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Component/ System	Fault Code	Monitor Strategy Description	Primary Malfunction Signal and Criteria	Threshold Logic	Threshold Value	Threshold Units	Threshold Conditions	Secondary Parameters	Enable Logic	Enable Value	Enable Units	Threshold Conditions	Time Required	Frequency of Checks	Criteria for Code
Catalyst Bank 1	P0420	oxygen storage of catalyst	normalized oxygen storage less than normalized oxygen storage of a limit catalyst	<	1	factor	<1factor	exhaust gas mass flow	>	8.33	g/sec	>8.33g/sec	approx.	0.01 sec	0.4 sec
								exhaust gas mass flow	<	27.78	g/sec	<27.78g/sec	1000 sec		continuous
								catalyst temp. model	<	700	° C	<700° C	during	one	or 4 sec
								catalyst temp. model	>	390	° C	>390° C	active	completed	cumulative
								engine speed	>	1000	rpm	>1040rpm	driving	test per	
								engine speed	<	3520	rpm	<3520rpm		driving	
								engine load	>	14 …. 17	%	>14 …. 17%	one test	cycle	
								engine load	<	42….55	%	<42….55%			
								modeled catalyst temp. gradient	<	2.5	° C / sec	<2.5° C / sec	(average		
								exhaust gas mass flow gradient	<	8.33	g/sec²	<8.33g/sec²	of 4		
								fuel system closed loop	active	-	-	active--	checks)		
								time after engine start	>	235	sec	>235sec	per driving		
								ambient temperature	>	-48	° C	>-48° C	cycle		
								scheduled by System Manager	TRUE	-	-	TRUE--			
								secondary O2 sensor	ready			ready			
								fuel adaptation fault	FALSE			FALSE			
								short term fuel trim (< max)	<	1.25	factor	<1.25factor			
								short term fuel trim (> min)	>	0.75	factor	>0.75factor			
								transient fuel control	FALSE			FALSE			
								critical misfire rate detected	FALSE			FALSE			
								cat. damaging misfire rate exceeded	FALSE			FALSE			
								cat oxygen storage neutralization	FALSE			FALSE			
Misfire		crankshaft speed	emissions relevant misfire rate	>	1.3	%	>1.3% (emission relevant misfire rate = 1.5%)	engine speed	>	450	rpm	>450rpm	1000 revs	cylinder	immediate
Emission Level		fluctuation cylinder 1 to						engine speed	<	6500	rpm	<6500rpm		firing	
Multiple Cylinder	P0300	cylinder 6						indicated torque (idle, no drive)	>	3.91	%	>3.91%		frequency	
Cylinder #1	P0301							indicated torque (drive) (MISALUN)	>	3.91 . . . 17.19	%	>3.91 . . . 17.19%			After
Cylinder #2	P0302							engine speed gradient	<	12800	rpm/sec	<12800rpm/sec		continuous	detection,
												(not active)			
Cylinder #3	P0303							volumetric efficiency gradient	<	768	%/rev	<768%/rev			the
												(not active)			
Cylinder #4	P0304							cylinder events after engine start	>	6	ignitions	>6ignitions			diagnostic
Cylinder #5	P0305							air temperature	>	-30	° C	>-30° C			can only
Cylinder #6	P0306							rough road	not detected	-	-	not detected--			pass if
								traction control	off	-	-	off--			similar
								clutch switch press / release	off	-	-	transitionFALSE-			conditions
								leak detection	off	-	-	off--			are
								active handling	not active			not active			encountered
								ABS	not active	-	-	not active--			
								engine drag control	not active	-	-	not active--			
								fuel cut off	not active	-	-	not active--			
								fuel level	>	5.9	%	> 5.93 %			
								OR fuel level	<	5.9	%	> 5.93 %			
								AND solid misfire MIL	on	-	-	on--			
								OR fuel level error	set	-	-	set--			
								error: throttle position	not set	-	-	not set--			
								error: crankshaft sensor	not set	-	-	not set--			
								error: ref.mark of crank sensor	not set	-	-	not set--			
										-	-	--			
										-	-	--			
										-	-	--			
			OR							-	-	--			
Catalyst Damaging Level			Catalyst damaging misfire rate	>	16.2 . . . 6.8	%	>16.2 . . . 6.8%	Includes all the above with the					1000 revs		
Multiple Cylinder	P0300				see Misfire		see Misfire	following exceptions:					First interval		
Cylinder #1	P0301				supplemental		supplemental	First interval extention					200 revs		
Cylinder #2	P0302				data		data	engine coolant temperature	<	-48	°C	<-48°C	all remaining		
Cylinder #3	P0303				(h) (2.5.1)		(h) (2.5.1)	fuel level	>=	6.19	%	> 6.19 %	intervals		
Cylinder #4	P0304							OR fuel level	<	6.19	%	> 6.19 %			
Cylinder #5	P0305							AND blinking MIL	blinking	-	-	blinking--			
Cylinder #6	P0306							AND NOT first blink event	-	-	-	---			

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Component/ System	Fault Code	Monitor Strategy Description	Primary Malfunction Signal and Criteria	Threshold Logic	Threshold Value	Threshold Units	Threshold Conditions	Secondary Parameters	Enable Logic	Enable Value	Enable Units	Threshold Conditions	Time Required	Frequency of Checks	Criteria for Code
evaporative system															
canister ventilation valve (AAV)	P0446	monitoring of tank pressure while AAV is open and CPV is closed	tank pressure too low because canister vent. defective & closed	<	-10.50049	hPa	< -10.50049 hPa	ambient temperature	>=	-9.8	°C	>= -9.8 °C	< 20 sec	once per dcy	2,6 secs
								ambient temperature	<=	45	°C	<= 45 °C			
								ambient pressure	>=	680.00	hPa	>= 680.00 hPa			
								vehicle speed	<=	1,86	mph	<= 1,86 mph			
								engine is in idle mode	true			true			
								unfiltered tank pressure	>=	-18.00	hPa	>= -18.00 hPa			
								and unfiltered tank pressure	<=	10.00	hPa	<= 10.00 hPa			
canister purge valve (CPV)	P0496	monitoring of tank pressure while CPV and AAV are closed	final pressure too low because CPV defective and open	<	-1.00098	hPa	< -1.00098 hPa	battery voltage	>=	10.45	V	>= 10.45 V	ca. 10 sec	once per dcy	
								and battery voltage	<=	18.00	V	<= 18.00 V			
								lambda control is active	true			true			
								secondary air pump inactive	true			true			
								secondary air diagnosis inactive	true			true			
								air bag hasn't been triggered	true			true			
								no torque reduction (e.g. resulting from switched-off cylinder)	true			true			
