2006   2.8L (LP1),   3.5L (LY7) *used in these vehicles:* **LaCrosse, Allure, CTS, STS, SRX, Rendezvous**
ENGINE DIAGNOSTIC PARAMETERS

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> **NOTE:** Printing this file may require 8.5" x 14" (legal size) paper, depending on your printer setup.

Component/ System	Fault Code	Monitor Strategy Description	Primary Malfunction Signal and Criteria	Threshold Value	Specified Units	Secondary Parameters	Enable Condition	Enable Value	Units	Time Required	Frequency of Checks	Criteria for Code	MIL Illumination
Camshaft Control													
Electrical													
Bank 1 Intake	P0010	circuit continuity - open	Voltage	IC Internal	-	engine speed	>	80	rpm	0.01 sec	0.01 sec	4 sec	two driving
	P2088	circuit continuity - ground				battery voltage	>	10	V		continuous	continuous	cycles each
	P2089	circuit continuity - voltage				battery voltage	<	18	V			or 50 sec	with: 4 sec
Bank 1 Exhaust	P0013	circuit continuity - open				output	activated and deactivated for complete checking					cumulative	continuous
	P2090	circuit continuity - ground											or 50 sec
	P2091	circuit continuity - voltage											cumulative
Bank 2 Intake	P0020	circuit continuity - open											
	P2092	circuit continuity - ground											
	P2093	circuit continuity - voltage											
Bank 2 Exhaust	P0023	circuit continuity - open											
	P2094	circuit continuity - ground											
	P2095	circuit continuity - voltage											
System - Control													
Bank 1 Intake	P0011	rationality low / high	difference to start test (filtered actual	5.0 . . . 10.0	degrees	engine speed	>	500	rpm	approx.	0.01 sec	4 sec	two driving
Bank 1 Exhaust	P0014		angle versus filtered desired angle) >	KFDWNWDMXE / 2		engine run time	>	1	sec	20 sec	continuous	continuous	cycles each
Bank 2 Intake	P0021		(desired must remain above value	KFDWNWDMXA / 2		camshaft control circuit test	complete	-	-			or 50 sec	with: 4 sec
Bank 2 Exhaust	P0024		to test to complete the evaluation)			error: camshaft control circuit	not set	-	-	(2 times		cumulative	continuous
						coolant temperature	<	143	° C	for 2.5 sec			or 50 sec
			filtered actual angle			coolant temperature	>	-48	° C	each)			cumulative
			< filtered desired angle from test start			engine oil temperature	<	143	° C				
			within time	2.5	sec	engine oil temperature	>	-48	° C				
			(detects 5 sec slow [time constant])			cam-crank alignment adaptation	complete	-	-				
			for multiple activation occurrences	2	count								
			(decrements upon activations where	(same as stated in "time required" column)									
			no difference is seen between desired										
			and actual)										
			difference (filtered actual angle max	0	degrees								
			versus actual at test start) >										
			(to detect slow response versus										
			stuck cam if above this limit)										
			at time	2.5	sec								
			(overlaps with time to detect above)										
			(passes after multiple good activations										
			in both cam phase rotation directions)										
System - Cam - Crank Alignment													
Bank 1 Intake	P0016	cam-crank adapted angle	adapted angle >	14.5	degrees	engine run time >	>	5	sec	approx.	0.2 sec	4 sec	two driving
Bank 1 Exhaust	P0017	limit check	or adapted angle <	14.5	degrees	engine coolant temp >	>	0	° C	600 sec	continuous	continuous	cycles each
Bank 2 Intake	P0018	(applies for each camshaft)	or actual angle with parked cams >	20	degrees	engine coolant temp <	<	95.25	° C			or 50 sec	with: 4 sec
Bank 2 Exhaust	P0019		and <	25	degrees	model: engine oil temp <	<	120	° C	fail after		cumulative	continuous
Bank 1 / Idler Sprocket	P0008		adapted angle for both cams >	10.5	degrees	error: camshaft sensor	not set	-	-	2 adaptation			or 50 sec
Bank 2 / Idler Sprocket	P0009		adapted angle for both cams <			error: camshaft control circuit	not set	-	-	cycles -			cumulative
										required			

