



RDW

Vehicle Technology Division

**THE NETHERLANDS
(N E D E R L A N D)**



COMMUNICATION

Concerning: - APPROVAL GRANTED
- ~~APPROVAL EXTENDED~~
- ~~APPROVAL REFUSED~~
- ~~APPROVAL WITHDRAWN~~
- ~~PRODUCTION DEFINITELY DISCONTINUED~~

of a vehicle type with regard to the emission of gaseous pollutants by the engine pursuant to regulation No. 83

Approval No.: E4-83RI-050611

Extension No.: 00

Reason for extension	: See Annex / not applicable
1. Category of vehicle type (M ₁ , N ₁ , etc.)	: M1
2. Engine fuel requirements	: (Petrol / diesel / LPG / CNG)
3. Trade name or mark of the vehicle	: LIFAN
4. Vehicle type	: LF7160L1
Commercial description(s)	: LIFAN, LIFAN-BREEZ
Engine type	: LF481Q3
5. Manufacturer's name and address	: Chongqing Lifan Passenger Vehicle Co., Ltd No.1539 Jinkai Avenue Northern New Area, Chongqing, China, 401122
6. Name and address of manufacturer's representative	: not applicable
7. Unladen mass of the vehicle	: 1125 - 1185 kg
7.1. Reference mass	: 1225 - 1285 kg
8. Maximum mass of the vehicle	: 1580 kg
9. Number of seats (including driver)	: 5
10. Transmission	
10.1. Manual or automatic or continuously variable transmission	: Manual
10.2. Number of gear ratios	: 5



10.3. Transmission ratio of gearbox

1. gear (N/V)	:	131.70	-	153.05
2. gear (N/V)	:	78.43	-	90.33
3. gear (N/V)	:	51.74	-	56.26
4. gear (N/V)	:	37.62	-	38.20
5. gear (N/V)	:	29.10	-	33.31
Final drive ratio	:	4.038		
Tyres	:	185/60R14		
dynamic rolling circumference	:	1762 mm		
Wheel drive	:	front		
11. Vehicle submitted for test on	:	July 30 ~ Aug. 31, 2007		
12. Technical service conducting approval tests	:	TÜV Kraftfahrt GmbH Institut für Verkehrssicherheit Am Grauen Stein D-51105 Köln		
13. Date of report issued by that service	:	September 6, 2007		
14. Number of report issued by that service	:	85-RI83-700/07		
15. Approval	:	granted / extended / refused / withdrawn		



16. Test results

All test results are worst case selection

16.1. Test type I

Pollutant in g/km	CO	HC	NOx	HC + NOx ¹⁾	particulates ¹⁾
1st measurement	1.408	0.083	0.076	--	--
2nd measurement	0.560	0.057	0.070	--	--
3rd measurement	--	--	--	--	--
Mean value	0.984	0.07	0.073	--	--
With factor Ki ²⁾	--	--	--	--	--
Deterioration factor	1.2	1.2	1.2	--	--
Test result	1.18	0.08	0.09	--	--
Limit value Row A	2.3	0.20	0.15	0.56	0.05

¹⁾ For compression-ignition engined vehicles only²⁾ For vehicles equipped with periodically regenerating systems as defined in paragraph 2.20 of this regulation measured values must be multiplied by the factors Ki obtained from annex 13.

16.1.1. In the case of vehicles fuelled with LPG or NG : not applicable

16.1.1.1. Repeat the table for all reference gases of LPG or NG, showing if results are measured or calculated. : not applicable
 In the case of vehicles designed to run either on petrol or on LPG or NG: repeat for petrol and all reference gases of LPG or NG.

16.1.1.2. Approval number of the parent vehicle, if the vehicle is a member of a family : not applicable

16.1.1.3. Ratios "r" of emission results for the family in the case of gaseous fuels for each pollutant : not applicable

16.2. Test type II : not applicable

CO [%] : not applicable

Rpm [1/min] : not applicable

16.3. Test type III : In every condition of measurement as defined in Annex 6, point 3.2, the pressure measured in the crankcase does not exceed the atmospheric pressure prevailing at the time of measurement.

16.4. Test type IV :

	HC (g/test)
overall mass	1.81
limit value	2.00



16.5. Test type V

16.5.1 Type of durability test : ~~80.000km/100.000km~~/ Not applicable

16.5.2 Deterioration factor : fixed

Engine category	Deterioration factor				
	CO	HC	NO _x	HC + NO _x	Particulates
positive-ignition	1.2	1.2	1.2	--	--
compression-ignition	1.1	--	--	1.0	1.2

16.6. Test type VI

:

	CO (g/km)	HC (g/km)
overall mass	7.877	0.707
limit value	15	1.8

16.7. OBD test

16.7.1 written description and/or drawing of the MI : see information folder

16.7.2. List and function of all components monitored by the OBD system : see information folder

16.7.3. Written description (general working principles) for :

16.7.3.1.Misfire detection ⁽¹⁾ : see information folder

16.7.3.2.Catalyst monitoring : see information folder

16.7.3.3.Oxygen sensor monitoring : see information folder

16.7.3.4.Other components monitored by the OBD system : see information folder

16.7.3.5.Particulate trap monitoring : not applicable

16.7.3.6.Electronic fuelling system actuator monitoring : not applicable

16.7.3.7.Other components monitored by the OBD system : not applicable

16.7.4. Criteria for MI activation (fixed number of driving cycles or statistical method) : see information folder

16.7.5. List of all OBD output codes and formats used (with explanation of each) : see information folder



17. Emission data required for roadworthiness testing :

	CO value [Vol%]	CO limit value [Vol%] at rpm	Lambda ⁽¹⁾ λ	engine speed [min ⁻¹]	engine oil temp. [°C]
low idle test	0.01	≤ 0.3 ^{(2) (3)} 800±50	--	850	96
high idle test	0.00	≤ 0.2 ^{(2) (3)} 2500±100	1.025	2500	100.7

(4) Lambda-formula: see section 5.3.7.3., footnote 1

(5) CO limit value [Vol%] declared by the manufacturer under point 4.2.1.8. of the information document.

(6) CO limit value used in absence of the manufacturer's declaration, mentioned under the Directive 96/96/EC amended by 2003/1882/EC Annex II point 8.2.1. for low idle ≤ 0.3 [Vol%] and for high idle ≤ 0.2 [Vol%] and $\lambda = 1 \pm 3\%$

18. Position of approval mark on vehicle : On the right of B-pillar
19. Place : Zoetermeer
20. Date : 26-SEP-2007
21. Signature :



J.C.M. Hoes

21. The following documents (66 pages), bearing the approval number shown above, are annexed to this communication:
one copy of Annex 1 to this regulation completed and with the drawings and diagrams referred to attached

Remark: This type approval has been granted on the basis of chapter 11, TRANSITIONAL PROVISIONS, par 11.1.7.1

Annex

List of modifications

Correction of : - --

Modification of : - --

Addition of : - --

Deletion of : - --



Vehicle type : LF7160L1
Manufacturer : Chongqing Lifan Passenger Vehicle Co., Ltd

TEST REPORT

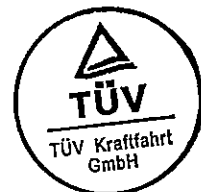
Uniform provisions concerning the approval of vehicles
with regard to the emission of pollutants according
to the engine fuel requirements

ECE-R83

including all amendments until

Amend. 05 Suppl. 06 Corr. 00

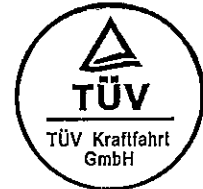
Current application for	
ECE - system type approval	: E4-83RI-050611 Ext. 00
Previously granted	
ECE - system type approval	: --



Vehicle type : LF7160L1
Manufacturer : Chongqing Lifan Passenger Vehicle Co., Ltd

0. General information

- 0.1. Make (trade name of manufacturer) : LIFAN
- 0.2. Vehicle type : LF7160L1
- 0.3. Category of vehicle : M1
- 0.4. Name and address of manufacturer : Chongqing Lifan Passenger Vehicle Co., Ltd
No.1539 Jinkai Avenue Northern New Area,
Chongqing, China, 401122
- 0.5. No. of information folder : L-R83-01



1. Test information

- 1.1. Test object(s)
identification number : LLV2A3A1770100217, LLV2A3A1770100223
- 1.2. Test date : July 30 ~ Aug. 31, 2007
- 1.3. Test site : Chongqing, China
- 1.4. Remark : The results of the test refer exclusively to the object(s)
mentioned under point 1.1 of this report.

2. Test minutes

- 2.1. Test facilities : The test equipment used was in compliance with the
requirements of the regulation.
- 2.2. Test results : see Appendix 1, point 1.7
- 2.3. Following tests were conducted

Vehicle classification	engine type	positive ignition	compression ignition
	category	M ₁	M ₁ , N ₁
	GVW	≤3500 kg >3500 kg	≤3500 kg >3500 kg
Test	Type I	yes Part one + Part two	yes Part one + Part two
	Type II	--	--
	Type III	yes	--
	Type IV	yes	--
	Type V	yes	yes
	Type VI	yes	--
	On board diagnostics	yes	--
	Road worthiness	yes	--
	Periodically Regenerating System (ECE)	--	--

Tyre pressure of driven wheels on dynamometer : 250 kPa

- 2.4. Remarks : —

Vehicle type : LF7160L1
Manufacturer : Chongqing Lifan Passenger Vehicle Co., Ltd

3. Remark concerning tested object(s)

: All versions of the vehicle type as stated in the information folder are covered with the tested vehicle version(s) and test object(s) respectively.

~~The vehicle type has been tested according to the amendments mentioned in appendix 0.~~

~~The actual test of the vehicle was not necessary and the results of the previous tests are still valid.~~

4. Appendices

- 0 List of modifications
 - 1 Test minutes
- Information folder

5. Statement of conformity

The information folder and the type described there comply with the requirements in the above-mentioned directive and/or regulation.

The test laboratory is accredited for the above mentioned tests by the RDW, Vehicle Technology and Information Centre, the Netherlands Accreditation Number: RDW-99050014-02

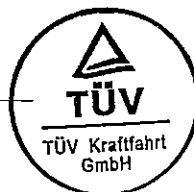
The test report comprises the pages 1 to 8 (including appendices 0, 1) and shall not be reproduced except in full without the written approval of the test laboratory.

Cologne, September 6, 2007

SK



Dipl.-Ing. O.Rothert



Vehicle type : LF7160L1
Manufacturer : Chongqing Lifan Passenger Vehicle Co., Ltd

List of modifications

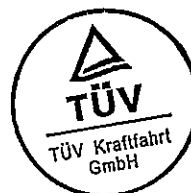
Appendix 0

Correction of : - - -

Modification of : - - -

Addition of : - - -

Deletion of : - - -

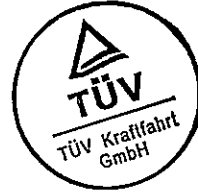


Vehicle type : LF7160L1
Manufacturer : Chongqing Lifan Passenger Vehicle Co., Ltd

Test minutes

Appendix 1

1. Additional information
 - Unladen mass of the vehicle : 1125 - 1185 kg
 - 1.1. Mass of the vehicle in running order : 1200 - 1260 kg
 - 1.2. Maximum mass of the vehicle : 1580 kg
 - 1.3. Reference mass : 1225 – 1285 kg
 - 1.4. Number of seats (including driver) : 5
 - 1.5. Engine identification
 - Type : LF481Q3
 - Engine fuel requirements : Petrol
 - Engine capacity : 1587 cm³
 - 1.6. Gearbox
 - 1.6.1. Manual, number of speeds : 5
 - 1.6.2. Automatic, number of ratios : --
 - 1.6.3. Continuously variable : no
 - 1.6.4. Ratio of the individual gears
 1. gear : 3.182
 2. gear : 1.895
 3. gear : 1.250
 4. gear : 0.909
 5. gear : 0.703
 - Transmission ratio of gearbox
 1. gear (N/V) : 131.70 - 153.05
 2. gear (N/V) : 78.43 - 90.33
 3. gear (N/V) : 51.74 - 56.26
 4. gear (N/V) : 37.62 - 38.20
 5. gear (N/V) : 29.10 - 33.31
 - 1.6.5. Ratio of final drive : 4.038
 - wheel drive : front



Vehicle type : LF7160L1
Manufacturer : Chongqing Lifan Passenger Vehicle Co., Ltd

- 1.6.6. Range of tyre sizes : 185/60R14
Range of dynamic rolling tyre circumference : 1762mm
- 1.6.7. Dynamic rolling tyre circumference for Type I test : 1762 mm
- 1.7. Test results : all test results are worst case selection
- Equivalent inertia mass : 1255 kg
- Method of setting : Coast-down method according to point 5.1. of Appendix 3 of Annex III (4)
~~alternative method according to point 3.2 of Appendix 2 of Annex III;~~ 8.4 kW at 80 km/h

Resistance to progress of the vehicle according to Appendix 3 of Annex III (4)
(actual coast down data)

(kW)	at km/h
0.75	20
2.09	40
4.46	60
8.18	80
14.05	100
21.08	120



1.7.1. Type I

Pollutant in g/km	CO	HC	NO _x	HC + NO _x ¹⁾	particulates ¹⁾
1st measurement	1.408	0.083	0.076	--	--
2nd measurement	0.560	0.057	0.070	--	--
3rd measurement	--	--	--	--	--
Mean value	0.984	0.07	0.073	--	--
With factor K _i ²⁾	--	--	--	--	--
Deterioration factor	1.2	1.2	1.2	--	--
Test result	1.18	0.08	0.09	--	--
Limit value Row A	2.3	0.20	0.15	0.56	0.05

¹⁾ For compression-ignition engined vehicles only

²⁾ For vehicles equipped with periodically regenerating systems as defined in paragraph 2.20 of this regulation measured values must be multiplied by the factors K_i obtained from annex 13.

1.7.2. Type II : not applicable

1.7.3. Type III : In every condition of measurement as defined in Annex V (6), point 3.2, the pressure measured in the crankcase does not exceed the atmospheric pressure prevailing at the time of measurement.

Vehicle type : LF7160L1
Manufacturer : Chongqing Lifan Passenger Vehicle Co., Ltd

1.7.4. Type IV

	HC (g/test)
overall mass	1.81
limit value	2.00

Remark

- : Provisions are made to prevent excess evaporative emissions and fuel spillage caused by a missing filler cap. This is achieved by using:
- an automatically opening and closing, non-removable fuel filler cap
 - design features which avoid excess evaporative emissions in the case of a missing filler cap
 - any other provision:
filler cap fixed by plastic cord on the vehicle body

1.7.5. Type V

Durability type : 100000 km / not applicable

Deterioration factor : fixed

Engine category	Deterioration factor				
	CO	HC	NO _x	HC + NO _x	Particulates
positive-ignition	1.2	1.2	1.2	--	--
compression-ignition	1.1	--	--	1.0	1.2

1.7.6. Type VI



	CO (g/km)	HC (g/km)
overall mass	7.877	0.707
limit value	15	1.8

Vehicle type : LF7160L1
Manufacturer : Chongqing Lifan Passenger Vehicle Co., Ltd

Details about the OBD-system

OBD family : Sun-teck (type : VA20012)

the information folder contains the manufacturer's information according to:

- section 3.1.1.1. to 3.1.1.4., 5.1.1. and 5.1.5.

- Annex XI, section 3.1.1., 3.2.1., 3.2.2., 3.3.3. and 3.4. to 3.8. and Appendix 2

The malfunction indicator (MI), its activation and extinguishing as well as the storage and erasing of fault codes (P-codes) fulfil the requirements of Annex XI section 3.

An inadmissible, temporary disablement of the OBD system doesn't take place.

The provisions for electronic system security fulfil the requirements of annex I, section 5.1.4.

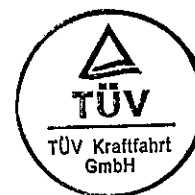
The "freeze frame" stored in the computer memory contains the minimum required diagnostic signals as required in Annex XI, Appendix 1, section 6.5.

Vehicle type representing the OBD family : LF7160L1

Identification number : LLV2A3A1770100223

Mileage : 80000km

Diagnostic tool : Make : AutoBoss
Type : V-30



Following OBD system tests were conducted:

failure mode	according to	MI* on	fault code
catalyst	6.3.1.1	yes	P 0420
engine missfire	6.3.1.2	yes	P 0300
oxygen sensor	6.3.1.3	yes	P 0134
canister plug off	6.3.1.5	yes	P 0445

1.7.7. Emission data required for roadworthiness testing

	CO value [Vol%]	CO limit value [Vol%] at rpm	Lambda ⁽¹⁾ λ	engine speed [min ⁻¹]	engine oil temp. [°C]
low idle test	0.01	≤ 0.3 ^{(2) (3)} 800±50	--	850	96
high idle test	0.00	≤ 0.2 ^{(2) (3)} 2500±100	1.025	2500	100.7

(1) Lambda-formula: see section 5.3.7.3., footnote 1

(2) CO limit value [Vol%] declared by the manufacturer under point 4.2.1.8. of the information document.

(3) CO limit value used in absence of the manufacturer's declaration, mentioned under the Directive 96/96/EC amended by 2003/1882/EC Annex II point 8.2.1. for low idle ≤ 0.3 [Vol%] and for high idle ≤ 0.2 [Vol%] and λ = 1 ± 3%

1.7.8. Remarks : none

PARTIAL MODEL INFORMATION DOCUMENT NO. L-R83-01

Uniform provisions concerning the approval of vehicles with regard to the emission of pollutants according to the engine fuel requirements R83.05

Vehicle Type : LF7160L1

This model information document consists of page 1 to 12 with 54 enclosures.