	P0497	monitoring of tank pressure while CPV and AAV are closed	purge control stuck closed					critical misfire rate	false			false			
								ratio intake manifold pressure /ambient pressure	<	0.602		< 0.602			
								fault of canister purge valve in actual driving cycle	false			false			
tank leak large	P0455	AAV is closed and CPV is open	vacuum pressure built up gradient too low	<	0.450039 ...0.750065	hPa/s	< 0.450039 ...0.750065 hPa/s	fault of canister ventilation valve in actual driving cycle	false			false	ca. 18 sec	once per dcy	
			because of large tank leakage (for example: open gas filler cap)					tank fuel level	>=	3.900	l	>= 3.900 l			
								and tank fuel level	<=	55.100	l	<= 55.100 l			
								enabled by diagnostic scheduler	true			true			
								fuel system adaptation has completed	true			true			
								or time since engine start exceeds threshold	>	600	sec	> 600 sec			
Fuel Evaporative System	P0456	Monitor fuel tank's pressure after engine shutdown						Engine off natural vacuum diagnosis has not been performed in this driving cyle.	true				100ms in afterrun	once per dcy	2.6 secs
								Fuel evaporative system monitor (at engine on) didn't run nor detect large leak nor a tight system.	true						
								Engine coolant temperature at start.	<=	42.0	°C	true			
								engine coolant temp. At start - intake air temp.	<=	6.8	°C	true			
								intake air temperature	<=	35.3	°C	true			
								intake air temperature	>=	3.8	°C	true			
								ambient air temperature	<	36.8	°C	true			
								ambient air temperature	>	2.3	°C	true			
								engine has been running for a cal. min. time	>	600.00	s	true			
								engine coolant temp. at engine stop	>	59.3	°C	true			
								driving distance (in current dcy) covered	>=	8100.0	m	true			
								charcoal canister load factor	<	10.00	-	true			
								ambient pressure	>=	680.0	hPa	true			
								driving distance (for vehicle lifetime) covered	>	20	Km	true			
								the fuel tank's level isn't at its minimum	true						
								the fuel tank's level isn't at ist maximum	true						
								battery's voltage	>	11.00	V	true			
								no refueling activity	true						
								the fuel tank pressure is within cal. range	true						
								no intake air temperature faults	true						
								no the purge control system faults	true						
								no faults of the purge control valve's power stage	true						
								no vehicle speed sensor faults	true						
								no engine coolant temperature sensor faults	true						
								no tank pressure sensor rationality faults	true						
								no tank pressure sensor range faults	true						
								no power supply voltage faults	true						
								no main load sensor faults	true						
								no canister vent valve faults	true						
								no canister ventilation valve's power stage faults	true						
								no ambient pressure sensor faults	true						
		Close canister ventilation valve. Look for maximum pressure. Abort if: - max. pressure >= threshold.	max. pressure	>=	volume & ambient temperature dependent	hPa									
		- max. pressure - current pressure >= threshold.	max. pressure - current pressure	>=	0.30029	hPa	>= 0.30029 hPa								

Component/ System	Fault Code	Monitor Strategy Description	Primary Malfunction Signal and Criteria	Threshold Logic	Threshold Value	Threshold Units	Threshold Conditions	Secondary Parameters	Enable Logic	Enable Value	Enable Units	Threshold Conditions	Time Required	Frequency of Checks	Criteria for Code
		- pressure stays in range	pressure	>=	-0.69946	hPa	>= -0.69946 hPa								
		near zero for	pressure	<=	0.69946	hPa	<= 0.69946 hPa								
		a specific time.			500	s	500 s								
		- pressure <=													
		threshold	pressure	<=	-0.74951	hPa	<= -0.74951 hPa								
		for a specific time			30.00	s	30.00 s								
		(vacuum build-up instead													
		of pressure build-up)													
		- pressure-phase-time													
		>= threshold.	pressure phase time	>=	2400.00	s	>= 2400.00 s								
		- diagnostic-time >=													
		threshold	diagnostic time	>=	2900.00	s	>= 2900.00 s								
		correct max. pressure.													
		open canister ventilation													
		valve for a calibrated time.			400.00	s	400.00 s								
		Look for minimum pressure													
		Abort if:													
		- min pressure <=													
		threshold	min. pressure	<=			<=								
		- diagnostic time >=													
		threshold	diagnostic time	>=	2900.00	s	>= 2900.00 s								
		current pressure - min.													
		- pressure >= threshold	current pressure - min. pressure	>=	0.30029	hPa	>= 0.30029 hPa								
		AND													
		min. pressure <=													
		threshold	min. pressure	<=	-0.69946	hPa	<= -0.69946 hPa								
		- pressure stays in	pressure	>=	-0.69946	hPa	>= -0.69946 hPa								
		ambient range for a	pressure	<=	0.69946	hPa	<= 0.69946 hPa								
		specific time			500.00	s	500.00 s								
		- canister vent valve re-													
		opened for a more than N times	no. canister vent valve openings	>	2		> 2								
		because the pressure													
		exceeds a threshold	pressure		0.74951	hPa	0.74951 hPa								
		Calculate difference													
		between corrected max.													
		pressure and min.													
		pressure.													
		Calculate normalized													
		result. First divide the													
		pressure difference by a													
		parameter. Then subtract			volume & ambient temperature dependent										
		this result from 1.													
		Filter the normalized													
		result with an EWMA													
		filter.													
		Compare filtered result	Filtered result	>	0.399994		> 0.399994								
		with threshold.													
		N results will be taken			4		4								
		into account in order to													
		determine a pass.													
		A fault will be indicated													
		immediately.													