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Air / Fuel Ratio Sensor Heating and Oxygen Sensor Heating													
heater circuits - electrical													
bank 1 sensor 1 (primary)	P0030	circuit continuity - open	Voltage	IC Internal	-	engine	running			0.01 sec	0.01 sec	4 sec	two driving
	P0031	circuit continuity - ground				battery voltage	>	10.5	V		continuous	continuous	cycles each
	P0032	circuit continuity - voltage				battery voltage	<	18	V			or 50 sec	with: 4 sec
bank 2 sensor 1 (primary)	P0050	circuit continuity - open				output	activated and deactivated for complete checking					cumulative	continuous
	P0051	circuit continuity - ground											or 50 sec
	P0052	circuit continuity - voltage											cumulative
bank 1 sensor 2 (secondary)	P0036	circuit continuity - open	Voltage	IC Internal	-	engine speed	>	80	rpm	0.01 sec	0.01 sec	4 sec	two driving
	P0037	circuit continuity - ground				battery voltage	>	10	V		continuous	continuous	cycles each
	P0038	circuit continuity - voltage				battery voltage	<	18	V			or 50 sec	with: 4 sec
bank 2 sensor 2 (secondary)	P0056	circuit continuity - open				output	activated and deactivated for complete checking					cumulative	continuous
	P0057	circuit continuity - ground											or 50 sec
	P0058	circuit continuity - voltage											cumulative
A/F Sensor Heating													
heater performance (secondary O2)													
bank 1 sensor 1	P0053	correction value for A/F sensor	absolute value of correction value for	15	Ohms	battery voltage	>	10.5	V	40 sec	0.1 sec	4 sec	two driving
bank 2 sensor 1	P0059	internal resistance measurement	A/F sensor internal resistance >			battery voltage	<	18	V		continuous	continuous	cycles each
		too much				engine starting	complete	-	-			or 50 sec	with: 4 sec
												cumulative	continuous
													or 50 sec
													cumulative
Mass air flow sensor	P0101	range check low	mass air flow <	-1.4 ... 78.6	g/sec	battery voltage	>	10.5	V	2 sec	0.01 sec	4 sec	two driving
		or		KFMLDMN		time after start	>	0.3	sec		continuous	continuous	cycles each
		fuel trim limits exceeded	> delta lambda correction	0.2	factor	crankshaft revolution counter	>	150	rev			or 50 sec	with: 4 sec
		range - multiplicative				error: throttle position sensor	not set	-	-			cumulative	continuous
		and				engine speed	>	320	rpm				or 50 sec
		correction factor (modeled air	< correction factor air mass	0.7	factor								cumulative
		mass at throttle / air mass											
		measured by air mass flow meter)											
		range check high	mass air flow >	26.7 ... 278	g/sec								
		or		KFMLDMX				-	-				
		fuel trim limits exceeded	< delta lambda correction	-0.2	factor								
		range - multiplicative											
		and											
		correction factor (modeled air	> correction factor air mass	1.3	factor								
		mass at throttle / air mass											
		measured by air mass flow meter)											
	P0102	circuit check low	mass air flow <	-11.7	g/sec	battery voltage	>	7.5	V	0.2 sec			
	P0103	circuit check high	mass air flow >	294.4	g/sec								
Intake air temperature	P0111	response check	max intake air temperature -			drive period - count	>=	7	count	2 sec	0.1 sec	4 sec	two driving
sensor			min intake air temperature >	3.8	° C	each with					continuous	continuous	cycles each
						vehicle speed	>=	37.5	mph				
						mass flow	<	11.1	g / sec			or 50 sec	with: 4 sec
						mass flow	>	42.2	g / sec			cumulative	continuous
						coolant temperature at start	<=	65.3	° C				or 50 sec
						no fuel shut-off							
						idle period - count	>=	4	count				cumulative
						each with							
						vehicle speed	<=	6.25	mph				
						coolant temperature at start	<=	65.3	° C				
						coolant temperature	>	75	° C				
	P0112	range check low	intake air temperature >	132	° C								
	P0113	range check high	Temperature for closed loop control	-42	° C	time after start	>	180	sec				
						then time in idle	>	10	sec				
						and intake air temperature	<	-42	° C				
						then | IAT change | (abs value)	<=	3	° C				
						while							
						integrated air mass increases	>=	1000	g				

2006   2.8L (LP1),   3.5L (LY7) *used in these vehicles:* **LaCrosse, Allure, CTS, STS, SRX, Rendezvous**
ENGINE DIAGNOSTIC PARAMETERS

