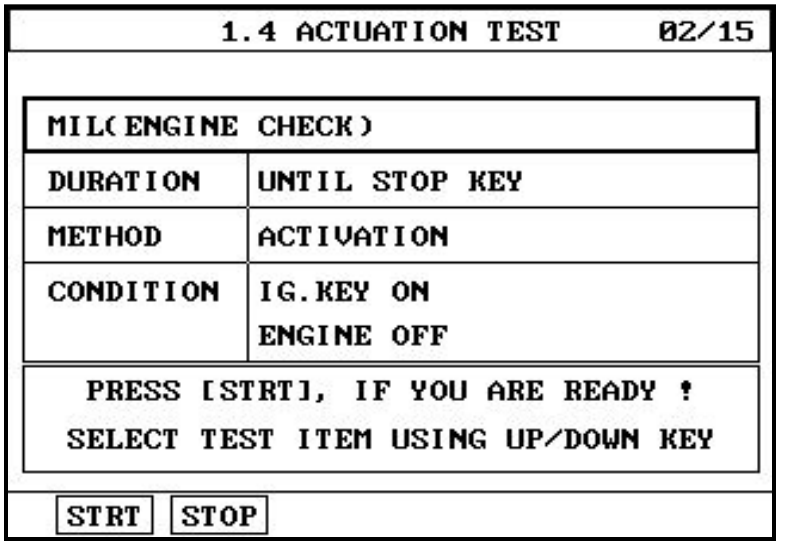


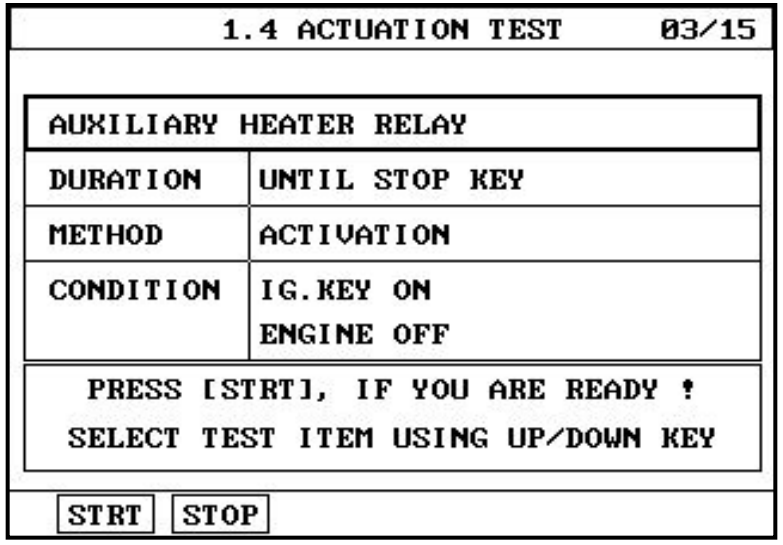


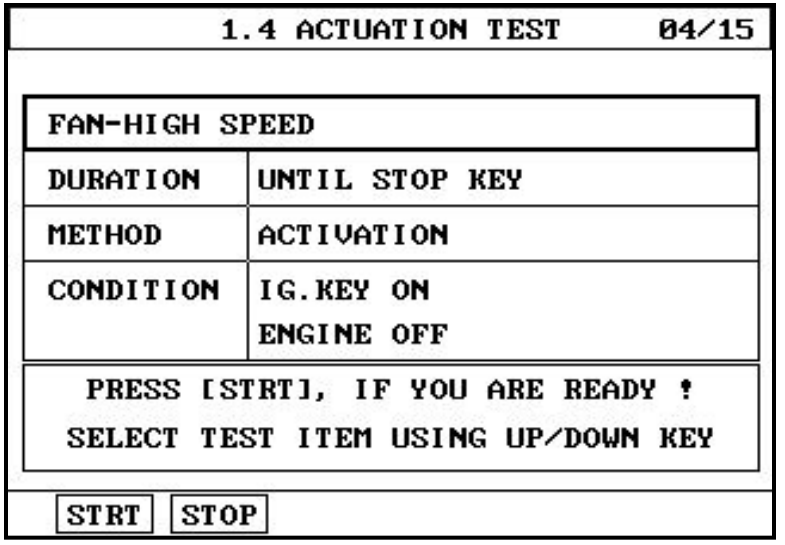