Component/ System	Fault Code	Monitor Strategy Description	Primary Malfunction Signal and Criteria	Threshold Logic	Threshold Value	Threshold Units	Threshold Conditions	Secondary Parameters	Enable Logic	Enable Value	Enable Units	Threshold Conditions	Time Required	Frequency of Checks	Criteria for Code
secondary air system	P0411	passive functional check	relative secondary air mass flow. Ratio from calculated secondary air mass by oxygen sensor signal and secondary air mass model	<	0.273		< 0.273	start with catalyst heating	active				< 5s	one	2.6 sec
								secondary air system	active						
								HO2S sensor specific values	active					complete	
								intake air temperature	>	0	°C	> 0 °C		test per dcy	
								intake air temperature	<	80.3	°C	< 80.3 °C		(only, if	
								engine coolant temperature	>	5.3	°C	> 5.3 °C		secondary-	
								engine coolant temperature	<	120	°C	< 120 °C		air-system	
								ratio: (MAP Model / Baro)	<	0.7		< 0.7		was active)	
								no error on altitude detection	avtive						
								fuel trim error	false						
								misfire	false						
								error: multiple misfire	false						
								error: HFM	false						
								error: intake air	false						
								error: motor temperature	false						
								error: secondary air pump (power stage)	false						
								error: canister purge system diagnosis	false						
								error: canister purge valve power stage	false						
								error: power supply voltage UB	false						
								error: lambda sensor heating upstream cat	false						
								error: fault from diagnostics of fuel supply system	false						
								error: lambda sensor upstream catalyst	false						
								condition for basic mixture adaptation disabled	false						
								enabled by the diagnostic scheduler	true						
								fuel cut off	false						
								mixture adaptation for secondary air diagnosis is in steady state	active						
								mass airflow	>	6	kg/h	> 6 kg/h			
								mass airflow	<	150	kg/h	< 150 kg/h			
								change in air charge per working cycle	<=	7	%	<= 7 %			
		active flow check seperate/additional enable conditions, different threshold	relative secondary air mass flow. Ratio from calculated secondary air mass by oxygen sensor signal and secondary air mass model	<	0.555 - 0.531		< 0.555 - 0.531	all other enabling conditions as for passive functional check					< 10s		
								mass airflow	<	6	kg/h	< 6 kg/h			
								mass airflow	>	100	kg/h	> 100 kg/h			
								change in air charge per working cycle	>=	-7	%	>= -7 %			
								change in air charge per working cycle	<=	7	%	<= 7 %			
								engine idle	true						
								vehicle speed	<	2.5	km/h	< 2.5 km/h			
								integrated air mass flow from engine start to max. va	>	0.499	kg	> 0.499 kg			
								time counter at end of start	>	143.5	sec	> 143.5 sec			
								condition filter frm deviation inside the allowed area	>	-0.119		> -0.119			
									<	0.119		< 0.119			
								release of active diagnosis from permitted numbers of active diagnosis	active						
Fuel System Rich/Lean Multiplicative and Additive	P2191	fuel trim limits exceeded	delta lambda correction	>	1.175	factor	>1.175factor	fuel system status	closed loop	-	-	closed loop--	approx.	0.1 sec	0.4 sec
	P2192	range - multiplicative (load > threshold and air flow > threshold)	or delta lambda correction	<	0.825	factor	<0.825factor	long term fuel trim status	active	-	-	active--	300 sec	continuous	continuous or 4 sec cumulative
								engine coolant temperature	>	50.3	°C	>50.3°C	from engine		
	P2187	range - additive	delta fuel load correction	>	5.25	%	>5.25%	purge control	not active	-	-	not active--	start (after		
	P2188	low speed and low load	or delta fuel load correction	<	-5.25	%	<-5.25%	intake air temperature	<=	65.3	°C	<=65.3°C	adaptation		
								fuel level	>	6.19	%	> 5.92 %	has		After detection, diagnostic can only pass if similar conditions are encountered
								or fuel level error	set	-	-	set--	stabilized)		
								integrated air mass	>=	2800	g	>=2800g			
demand controlled fuel supply (DECOS)	P0088	difference between measured and set-point fuel rail pressure	fuel rail pressure difference	<	- 150	kPa	< - 150 kPa	DECOS fuel pump is active	true			true	5 sec	continuous	0.2 sec
								DECOS fuel control is enabled	true			true			
								time after engine start	>	1	sec	> 1 sec			
	P0089	difference between actual necessary and pre-control	duty cycle difference	<	-25	%	< -25 %	time after hot start	>	6	sec	> 6 sec			
								no fault of							

Component/ System	Fault Code	Monitor Strategy Description	Primary Malfunction Signal and Criteria	Threshold Logic	Threshold Value	Threshold Units	Threshold Conditions	Secondary Parameters	Enable Logic	Enable Value	Enable Units	Threshold Conditions	Time Required	Frequency of Checks	Criteria for Code
		duty cycle						- fuel pressure sensor (DECOS) - power stage of demand controlled fuel pump	true true			true true			
	P0087	difference between measured and set-point fuel rail pressure	fuel rail pressure difference	>	150	kPa	> 150 kPa	DECOS fuel pump is active DECOS fuel control is enabled time after engine start	true true >	 1	 sec	true true > 1 sec			
	P0089	difference between actual necessary and pre-control duty cycle	duty cycle difference	>	25	%	> 25 %	time after hot start no fault of - low pressure fuel sensor (DECOS) - power stage of demand controlled fuel pump no empty or almost empty fuel tank	> true true true	6	sec	> 6 sec true true true			
fuel pressure sensor (DECOS)	P0193 P0192	cirtcuit continuity - high or open cirtcuit continuity - low	measured sensor voltage measured sensor voltage	> <	4.7 0.3	V V	> 4.7 V < 0.3 V	fuel supply system is active	true			true	0.5 sec	continuous	0.2 sec
	P0193	range check - high	measured fuel pressure	>	680	kPa	> 680 kPa						5 sec		
	P0192	range check - low	measured fuel pressure	<	60	kPa	< 60 kPa	fuel supply system is active time after power fail	true >=	360	sec	true >= 360 sec	5 sec		
Diagnosis of Power Control Module								**general enabling conditions** battery voltage locking request immobilizer	 < > false	18 10	V V	< 18 V > 10 V false	0.6 sec	continuous	0.2 sec