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Component	Code	Malfunction	Check	Value	Unit	Enable condition	Op	Value	Unit	Time	Sample	Req.	MIL
Engine coolant	**P0116**	difference from intake air	filtered difference			key up IAT - previous min IAT	<	2.25	° C	300 sec	0.2 sec	4 sec	immediate
temperature sensor		temperature after soaking	(ECT at key on - IAT at key on) >	10	° C	key up IAT - previous min IAT	>	-30	° C	for block	continuous	additional	once code
						previous accumulated air mass	>	4000	g	heating		after block	has
			or			previous engine run time	>	400	sec	check	one filter	heater	been set
						or					update per	check when	
			filtered difference			ECT at shut down	>	84.75	° C		cold start	filtered	approx.
			(ECT at key on - IAT at key on) <	-30	° C	Controller Shut Down at end of	last cycle	-	-			difference	6 test
						Strong Wind / Open Hood	not detected	-	-			exceeds	average
						based on IAT rise at shut down						threshold	run length
						Block Heater	not detected	-	-				(15°C delta)
Engine coolant	**P0117**	range check high	coolant temperature >	140.3	° C	If Startup IAT	>	72	° C	0.1 sec	0.1 sec	4 sec	two driving
temperature sensor						hot restart timer	>=	60	sec		continuous	continuous	cycles each
	P0118	range check low	coolant temperature <	-42	° C	If Startup ECT	<	-42	° C			or 50 sec	with: 4 sec
						| ECT-Startup ECT | (abs value)	<=	2.25	° C			cumulative	cont. or 50
						integrated air mass increases	>=	0	g				sec cum.
						and air mass timer	>=	2	sec				
Throttle Position	**P0121**	range check poti voltage	sensor difference >	9	%	battery voltage	>	7	V	continuous	0.1 sec	4 sec	code set
Sensor 1 (primary)	**P0122**	plausibility to other poti	sensor circuit low voltage <	0.176	V						continuous	continuous	then 5 sec
	P0123		sensor circuit high voltage >	4.629	V							or 50 sec	
												cumulative	
Sensor 2 (redundant)	**P0221**	range check poti voltage,	sensor difference >	9	%	battery voltage	>	7	V	continuous	0.1 sec		
	P0222	plausibility to other poti	sensor circuit low voltage <	0.156	V						continuous		
	P0223		sensor circuit high voltage >	4.883	V								
Engine coolant	**P0125**	Signal check	Temperature for closed loop control	-12	° C	engine	running			120 to 300 sec		4 sec	two driving
temperature sensor			not reached after time									continuous	cycles each
	P0125	plausibility check	calculated coolant temperature model	9.8	° C	the model temperature increases				approx.		or 50 sec	with: 4 sec
			minus measured temperature >			depending on air flow				500 sec		cumulative	cont. or 50
													sec cum.
Engine Coolant	**P0128**	Coolant Temperature Below	(calculated reference model coolant temp	10.5	° C	debouncing time	>	20	sec	approx.	0.1 sec	4 sec	two driving
Thermostat Monitoring		Thermostat Regulating	minus measured coolant temperature) >			error: engine coolant temp	not set	-	-	900 sec	continuous	continuous	cycles each
		Temperature (plausibility check)				error: vehicle speed sensor	not set	-	-			or 50 sec	with: 4 sec
			reference model calculation limit	89.25	° C	est. ambient temperature	>	-10.5	°C			cumulative	continuous
						est. ambient temperature	<	70	°C				or 50 sec
			(development vehicles indicated			vehicle speed	>=	9.375	mph				cumulative
			steady thermostat regulating			engine speed	>	960	rpm				
			temperatures of 89°C, as measured			coolant temperature at start	<	70.5	°C				
			by the engine coolant temp. sensor.			integrated air mass flow	>	3000	g				
			The thermostat opening temp.										
			is 82°C. The thermostat is fully open										
			by 95°C. All critical OBD and										
			emission functions are enabled										
			above 60°C.)										
Air / Fuel Ratio Sensor (primary A/F)													
integrated circuit interface													
bank 1	**P0130**	A/F sensor voltage	A/F sensor voltage IC corrective value >	0.1	V	battery voltage	<	18	V	0.1 sec	0.1 sec	4 sec	two driving
bank 2	**P0150**	IC correction too high				battery voltage	>	10.7	V		continuous	continuous	cycles each
						engine	running	-	-			or 50 sec	with: 4 sec
						engine starting	complete	-	-			cumulative	continuous
													or 50 sec
													cumulative