Type : LF7160L1

1. GENERAL

- 1.1. Make (trade name of manufacturer) : LIFAN
- 1.2. Type and general commercial description(s)
Type : LF7160L1
Commercial description(s) : LIFAN, LIFAN-BREEZ
- 1.3. Means of identification of type, if marked
on the vehicle : ?????3A???????????
- 1.3.1. Location of that marking : on the dashboard
on the sheet panel of engine compartment
on the manufacturer's plate
- 1.4. Category of vehicle : M1
- 1.5. Name and address of the manufacturer : Chongqing Lifan Passenger Vehicle CO.,LTD
No.1539 Jinkai Avenue Northern New Area,
Chongqing,China
Zip:401122
- 1.6. Name and address of manufacturer's authorised
representative where appropriate : N/A
- 1.7. Address(es) of assembly plant(s) : Chongqing Lifan Passenger Vehicle CO.,LTD
No.1539 Jinkai Avenue Northern New Area,
Chongqing,China
Zip:401122
- 1.8. Position of ECE approval mark on the vehicle : on the right B pillar



Type : LF7160L1

2. GENERAL CONSTRUCTION CHARACTERISTICS OF THE VEHICLE

- 2.1. Photographs and/or drawings of a representative vehicle : See annex B
- 2.2. Powered axles (number, position, interconnection) : 1 powered axle, front axle

3. MASSES (Kilograms) (Refer to Drawing where Applicable)

- 3.1. Mass of the vehicle with bodywork in running order, or mass of the chassis with cab if the manufacturer does not fit the bodywork (with standard equipment, including coolant, oils, fuel, tools, spare wheel and driver) (maximum and minimum) : 1200kg - 1260kg
- 3.2. Technically permissible maximum laden mass stated by the manufacturer (maximum and minimum) : 1580



Type : LF7160L1

4. DESCRIPTION OF ENERGY CONVERTERS

4.1. Engine Manufacturer : Lifan Automobile Engine Co., Ltd.

4.1.1. Manufacturer's engine code (as marked on the engine, or other means of identification) : LF481Q3

4.2. Internal combustion engine

4.2.1. Specific engine information

4.2.1.1. Working principle (positive ignition/ compression ignition, four stroke/ two stroke) : Positive ignition, four stroke

4.2.1.2. Number, arrangement and firing order of cylinders : 4, In-line , 1-3-4-2

4.2.1.2.1. Bore: mm : 81

4.2.1.2.2. Stroke: mm : 77

4.2.1.3. Engine capacity: cm³ : 1587

4.2.1.4. Volumetric compression ratio : 9.5

4.2.1.5. Drawings of combustion chamber and piston crown : See Annex C page 3

4.2.1.6. Normal engine idling speed : min⁻¹ : 800±504.2.1.7. High idle engine speed : min⁻¹ : 2500±100

4.2.1.8. Carbon monoxide content by volume in the exhaust gas with the engine idling (according to the manufacturer's specifications) : less than 0.2

4.2.1.9. Maximum net power kW at min⁻¹ (manufacturer's declared value) : 78 / 6000

4.2.2. Fuel: diesel oil/petrol/LPG/any other : Petrol

4.2.3. Research octane number (RON) : 95 unleaded



Type : LF7160L1

- 4.2.4 Fuel feed
- 4.2.4.1 By carburetor(s): yes/no : No
- 4.2.4.2 By fuel injection (compression ignition only):
yes/no : No
- 4.2.4.3 By fuel injection (positive ignition only) : yes/no : Yes
- 4.2.4.3.1 System description : See annex C page 9
- 4.2.4.3.2 Working principle: intake manifold
(single/multi-point)/direct injection/other (specify) : Multi-point / Direct injection
- 4.2.4.3.3 Make : Chongqing Pengdi
- 4.2.4.3.4 Type : Turbine pump
- 4.2.4.3.5. Injectors: Opening pressure (kPa or characteristic
diagram) : 380 KPa
See annex C page 11
- 4.2.4.3.6 Injection timing : Contolled by ECU
- 4.2.4.3.7 Cold start system : N/A
- 4.2.4.4 Feed pump : Impeller pump
- 4.2.4.4.1 Pressure: kPa or characteristic diagram : 390 KPa
- 4.2.5 Ignition
- 4.2.5.1 Make(s) : Sun&Teck
- 4.2.5.2 Type(s) : PCP
- 4.2.5.3 Working principle : Positive ignition
- 4.2.5.4 Ignition advance curve : See annex C page 16
- 4.2.5.5 Static ignition timing : BTDC $5^{\circ} \pm 3^{\circ}$
- 4.2.5.6 Contact-point gap : N/A



Title : Partial model information document no.L-R83-01	Page : 6
Type : LF7160L1	

4.2.5.7	Dwell-angle	:	N/A
4.2.5.8	Spark plugs		
4.2.5.8.1	Make	:	Zhu Zhou Torch
4.2.5.8.2	Type	:	K7RTC
4.2.5.8.3	Spark plug gap setting(mm)	:	0.8--0.9
4.2.5.9	Ignition coil		
4.2.5.9.1	Make	:	Sun&Teck Co. Ltd.
4.2.5.9.2	Type	:	PCP
4.2.5.10	Ignition condenser	:	N/A
4.2.5.10.1	Make	:	-
4.2.5.10.2	Type	:	-
4.2.6	Cooling system (liquid/air)	:	liquid
4.2.7	Intake system		
4.2.7.1	Pressure charger: yes/no	:	NO
4.2.7.2	Intercooler: yes/no	:	NO
4.2.7.3	Description and drawings of inlet pipes and their accessories (plenum chamber,heating device, additional air intakes, etc.)	:	See annex C page 4
4.2.7.3.1	Intake manifold description (drawings and/or photographs)	:	See annex C page 1
4.2.7.3.2	Air filter, drawings	:	See annex C page 4
4.2.7.3.2.1	Make(s)	:	Tianfu
4.2.7.3.2.2	Type(s)	:	L1109111B1



Title : Partial model information document no.L-R83-01	Page : 7
Type : LF7160L1	

- 4.2.7.3.3 Intake silencer, drawings : See annex C page 4
- 4.2.7.3.3.1. Make(s) : Tianfu
- 4.2.7.3.3.2. Type(s) : L1109001B1
- 4.2.8. Exhaust system
- 4.2.8.1. Description and/or drawing of the exhaust system : See annex C page 2, 5, 6 & 7
- 4.2.9. Valve timing or equivalent data
- 4.2.9.1. Maximum lift of valves, angles of opening and closing, or timing details of alternative distribution system, in relation to dead centres : Inlet :8.665mm Outlet : 8.01 mm
Inlet opening : BTDC 10°
Inlet closing : ABDC 30°
Outlet opening : BBDC 41°
Outlet closing : BTDC 4 °
- 4.2.9.2. Reference and/or setting ranges : Inlet :0.15-0.2mm
Outlet :0.25-0.3mm
- 4.2.10. Lubricant used
- 4.2.10.1. Make : Mobil
- 4.2.10.2. Type : GX 80W-90
- 4.2.11. Measures taken against air pollution
- 4.2.11.1. Device for recycling crankcase gases (description and drawings) : See annex C page 12
- 4.2.11.2. Additional anti-pollution devices (if any, and if not covered by another heading) : N/A
- 4.2.11.2.1. Catalytic converter: yes/no : Yes
- 4.2.11.2.1.1. Number of catalytic converters and elements : 2 converters, 1 brick for each converter
- 4.2.11.2.1.2. Dimensions and shape of the catalytic converter(s) (volume,...) : See annex C page 8



Type : LF7160L1

4.2.11.2.1.3.	Type of catalytic action	:	Three way
4.2.11.2.1.4.	Total charge of precious metal	:	50 g/ft ³ (front), 25 g/ft ³ (rear)
4.2.11.2.1.5.	Relative concentration	:	Pt:Pd:Rh=5:5:3
4.2.11.2.1.6.	Substrate (structure and material)	:	Ceramic honey comb
4.2.11.2.1.7.	Cell density	:	400 cell / in ²
4.2.11.2.1.8.	Type of casing for the catalytic converter(s)	:	Metal
4.2.11.2.1.9.	Positioning of the catalytic converter(s) (place and reference distances in the exhaustsystem)	:	See annex C page 5
4.2.11.2.1.10.	Regeneration systems/method of exhaust after-treatment systems, description	:	No
4.2.11.2.1.11.	Oxygen sensor: type	:	0258006028(both are same)
4.2.11.2.1.11.1.	Location of oxygen sensor	:	Exhaust manifold, Front Converter
4.2.11.2.1.11.2.	Control range of oxygen sensor	:	0.6--1.2
4.2.11.2.2.	Air injection: yes/no	:	No
4.2.11.2.3.	Exhaust Gas Recirculation (EGR): yes/no	:	No
4.2.11.2.4.	Evaporative emission control system. Complete detailed description of the devices	:	Yes
	Drawing of the evaporative control system	:	See annex C page 15
	Drawing of the carbon canister	:	See annex C page 14
	Drawing of the fuel tank with indication of capacity and material	:	See annex C page 10
4.2.11.2.5.	Particulate trap: yes/no	:	No
4.2.11.2.6.	Other systems (description and operation)	:	N/A
4.2.11.2.7.	On-Board diagnostic (OBD) system	:	Yes
4.2.11.2.7.1	Written description and/or drawing of the MI	:	See annex D



Type : LF7160L1

- 4.2.11.2.7.2 List and purpose of all components monitored by the OBD system : See annex D
- 4.2.11.2.7.3 Written description(general working principles) for : See annex D
- 4.2.11.2.7.3.1 Positive-ignition engines : See annex D
- 4.2.11.2.7.3.1.1 Catalyst monitoring : See annex D
- 4.2.11.2.7.3.1.2 Misfire detection : See annex D
- 4.2.11.2.7.3.1.3 Oxygen sensor monitoring : See annex D
- 4.2.11.2.7.3.1.4 Other components monitored by the OBD system : See annex D
- 4.2.11.2.7.3.2 Compression-ignition engines : N/A
- 4.2.11.2.7.4 Criteria for MI activation(fixed number of driving cycles or statistical method) : See annex D
- 4.2.11.2.7.5 List of all OBD out codes and formats used (with explanation of each) : See annex D
- 4.2.11.2.7.6 Additional information must be provided by the the vehicle manufacturer for the purposes of enabling the manufacture of OBD-compatible replacement or service parts and diagnostic tools and test equipment : See annex D



Type : LF7160L1

5 TRANSMISSION

5.1. Clutch (type) : Single plate dry disc

5.1.1. Maximum Torque conversion : NA

5.2. Gearbox

5.2.1. Type : Manual

5.3. Gear ratios

Gear	Internal gearbox ratios (ratios of engine to gearbox output shaft revolutions)	Final drive ratios (ratio of gearbox output shall to driven wheel revolutions)	Total gear ratios
1	3.182	4.038	12.849
2	1.895	4.038	7.652
3	1.250	4.038	5.048
4	0.909	4.038	3.671
5	0.703	4.038	2.839
R1	3.083	4.038	12.449

6 SUSPENSION

6.1. Tyres and wheels

6.1.1. Tyre/wheel combination(s) (for tyres indicate size designation, minimum load-capacity index, minimum speed category symbol; for wheels indicate rim size(s) and off-set(s))

6.1.1.1. Axles

6.1.1.1.1. Axle 1 : 185/60R14:281mm

6.1.1.1.2. Axle 2 : 185/60R14:281mm



Type : LF7160L1

6.1.2. Upper and lower limit of rolling radii :

6.1.2.1.1. Axle 1 : 185/60R14 : 281mm
165/70R14 : 285mm(spare tyre)

6.1.2.1.2. Axle 2 :
185/60R14 : 281mm
165/70R14 : 285mm(spare tyre)

6.1.3. Tyre pressure(s) as recommended by the manufacturer: kPa

185/60R14		165/70R14	
Front	Rear	Front	Rear
250	250	250	250

7 BODYWORK

7.1. Number of seats : 5 (Front: 2 individual seats /
2nd : Bench seat for 3 persons)



Type : LF7160L1

List of attachments

<u>Annex</u>	<u>Page</u>	<u>Subject</u>	<u>Drawing number</u>
A	1	Vehicle identification number system	None
B	1	Views of the vehicle	01
C	1	Intake manifold	02
	2	Exhaust manifold	03
	3	Piston ring, piston crown and piston chamber	04
	4	Intake system	05
	5	Exhaust system	06
	6	Muffler assy	07
	7	Rear silencer assy	08
	8	Converter assy	09
	9	Fuel injection control	10
	10	Fuel tank	11
	11	Fuel injection nozzle	12
	12	Device for recycling crankcase gas	None
	13	ECU (engine control unit)	13
	14	Canister	14
	15	Evaporative emission control system	15
	16	Ignition advance curve	16
D	1~36	Description of EOBD system	None

Chongqing, June 20, 2007
L-R83-01 / Si Shunquan



Annex to partial model information document no. L-R83-01	Annex A Page 1
Title : Vehicle identification number system	Drawing no. : None Directive : - Regulation : 83
Type : LF7160L1	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
L	L	V	2	A	3	A	1	x	x	x	x	x	x	x	x	x

Digit

- 0 : Symbol according to no. 3.1.2 sentence 4 of 76/114/EEC
- 1 : Nation - L
- 2 : Maker identification - L
- 3 : Vehicle type - V
- 4 : Category of Vehicle 1- Coupe 2-Minicar 3-Pullman saloon 4-Forward control pas
4- Forward control passenger car 5-Multipurpose passenger car
6-Specil passenger car
- 5 : Body Type A-3-box 4-door B-3-box 2-door C-2-box 4-door D-Coupe body
E-Van F-Others
- 6 : Engine Type 0. <0.8L Displacement
1 >0.8 L~1.0Ldisplacement
2 >1.0 L~1.3 Ldisplacement
3 >1.3 L~1.6 Ldisplacement
4 >1.6 L~1.8 Ldisplacement
5 >1.8 L~2.0 Ldisplacement
6 >2.0 L~2.4 Ldisplacement
7 >2.4L Displacement
- 7 : Transimission Type A. Manually Transmission B. Automatical Transmission
C. Manually-automatical Transmission
- 8 : Brake Type 1.Fr. Disc,Rr. Drum 2. Fr.& Rr. Disc 3. Fr.& Rr. Drum
- 9 : Check number 7
- 10 : Model year 5 - 2005
6 - 2006
7 - 2007
8 - 2008
9 - 2009
- 11 : Plant code Express with "0"
- 12 ~ 17 : Production Serial Number 000001 ~ 999999