	P0092	diagnosis short circuit to battery voltage only active if powerstage on	backward powerstage voltage of fuel pump diagnosis **and** backward powerstage voltage of fuel pump diagnosis **and** duty cycle PCM	> > <	3.9014 2.7979 100	V V %	> 3.9014 V > 2.7979 V < 100 %	**special enabling condition** condition output duty cycle PCM for power on diagnosis	true			true			
		diagnosis short circuit to battery voltage only active if powerstage off	backward powerstage voltage of fuel pump diagnosis	>	3.9014	V	> 3.9014 V	condition output duty cycle PCM for power off diagnosis	false			false			
	P0091	diagnosis short circiut to ground only active if powerstage on	backward powerstage voltage of fuel pump diagnosis **and** duty cycle PCM	<= >	2.3486 0	V %	<= 2.3486 V > 0 %	condition output duty cycle PCM for power on diagnosis	true			true			
	P0090	diagnosis wire interruption only active if powerstage on	backward powerstage voltage of fuel pump diagnosis **and** duty cycle PCM **and** max-fault; powerstage diagnosis	> < false	2.4414 100 	V % 	> 2.4414 V < 100 % false	condition output duty cycle PCM for power on diagnosis	true			true			
		diagnosis wire interruption only active if powerstage off	backward powerstage voltage of fuel pump diagnosis **and** backward powerstage voltage of fuel pump diagnosis	> <	2.4414 3.9014	V V	> 2.4414 V < 3.9014 V	condition output duty cycle PCM for power off diagnosis	false			false			
	P0090	powerstage locked	condition fault message of PCM powerstage is locked	true			true								
Air / Fuel Ratio Sensor (primary A/F) sensor voltage bank 1 sensor 1	P0130	A/F sensor voltage exceeds threshold but not out of full range	A/F sensor voltage and A/F sensor voltage or AF sensor voltage	> < >	3.7 4.81 2.5	V V V	>3.7V <4.81V >2.5V	A/F sensor heater at operating temperature engine starting desired A/F all injectors activated scheduled by System Manager	TRUE complete < TRUE TRUE	- - 1.6 - -	- - lambda - -	TRUE-- complete-- <1.6lambda TRUE-- TRUE--	10 sec additional time if fuel level is low and not failed	0.1 sec continuous	0.4 sec continuous or 4 sec cumulative

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			and A/F sensor voltage (if using rich calibration curve characteristic)	 <	 3.06	 V	 <3.06V						600 sec		
Air / Fuel Ratio Sensor (primary A/F) integrated circuit interface bank 1	P0130	A/F sensor voltage IC correction too high	A/F sensor voltage IC corrective value	>	0.1	V	>0.1V	battery voltage battery voltage engine engine starting	< > running complete	18 10.7 - -	V V - -	<18V >10.7V running-- complete--	10 sec	0.1 sec continuous	0.4 sec continuous or 4 sec cumulative
		A/F sensor IC operating voltage too low	low voltage	=	TRUE	- -	=TRUE- -	battery voltage battery voltage engine engine starting	> < running complete	10.7 18 - -	V V - -	>10.7V <18V running-- complete--	10 sec		
		A/F sensor IC SPI interface communication error	communication error	=	TRUE		=TRUE		> <	10.7 18	V V	>10.7V <18V			
		A/F sensor IC circuit write error at INIT register	write error	=	TRUE		=TRUE		running complete	- -	- -	running-- complete--			
Air / Fuel Ratio Sensor (primary A/F) pumping current circuit open bank 1 sensor 1	P2239	lambda control factor change above threshold	absolute value of lambda control factor change from the point when the secondary conditions are met	>	0.025	lambda	>0.025lambda	battery voltage battery voltage engine engine starting A/F sensor voltage A/F sensor voltage A/F sensor electrical trimming A/F sensor heater at op.temp. A/F sensor warm up control lambda closed loop control forced fuel trim amplitude | fuel trim forced amplitude | catalyst warm up control sec. O2 sensor proportional trim lean mixture inhibit lambda closed loop control init closed loop control startup	< > running complete < > not active TRUE complete TRUE TRUE > stable stable stable FALSE FALSE	18 10.7 - - 1.51 1.49 - - - - - 0.015 - - - - -	V V - - V V - - - - - lambda - - - - -	<18V >10.7V running-- complete-- <1.51V >1.49V not active-- TRUE-- complete-- TRUE-- TRUE-- >0.015lambda stable-- stable-- stable-- FALSE-- FALSE--	1.5 sec	0.1 sec continuous	0.4 sec continuous or 4 sec cumulative
Air / Fuel Ratio Sensor (primary A/F) pumping current circuit open bank 1 sensor 1	P2237	A/F sensor voltage within upper and lower thresholds and desired lambda is outside of upper or lower threshold	A/F sensor voltage and A/F sensor voltage	< >	1.51 1.49	V V	<1.51V >1.49V	battery voltage battery voltage engine engine starting target lambda above upper limit or below lower limit closed loop control A/F sensor heater at operating temperature A/F sensor electrical trimming A/F sensor dynamic response error: A/F sensor heating integrated exhaust gas mass	< > running complete > < TRUE TRUE not active not slow not set >	18 10.7 - - 1.01 0.99 - - - - - 400	V V - - lambda lambda - - - - - g	<18V >10.7V running-- complete-- >1.01lambda <0.99lambda TRUE-- TRUE-- not active-- not slow-- not set-- >400g	approx. 8 sec once the driving condition is met	0.1 sec continuous	0.4 sec continuous or 4 sec cumulative
Air / Fuel Ratio Sensor (primary A/F) pumping current circuit open bank 1 sensor 1	P2238	A/F sensor not lean enough during fuel shut off operation	A/F sensor voltage	<	1.7	V	<1.7V	battery voltage battery voltage engine engine starting time after fuel shut off A/F sensor heater at operating temperature	< > running complete > TRUE	18 10.7 - - 3 -	V V - - sec -	<18V >10.7V running-- complete-- >3sec TRUE--	5 sec	0.1 sec continuous	0.4 sec continuous or 4 sec cumulative
Air / Fuel Ratio Sensor (primary A/F) reference voltage circuit open bank 1 sensor 1	P2243	A/F sensor voltage above upper threshold or below lower threshold	A/F sensor voltage A/F sensor voltage	< >	0.2 4.7	V V	<0.2V >4.7V	battery voltage battery voltage engine	< > running	18 10.7 -	V V -	<18V >10.7V running--	2 sec	0.1 sec continuous	0.4 sec continuous or 4 sec

Component/ System	Fault Code	Monitor Strategy Description	Primary Malfunction Signal and Criteria	Threshold Logic	Threshold Value	Threshold Units	Threshold Conditions	Secondary Parameters	Enable Logic	Enable Value	Enable Units	Threshold Conditions	Time Required	Frequency of Checks	Criteria for Code
								engine starting	complete	-	-	complete--			cumulative
			for time	>	1	sec	>1sec	A/F sensor heating normal operation range for time	>	10	sec	>10sec			