Actuation test









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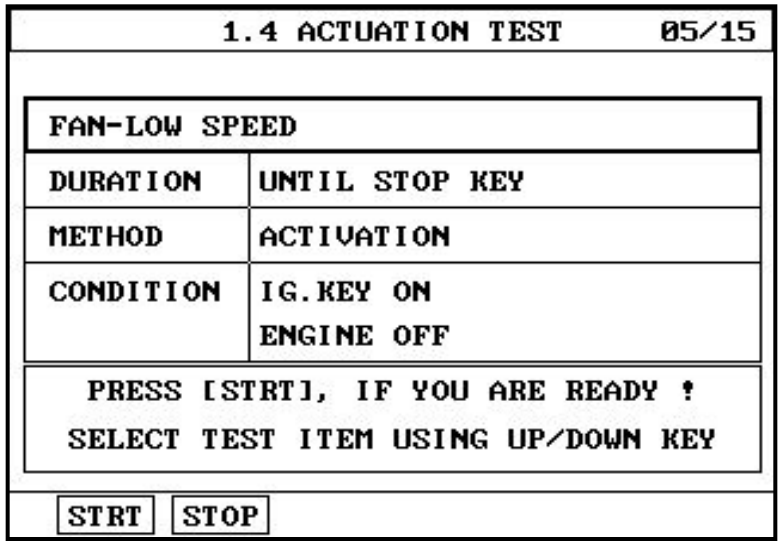
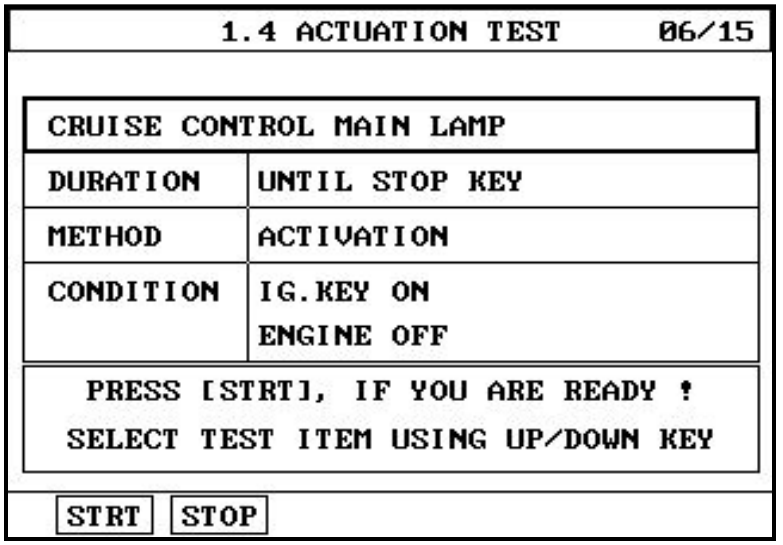