Title : Views of the vehicle

Drawing no. : 01

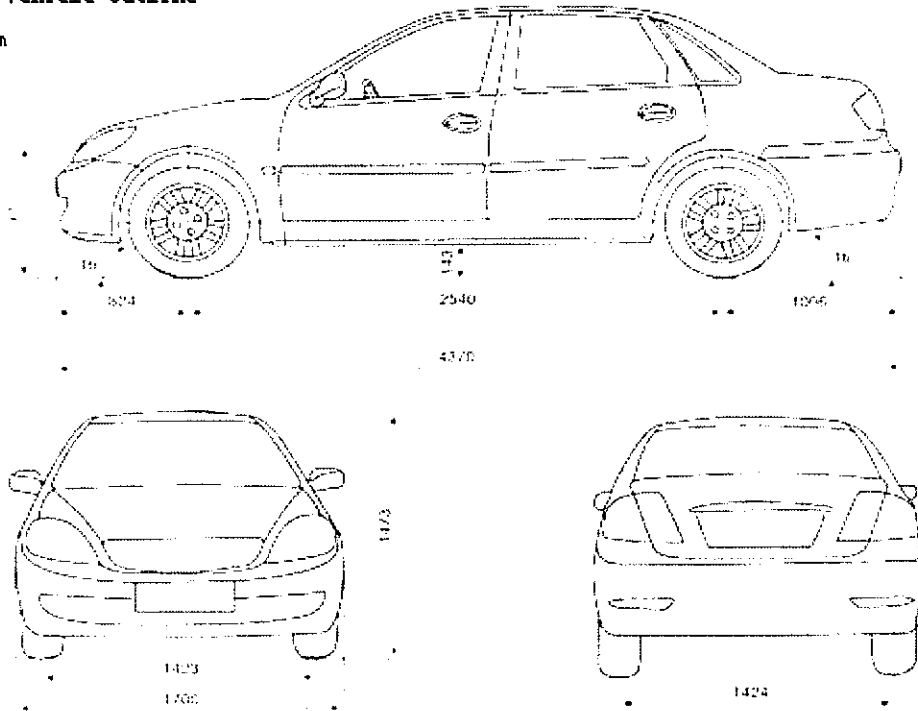
Type : LF7160L1

Directive : -

Regulation : 83

LF7160L1 Vehicle outline

unit:mm



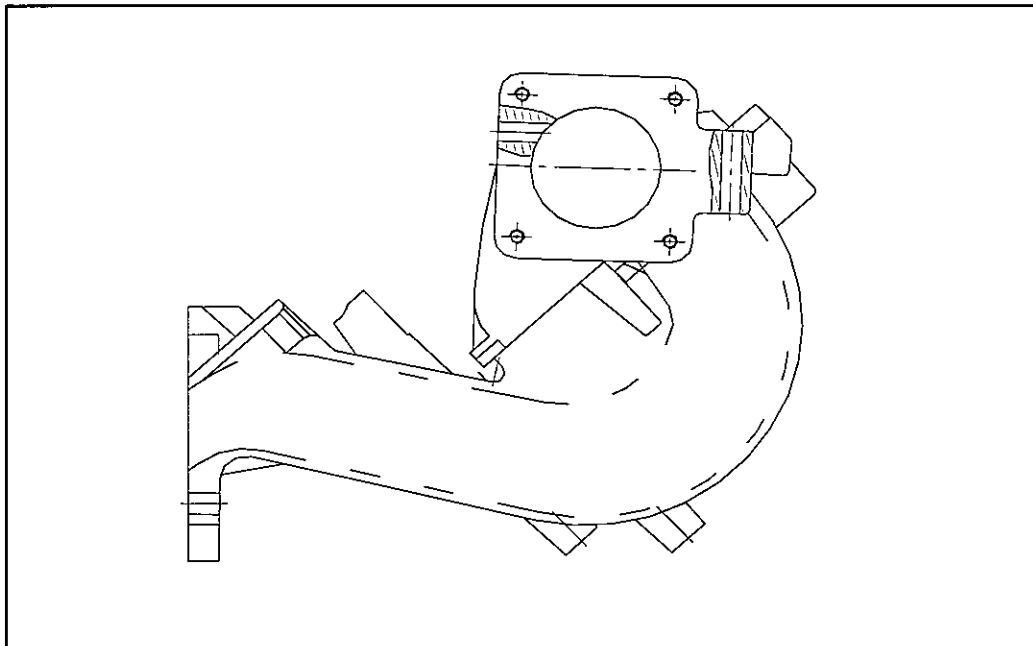
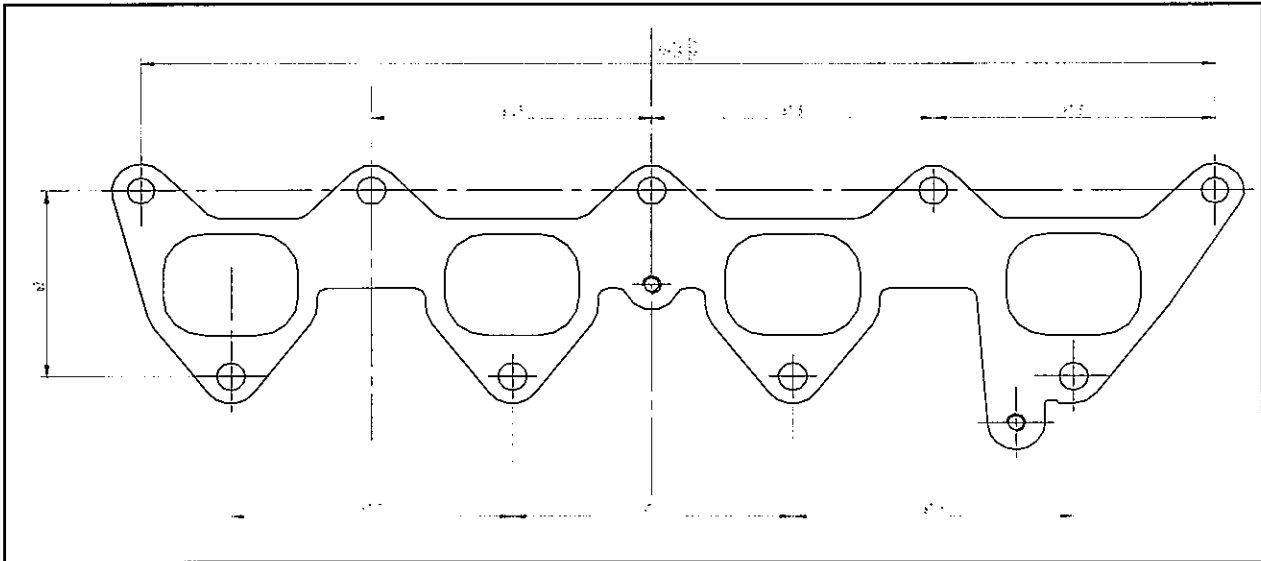
Title : Intake manifold

Drawing no. : 02

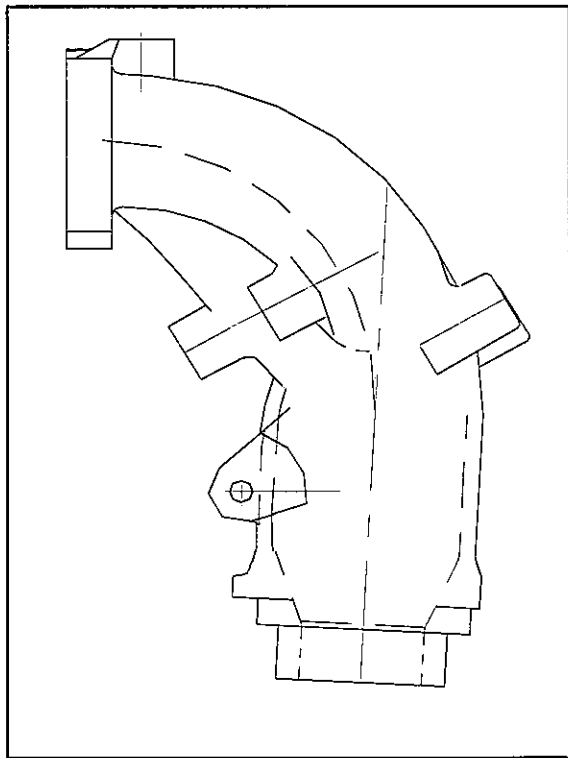
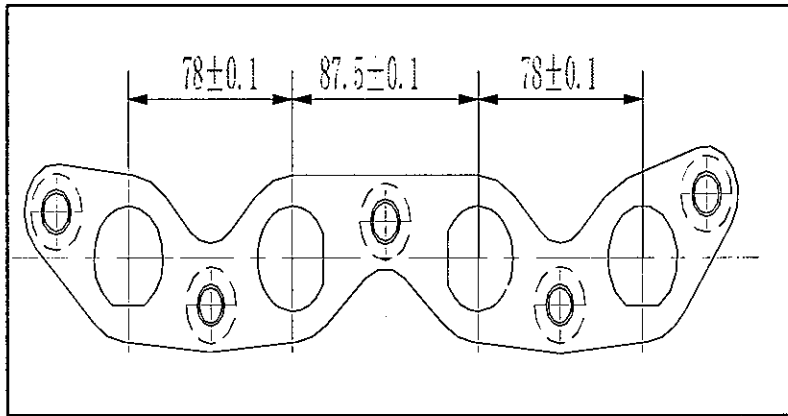
Type : LF7160L1

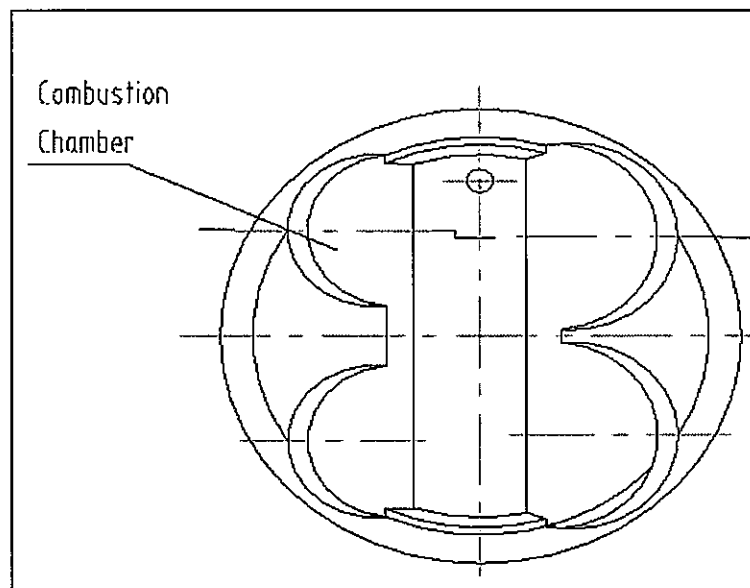
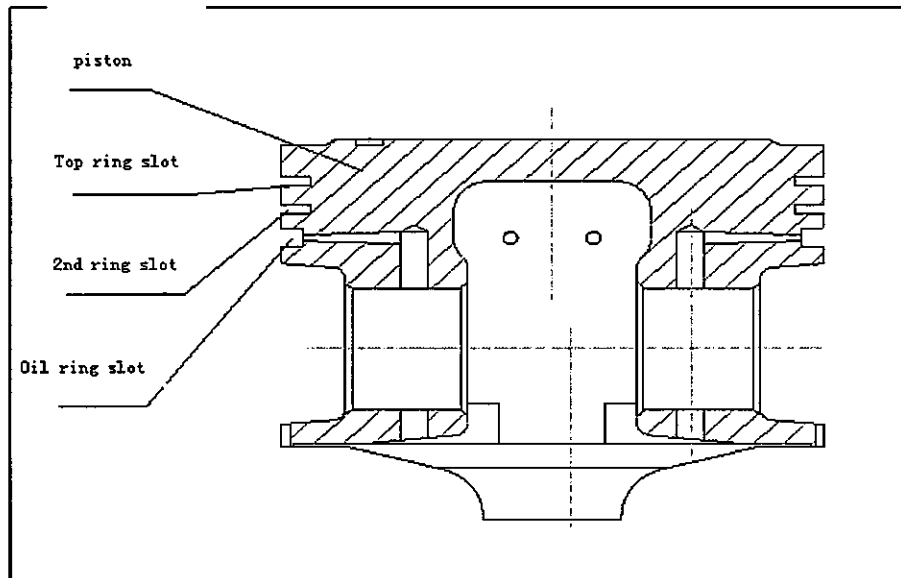
Directive : -

Regulation : 83

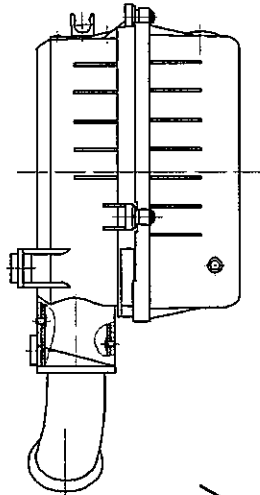
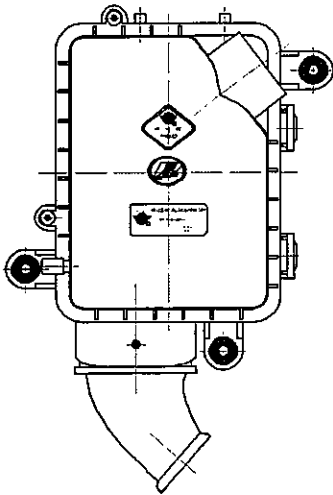
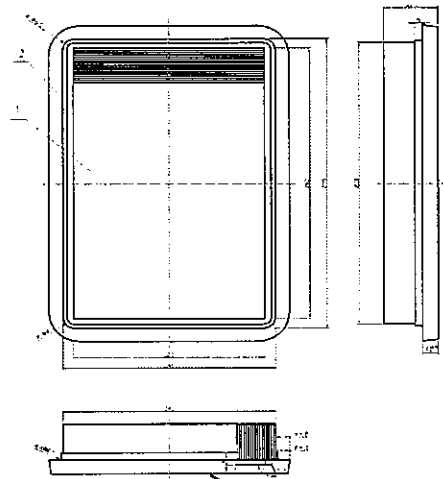
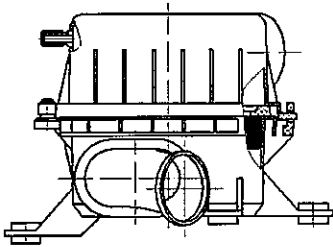


Annex to partial model information document no. L-R83-01	Annex C Page 2
Title : Exhaust manifold Type : LF7160L1	Drawing no. : 03 Directive : - Regulation : 83





Annex to partial model information document no. L-R83-01	Annex C Page 4
Title : Intake system Type : LF7160L1	Drawing no. : 05 Directive : - Regulation : 83



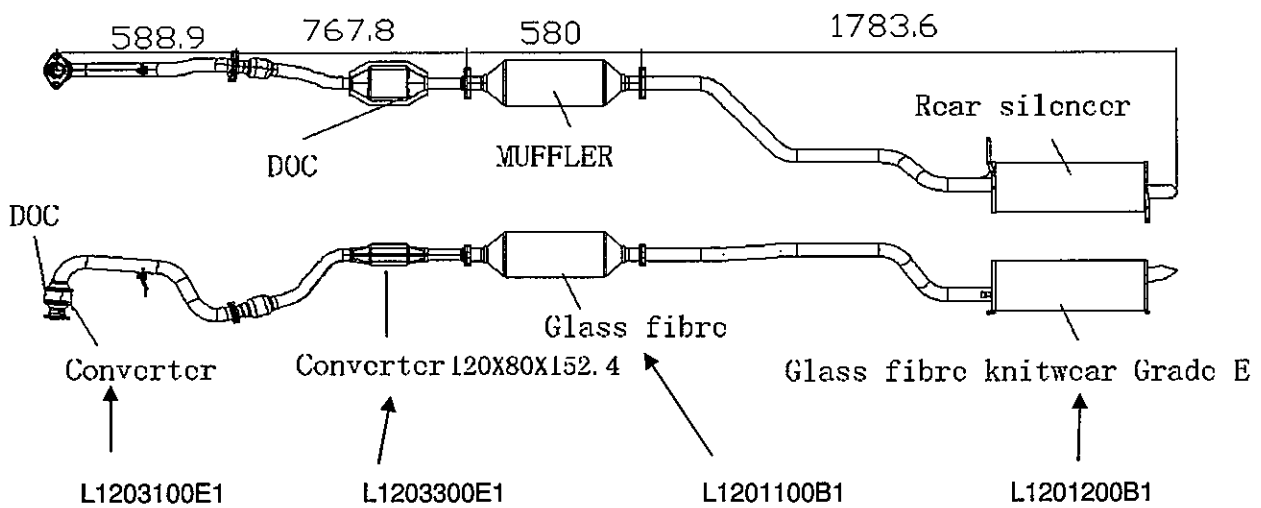
Element assy
L1109111B1

Air cleaner assy
L1109001B1

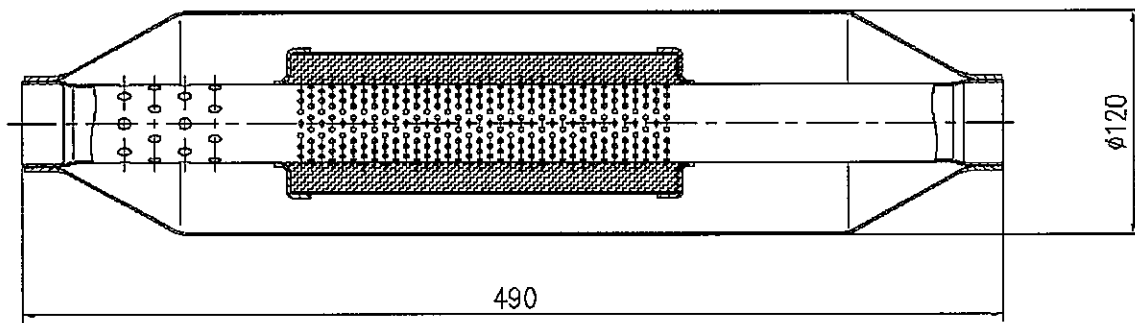
Make: Tianfu



Annex to partial model information document no. L-R83-01	Annex C Page 5
Title : Exhaust system Type : LF7160L1	Drawing no. : 06 Directive : - Regulation : 83



Annex to partial model information document no. L-R83-01	Annex C Page 6
Title : Muffler assy Type : LF7160L1	Drawing no. : 07 Directive : - Regulation : 83

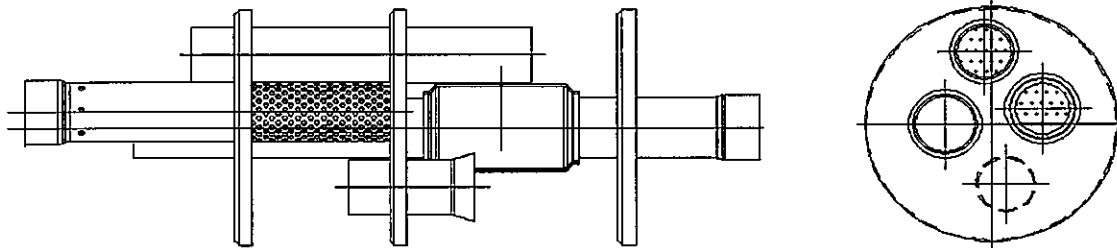


Make : Wuxi Honghu

Front silencer
L1201100B1



Annex to partial model information document no. L-R83-01	Annex C Page 7
Title : Rear silencer assy Type : LF7160L1	Drawing no. : 08 Directive : - Regulation : 83



Make : Wuxi Honghu

Rear silencer
L1201200B1



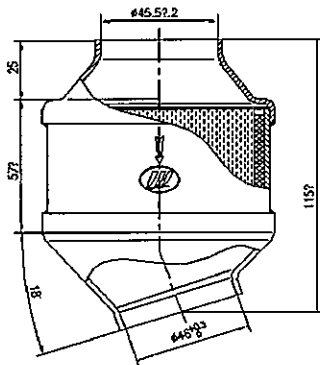
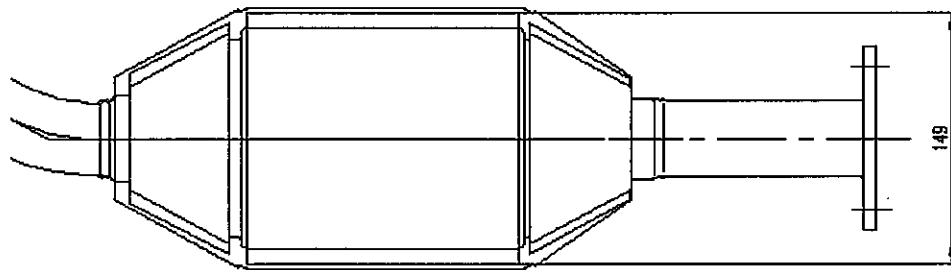
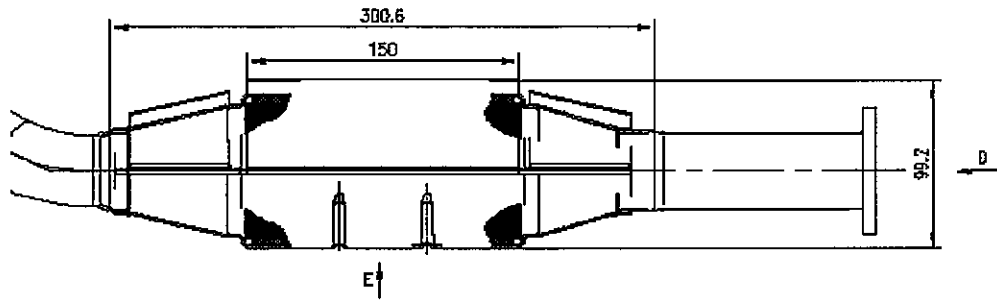
Title : Converter assy