								error: A/F sensor heater circuit	not set	-	-	not set--			
								A/F sensor internal resistance	>	1500	Ohms	>1500Ohms			
Air / Fuel Ratio Sensor (primary A/F) reference ground circuit open bank 1 sensor 1	P2251	measured A/F sensor internal resistance above upper threshold	A/F sensor internal resistance	>	1500	Ohms	>1500Ohms	battery voltage	<	18	V	<18V	5 sec	0.1 sec continuous	0.4 sec continuous or 4 sec cumulative
								battery voltage	>	10.7	V	>10.7V			
								engine	running	-	-	running--			
			for time	>	5	sec	>5sec	engine starting	complete	-	-	complete--			
								A/F sensor voltage	<	1.48	V	<1.48V			
								A/F sensor voltage	>	1.36	V	>1.36V			
								error: A/F sensor heater circuit	not set			not set			
								A/F sensor pump voltage shut off	FALSE	-	-	FALSE--			
								A/F sensor warm up control	complete	-	-	complete--			
								A/F sensor heater operation time	>	28	sec	>28sec			
								engine run time	>	28	sec	>28sec			
								battery voltage below heater switch off voltage for time	>	28	sec	>28sec			
								fuel cut in time	>	28	sec	>28sec			
								for a fuel cut off time	>	10	sec	>10sec			
								battery voltage exceed 11V time	>	28	sec	>28sec			
Air / Fuel Ratio Sensor (primary A/F) measuring (trim) current circuit open bank 1 sensor 1	P2626	A/F sensor voltage above threshold	A/F sensor voltage	>	4.81	V	>4.81V	battery voltage	<	18	V	<18V	2 sec	0.1 sec continuous	0.4 sec continuous or 4 sec cumulative
								battery voltage	>	10.7	V	>10.7V			
								engine	running	-	-	running--	additional time if fuel level is low and not failed		
								engine starting	complete	-	-	complete--			
								fuel cut off	TRUE	-	-	TRUE--			
								modeled exhaust temp in front of catalyst	<	750	° C	<750° C			
								A/F sensor heater at operating temperature	TRUE	-	-	TRUE--	600 sec		
Air / Fuel Ratio Sensor (primary A/F) general error causing open loop	P0130	general A/F sensor electrical fault	A/F sensor internal resistance	>	1500	Ohms	>1500Ohms	A/F sensor heater operation time	>	15	sec	>15sec	15 sec	0.1 sec continuous	immediate
								fuel cut in time	>	15	sec	>15sec			
								for a fuel cut off time	>	3	sec	>3sec			
								battery voltage	>	10.7	V	>10.7V			
								battery voltage	<	18	V	<18V			
								A/F sensor	ready			ready			
								A/F sensor heater pwr. stage err.	FALSE			FALSE			
								A/F sensor IC internal error	FALSE			FALSE			
								A/F sensor pin short circuit error	FALSE			FALSE			
								modeled exhaust gas temp. invalid	FALSE			FALSE			
								modeled exhaust gas temperature	>	0	°C	>0°C			
			calculated A/F sensor temperature	<	640	°C	<640°C	A/F sensor heater operation time	>	15	sec	>15sec	15 sec		
								fuel cut in time	>	15	sec	>15sec			
								for a fuel cut off time	>	3	sec	>3sec			
								battery voltage	>	10.7	V	>10.7V			
								battery voltage	<	18	V	<18V			
								A/F sensor	ready			ready			
								A/F sensor heater pwr. stage err.	FALSE			FALSE			
								A/F sensor IC internal error	FALSE			FALSE			
								A/F sensor pin short circuit error	FALSE			FALSE			
								modeled exhaust gas temp. invalid	FALSE			FALSE			
								modeled exhaust gas temperature	>	0	°C	>0°C			
			A/F sensor pin UN error set	=	TRUE		=TRUE								
				=	TRUE		=TRUE								
			A/F sensor pin VM error set	=	TRUE		=TRUE								
				=	TRUE		=TRUE								
			A/F sensor heater error set by after engine start diagnosis	=	TRUE		=TRUE								
				=	TRUE		=TRUE								
			A/F sensor heater error set by maximum heater output diagnosis	=	TRUE		=TRUE								
				=	TRUE		=TRUE								
Air / Fuel Ratio Sensor (primary A/F) reference ground circuit; reference voltage circuit; or measuring current circuit bank 1 sensor 1 - low volt	P0131	A/F sensor signal at VM	IC Circuit Status shorted low	=	TRUE	-	=TRUE-	battery voltage	<	18	V	<18V	25 sec	0.1 sec	0.4 sec

Component/ System	Fault Code	Monitor Strategy Description	Primary Malfunction Signal and Criteria	Threshold Logic	Threshold Value	Threshold Units	Threshold Conditions	Secondary Parameters	Enable Logic	Enable Value	Enable Units	Threshold Conditions	Time Required	Frequency of Checks	Criteria for Code
		(reference ground) below lower limit						battery voltage	>	10.7	V	>10.7V		continuous	continuous
		or A/F sensor signal at UN	IC Circuit Status shorted low	=	TRUE	-	=TRUE-	engine	running	-	-	running--			or 4 sec
		(reference voltage [Nernst voltage]) below lower limit						engine starting	complete	-	-	complete--			cumulative
		or A/F sensor signal at IA	IC Circuit Status shorted low	=	TRUE	-	=TRUE-								
		(measuring current trim circuit) below lower limit													
bank 1 sensor 1 - high volt	P0132	A/F sensor signal at VM	IC Circuit Status shorted high	=	TRUE	-	=TRUE-								
		(reference ground) above upper limit													
		or A/F sensor signal at UN	IC Circuit Status shorted high	=	TRUE	-	=TRUE-								
		(reference voltage [Nernst voltage]) above upper limit													
		or A/F sensor signal at IA	IC Circuit Status shorted high	=	TRUE	-	=TRUE-								
		(measuring current trim circuit) above upper limit													
Air / Fuel Ratio Sensor (primary A/F) response		dynamic response	A/F sensor dynamic value	<	0,2	ratio	< 0.2ratio	fuel trim forced amplitude	active	-	-	active--			
Bank 1 Sensor 1	P0133	slow or low amplitude						A/F sensor	ready	-	-	ready--	dynamic	0.01 sec	0.4 sec
						(versus	(versus	short term fuel trim (o.k.)	< MAX	1.25	factor	< MAX1.25factor	test	continuous	continuous
						reference	reference	short term fuel trim (o.k.)	> MIN	0.75	factor	> MIN0.75factor	sample		or 4 sec
						sensor)	sensor)	measured A/F minus integral control of secondary O2	<	1,05	lambda	<1.05lambda	count		cumulative
								measured A/F minus integral control of secondary O2	>	0,95	lambda	>0.95lambda	>		
								engine speed	<	2800	rpm	<2800rpm	35		
								engine speed	>	1160	rpm	>1160rpm	samples		
								volumetric efficiency	<	45	%	<45%			
								volumetric efficiency	>	17.25	%	>17.25%	then		
								volumetric efficiency gradient	<	30	%/sec	<30%/sec	2 sec		
								A/F sensor housing model temp	<	570	°C	<570°C			
								filtered purge HC conc. factor	<	15	factor	<15factor	total time		
								or evap purge	not active			not active	= approx.		