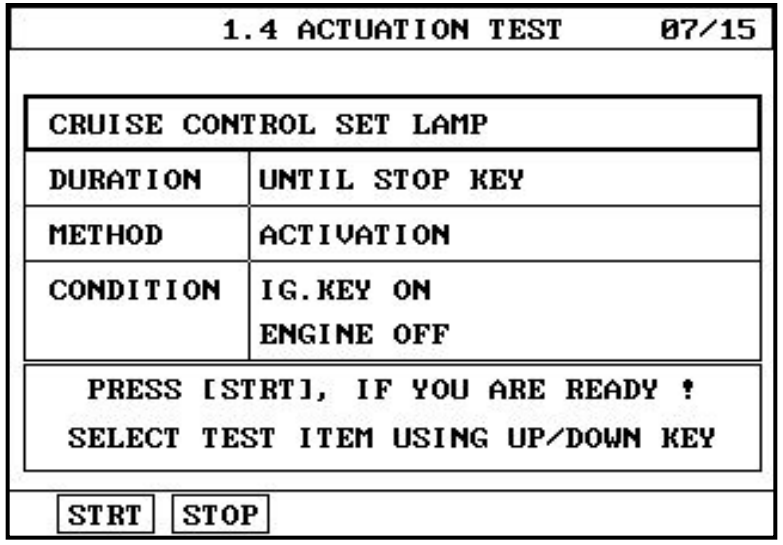
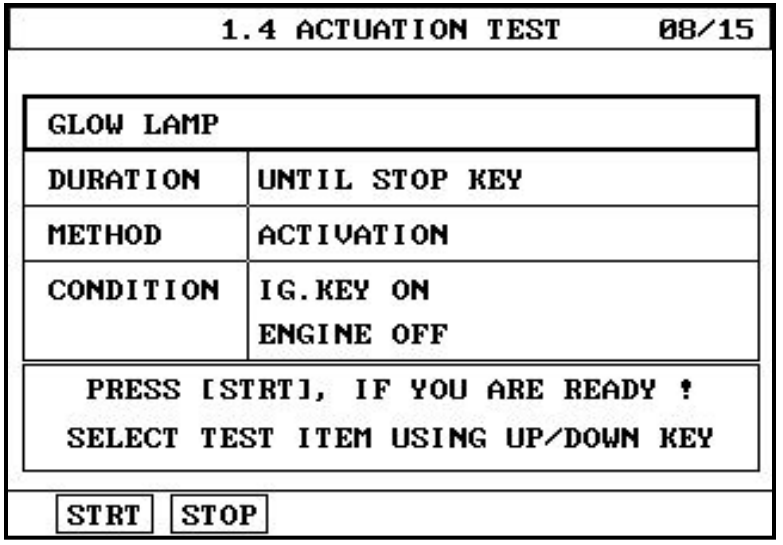
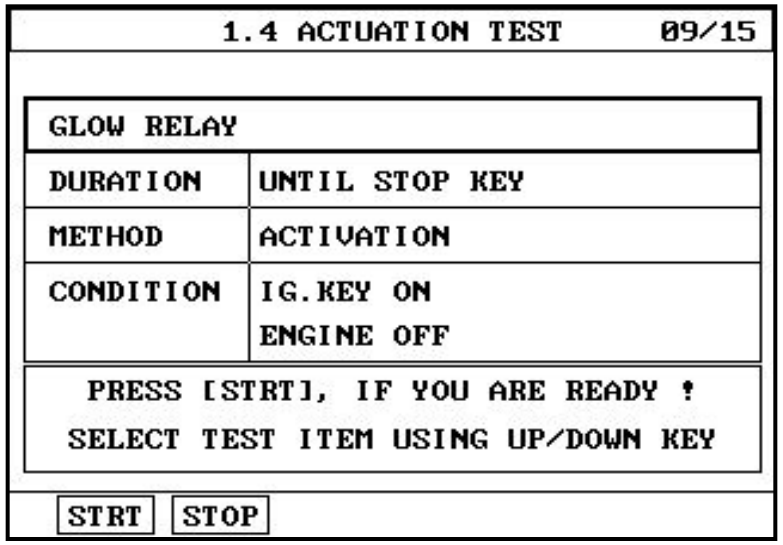