Drawing no. : 09

Type : LF7160L1

Directive : -

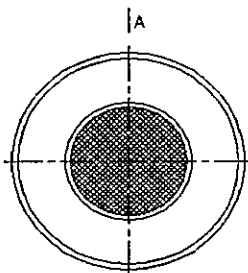
Regulation : 83



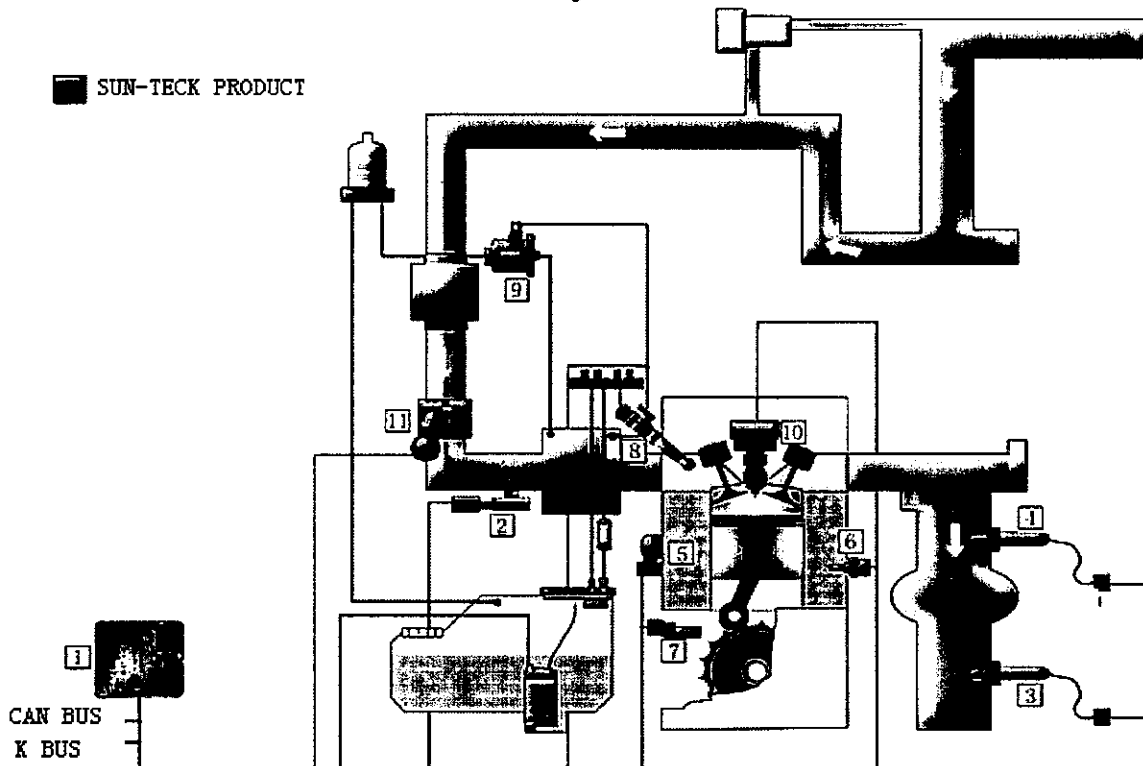
Make : Wuxi Honghu

Rear Converter
L1203300E1

Front converter
L1203100E1



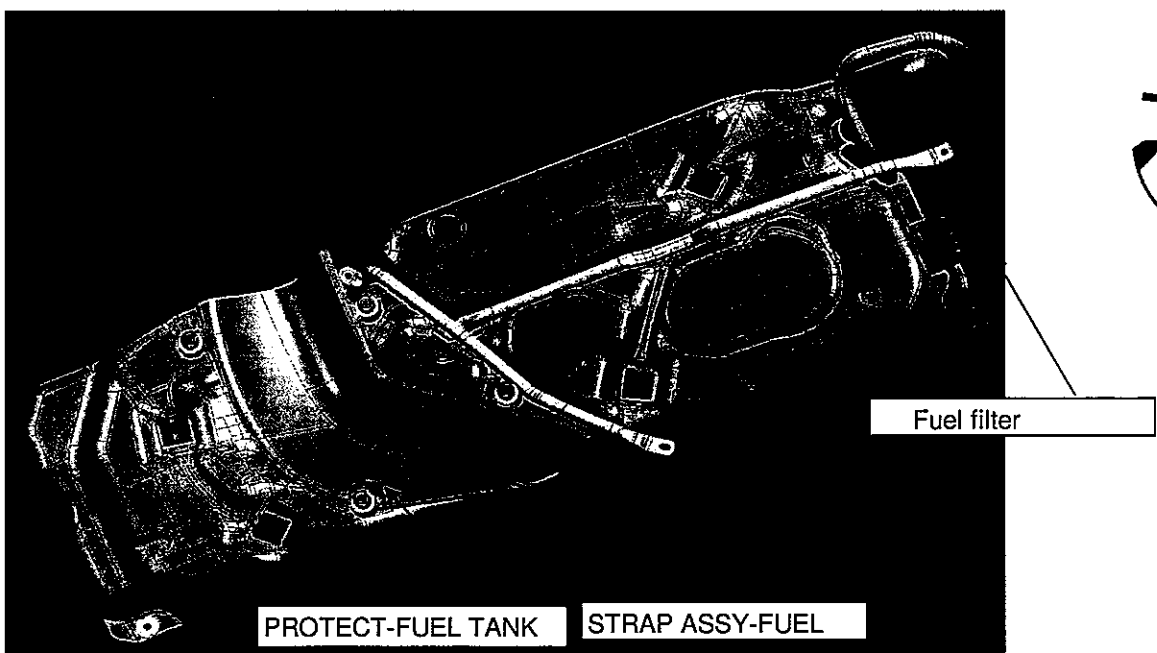
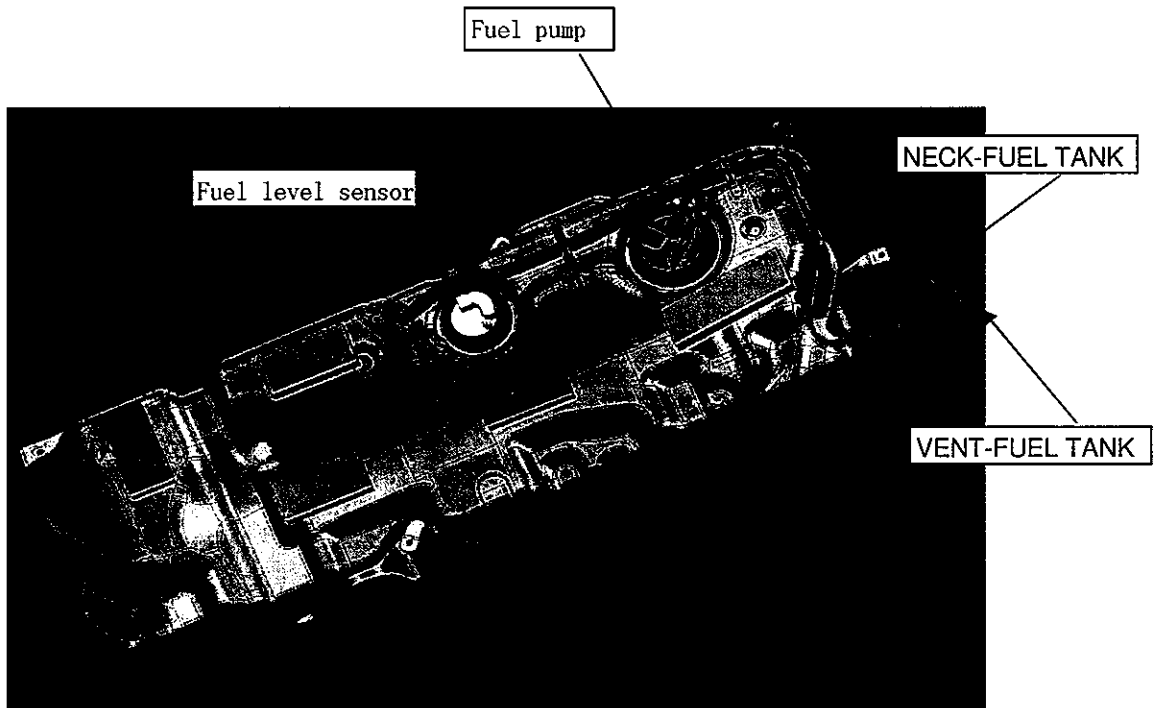
Annex to partial model information document no. L-R83-01	Annex C Page 9
Title : Fuel injection control	Drawing no. : 10 Directive : - Regulation : 83
Type : LF7160L1	



- 1.ECU
- 2.Inlet temperature pressure sensors
- 3.Rear oxygen probe
- 4.front oxygen probe
- 5.Knock sensor
- 6.Temperature sensor
- 7.Crankshaft sensor
- 8.Oil rail fuel injection zone HAVC
- 9.Carbon cans solenoid valve
- 10.Ignition coil



Annex to partial model information document no. L-R83-01	Annex C Page 10
Title : Fuel tank	Drawing no. : 11
Type : LF7160L1	Directive : -
	Regulation : 83



SIZE OF FUEL TANK :
 LENGTH (X) 1274 mm
 WIDTH (Y) 470 mm
 HEIGHT (Z) 185 mm

Make: LINDA
 Volume : 51L

Material : Plastic

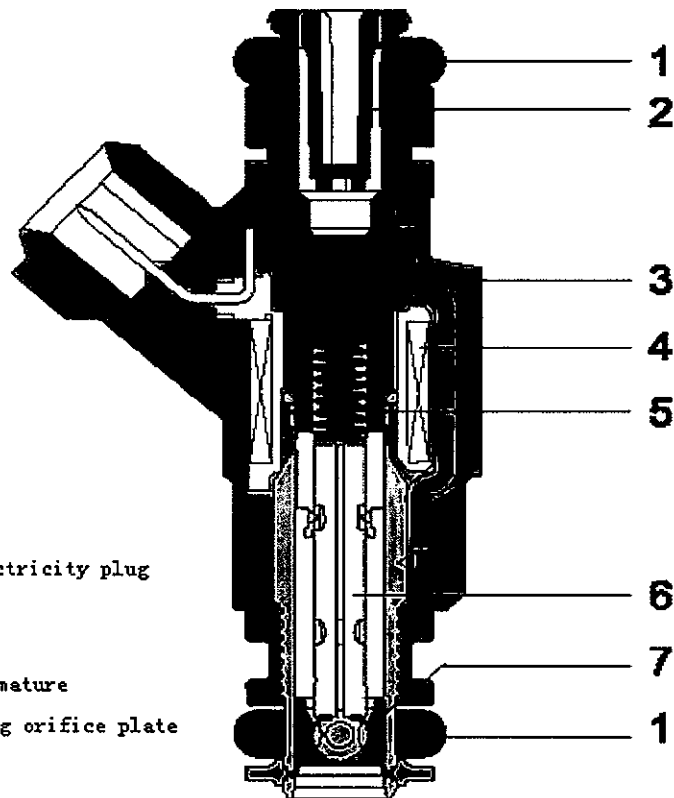
Title : Fuel injection nozzle

Drawing no. : 12

Type : LF7160L1

Directive : -

Regulation : 83



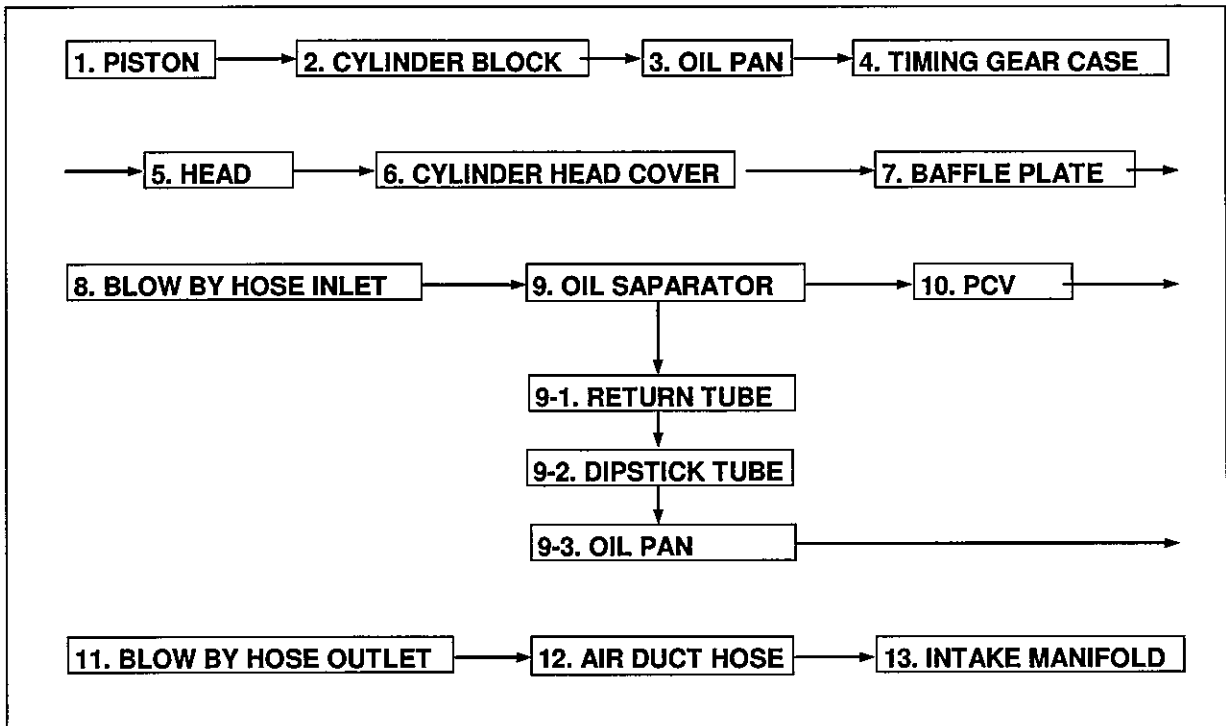
- 1—O-ring
- 2—Filter insert
- 3—Injector body with electricity plug
- 4—Coil
- 5—Spring
- 6—Needle with solenoid armature
- 7—Valve seat with metering orifice plate



Annex to partial model information document no. L-R83-01	Annex C Page 12
Title : Device for recycling crankcase gas	Drawing no. : None
Type : LF7160L1	Directive : - Regulation : 83

1. Device for recycling crankcase gases

Crankcase vapors(Blow By Gas) pass into cylinder head cover via the various oil drain passages in the engine and dipstick tube from oil separator return hole in oil pan.
The vapors(Blow By Gas) are drawn from cylinder head cover into the intake manifold via a oil separator outlet hose.



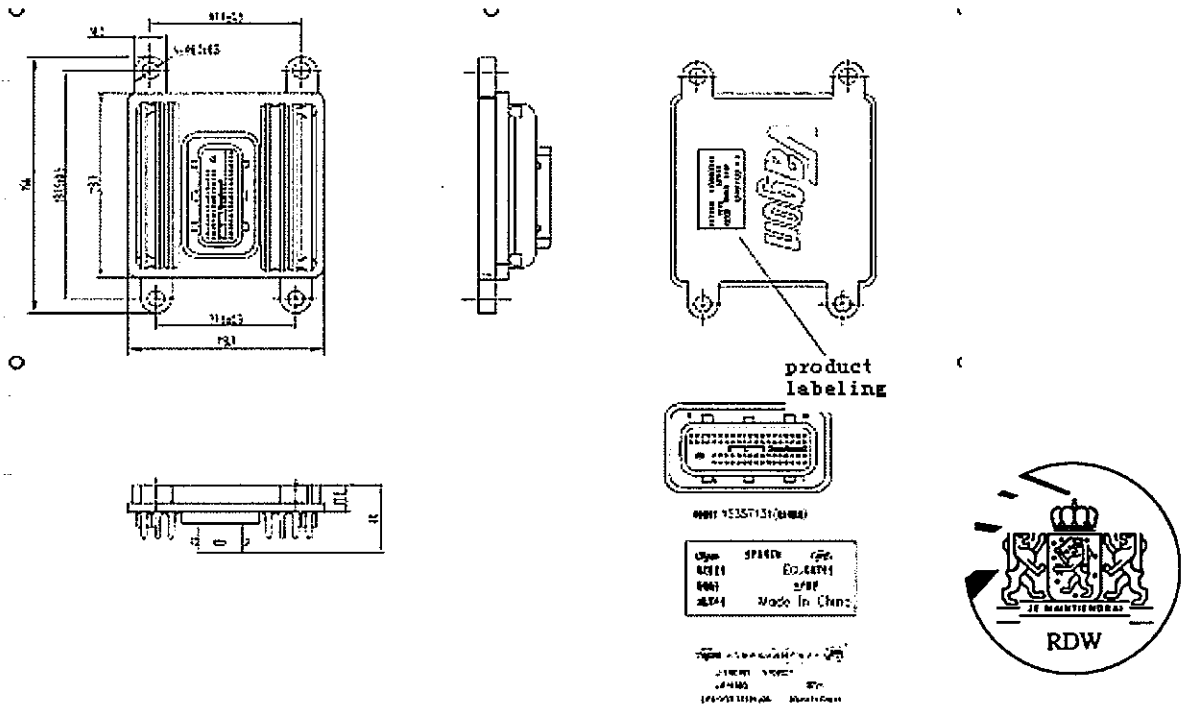
Title : ECU (engine control unit)