								all fuel injectors active	TRUE			TRUE	600 sec		
								evap purge high HC conc.	FALSE	-	-	FALSE--			
								A/F pumping current circuit	checked OK	-	-	checked OK--			
								error: evap purge valve	not set	-	-	not set--			
								error: evap purge valve circuit	not set	-	-	not set--			
								scheduled by System Manager	TRUE	-	-	TRUE--			
								forced amplitude	>	0.01	lambda	>0.01lambda			
Oxygen Sensor (secondary O2) Trim of Air / Fuel Ratio Sensor (primary A/F)															
primary A/F signal RICH / secondary O2 signal LEAN															
Bank 1	P2096	A/F sensor long term secondary	secondary O2 sensor trim	<	-0.03	lambda	<-0.03lambda	engine starting	complete	-	-	complete- -	2 sec	0.1 sec	0.4 sec
		trim - rich shift	integral control					secondary O2 trim active	TRUE	-	-	TRUE--		continuous	continuous
		- correction below threshold						and secondary O2 oscillation check finished	TRUE	-	-	TRUE- -			or 4 sec cumulative
primary A/F signal LEAN / secondary O2 signal RICH								then timer	>	25	sec	>25sec			
Bank 1	P2097	A/F sensor long term secondary	secondary O2 sensor trim	>	0.03	lambda	>0.03lambda	scheduled by System Manager	TRUE			TRUE			
		trim - lean shift	integral control					sec. O2 trim - fast lean correction	FALSE			FALSE			
		- correction above threshold						sec. O2 trim - fast rich correction	FALSE			FALSE			
								suspicion A/F sensor lean shift	FALSE			FALSE			
								secondary O2 oscillation test	checked OK			checked OK			
Oxygen Sensor (secondary O2) Trim of Air / Fuel Ratio Sensor (primary A/F)															
Bank 1	P2195	secondary O2 sensor operation	secondary O2 sensor voltage	>	0.75	V	>0.75V	A/F sensor measured lambda	>	1.08008	lambda	>1.08008lambda	approx.	0.1 sec	0.4 sec
		too rich - strong correction						short term fuel trim	= MAX	1.25	factor	= MAX1.25factor	100 sec	continuous	continuous
								A/F sensor	ready	-	-	ready--			or 4 sec
		A/F sensor measured too lean	or					secondary O2 sensor then	ready	-	-	ready--			cumulative
								accumulated exhaust gas mass	>	300	g	>300g			
			secondary O2 sensor voltage	>	0.75	V	>0.75V	A/F sensor measured lambda	>	1.08008	lambda	>1.08008lambda			
								secondary O2 sensor fuel trim proportional trim dominating	>	0.014008	lambda	>0.014008lambda			
								secondary O2 aging diagnosis	complete	-	-	complete--			
								secondary O2 circuit diagnosis	complete	-	-	complete--			
								secondary O2 fuel trim active	TRUE	-	-	TRUE--			
								A/F sensor	ready	-	-	ready--			
								secondary O2 sensor then	ready	-	-	ready--			
								accumulated exhaust gas mass	>	300	g	>300g			
			secondary O2 sensor voltage	>	0.75	V	>0.75V	target lambda	>	1.04	lambda	>1.04lambda	0.9 sec		
								A/F sensor	ready	-	-	ready--			
								secondary O2 sensor	ready	-	-	ready--			
								lambda closed loop control	active	-	-	active--			
								secondary O2 circuit diagnosis	complete	-	-	complete--			

Component/ System	Fault Code	Monitor Strategy Description	Primary Malfunction Signal and Criteria	Threshold Logic	Threshold Value	Threshold Units	Threshold Conditions	Secondary Parameters	Enable Logic	Enable Value	Enable Units	Threshold Conditions	Time Required	Frequency of Checks	Criteria for Code
								short term fuel trim (o.k.) then accumulated exhaust gas mass	> MIN >	0.75 800	factor g	> MIN0.75factor >800g			
Oxygen Sensor (secondary O2) Trim of Air / Fuel Ratio Sensor (primary A/F)															
Bank 1	P2196	secondary O2 sensor operation too lean - strong correction A/F sensor measured too rich	secondary O2 sensor voltage	<	0.2012	V	<0.2012V	A/F sensor measured lambda short term fuel trim A/F sensor secondary O2 sensor then accumulated exhaust gas mass	< = MIN ready ready >	0.92 0.75 - - 300	lambda factor - - g	<0.92lambda = MIN0.75factor ready-- ready-- >300g	approx. 100 sec	0.1 sec continuous	0.4 sec continuous or 4 sec cumulative
			secondary O2 sensor voltage	<	0.2012	V	<0.2012V	A/F sensor measured lambda secondary O2 sensor fuel trim proportional trim dominating secondary O2 aging diagnosis secondary O2 circuit diagnosis secondary O2 fuel trim active A/F sensor secondary O2 sensor then accumulated exhaust gas mass	< complete complete TRUE ready ready >	0.92 0.014 - - - - - 300	lambda lambda - - - - - g	<0.92lambda <0.014lambda complete-- complete-- TRUE-- ready-- ready-- >300g			
			secondary O2 sensor voltage	<	0.2012	V	<0.2012V	target lambda A/F sensor secondary O2 sensor lambda closed loop control secondary O2 circuit diagnosis short term fuel trim (o.k.) then accumulated exhaust gas mass	< ready ready active complete < MAX >	0.96 - - - - 1.25 800	lambda - - - - factor g	<0.96lambda ready-- ready-- active-- complete-- < MAX1.25factor >800g	0.9 sec		
Air / Fuel Ratio Sensor (primary A/F) electrical wire to wire short circuit bank 1 sensor 1	P2231	sensor short to heater	filtered maximum pump current variation within every 10ms	>	0.00019	A	>0.00019A	all injectors activated battery voltage battery voltage A/F sensor IC diagnosis error: A/F sensor IC engine rpm modeled exhaust gas temperature heater duty cycle heater duty cycle A/F sensor heater at op.temp. after A/F sensor curve switching for time	TRUE < > complete not set < < > < TRUE >	- 18 10,7 - - 1800 800 20 80 0.06	- V V - - rpm ° C % % sec	TRUE-- <18V >10.7V complete-- not set-- <1800rpm <800° C >20% <80% TRUE >0.06sec	15 sec	0.01 sec continuous	0.4 sec continuous or 4 sec cumulative