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Air / Fuel Ratio Sensor (primary A/F)

reference ground circuit; reference voltage circuit; or measuring current circuit

Parameter	Code	Description	Status			Condition	Op	Value	Unit				
bank 1 sensor 1 - low volt	**P0131**	A/F sensor signal at VM	IC Circuit Status shorted low	-	-	battery voltage	<	18	V	2 sec	0.1 sec	4 sec	two driving
bank 2 sensor 1 - low volt	**P0151**	(reference ground) below lower limit				battery voltage	>	10.7	V		continuous	continuous	cycles each
		or A/F sensor signal at UN	IC Circuit Status shorted low	-	-	engine	running	-	-			or 50 sec	with: 4 sec
		(reference voltage [Nernst voltage]) below lower limit				engine starting	complete	-	-			cumulative	continuous
		or A/F sensor signal at IA	IC Circuit Status shorted low	-	-								or 50 sec
		(measuring current trim circuit) below lower limit											cumulative
bank 1 sensor 1 - high volt	**P0132**	A/F sensor signal at VM	IC Circuit Status shorted high	-	-								
bank 2 sensor 1 - high volt	**P0152**	(reference ground) above upper limit											
		or A/F sensor signal at UN	IC Circuit Status shorted high	-	-								
		(reference voltage [Nernst voltage]) above upper limit											
		or A/F sensor signal at IA	IC Circuit Status shorted high	-	-								
		(measuring current trim circuit) above upper limit											

Air / Fuel Ratio Sensor (primary A/F)

response

Parameter	Code	Description	Status	Value	Unit	Condition	Op	Value	Unit				
response		dynamic response	A/F sensor dynamic value <	0.4	ratio	fuel trim forced amplitude	active	-	-				
Bank 1 Sensor 1	**P0133**	slow or low amplitude				A/F sensor	ready	-	-	dynamic	0.01 sec	4 sec	two driving
Bank 2 Sensor 1	**P0153**					(versus	short term fuel trim (o.k.)	< MAX	1.25	factor	test	continuous	continuous	cycles each
						reference	short term fuel trim (o.k.)	> MIN	0.75	factor	sample		or 50 sec	with: 4 sec
						sensor)	measured A/F minus integral	<	1.06	lambda	count		cumulative	continuous
							control of secondary O2							or 50 sec
							measured A/F minus integral	>	0.94	lambda	>			cumulative
							control of secondary O2							
							engine speed	<	2520	rpm	60			
							engine speed	>	1480	rpm	samples			
							volumetric efficiency	<	50	%				
							volumetric efficiency	>	16.5	%	then			
							volumetric efficiency gradient	<	30	%/sec	2 sec			
							A/F sensor housing model temp	<	570	°C				
							filtered purge HC conc. factor	<	15	factor	total time			
							or evap purge	not active			= approx.			
							all fuel injectors active	TRUE			600 sec			
							evap purge high HC conc.	FALSE	-	-				
							A/F pumping current circuit	checked OK	-	-				
							error: evap purge valve	not set	-	-				
							error: evap purge valve circuit	not set	-	-				
							scheduled by System Manager	TRUE	-	-				

A/F Sensor Heating

heater performance (primary A/F)

Parameter	Code	Description	Status	Value	Unit	Condition	Op	Value	Unit				
bank 1 sensor 1	**P0135**	A/F sensor calculated temperature	A/F sensor temperature calculation <	650	°C	battery voltage	>	10.5	V	70 sec	0.1 sec	4 sec	two driving
bank 2 sensor 1	**P0155**	too low				battery voltage	<	18	V		continuous	continuous	cycles each
						internal resistance measurement	valid	-	-			or 50 sec	with: 4 sec
						all injectors activated	TRUE	-	-			cumulative	continuous
						A/F sensor internal resistance	FALSE	-	-				or 50 sec
						excessive correction required							cumulative
						engine stop time	>	300	sec				
						engine temperature at start	>	-9.75	°C				
						A/F sensor heating ready	TRUE	-	-				
						A/F heater control shut off	FALSE	-	-				
						scheduled by System Manager	TRUE	-	-				

heater performance (primary A/F)