Drawing no. : 13

Type : LF7160L1

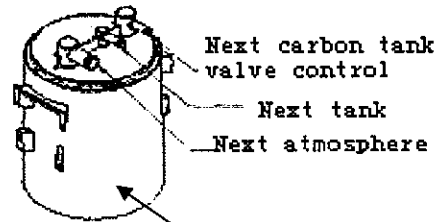
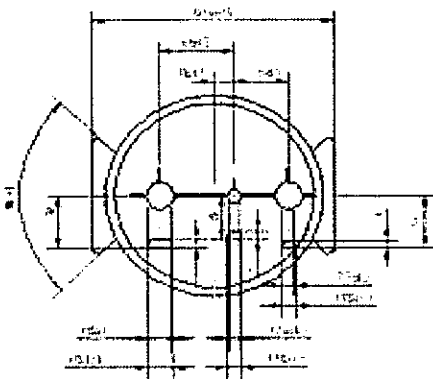
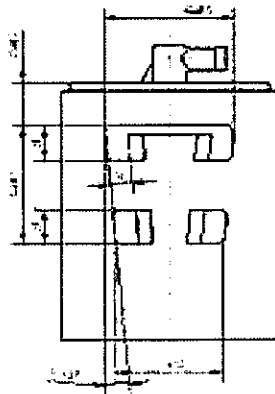
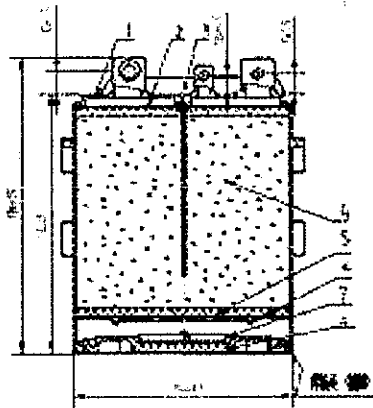
Directive : -

Regulation : 83



No of leads	Name of leading-out plug	No of	Name of leading-out plug	No of leads	Name of leading-out plug
J101	Ignition switch	J126	aporator temperature sensor sig	J151	—
J102	Main relay power	J127	Air inlet temperature signal	J152	Ignition coil driving 2,3 cylinders
J103	Speed sensor	J128	crankshaft position sensor low sig	J153	Idling control valve A coil- negative
J104	5V-2 (TMAP)	J129	—	J154	Idling control valve A coil-positive
J105	GND	J130	—	J155	Nozzle 1
J106	GND	J131	Engine failure indicator ignition coil driving 1,4 cylinders	J156	Nozzle 2
J107	—	J132	Idling control valve B coil- positive	J157	—
J108	—	J133	Idling control valve B coil- negative	J158	Control of relay
J109	Compressor switch	J134	—	J159	—
J110	—	J135	Acceleration signal	J160	—
J111	K-Line	J136	Booster steering	J161	Control of front oxygen sensor heat
J112	crankshaft position sensor signa	J137	—	J162	front oxygen sensor signal high
J113	—	J138	Rear oxygen sensor signal high	J163	Charcoal Canister-purge Valve
J114	CAN cathode	J139	Air conditioner- requesting signa	J164	Control of Rear oxygen sensor heat
J115	CAN anode	J140	—	J165	Water temperature output
J116	—	J141	Neutral/stop switch	J166	—
J117	Accumulator 1	J142	Pressure of intake manifold absolute pre	J167	Control of low speed fan relay
J118	Accumulator 2	J143	Sensor of coolant temperature	J168	—
J119	—	J144	—	J169	Knock sensor signal
J120	5V-1 Throttle position sensor	J145	Tachometer	J170	Nozzle 3
J121	—	J146	Pressure of air conditioner compressor c	J171	Nozzle 4
J122	Emission failure indicator	J147	Control of fuel pump relay	J172	Head lamp switch
J123	AD4	J148	—	J173	Ground system
J124	Throttle position sensor signal	J149	Fuel level sensor		
J125	—	J150	Control of high speed fan relay		

Annex to partial model information document no. L-R83-01	Annex C Page 14
Title : Canister Type : LF7160L1	Drawing no. : 14 Directive : - Regulation : 83

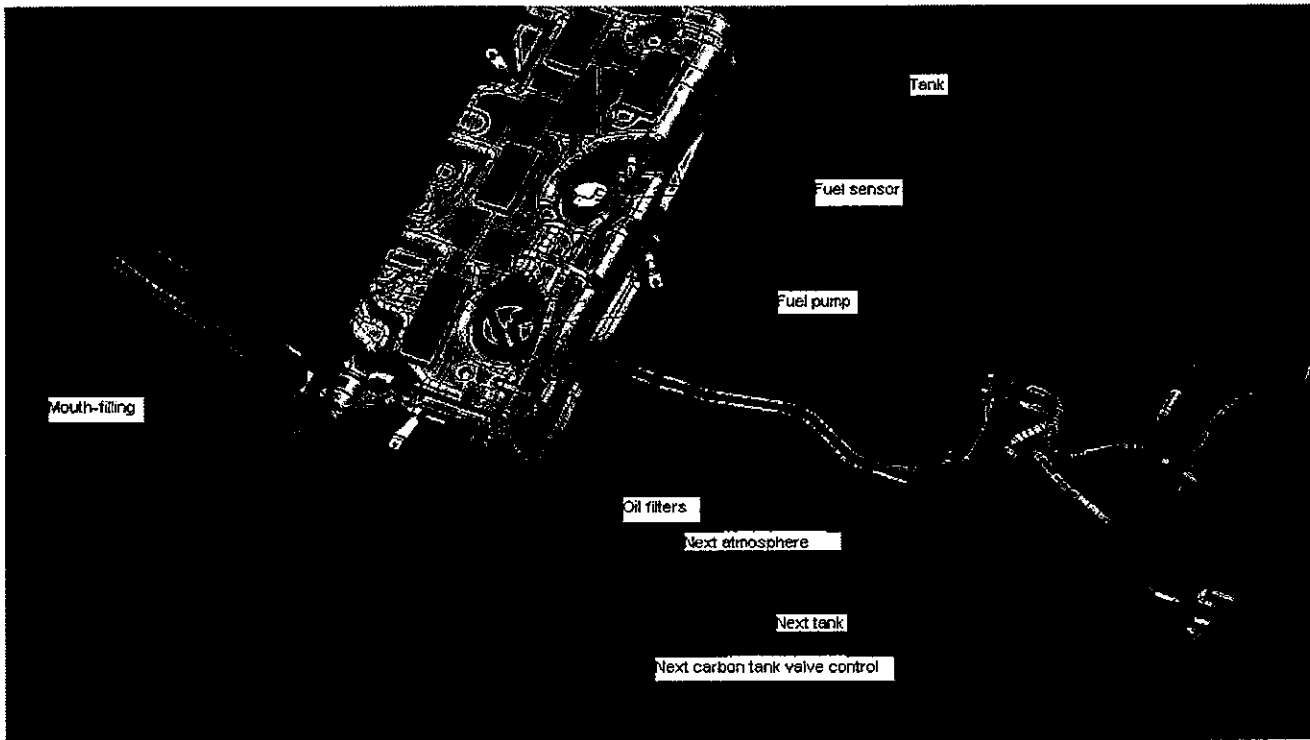


Make : NanJing hongguang

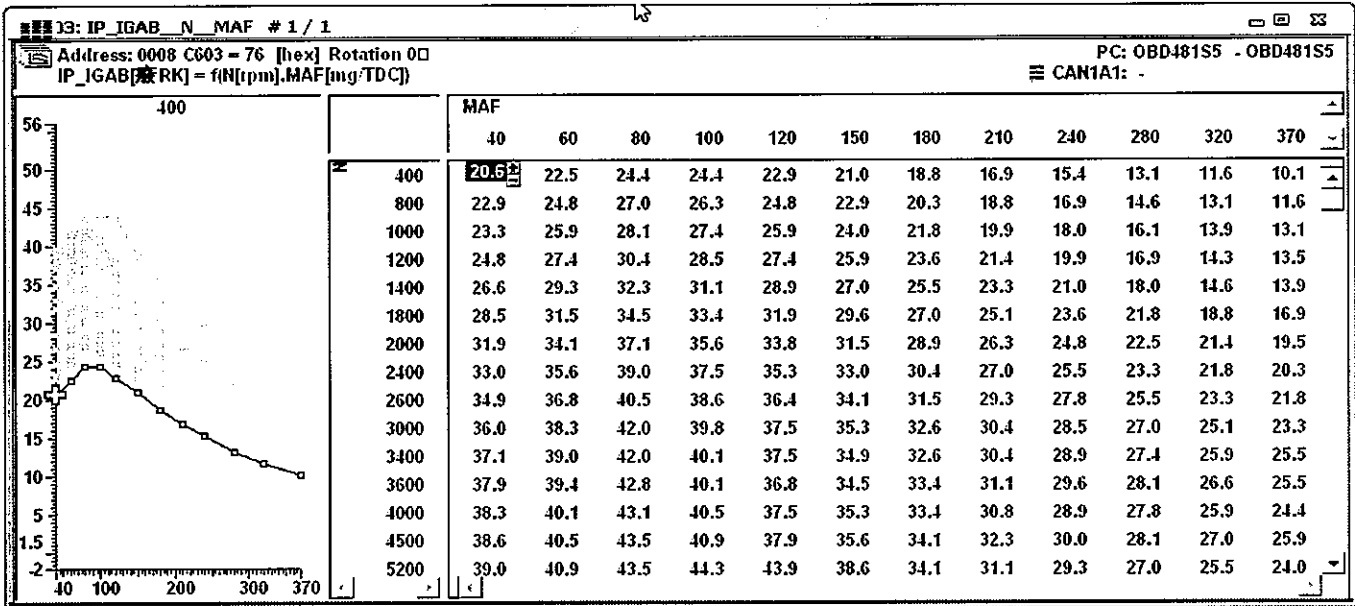
Canister
L1130200



Annex to partial model information document no. L-R83-01	Annex C Page 15
Title : Evaporative emission control system Type : LF7160L1	Drawing no. : 15 Directive : - Regulation : 83



Annex to partial model information document no. L-R83-01	Annex C Page 16
Title : Ignition advance curve	Drawing no. : 16
Type : LF7160L1	Directive : - Regulation : 83



Annex to partial model information document no. L-R83-01	Annex D Page 1
Title : Description of EOBD system Type : LF7160L1	Drawing no. : None Directive : - Regulation : 83

0 OBD system

- Make : SUN-TEK
- Type : VA20012

1 Catalyst Efficiency Diagnostic

➤ Logic description

The hydrocarbon conversion efficiency of the catalyst is determined by monitoring its oxygen storage capacity. The oxygen storage capacity is derived from the amplitude of the downstream oxygen sensor's signals. The amplitudes of the downstream oxygen sensor's signals are strongly influenced by engine load dependent fluctuations of the catalyst's oxygen concentration. Oxygen stored during lean mode operation is partly or completely used up during rich mode operation.

Operating point influences are taken into consideration by implementing a correction function which utilizes the air-fuel mixture control variable as an input parameter to compute the expected signal of the downstream oxygen sensor's amplitude. The difference between this expected signal and the actual oxygen sensor's signal is integrated and normalized over time.

A maximum fault indicating a defective catalyst is set when the amplitude of the downstream oxygen sensor's signal lies above a calibrated maximum (i.e. 0.4) after a calibrated active diagnostic time (i.e. 50sec) has elapsed.

➤ Monitoring conditions

The catalyst conversion efficiency diagnostic is not always active. Any one of the following conditions will lead to a halt of the diagnostic:

- MAF is out of its maximum or minimum limit
- vehicle speed is out of its maximum or minimum limit
- a malfunction of the upstream oxygen sensor heater
- a malfunction of the downstream oxygen sensor heater
- a malfunction of the upstream oxygen sensor
- a malfunction of the downstream oxygen sensor
- the condition for lambda closed loop control (upstream catalyst) isn't fulfilled
- the downstream oxygen sensor isn't ready for operation
- lambda control is at its maximum or minimum limit
- A drop in temperature reduces the catalyst's hydrocarbon conversion rate. This



Annex to partial model information document no. L-R83-01	Annex D Page 2
Title : Description of EOBD system Type : LF7160L1	Drawing no. : None Directive : - Regulation : 83

- leads to higher amplitudes of the downstream oxygen sensor. The diagnosis is hence disabled when the modeled exhaust gas temperature falls below a calibration
- the diagnostic is halted at catalyst modeling temperatures greater than a calibrated threshold to avoid recognizing a catalyst as being too good.
 - engine speed lies above a calibrated maximum, above which the catalyst diagnostic shouldn't run
 - The engine coolant start temperature lies below a calibrated minimum
- Class
- MIL ON after 2 driving cycles.
 - Healing after 3 driving cycles.
- DTC
- P0420 Catalyst System Efficiency Below Threshold

Limit of catalyst efficiency diagnosis:

If conditions of catalyst efficiency diagnosis are fulfilled, the value of catalyst efficiency diagnosis will be calculated. when the calculated value greater than a calibrate value (C_CAT_MAX_DIAG), the low catalyst efficiency is determined.



Annex to partial model information document no. L-R83-01	Annex D Page 3
Title : Description of EOBD system Type : LF7160L1	Drawing no. : None Directive :- Regulation : 83

2 Misfire Diagnostic

➤ Logic description

When engine is running, the ECU will detect combustion misfire by evaluating engine (crankshaft) speed fluctuations. And the ECU will take count of the combustion misfire, and the fault code management will determines every period of time if the combustion misfire is serious enough to active MIL and set fault code report.

Misfire detection:

The core of the method is the precise measurement of engine speed. This is performed by scanning the 60-less-2-teeth trigger wheel by means of an inductive sensor. The ECU reads the sensor signal and calculates the duration of the crankshaft segments. The time required for each crankshaft segment to travel past the inductive sensor is referred to as the segment time.

The arithmetic calculates an Average value of engine roughness (ER_AV) and a threshold value of engine roughness (THD_ER_AV). When ER_AV is larger than THD_ER_AV, misfire is detected, and the misfire counter is added by one.

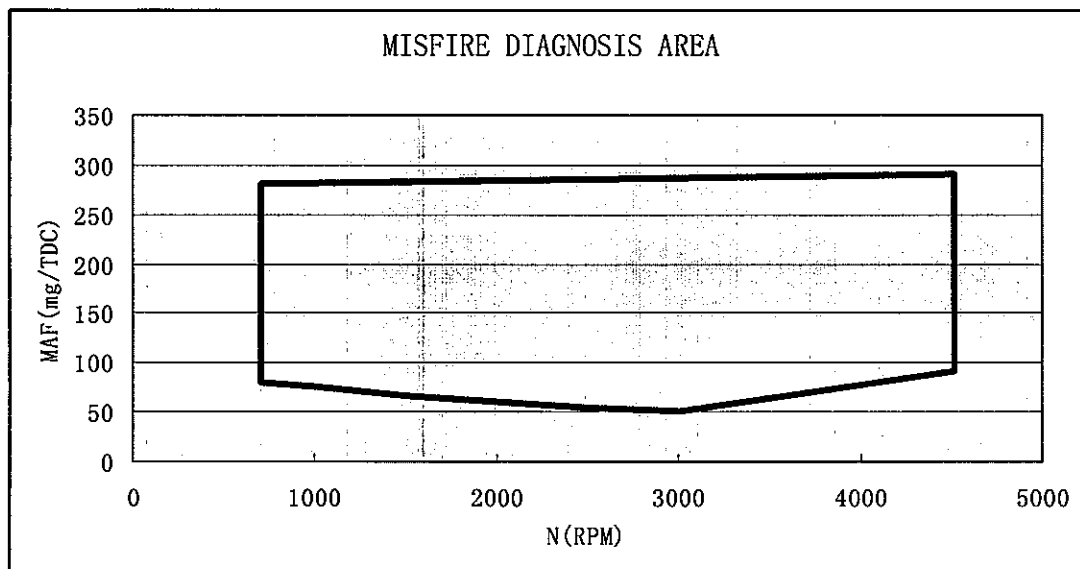
Misfire diagnosis:

The ECU will diagnose misfire once at a fix period of time. Every time the diagnosis happens, the misfire counter will be set to zero. If the counter is larger than a threshold value when the diagnosis happens, the failure of misfire will be considered to be happens. There are two kind of failure of misfire called type A and type B. If failure of type B happens, set the fault code. And if this happens again at the second engine cycle, than active the MIL. If failure of type A happens, it is considered to be a serious condition and the MIL will flash continually.



Annex to partial model information document no. L-R83-01	Annex D Page 4
Title : Description of EOBD system	Drawing no. : None
Type : LF7160L1	Directive : - Regulation : 83

Misfire diagnosis area:



Misfire diagnosis area

Misfire rate and emission standard:

Emission reaches emission standard of EOBD when misfire rate reaches 1.7%. Misfire failure of type B happens. MIL is active.

Catalyst converter will be destroyed when misfire rate reaches limits under table. Misfire failure of type A happens. MIL flash continually.

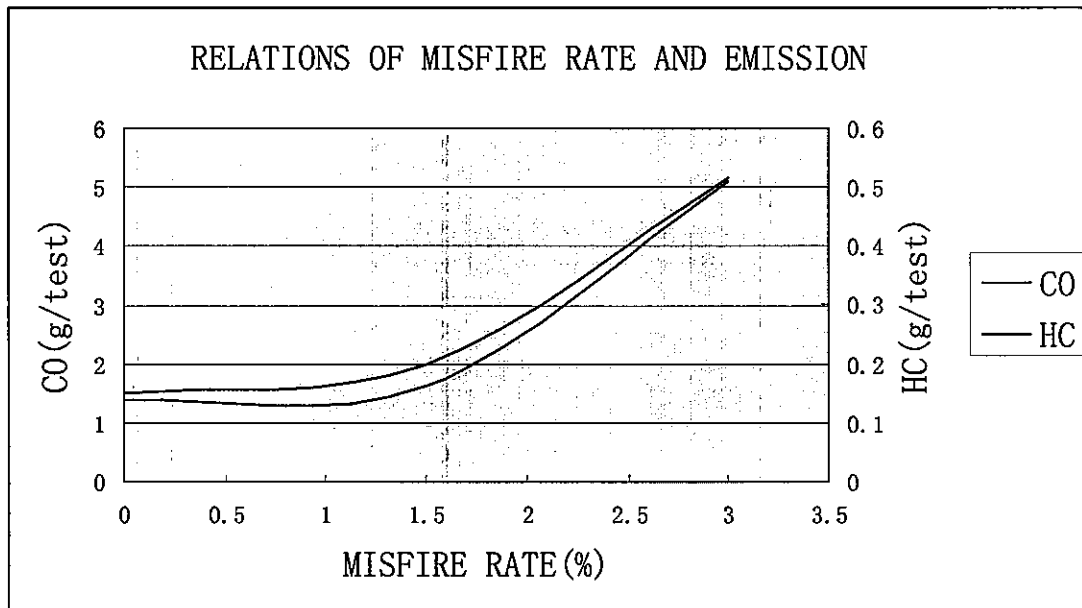
Misfire rate limits of type A(%)

rpm\maf	98	131	202	300
992	25	20	13	10
2016	20	15	10	7
3008	15	10	7	5
4000	10	7	5	5
4500	8	6	5	5



Annex to partial model information document no. L-R83-01	Annex D Page 5
Title : Description of EOBD system	Drawing no. : None
Type : LF7160L1	Directive :- Regulation : 83

Following Figure shows relationship of misfire rate and emission:



Deactivation of misfire diagnosis:

At certain operating states deactivation of misfire detection can be necessary in order to avoid misdetection:

- Crank error - LV_ERR_CRK.
- CAM error - LV_ERR_CAM.
- MAP error - LV_ERR_MAP.
- MAP PLAUS error - LV_ERR_MAP_PLAUS.
- Crank oscillate error - LV_STATE_CRK_OSC.
- Low MAF.
- RoughRoad detected.
- Big DIF of Ignition angle.
- Big DIF of TPS.
- Big DIF of MAF.
- Transition of AC switch.
- Low RPM or High RPM.