Diagnosis of Heater upstream HO2S	P0032	short circuit to battery voltage	Voltage	IC internal			IC internal	for time battery voltage via main relay battery voltage via main relay condition end of start condition engine speed: n > NMIN	> <= >= True True	5 18 10,7	sec V V	> 5 sec <= 18 V >= 10,7 V True True	5 sec	continous	0.2 sec
	P0031	short circiut to ground													
	P0030	wire interruption													
A/F Sensor Heating heater performance (primary A/F) bank 1 sensor 1	P0135	A/F sensor calculated temperature too low	A/F sensor temperature calculation	<	715	° C	<715° C	battery voltage battery voltage internal resistance measurement all injectors activated A/F sensor internal resistance excessive correction required engine stop time engine temperature at start A/F sensor heating ready A/F heater control shut off scheduled by System Manager	> < valid TRUE FALSE > > TRUE FALSE TRUE	10,7 18 - - - 5400 -9,8 - - -	V V - - - sec ° C - - -	>10.7V <18V valid-- TRUE-- FALSE-- >5400sec >-9.8° C TRUE-- FALSE-- TRUE--	35 sec	0.1 sec continuous	0.4 sec continuous or 4 sec cumulative
heater performance (primary A/F) bank 1 sensor 1 (primary)	P0135	A/F sensor calculated temperature below threshold	A/F sensor temperature calculation	<	715	° C	<715° C	A/F Heater at Maximum Power modeled exhaust temp. at sensor timer expires after either: fuel shut off >= 3 sec dur. ends or initial A/F heater turn on battery voltage	TRUE > > - - >	 300 50 - - 10,7	 ° C sec - - V	TRUE >300° C >50sec --- --- >10.7V	60 sec	0.1 sec continuous	0.4 sec continuous or 4 sec cumulative

Component/ System	Fault Code	Monitor Strategy Description	Primary Malfunction Signal and Criteria	Threshold Logic	Threshold Value	Threshold Units	Threshold Conditions	Secondary Parameters	Enable Logic	Enable Value	Enable Units	Threshold Conditions	Time Required	Frequency of Checks	Criteria for Code
								battery voltage	<	18	V	<18V			
								A/F heater control shut off	FALSE	-	-	FALSE--			
								modeled exhaust temp. valid	TRUE			TRUE			
								scheduled by System Manager	TRUE	-	-	TRUE--			
A/F Sensor Heating heater performance (secondary O2)															
bank 1 sensor 1 bank 2 sensor 1	P0053	correction value for A/F sensor internal resistance measurement too much	absolute value of correction value for A/F sensor internal resistance	>	45	Ohms	>45Ohms	battery voltage battery voltage engine starting	> < complete	10.7 18 -	V V -	>10.7V <18V complete--	40 sec	0.1 sec continuous	0.4 sec continuous or 4 sec cumulative
Oxygen Sensor sensor circuit (secondary O2)															
bank 1 sensor 2	P0137	short circuit to ground	secondary O2 sensor voltage	<	0.06	V	<0.06V	secondary O2 heating stable and mod. exhaust gas temp. for time engine running battery voltage mod. exhaust-gas temp. time after start engine temp at stop engine temp error: engine coolant temp	> > > TRUE > < < > < not set	10 250 90 - 10.7 800 1 60 40 -	sec ° C sec - V ° C sec ° C ° C -	> 10sec >250° C >90sec TRUE-- >10.7V <800° C <1sec >60° C <40° C not set--	0.1 sec	0.1 sec continuous	0.4 sec continuous or 4 sec cumulative
bank 1 sensor 2	P0138	short circuit to battery voltage	secondary O2 sensor voltage >	>	1.08	V	>1.08V	secondary O2 heating stable and mod. Exhaust-gas temp. for time engine running battery voltage mod. exhaust-gas temp.	> > > TRUE > <	10 250 90 - 10.7 800	sec ° C sec - V ° C	> 10sec >250° C >90sec TRUE-- >10.7V <800° C	5.1 sec		
bank 1 sensor 2	P0140	sensor line disconnection	secondary O2 sensor voltage and secondary O2 sensor voltage or secondary O2 sensor internal resistance when modeled exhaust gas temperature	> > >	0.401 0.499 40000 600	V V Ohm ° C	>0.401V <0.499V >40000Ohm >600° C	secondary O2 heating stable and mod. Exhaust-gas temp. for time engine running battery voltage mod. exhaust-gas temp.	> > > TRUE > <	10 250 90 - 10.7 800	sec ° C sec - V ° C	> 10sec >250° C >90sec TRUE-- >10.7V <800° C	600 sec		
Oxygen Sensor sensor circuit (secondary O2)															
bank 1 sensor 2	P2232	sensor line short circuit to heater output line	secondary O2 sensor voltage gradient within time after heater turn off for occurrences out of heater turn offs	> < > =	2 0.04 4 6	V sec count count	>2V <0.04sec >4count =6count	secondary O2 heating stable and mod. Exhaust-gas temp. for time engine running battery voltage mod. exhaust-gas temp. time after dew point exceeded	> > > TRUE > >	10 250 90 - 10.7 800 10	sec ° C sec - V ° C sec	> 10sec >250° C >90sec TRUE-- >10.7V <800° C >10sec	10 sec	0.01 sec continuous	0.4 sec continuous or 4 sec cumulative
Oxygen Sensor Heating heater performance (secondary O2)															
bank 1 sensor 2 (secondary)	P0141	secondary O2 sensor internal resistance above threshold	measured secondary O2 sensor internal resistance nominal internal resistance multipy times degradation factor for time	> > >	88 . . . 408 KFRINH 3 . . . 20 FRINH 6	Ohms factor sec	>88 . . . 408Ohms KFRINH >3 . . . 20factor FRINH >6sec	battery voltage battery voltage engine running engine starting fuel cut off sec. O2 internal resistance intake air temperature engine off soak time modeled exhaust temp. at secondary O2 sensor suspicion of secondary O2 sensor open circuit secondary O2 voltage supply scheduled by System Manager for time	> < TRUE complete FALSE valid > > in range FALSE ON >	10,7 18 - - - - -9,8 120 350 . . . 550 120	V V - - - - C sec C sec	>10.7V <18V TRUE-- complete-- FALSE-- valid-- >-9.8C >120sec in range350 . . . 550C FALSE ON >120sec	6 sec	0.1 sec continuous	0.4 sec continuous or 4 sec cumulative
sensor response (secondary O2)															