Parameter	Code	Description	Status	Value	Unit	Condition	Op	Value	Unit				
bank 1 sensor 1 (primary)	**P0135**	A/F sensor calculated	A/F sensor temperature calculation <	671. . . 740	°C	A/F Heater at Maximum Power	TRUE			60 sec	0.1 sec	4 sec	two driving
bank 2 sensor 1 (primary)	**P0155**	temperature below threshold		KLTKERDCMN		modeled exhaust temp. at sensor	>	250	°C		continuous	continuous	cycles each
						timer expires after either:	>	25	sec			or 50 sec	with: 4 sec
						fuel shut off >= 3 sec dur. ends	-	-	-			cumulative	continuous
						or initial A/F heater turn on	-	-	-				or 50 sec
						battery voltage	>	10.5	V				cumulative
						battery voltage	<	18	V				
						A/F heater control shut off	FALSE	-	-				
						modeled exhaust temp. valid	TRUE						
						scheduled by System Manager	TRUE	-	-				

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ENGINE DIAGNOSTIC PARAMETERS

Oxygen Sensor

sensor circuit (secondary O2)

	Code			Value	Unit	Condition		Value	Unit				
bank 1 sensor 2	P0137	short circuit to ground	secondary O2 sensor voltage <	0.06	V	secondary O2 heating stable	>	10	sec	0.1 sec	0.1 sec	4 sec	two driving
bank 2 sensor 2	P0157					and mod. exhaust gas temp.	>	250	° C		continuous	continuous	cycles each
						for time	>	90	sec			or 50 sec	with: 4 sec
						engine running	TRUE	-	-			cumulative	continuous
						battery voltage	>	10.5	V				or 50 sec
						mod. exhaust-gas temp.	<	800	° C				cumulative
						time after start	<	1	sec				
						engine temp at stop	>	60	° C				
						engine temp	<	40	° C				
						error: engine coolant temp	not set	-	-				
bank 1 sensor 2	P0138	short circuit to battery voltage	secondary O2 sensor voltage >	1.05	V	secondary O2 heating stable	>	10	sec	5.1 sec			
bank 2 sensor 2	P0158		for time >			and mod. Exhaust-gas temp.	>	250	° C				
						for time	>	90	sec				
						engine running	TRUE	-	-				
						battery voltage	>	10.5	V				
						mod. exhaust-gas temp.	<	800	° C				
bank 1 sensor 2	P0140	sensor line disconnection	secondary O2 sensor voltage >	0.401	V	secondary O2 heating stable	>	10	sec	600 sec			
bank 2 sensor 2	P0160		and secondary O2 sensor voltage <	0.519	V	and mod. Exhaust-gas temp.	>	250	° C				
						for time	>	90	sec				
			or			engine running	TRUE	-	-				
			secondary O2 sensor internal resistance >	40000	Ohm	battery voltage	>	10.5	V				
			when modeled exhaust gas temperature >	600	° C	mod. exhaust-gas temp.	<	800	° C				

Oxygen Sensor Heating

heater performance (secondary O2)

	Code			Value	Unit	Condition		Value	Unit				
bank 1 sensor 2 (secondary)	P0141	secondary O2 sensor	measured secondary O2 sensor internal			battery voltage	>	10.5	V	approx.	0.1 sec	4 sec	two driving
bank 2 sensor 2 (secondary)	P0161	internal resistance	resistance >			battery voltage	<	18	V	100 sec	continuous	continuous	cycles each
		above threshold	nominal internal resistance	104 . . . 296	Ohms	engine running	TRUE	-	-			or 50 sec	with: 4 sec
				KFRINH / 2		engine starting	complete	-	-			cumulative	continuous
			multipy times degradation factor >	3.5 . . . 7.5	factor	fuel cut off	FALSE	-	-				or 50 sec
				FRINH1 / 2		sec. O2 internal resistance	valid	-	-				cumulative
			for time	6	sec	intake air temperature	>	-6.75	C				
						engine off soak time	>	120	sec				
						modeled exhaust temp.	in range	360 . . .	C				
						at secondary O2 sensor							
						suspicion of secondary	FALSE						
						O2 sensor open circuit							
						secondary O2 voltage supply	ON						
						scheduled by System Manager							
						for time	>	120	sec				