- **DTC**
- P0300 Multi-cylinder Misfire Detected
 - P0301 Cylinder 1 Misfire Detected
 - P0302 Cylinder 2 Misfire Detected
 - P0303 Cylinder 3 Misfire Detected
 - P0304 Cylinder 4 Misfire Detected

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Title : Description of EOBD system Type : LF7160L1	Drawing no. : None Directive :- Regulation : 83

3 O2 Sensor

3.1 Upstream Oxygen sensor monitoring

3.1.1 upstream oxygen sensor signal monitoring

➤ SHORT TO GND CHECK

In order to determine the electrical fault, short circuit to GND, the oxygen sensor signal voltage is compared to a calibrateable threshold in conjunction with certain activation conditions.

A minimum fault LSH indicating a malfunction is set when the output voltage of the upstream HO2S lies below a minimum calibrated threshold for more than a calibrated period of time.

➤ Monitoring conditions –SHORT TO GND CHECK

- ignition on
- there is no malfunction of the canister purge valve's power stage
- no malfunction has been detected by the canister purge system diagnosis
- no misfire
- no fuel supply system malfunction
- no fault of mass airflow sensor
- no fault of throttle position sensor
- no fault of crankshaft position sensor
- no fault of camshaft position sensor
- no fault of intake air temperature sensor
- no malfunction of the engine coolant temperature sensor
- the upstream lambda control is active
- the lambda controller hasn't reached its maximum limit
- The upstream oxygen sensor has been properly heated



➤ Short circuit to battery check

In order to determine the electrical fault, short circuit to GND, the oxygen sensor signal

voltage is compared to a calibrateable threshold in conjunction with certain activation conditions.

A minimum fault LSH indicating a malfunction is set when the output voltage of the upstream HO2S lies below a maximum calibrated threshold for more than a calibrated period of time.

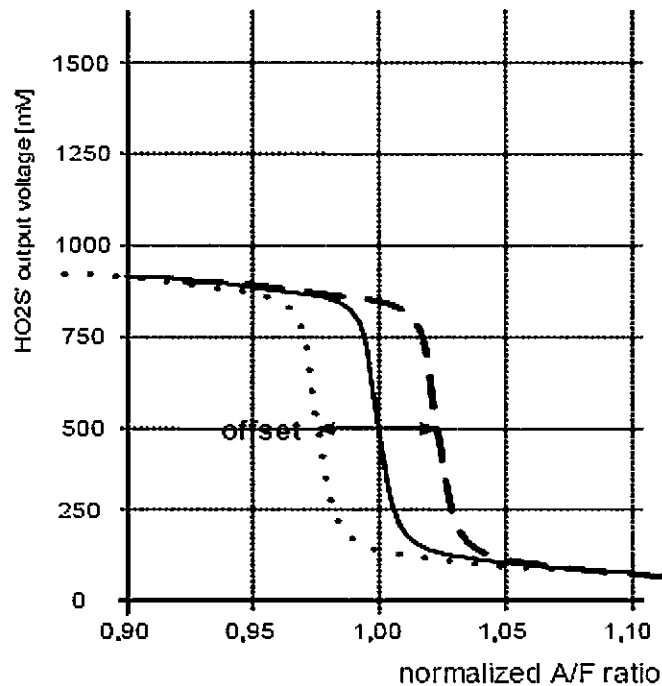
Annex to partial model information document no. L-R83-01	Annex D Page 7
Title : Description of EOBD system	Drawing no. : None Directive :- Regulation : 83
Type : LF7160L1	

- Monitoring conditions –SHORT TO VBATT CHECK
 - ignition on
 - not in the start and engine stop state
 - no battery voltage faults
 - Battery voltage has in the properly range

3.1.2 Upstream oxygen sensor aging monitoring

It's also called OBD II upstream oxygen sensor signal diagnosis, based on frequency, switching time). The signal diagnosis check the time interval of switching time and of the frequency to determine the aging state.

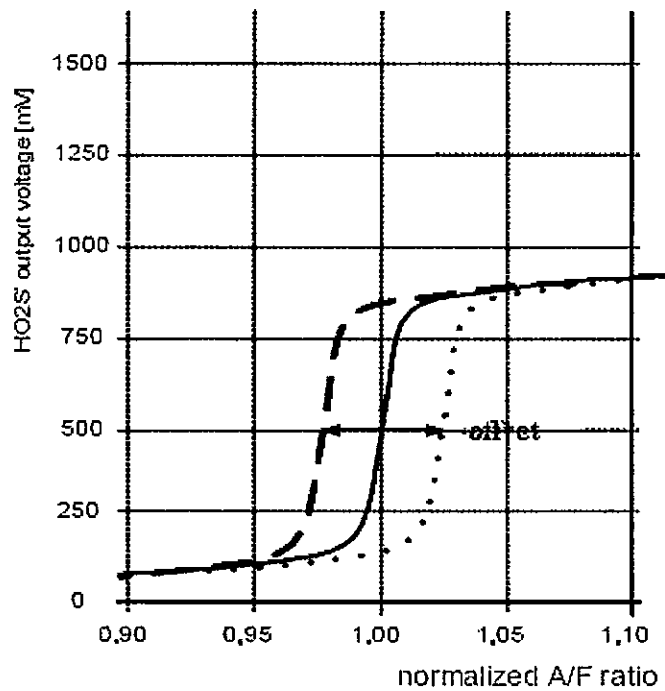
The diagnosis of aging the upstream heated oxygen sensor(HO2S) consist of two offset and two cycle duration check.



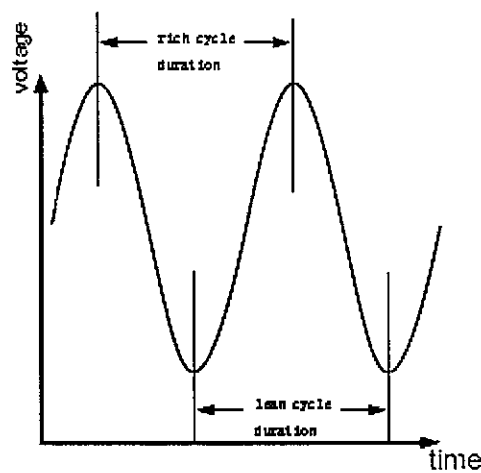
a) time interval for switching time monitoring(rich to lean)



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b) time interval for switching time monitoring(lean to rich)



c) time interval for frequency monitoring

Figure 1: Illustration of shifts in the characteristic lambda curve of the upstream HO2S's response (a) (b) and a depicted definition of a cycle duration (c).

Offset check:

- Monitoring conditions - offset check
- Downstream closed loop control is enabled

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Title : Description of EOBD system Type : LF7160L1	Drawing no. : None Directive : - Regulation : 83

- the canister purge valve isn't active
- no canister purge activity with high load
- no fuel supply system malfunction
- no critical misfire rate
- no camshaft position sensor malfunction
- no canister purge system malfunction
- no malfunction of the power stage of the canister purge valve
- no battery voltage faults
- no malfunction of the upstream HO2S' heater
- no malfunction of the downstream HO2S' heater
- no catalyst malfunction.
- all monitoring conditions active for calibrated period of time (i.e. 50sec).

➤ **Class**

- MIL ON after 2 driving cycles.
- Healing after 3 driving cycles.

Cycle duration check :

The expected mean value of the upstream oxygen sensor might still be achieved even when the sensor's response rate deteriorates. A maximum fault LATP is however set when the filtered cycle duration of the upstream HO2S exceeds a calibrated upper limit (i.e. 3sec) after a calibrated number of samples (i.e. 20 times).

➤ **Monitoring conditions – cycle duration check**

- upstream closed loop control enabled
- no malfunction of the main load sensor
- no malfunction of the engine coolant temperature sensor
- no malfunction of the intake air temperature sensor
- the canister purge valve isn't active
- no canister purge activity with high load
- no fuel supply system malfunction
- no critical misfire rate
- no camshaft position sensor malfunction
- no canister purge system malfunction
- no canister purge valve power stage malfunction
- no battery voltage fault
- the upstream HO2S' heater diagnostic has been performed and no malfunctions were detected



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- no downstream HO2S heater malfunction
- the engine speed lies within a calibrated range (i.e. 1600~3200rpm)
- the engine load lies within a calibrated range (i.e. 30~65%)
- the modeled exhaust gas temperature at the upstream HO2S' vicinity exceeds a calibrated threshold (i.e. 450degC).

➤ Class

- MIL ON after 2 (for Korean market) or 3 (for European market) driving cycles.
- Healing after 3 driving cycles.

➤ DTC

- P0130 O2 Sensor Circuit Malfunction (Bank1 Sensor 1)
P0131 O2 Sensor Circuit Low Voltage (Bank1 Sensor 1)
P0132 O2 Sensor Circuit High Voltage (Bank1 Sensor 1)
P0133 O2 Sensor Slow Response(Bank1 Sensor 1)
P0134 O2 Sensor No Activity Detected (Bank1 Sensor 1)

Upstream oxygen sensor diagnosis :

If (VLS_UP_i < C_VLS_UP_MIN_DIAG)
then "Short to GND fault present"

If (VLS_UP_i > C_VLS_UP_MAX_DIAG)
then "Short to Vbatt fault present"

If (C_VLS_UP_AFL_DIAG < VLS_UP_i < C_VLS_UP_AFR_DIAG)
then If (TIMER_1 > C_T_DLY_VLS_UP_OC_DIAG)
then "Open circuit fault present"

If (VLS_UP_i > C_VLS_UP_MIN_PUC)
then "PUC signal plausibility fault present"

If ((VLS_MMV_MAX_i - VLS_MMV_MIN_i) < C_VLS_DIF_BOL_TOL_MIN)
then "Voltage excursion plausibility fault present"

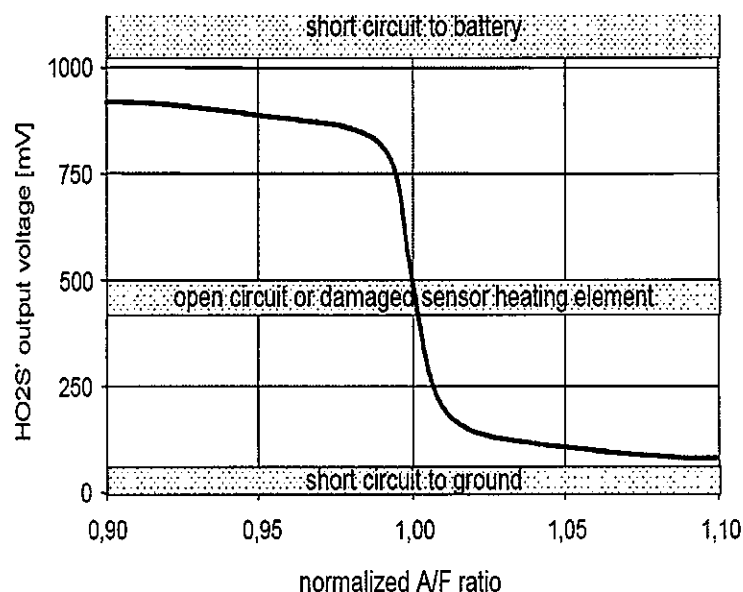


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Title : Description of EOBD system	Drawing no. : None Directive : - Regulation : 83
Type : LF7160L1	

3.2 Downstream Oxygen sensor monitoring

3.2.1 Downstream oxygen sensor signal monitoring

The operation readiness diagnostic of the downstream heated oxygen sensor (HO2S) runs continuously and can detect all faulty electrical connections of the HO2S. Most of the checks use the measured voltage of the downstream HO2S as an input for diagnosis, indicating the regions where all possible malfunctions (given the appropriate monitoring conditions are fulfilled) are detectable.



➤ SHORT TO GND CHECK

- In order to determine the electrical fault, short circuit to GND, the oxygen sensor signal voltage is compared to a calibrateable threshold in conjunction with certain activation conditions.
- A minimum fault LSH indicating a malfunction is set when the output voltage of the downstream HO2S lies below a minimum calibrated threshold for more than a calibrated period of time.

➤ Monitoring conditions –SHORT TO GND CHECK

- ignition on



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- there is no malfunction of the canister purge valve's power stage
- no malfunction has been detected by the canister purge system diagnosis
- no misfire
- no fuel supply system malfunction
- no fault of mass airflow sensor
- no fault of throttle position sensor
- no fault of crankshaft position sensor
- no fault of camshaft position sensor
- no fault of intake air temperature sensor
- no malfunction of the engine coolant temperature sensor
- the downstream lambda control is active
- the lambda controller hasn't reached its maximum limit
- The downstream oxygen sensor has been properly heated



➤ **SHORT CIRCUIT TO VBATT CHECK**

- In order to determine the electrical fault, short circuit to GND, the oxygen sensor signal
 - voltage is compared to a calibrateable threshold in conjunction with certain activation conditions.
 - A minimum fault LSH indicating a malfunction is set when the output voltage of the downstream HO2S lies below a maximum calibrated threshold for more than a calibrated period of time.
- **Monitoring conditions –SHORT TO VBATT CHECK**
- ignition on

3.2.2 Downstream Oxygen sensor aging monitoring

The aging diagnosis of the downstream heated oxygen sensor (HO2S) consists of an oscillation check and a threshold check during trailing throttle (fuel cut-off). Both checks run continuously.

➤ **Oscillation Check**

During normal engine operation the normalized A/F ratio and hence the voltage of the downstream HO2S oscillates about the set point value. The oscillation check triggers a test function if the measured voltage of the downstream HO2S permanently lies below or above the set point value for a calibrated period of time. The test function applies a rich A/F mixture if the voltage did stayed stuck below the set point value or a lean A/F mixture if it stayed stuck above the set point value. If the voltage of the downstream HO2S still

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doesn't cross the set point value in the expected direction after applying a lean or rich A/F mixture, a minimum or maximum fault LASH indicating a malfunction of the downstream HO2S will be set respectively.

➤ **Monitoring Conditions for Oscillation Check:**

- Closed loop lambda control is active
- The mass airflow lies within a calibrated range
- the downstream HO2S has been ready for operation for a calibrated period of time
- the canister purge valve isn't active
- the mixture adaptation fault thresholds have not been exceeded
- no critical misfire rate
- no faults from the canister purge system diagnosis
- no malfunction of the canister purge valve's power stage
- no power supply voltage faults.
- the mean value of the lambda controller lies within a calibration
- the lambda control multiplicative factor is in a steady state
- the voltage of the downstream HO2S has stayed above/below the target value for a calibrated period of time

➤ **Monitoring Conditions for Threshold check during trailing throttle**

This check determines whether the voltage of the HO2S' signal exceeds a calibrated threshold for a calibrated period of time during trailing throttle. A signal fault LASH indicating a malfunction is set if this is true.

➤ **Monitoring Conditions for Threshold check during trailing throttle:**

- no electrical fault of oxygen sensor
- fuel cut-off for a calibrated period of time
- mass airflow integration after fuel cut-off exceeds calibrated threshold
- catalyst temperature from model exceeds calibrated threshold
- no fault of camshaft position sensor
- no fault of canister purge system
- no fault of canister purge valve power stage
- no fault of battery voltage supply



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- no fault of downstream oxygen sensor exchange diagnosis.

➤ Class

- MIL ON after 1 driving cycles.

- Healing after 3 driving cycles.

➤ DTC:

- P0136 O2 Sensor Circuit Malfunction (Bank1 Sensor 2)
- P0137 O2 Sensor Circuit Low Input (Bank1 Sensor 2)
- P0138 O2 Sensor Circuit High Input (Bank1 Sensor 2)
- P0139 O2 Sensor Slow Response(Bank1 Sensor 2)
- P0140 O2 Sensor No Activity Detected (Bank1 Sensor 2)



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Title : Description of EOBD system Type : LF7160L1	Drawing no. : None Directive :- Regulation : 83

4 Comprehensive Component Monitor - Engine

4.1 Throttle Position Sensor Diagnosis (TPS)

The diagnosis of the throttle position sensors used for measuring throttle angle consists of a range check of its measured voltages.

The purpose is to diagnose the direct analog input signal (TPS) from the throttle position sensor to the microcontroller.

➤ Range check

The range check is performed by measuring the voltages of sensor and comparing them with their respective minimum and maximum calibrated values.

If the measured voltage exceeds the calibrated maximum, *'Signal Line Short to Battery Voltage'* or *'Signal Line Break'* is detected.

If the measured voltage lies below the calibrated minimum, *'Signal Line Short to Ground'* is detected.

➤ Monitoring conditions

- sufficient supply voltage
- Every value is diagnosed only if ignition key is open and the voltage fulfilled certain condition.