bank 1 sensor 2	P2270	oscillation check low	secondary O2 sensor voltage for time then ramping in enrichment by at gradient for time (after enrichment limit reached)	< > = = >	0.499 . . . 0.603 5 0.25 0.0513 7	V sec lambda l / sec sec	<0.499 . . . 0.603V >5sec =0.25lambda 0,0513 l / sec >7sec	secondary O2 sensor for time secondary O2 closed loop control all injectors activated engine air flow (intrusive test) and engine air flow	ready > active TRUE > <	- 10 - - 9.72 33.33	- sec - - g/sec g/sec	ready - - >10sec active - - TRUE - - 9.72g/sec 33.33g/sec	approx. 600 sec additional time if fuel level	0.1 sec continuous	0.4 sec continuous or 4 sec cumulative

Component/ System	Fault Code	Monitor Strategy Description	Primary Malfunction Signal and Criteria	Threshold Logic	Threshold Value	Threshold Units	Threshold Conditions	Secondary Parameters	Enable Logic	Enable Value	Enable Units	Threshold Conditions	Time Required	Frequency of Checks	Criteria for Code
								for time	>	3	sec	>3sec	is low and		
								engine air flow (passive monitor)	>	9.72	g/sec	9.72g/sec	not failed		
								sec. O2 trim - fast lean correction	FALSE			FALSE	600 sec		
								sec. O2 trim - fast rich correction	FALSE			FALSE			
								engine	running			running			
								scheduled by System Manager	TRUE			TRUE			
bank 1 sensor 2	P2271	oscillation check high	secondary O2 sensor voltage	>	0.499 . . . 0.603	V	>0.499 . . . 0.603V	secondary O2 sensor	ready	-	-	ready - -	approx.	0.1 sec	0.4 sec
			for time	>	5	sec	>5sec	for time	>	10	sec	>10sec	600 sec	continuous	continuous
			then					secondary O2 closed loop control	active			active			or 4 sec
			ramping in enleanment by	=	0.07	lambda	=0.07lambda	all injectors activated	TRUE			TRUE			cumulative
			at gradient	=	0,0513	I / sec	0,0513 I / sec	engine air flow (intrusive test)	>	9.72	g/sec	9.72g/sec			
			for time (after enleanment limit reached)	>	7	sec	>7sec	and engine air flow	<	33.33	g/sec	33.33g/sec			
								for time	>	3	sec	>3sec			
								engine air flow (passive monitor)	>	9.72	g/sec	9.72g/sec			
								sec. O2 trim - fast lean correction	FALSE			FALSE			
								sec. O2 trim - fast rich correction	FALSE			FALSE			
								engine	running			running			
								scheduled by System Manager	TRUE			TRUE			
bank 1 sensor 2	P2271	fuel cut off check high	secondary O2 sensor voltage	>	0.202	V	>0.202V	secondary O2 heating stable	>	10	sec	> 10sec	0.2 sec	0.1 sec	0.4 sec
			time after fuel cut off	>	2,5	sec	>2,5sec	secondary O2 dew point exceeded	TRUE	-	-	TRUE - -		continuous	continuous
								for time	>	30	sec	>30sec			or 4 sec
								air passed after fuel cut off	>	15	g	>15g			cumulative
								modeled exhaust temp	>	350	° C	>350° C			
								at secondary O2 sensor							
								scheduled by System Manager	TRUE	-	-	TRUE - -			
								error: cam sensor	not set	-	-	not set - -			
								error: evap canister purge sys.	not set	-	-	not set - -			
								error: evap purge valve ckt	not set	-	-	not set - -			
								error: battery voltage	not set	-	-	not set - -			
bank 1 sensor 2	P0139	fuel cut off check high	secondary O2 sensor voltage	>	0,152	V	>0.152V	secondary O2 heating stable	>	10	sec	> 10sec	0.2 sec	0.1 sec	0.4 sec
			time after fuel cut off	>	3,0	sec	>3,0sec	secondary O2 dew point exceeded	TRUE	-	-	TRUE - -		continuous	continuous
			lambda actual value	>	2		lambda >2	for time	>	30	sec	>30sec			or 9,5 sec
								air passed after fuel cut off	>	15	g	>20g			cumulative
								bank 1 sensor 2 voltage				>0,6 V			
								for time				> 3 sec			
								battery voltage				> 10,7V			
Camshaft Control															
System - Locking Pin															
Bank 1 Intake	P0011	rationality high	average of actual angle measurements	>	10	degrees	>10degrees	engine speed	>	560	rpm	>560rpm	10 sec	0.01 sec	0.4 sec
Bank 2 Intake	P0021		versus locked position angle					engine run time	>	1	sec	>1sec			continuous
								camshaft control circuit test	complete	-	-	complete--			or 4 sec
								error: camshaft control circuit	not set	-	-	not set--			cumulative
System - Control	P000A	rationality low / high	difference to start test (filtered actual	>	6	degrees	> 6degrees	engine speed	>	560	rpm	>560rpm	approx.	0.01 sec	0.4 sec
Bank 1 Intake	P000C		angle versus filtered desired angle)		KFDWNWDMXE / 2		KFDWNWDMXE / 2	engine run time	>	1	sec	>1sec	20 sec	continuous	continuous
Bank 2 Intake			(desired must remain above value					camshaft control circuit test	complete	-	-	complete--			or 4 sec
			to test to complete the evaluation)					error: camshaft control circuit	not set	-	-	not set--			cumulative
			same as above, but offset added to the	+	0	degrees	+0degrees	coolant temperature	<	143	° C	< 143° C	(4 times		
			difference, during cold start only:					coolant temperature	>	-48	° C	>-48° C	for 4 sec		
			filtered actual angle remains	<			<	engine oil temperature	<	143	° C	<143° C	each)		
			filtered desired angle from test start					engine oil temperature	>	-48	° C	>-48° C			
			within time	=	2	sec	=2sec	cam-crank alignment adaptation	complete	-	-	complete--			
			(detects 5 sec slow [time constant])												
			for multiple activation occurrences	>	4	count	>4count								
			(decrements upon activations where				(same as stated in "time required" column)								
			no difference is seen between desired												
			and actual)												
			same as above, but during cold start only:	>	2	count	>2count								
			difference (filtered actual angle max	>	3	degrees	>3degrees								
			versus actual at test start)												
			(to detect slow response versus												
			stuck cam if above this limit)												
			at time	=	4	sec	=4sec								
			(overlaps with time to detect above)												