Fuel Injector

circuit continuity

	Code			Value	Unit	Condition		Value	Unit				
Cylinder #1	P0201	circuit continuity - open	Voltage	IC Internal	-	engine speed	>	80	rpm	0.01 sec	0.01 sec	4 sec	two driving
	P0261	circuit continuity - ground				battery voltage	>	10	V		continuous	continuous	cycles each
	P0262	circuit continuity - voltage				battery voltage	<	18	V			or 50 sec	with: 4 sec
Cylinder #2	P0202	circuit continuity - open				output	activated and deactivated for complete checking					cumulative	continuous
	P0264	circuit continuity - ground											or 50 sec
	P0265	circuit continuity - voltage											cumulative
Cylinder #3	P0203	circuit continuity - open											
	P0267	circuit continuity - ground											
	P0268	circuit continuity - voltage											
Cylinder #4	P0204	circuit continuity - open											
	P0270	circuit continuity - ground											
	P0271	circuit continuity - voltage											
Cylinder #5	P0205	circuit continuity - open											
	P0273	circuit continuity - ground											
	P0274	circuit continuity - voltage											
Cylinder #6	P0206	circuit continuity - open											
	P0276	circuit continuity - ground											
	P0277	circuit continuity - voltage											

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Misfire		crankshaft speed	emissions relevant misfire rate	1.82	%	engine speed	>	420	rpm	1000 revs	cylinder	4 sec	Fault during
Emission Level		fluctuation cylinder 1 to				engine speed	<	7000	rpm		firing	continuous	1st interval:
Multiple Cylinder	**P0300**	cylinder 6				indicated torque (idle, no drive)	>	10.2	%		frequency		2 faults in
Cylinder #1	**P0301**					indicated torque (drive)	>	10.5 . . . 31	%			After	2 different
Cylinder #2	**P0302**					engine speed gradient	<	200 . . . 362	rpm/sec		continuous	detection,	drive cycles.
Cylinder #3	**P0303**					volumetric efficiency gradient	<	225 . . . 1350	%/rev			the	
Cylinder #4	**P0304**					cylinder events after engine start	>	6	ignitions			diagnostic	Fault during
Cylinder #5	**P0305**					air temperature	>	-30	° C			can only	remaining
Cylinder #6	**P0306**					rough road	not detected	-	-			pass if	intervals:
						traction control	off	-	-			similar	8 faults in 2
						leak detection	off	-	-			conditions	different
						active handling	not active					are	drive cycles
						ABS	not active	-	-			encountered	with at least
						engine drag control	not active	-	-				4 faults in
						fuel cut off	not active	-	-				each.
						fuel level	>	11.6	%				
						OR fuel level	<	11.6	%				
						AND solid misfire MIL	on	-	-				
						OR fuel level error	set	-	-				
						error: throttle position	not set	-	-				
						error: crankshaft sensor	not set	-	-				
						error: ref.mark of crank sensor	not set	-	-				
			OR										
Catalyst Damaging Level			Catalyst damaging misfire rate			Includes all the above with the				1000 revs			First
Multiple Cylinder	**P0300**					following exceptions:							occurance:
Cylinder #1	**P0301**					First interval extention				200 revs			immediate
Cylinder #2	**P0302**					engine coolant temperature	<	47	°C	all remaining			flashing
Cylinder #3	**P0303**					fuel level	>=	11.6	%	intervals			while error
Cylinder #4	**P0304**			18.1 . . . 5	%	OR fuel level	<	11.6	%				present, then
Cylinder #5	**P0305**			see Misfire		AND blinking MIL	blinking	-	-				no MIL
Cylinder #6	**P0306**			supplemental		AND NOT first blink event	-	-	-				with no error.
				data									
				(h) (2.5.1)									Second
													occurance:
													immediate
													flashing
													while error
													present, then
													solid MIL
													with no error.
Rough Road Signal	**P0318**	signal missing	signal missing	-	-	no	-	-	-	5 sec	0.1 sec	4 sec or	no
											continuous	50 sec cum	

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ENGINE DIAGNOSTIC PARAMETERS