➤ DTC

P0122 Throttle/Pedal Position Circuit low input
P0123 Throttle/Pedal Position Circuit high input

4.2 Camshaft Sensor Diagnosis

Camshaft sensor signal acquisition is used for engine position recognition

➤ Monitoring conditions

- engine synchronize completely
- no error currently present on crankshaft
- no error present on crankshaft sensor after synchronisation

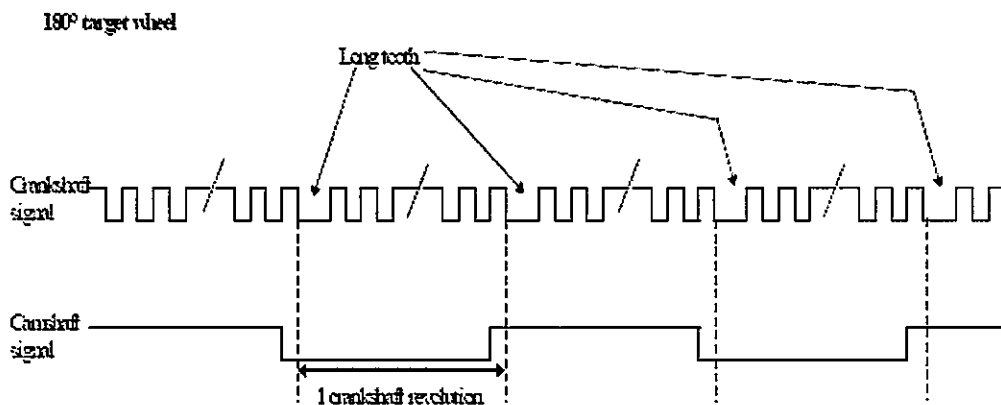
4.2.1 Restricted to Half moon type camshaft wheel



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Title : Description of EOBD system	Drawing no. : None
Type : LF7160L1	Directive :- Regulation : 83

➤ Logic description

Camshaft signal plausibility is done in a window range of crankshaft. The polarity of camshaft sensor signal must change only once per crankshaft revolution .



➤ Monitoring conditions

- no error currently present on crankshaft
- no error present on crankshaft sensor after synchronisation

➤ Error Detection

- No change of polarity between two validated long teeth
- No valid position compared to crankshaft

➤ Range Detect

- If diagnosis evaluation set on active camshaft edge, then "No Signal" is detected
- If Measured value out of diagnosis window, then "Invalid signal" is detected

➤ DTC

P0340 Camshaft Position Sensor Circuit Malfunction



4.2.2 Crankshaft Sensor Diagnosis

➤ Logic description

Crankshaft sensor diagnosis is based on valid teeth recognition procedure. It's different before / after synchronisation.

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Title : Description of EOBD system Type : LF7160L1	Drawing no. : None Directive : - Regulation : 83

The teeth number is monitored once per revolution after synchronisation.

- Monitoring conditions
 - ignition key status is active
 - battery voltage condition fulfilled for remaining diagnosis
- Range Detect

Error before synchronisation

- if the Valid teeth not yet detected and a number of camshaft edges are detected, then "No signal" is detected
- if Valid teeth detected and and a number of camshaft edges are detected, then "Invalid signal" is detected

Error after synchronisation

- crankshaft signal is missing while engine is running
- number of crankshaft teeth per revolution differs by one (Detected teeth: 57 or 59)
- number of crankshaft teeth per revolution differs by two(Detected teeth: 56 or 60)
- number of crankshaft teeth per revolution differs by more than two(Detected teeth: 56 or 60)

- DTC
P0335 Crankshaft Position Sensor Circuit Malfunction



4.3 Vehicle Speed Signal Diagnosis (VS)

- Logic description

The purpose is to diagnose the frequent input signal (VS) on the microcontroller.

The application recurrence is 10 msec.

Plausibility Check: if the following conditions is fulfilled, then the time counter is running.

Vehicle speed is zero,

Engine speed is not less than Engine speed threshold for implausible signal condition detected on Vehicle speed signal,

mass air flow is greater than Mass air flow threshold for implausible signal condition detected on VS signal,

Indication in case of any fuel shut-off is zero,

Coolant temperature is greater than Minimum coolant temperature to perform vehicle speed diagnosis.

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Title : Description of EOBD system Type : LF7160L1	Drawing no. : None Directive : - Regulation : 83

If the time counter seconds has run out, then `Invalid Signal` is detected

The time delay to detect implausible signal on VS signal is frozen when one of the abovementioned diagnosis conditions is currently not present (except VS = 0). When all conditions are present again, the counter continues. As soon as VS > 0 is detected the time counter is reset immediately.

- Monitoring condition
 - battery voltage condition is fulfilled for OBD-I diagnosis

- DTC
 - P0501 Vehicle Speed Sensor Range/Performance



4.4 Intake Air Temperature Sensor Diagnosis (TIA)

- Logic description

The purpose is to diagnose the analog input signal (TIA) from the intake air temperature sensor to the microcontroller. The application recurrency is 500 msec.

The delay time has run out after the transition from start to idle or part load then indicating time delay has elapsed.

Air intake temperature value measured exceeds Intake air temperature threshold, then `Signal Line Short to Ground` is detected and the anti-bounce counter is incremented with Anti-bounce counter increment for intake air temperature sensor diagnosis.

The anti-bounce counter reaches Maximum value of the anti-bounce counter for air intake temperature sensor diagnosis, then intake air temperature sensor error is true ,else false.

If indicating time delay has elapsed, and Air intake temperature value measured less than intake air temperature threshold, then `Signal Line Short to Battery Voltage` or `Signal Line Break` is detected, and anti-bounce counter is incremented with Anti-bounce counter increment for intake air temperature sensor diagnosis.

If the anti-bounce counter reaches Maximum value of the anti-bounce counter for air intake temperature sensor diagnosis. then intake air temperature sensor error is true, else false .

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Title : Description of EOBD system Type : LF7160L1	Drawing no. : None Directive : - Regulation : 83

- Monitoring condition
 - ignition key status Is on
 - battery voltage condition is fulfilled for remaining diagnosis.
- DTC
 - P0112 Intake Air Temperature Circuit Low Input
 - P0113 Intake Air Temperature Circuit High Input

4.5 Coolant Temperature Sensor Diagnosis (TCO)

The diagnosis of the engine coolant temperature sensor (ECT sensor) consists of circuit continuity and rationality checks of the coolant's temperature behavior.

➤ Circuit continuity checks

The circuit continuity check compares the measured engine coolant temperature with an upper and a lower calibration to detect out-of-range values.

If the coolant temperature signal exceeds the upper calibration limit for a calibrated period of time, 'Signal Line Short to Ground' is detected.

If the coolant temperature signal lies below the lower calibration limit for a calibrated period of time, 'Signal Line Short to Battery' or 'Signal Line Break' is detected.

➤ Monitoring conditions for circuit continuity check

- ignition switched on
- battery voltage condition fulfilled for remaining diagnosis

➤ Rationality checks

To determine the rationality of the ECT sensor several checks are performed.



Rationality check with stuck signal:

The stuck signal is calculated with the help of a temperature model. This calculated temperature is reduced by a calibrated safety margin and compared with the actual measured engine coolant temperature. If the substitute coolant temperature exceeds minimum value and the measured coolant temperature does not rise in the expected way, TCO Stuck Signal Failure is detected.

Rationality check with the gradient of the temperature sensor voltage:

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The gradient of the temperature sensor voltage is calculated and compared with two different thresholds.

If the absolute voltage gradient exceeds the maximum threshold for a calibrated amount of events, TCO Signal Gradient Failure is detected.

Also if the absolute voltage gradient does not exceed the maximum threshold, TCO Signal Gradient Failure is healed.

- Monitoring conditions for rationality check
 - ignition switched on
 - battery voltage condition fulfilled for remaining diagnosis

➤ DTC

- P0117 Engine Coolant Temperature Circuit low input
- P0118 Engine Coolant Temperature Circuit high input
- P0116 Engine Coolant Temperature Circuit Range/Performance
- P0119 Engine Coolant Temperature Circuit Intermittent

4.6 Canister Purge Solenoid Diagnosis (CPS)

➤ Logic description

The purpose is to diagnose the output signals from the driver which controls the canister purge solenoid valve.

- Monitoring conditions
 - ignition key is on
 - boolean for battery voltage condition fulfilled for OBD-I diagnosis

➤ Range Check

This Signal is tested ECU-internally by the Quad PWM Powerstage Diagnosis.

➤ Electrical Check

- Signal Line Short to Ground
- Signal Line Short to Battery Voltage
- Signal Line Break

➤ DTC

- P0444 Evap. Emission Control System - Purge Control Valve Circuit Open
- P0445 Evap. Emission Control System - Purge Control Valve Circuit Shorted



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Title : Description of EOBD system	Drawing no. : None
Type : LF7160L1	Directive :- Regulation : 83

4.7 Injection Valve Diagnosis

➤ Logic description

The purpose is to diagnose the output signals from the drivers which control the injection valves.

➤ Monitoring conditions

- ignition key status is active
- battery voltage condition fulfilled for OBD-I diagnosis
- engine speed exceeds engine speed minimum threshold

➤ Electrical Check

- Signal Line Short to Ground
- Signal Line Short to Battery Voltage
- Signal Line Break

➤ Range Check

This Signal is tested ECU-internally by the Quad PWM Powerstage Diagnosis.

➤ DTC

Error Type: Signal below minimum Threshold

P0261 Injector #1
P0264 Injector #2
P0267 Injector #3
P0270 Injector #4

Error Type: Signal above maximum Threshold or No Signal

P0262 Injector #1
P0265 Injector #2
P0268 Injector #3
P0271 Injector #4



4.8 Knock Sensor diagnosis

➤ Logic description

The purpose is to observe the analog input signal from the knock sensor to the microcontroller.

The signal is checked continuously by a range check of the signal and with two

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algorithms, which observe the signal bandwidth. A Slave and a Master algorithm is used. Both algorithms have to show the same state to increment the anti-bounce counter.

➤ **Range check**

The absolute noise value of the knock sensor device is checked if it is inside the normal operating range.

The Master algorithm:

The bandwidth of the signal is evaluated for cylinder 2 and 3. In case of short to ground, short to battery or open load the bandwidth is smaller than during normal operation. To monitor the bandwidth of the signal the magnitude is compared with a calibratable threshold. If the bandwidth magnitude of cylinder 2 and 3 does not exceed the threshold the cycle counter is incremented by 1 every 360°. This cycle counter is reset as soon as the knock signal value of cylinder 2 or 3 exceeds the threshold. If the cycle counter reaches a calibratable number, a knock sensor failure can be detected if the slave algorithm confirms the failure also. After the failure has been detected the counter is decremented by 5 if the bandwidth of cyl. 2 or 3 exceeds the threshold and the state of the 'Slave algorithm' is void.

The Slave algorithm:

This algorithm uses the bandwidth of the signal as well. The bandwidths of cylinder 2 and 3 are accumulated via an integration method. The accumulated voltage value is compared every revolution with a calibratable threshold. As soon as the threshold is reached the cycle counter (incremented every 360°) is reset. If the cycle counter reaches a threshold before the voltage threshold is reached the failure is confirmed by the slave algorithm.

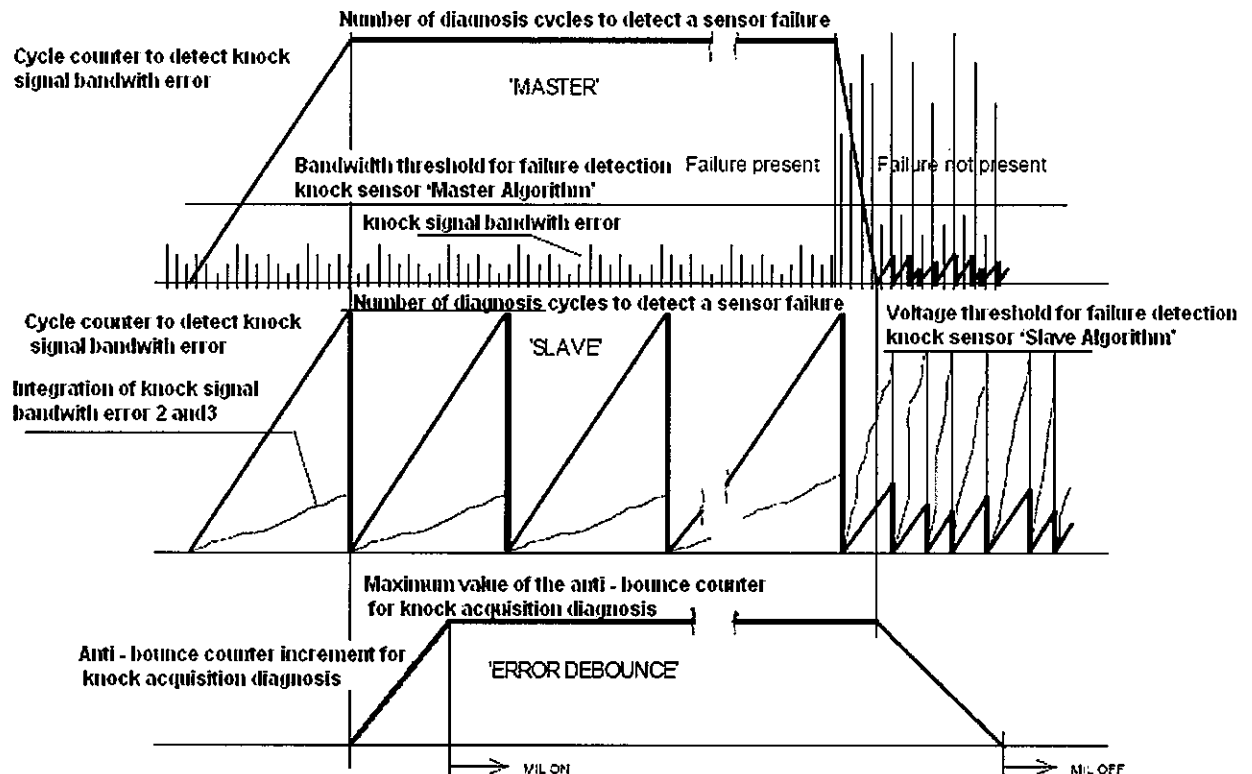
If both algorithms detect a failure, the debounce starts (anti-bounce counter is incremented). After the detection of the failure (anti-bounce counter equal to the max

value) the master algorithm only is used to observe the bandwidth of the signal. If at least one value of the bandwidths exceeds the threshold the counter is decremented by 5 every 360°. As soon as the counter reaches 0 the anti-bounce counter is decremented by 1 every 720°.

Description:



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➤ **Monitoring conditions**

- engine Operating State is out of “engine stop”, “start”, “trailing throttle” and “trailing throttle fuel cut – off”
- mass air flow exceeds the minimum value threshold for TCO
- mass air flow exceeds the minimum value threshold for diagnose
- engine speed exceeds the threshold to enable KNKS diagnosis
- no error currently present on crankshaft
- no error currently present on camshaft
- no communication failure (SPI bus) is present

➤ **DTC**

P0325 Knock Sensor Circuit Malfunction



4.9 Idle Speed Actuator Diagnosis (For stepper motor system)

4.9.1 Electrical Diagnosis

➤ **Logic description**

The purpose is to diagnose the output signal from the driver which controls the idle speed

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actuator, in this case, a stepper motor.

➤ Range check

The range check is performed by measuring the Idle Speed Actuator Command Signal and comparing them with their respective minimum and maximum calibrated values.

If the measured Signal is above maximum Threshold, *'Signal Line Short to Battery Voltage'* is detected.

If the measured Signal is below minimum Threshold, *'Signal Line Short to Ground'* is detected.

If there is no signal, *'Signal Line Break'* is detected.

➤ Monitoring conditions

- Ignition Key is open
- Battery voltage condition fulfilled for certain standard

➤ DTC

P0505 Idle Speed Actuator



4.9.2 Plausibility check

➤ Logic description

Engine speed deviation from the nominal engine speed is monitored when the vehicle is stopped and the idle speed valve opening is stable.

➤ Range check

The range check is performed by measuring the Idle Control System RPM and

comparing them with their respective minimum and maximum calibrated values.

If the measured RPM exceeds the calibrated maximum, *'Idle Control System RPM higher than expected'* is detected.

If the measured RPM lies below the calibrated minimum, *'Idle Control System RPM lower than expected'* is detected.

➤ Monitoring conditions

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- the difference to the nominal Idle Speed is too high

➤ DTC

- P0507 Engine Speed too high
P0506 Engine Speed too low

4.10 Air Condition Compressor Control Relay Diagnosis

➤ Logic description

The purpose is to diagnose the air condition compressor signal from the driver which controls the air condition compressor control relay.

The diagnosis takes place with a recurrence of 2 sec. only if the ignition key is on, the boolean for battery voltage condition fulfilled for OBD-I diagnosis is TRUE and air condition control is active.

➤ Monitoring conditions

- ignition key is on
- boolean for battery voltage condition fulfilled for OBD-I diagnosis
- Status information for climate control is enable

➤ Electrical Check

- Signal Line Short to Ground
- Signal Line Short to Battery Voltage
- Signal Line Break

➤ Range Check

This Signal is tested ECU-internally by the Octal Static Powerstage Diagnosis

➤ DTC:

- P1545 A/C Clutch Relay Circuit Malfunction



4.11 Ignition Diagnosis

➤ Logic description

The purpose of this diagnosis function is to detect all major failures which can happen between ECU output and spark plugs, including :

- worn out plug (gap of the plug becoming too large with age)

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Title : Description of EOBD system Type : LF7160L1	Drawing no. : None Directive :- Regulation : 83

- wiring fault or failure (connection missing, open...)

This function is applicable with a [cyl.nr.] cylinder engine but the type of spark plugs and ignition coils (double or single output) must be taken into account.

The diagnosis is performed for each cylinder or each coil. The direct analog input signal from the specific ignition coil (following the firing order) is sent to the microcontroller. The application recurrence is one segment (180 °CRK) with a resolution of 4 µsec.

Every value measured is diagnosed only if ignition key status is active and battery voltage condition fulfill for OBD-I diagnosis.