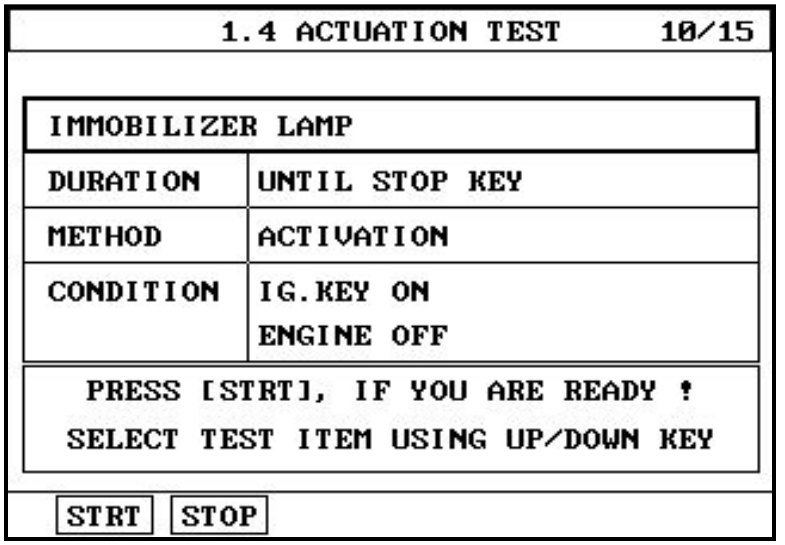


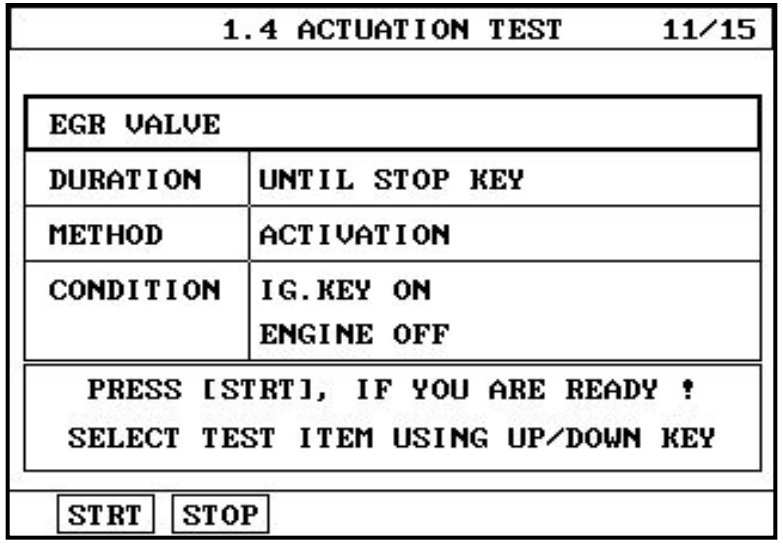


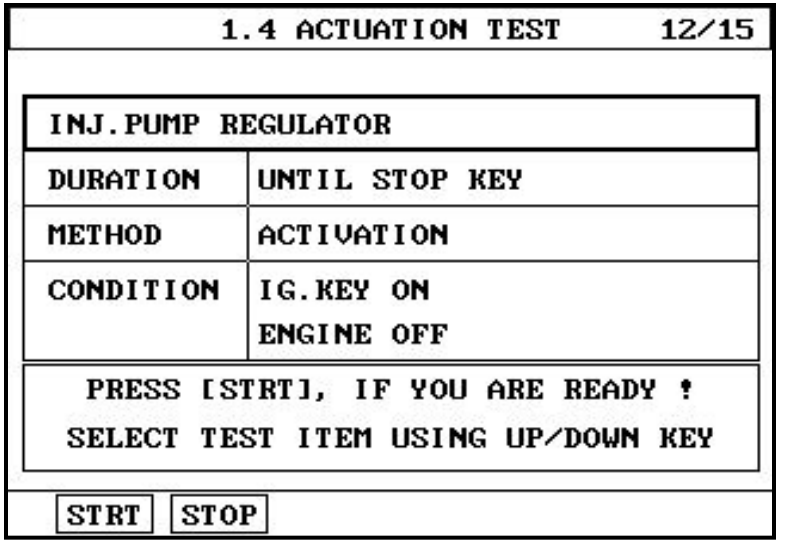


Actuation test









Actuation test