Fault detection is based on ignition coil primary overvoltage measurement. The presence of overvoltage verifies the primary continuity. The duration of this overvoltage allows to detect open circuit on the secondary side.

This ignition diagnosis function provides a detection of missing spark from the ignition coil primary over voltage duration.

This duration is measured with a gated timer of the micro-processor. The gated timer is allowed to count after the turn-off of the ignition output until the turn-off of the following ignition output, to ensure a correct measurement in case of spark break-off.

The ignition coil primary overvoltage of each ignition output of engines up to 3 cylinders are not overlapping in the normal operating mode at maximum engine speed for detection of signal acquisition input failure. The software strategy must detect overlapping.

➤ **Description:**

The diagnosis hardware measures the spark duration from the ignition output. The ignition coil primary overvoltage on the ignition output is roughly equal to the voltage across the spark gap divided by the ignition coil transformation ratio, superimposed on the battery voltage.

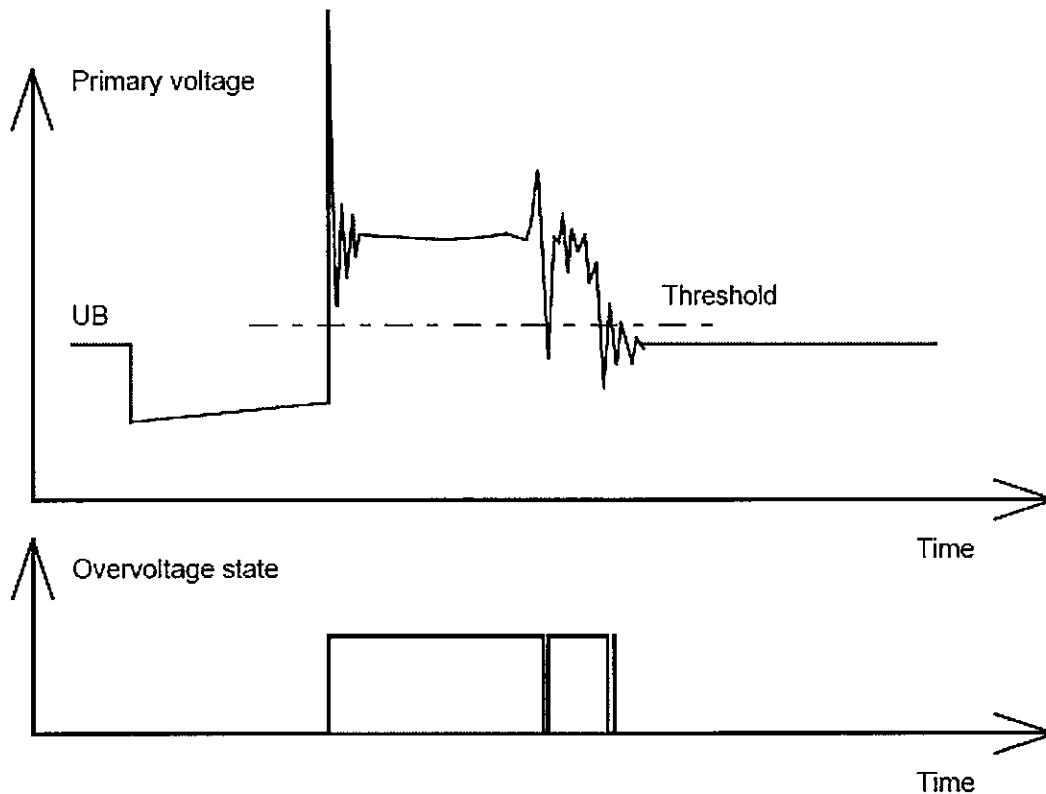
The measurement of the time during which the overvoltage exceeds an applicable threshold represents the spark duration.

When the spark is "burning", there can be noise on the ignition coil primary overvoltage, larger than the threshold and even larger than the battery voltage. Therefore, an input analog low-pass filter is necessary to prevent high frequency noise and to avoid error measurement.



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In addition, the gated timer calculates the sum of all the periods where over-voltage is present and thus the measurement is less sensitive to residual digital noise.



➤ **Monitoring conditions**

- engine operating states "engine stopped" or "start" are exited
- Coolant temperature exceed coolant temperature threshold to allow ignition diagnosis
- no cylinder shut-off (due to PUC, ASR, MSR, GS, application assistance, torque intervention, engine or vehicle speed limitation) is active
- 5 subsequent working cycles after cylinder shut-off are passed
- no error currently present on camshaft
- no error currently present on MAP-sensor
- no MAP-plausibility error currently present

➤ **DTC**

- P0351 Spark Plug #1
- P0352 Spark Plug #2
- P0353 Spark Plug #3



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P0354 Spark Plug #4

4.12 Cooling and Condenser Fans Control Relays Diagnosis

➤ Logic description

The purpose is to diagnose the cooling and condenser fans control signals from the driver which controls the cooling and condenser fans. The diagnosis takes place with a recurrence of 2 sec.

➤ Monitoring condition

- ignition switched on
- battery voltage condition fulfilled for OBD-I diagnosis
- no Signal Line Short to Ground'
- no Signal Line Break'
- no Signal Line Short to Battery Voltage

➤ DTC

P1624 Relay - "Low" Circuit
P1625 Relay - "High" Circuit

4.13 Malfunction Indicator Light Diagnosis (MIL) - (Check Engine Light)

➤ Circuit continuity checks

The circuit continuity check compares the malfunction indicator light control signal with an upper and a lower calibration to detect out-of-range values.

If the malfunction indicator light control signal exceeds the upper calibration limit, 'Signal Line Short to Battery Voltage' is detected .

If the malfunction indicator light control signal lies below the lower calibration limit, 'Signal Line Short to Ground or 'Signal Line Break' is detected .

➤ Monitoring conditions for circuit continuity check

- ignition switched on
- battery voltage condition fulfilled for OBD-I diagnosis

➤ DTC

P0650 Diagnostic Lamp Powerstage Malfunction



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4.14 Electrical Fuel Pump Relay Diagnosis (RLY_EFP)

➤ Circuit continuity checks

The circuit continuity check compares the electrical fuel pump relay control signal with an upper and a lower calibration to detect out-of-range values.

If the electrical fuel pump relay control signal exceeds the upper calibration limit, 'Signal Line Short to Battery Voltage' is detected .

If the electrical fuel pump relay control signal lies below the lower calibration limit, 'Signal Line Short to Ground or 'Signal Line Break' is detected .

➤ Monitoring conditions for circuit continuity check

- battery voltage less than battery voltage threshold for low voltage detection for OBD-I variants

➤ DTC

P0230 Fuel Pump Circuit Malfunction

4.15 Manifold Air Pressure Sensor Diagnosis (MAP)

The purpose is to diagnose the analog input signal from manifold air pressure sensor.

Two errors can be detected by range-check:

➤ Range check

The range check is performed by measuring the Manifold absolute pressure signals and comparing them with their respective minimum and maximum calibrated values.

If the measured the Manifold absolute pressure signal exceeds the calibrated maximum, 'Signal Line Short to Battery Voltage or Ground line Break' is detected.

If the measured the Manifold absolute pressure signal lies below the calibrated minimum, 'Signal Line Short to Ground or Signal line break' is detected.

➤ Monitoring conditions

- Ignition Key is open
- Battery voltage condition fulfilled for certain standard



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➤ DTC

- P0107 MAP sensor circuit Low
P0108 MAP sensor circuit High

4.16 AC evaporator temperature diagnosis

➤ Logic description

The purpose is to diagnose the analog input signal (TACE) from AC evaporator temperature sensor to the micro-controller. The diagnosis is performed only in case of presence of Air Conditioning system request

➤ Monitoring conditions

- ignition key status is active
- battery voltage condition fulfilled for OBD-I diagnosis
- ACC diagnosis is authorized
- Coolant temperature exceeds the minimum water temperature for diagnosis

➤ Range Detect

- If Evaporator temperature sensor raw acquisition exceeds a maximum threshold, "Short to Ground" is detected
- If Evaporator temperature sensor raw acquisition exceeds a minimum threshold, "Short to Battery Voltage" or "Line Break" is detected

➤ DTC

- P1536 Signal below minimum Threshold
P1535 Signal above maximum Threshold



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5 ECU-selftest

➤ Logic description

The purpose of the test is the check of ram areas and communication connections. In the stored ECU-failure bytes the error location is specified more detailed. Most of the checks are performed during system start-up.

➤ Error Detect

Diagnosis of the communication microcontroller-OCTAL-driver respectively microcontroller-QPS via SPI interface.

➤ DTC

P0605 Internal Control Module Read Only Memory (ROM) Error



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6. Additional OBD information used for the original type approval of the vehicle

Component	Catalyst	Engine misfire	Oxygen sensor	Canister Purge Solenoid
Fault code	P0420	P0300 P0301 P0302 P0303 P0304	P0134	P0444 P0445
Monitoring strategy	Oxygen sensor 1 and 2 signals	Target wheel segment time variation	Oxygen sensor signal	Purge Control Valve Circuit signal
Fault detection criteria	Difference between sensor 1 and sensor 2 signals	Increasing segment time	Oxygen sensor signal voltage < 0.4	Purge Control Valve Circuit open, Purge Control Valve Circuit short
MI activation criteria	2nd cycle	2nd cycle (Misfire Type B) 1st cycle (Misfire Type A)	2nd cycle	2nd cycle
Secondary parameters	Engine speed, Engine load, A/F mode, Catalyst temperature	Camshaft signal, Crank signal, Engine speed, Engine load, Throttle position	Oxygen sensor signal, MAF, Coolant temperature, Engine running time	VB, Purge Control Valve Circuit signal,
Preconditioning	One type I cycle	One type I cycle (Misfire Type B) None (Misfire Type A)	One type I cycle	One type I cycle
Demonstration test	Type I	Type I	Type I	Type I



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7. Table of DTCs

DTC Error Location and Error Type

DTC	CONTENTS
P0002	Fuel Volume Regulator Control Circuit Range/Performance
P0030	HO2S Heater Control Circuit Bank 1 Sensor 1
P0031	HO2S Heater Control Circuit Low (Bank1 Sensor1)
P0032	HO2S Heater Control Circuit High (Bank1 Sensor1)
P0036	HO2S Heater Control Circuit Bank 1 Sensor 2
P0037	HO2S Heater Control Circuit Low (Bank1 Sensor2)
P0038	HO2S Heater Control Circuit High (Bank1 Sensor2)
P0106	Manifold Absolute Pressure System Performance
P0107	Manifold Absolute Pressure Circuit Low Input
P0108	Manifold Absolute Pressure Circuit High Input
P0112	Intake Air Temperature Circuit Low Input
P0113	Intake Air Temperature Circuit High Input
P0116	Engine Coolant Temperature Circuit Range/Performance
P0117	Engine Coolant Temperature Circuit Low Input
P0118	Engine Coolant Temperature Circuit High Input
P0119	Engine Coolant Temperature Circuit intermittent
P0121	Throttle Position Sensor A Circuit Range/Performance
P0122	Throttle/Pedal Position Sensor/Switch "A" circuit Low Input
P0123	Throttle/Pedal Position Sensor/Switch "A" circuit High Input
P0125	Engine Coolant Temperature [ECT] Excessive Time To Closed Loop Fuel Control
P0128	Coolant Thermostat (Coolant Temp Below Thermostat Regulating Temperature)
P0130	O2 Sensor Circuit Malfunction (Bank1 Sensor1)
P0131	O2 Sensor Circuit Low Voltage (Bank1 Sensor1)
P0132	O2 Sensor Circuit High Voltage (Bank1 Sensor1)
P0133	HO2S Slow Response Bank 1 Sensor 1
P0134	O2 Sensor No Activity Detected (Bank1 Sensor1)
P0136	O2 Sensor Circuit Malfunction (Bank1 Sensor2)
P0137	O2 Sensor Circuit Low Voltage (Bank1 Sensor2)
P0138	O2 Sensor Circuit High Voltage (Bank1 Sensor2)
P0140	O2 Sensor Circuit No Activity Detected (Sensor2)
P0171	Fuel Trim System Lean Bank 1
P0172	Fuel Trim System Rich Bank 1
P0230	Fuel Pump Primary Circuit Malfunction
P0261	Cylinder 1 Injector Circuit Low



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P0262	Cylinder 1 Injector Circuit High
P0264	Cylinder 2 Injector Circuit Low
P0265	Cylinder 2 Injector Circuit High
P0267	Cylinder 3 Injector Circuit Low
P0268	Cylinder 3 Injector Circuit High
P0270	Cylinder #4 Injector Circuit Low
P0271	Cylinder #4 Injector Circuit High
P0300	Misfire
P0301	Cylinder 1 Misfire Detected
P0302	Cylinder 2 Misfire Detected
P0303	Cylinder 3 Misfire Detected
P0304	Cylinder 4 Misfire Detected
P0325	Knock Sensor 1 Circuit Malfunction (Bank 1 or Single Sensor)
P0335	Crankshaft Position Sensor "A" Circuit Malfunction
P0340	Camshaft Position Sensor "A" Circuit Malfunction
P0351	Ignition Coil 'A' Primary/Secondary Circuit Malfunction (CYL#1)
P0352	Ignition Coil 'B' Primary/Secondary Circuit Malfunction (CYL#2)
P0353	Ignition Coil 'C' Primary/Secondary Circuit Malfunction (CYL#3)
P0354	Ignition Coil 'D' Primary/Secondary Circuit Malfunction (CYL#4)
P0420	Catalyst System Efficiency Below Threshold (Bank 1)
P0441	Evaporative Emission Control System Incorrect Purge Flow
P0442	Evaporative Emission Control System Leak Detected (small leak)
P0444	Evap. Emission Control System - Purge Control Valve Circuit Open
P0445	Evap. Emission Control System - Purge Control Valve Circuit Shorted
P0447	EVAP Vent Valve Control Circuit Open
P0448	EVAP Vent Valve Control Circuit Shorted
P0449	EVAP Canister Vent Solenoid Valve Control Circuit
P0450	Evaporative Emission Control System Pressure Sensor
P0451	Evaporative Emission Control System Pressure Sensor Range/Performance
P0452	Evaporative Emission Control System Pressure Sensor Low Input
P0453	Evaporative Emission Control System Pressure Sensor High Input
P0454	Evaporative Emission System Pressure Sensor/Switch Intermittent
P0455	Evaporative Emission Control System Leak Detected (gross leak/no flow)
P0456	Evaporative Emission Control System Leak Detected (very small leak)
P0457	Evaporative Emission Leak Detected (fuel cap loose/off)
P0501	Vehicle Speed Sensor Range/Performance
P1502	Open Wire Magnetic Wheel Speed Sensor
P0505	Idle Speed Actuator Command Signal Incorrect
P0506	Engine Speed too low



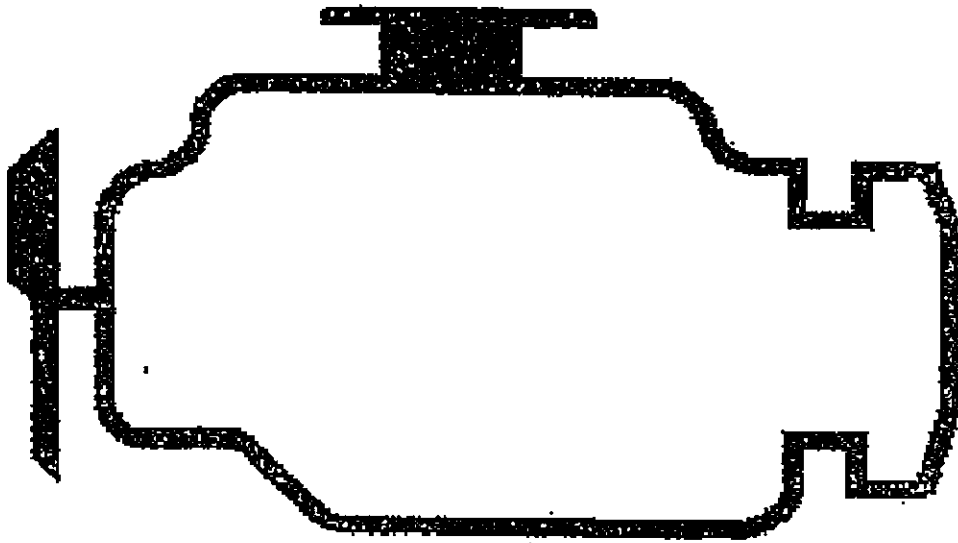
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P0507	Engine Speed too high
P0526	Fan Speed Sensor Circuit
P0560	System Voltage
P0561	System Voltage Unstable
P0562	System Voltage Low
P0563	System Voltage High
P0600	Serial Communication Link
P0605	Internal Control Module Read Only Memory (ROM) Error
P0650	Malfunction Indicator Lamp(MIL) Control Circuit
P0648	Immobilizer Lamp Control Circuit
P1134	
P1166	O2 Sensor - Lambda Controller at the limit(Bank1)
P1167	O2 Sensor - Lambda Controller at the limit(Bank2)
P1372	Crankshaft Position Sensor Circuits Performance
P1507	Idle Air Control Under speed Error
P1508	Idle Air Control System Low Closed
P1529	Heated Windshield Request
P1535	AC evaporator Temperature Circuit high - SCB or OC
P1536	AC evaporator Temperature Circuit Low Input - SCG
P1545	A/C Clutch Relay Circuit Malfunction
P1602	TCU1 TIMEOUT
P1609	
P1610	
P1624	Cooling Fan Relay - Circuit Malfunction ("Low/High" Circuit)
P1625	Cooling Fan Relay - Circuit Malfunction ("Low/High" Circuit)
P1700	
P1801	
P1802	
P1803	
P1805	
P000A	"A"Camshaft Position Actuator Circuit Bank 1
P000B	"A" Camshaft Position - Timing Over - Advanced or System Performance Bank 1
P000C	"A" Camshaft Position - Time Over - Retarded Bank 1
P000D	"B" Camshaft Position - Actuator Circuit Bank 1



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6 MIL Symbol



- Color : Yellow