System	Code	Strategy	Malfunction Criteria	Value	Unit	Secondary Parameters	Comp	Value	Unit				
Knock Control													
Circuit	**P0324**	zero test (part 1)	| integrator voltage - 715 mV | >	0.215	V	knock control	active	-	-	50 sec	every 510	4 sec	two driving
			(absolute value)			engine speed gradient	<	2300	rpm / sec	cumulative	engine	continuous	cycles each
			for consecutive events	2	count	engine load gradient	<	50 . . . 100	kPa / sec		cycles	or 50 sec	with: 4 sec
			or			test pulse fault assumption	not set	-	-		continuous	cumulative	continuous
	P0324	zero test (part 2)	| integrator gradient | (absolute value) >	60 . . . 40	V / sec	knock control	active	-	-				or 50 sec
			(absolute value)	DKROFN		engine speed gradient	<	2300	rpm / sec				cumulative
			for consecutive events	2	count	engine load gradient	<	50 . . . 100	kPa / sec				
						test pulse fault assumption	not set	-	-				
						engine speed	>	1000	rpm				
						engine speed	<	4200	rpm				
	P0324	test pulse	test pulse integral <	3.7	V	engine coolant temp.	>	60	° C				
			for consecutive events	2	count	engine speed gradient	<	2300	rpm / sec				
						engine load gradient	<	50 . . . 100	kPa / sec				
						zero test fault assumption	not set	-	-				
Bank 1	**P0327**	range check low	reference voltage <	0.7 . . . 2.2	V	engine coolant temperature	>	60	° C	approx.	0.1 sec	4 sec	two driving
Performance				UDKSNU		engine speed	>	2000	rpm	20 sec	continuous	continuous	cycles each
			for consecutive events	100	count	cylinder identification	correct	-	-			or 50 sec	with: 4 sec
	P0328	range check high				engine speed	>	2000	rpm			cumulative	continuous
			reference voltage >	33 . . . 99	V	engine speed gradient	<	2300	rpm / sec				or 50 sec
				UDKSNO		engine load gradient	<	50 . . . 100	kPa / sec				cumulative
			for consecutive events	100	count	error: knock control circuit (IC)	not set	-	-				
						engine speed limp home	not active	-	-				
Bank 2	**P0332**	range check low	reference voltage <	0.7 . . . 2.2	V	engine coolant temperature	>	60	° C	approx.	0.1 sec	4 sec	two driving
Performance				UDKSNU		engine speed	>	2000	rpm	20 sec	continuous	continuous	cycles each
			for consecutive events	100	count	cylinder identification	correct	-	-			or 50 sec	with: 4 sec
	P0333	range check high				engine speed	>	2000	rpm			cumulative	continuous
			reference voltage >	33 . . . 99	V	engine speed gradient	<	2300	rpm / sec				or 50 sec
				UDKSNO		engine load gradient	<	50 . . . 100	kPa / sec				cumulative
			for consecutive events	100	count	error: knock control circuit (IC)	not set	-	-				
						engine speed limp home	not active	-	-				
Crankshaft Position Sensor	**P0335**	circuit continuity	no engine signal	0	rpm	camshaft revolutions detected	>	12	counts	approx.	0.01 sec	4 sec	two driving
			but phase signals available							5 sec	continuous	continuous	cycles each
		rationality check	reference gap missing >	3	gaps							or 50 sec	with: 4 sec
			(sensor signal but no reference)									cumulative	continuous
	P0336	rationality check	unexpected re-synchronization >	6	count							or 50 sec	
			(loss of reference mark)									cumulative	
		rationality check	intermittent loss of engine speed signal >	14	count								
	P0338	rationality check	difference in counted teeth between	8	teeth					approx.	1 per rev		
			reference gap position events >							2 sec	continuous		
Camshaft Position Sensor													
Bank 1 Intake	**P0341**	plausibility check	signal erratic or out of position	4	count	engine in synchronized mode	TRUE	-	-	10	1 per rev	4 sec	two driving
	P0342	circuit low	signal permanently low	5	count					revolutions	continuous	continuous	cycles each
	P0343	circuit continuity or high	signal permanently high	5	count							or 50 sec	with: 4 sec
												cumulative	continuous
Bank 2 Intake	**P0346**	plausibility check	signal erratic or out of position										or 50 sec
	P0347	circuit low	signal permanently low										cumulative
	P0348	circuit continuity or high	signal permanently high										
Bank 1 Exhaust	**P0366**	plausibility check	signal erratic or out of position										
	P0367	circuit low	signal permanently low										
	P0368	circuit continuity or high	signal permanently high										
Bank 2 Exhaust	**P0391**	plausibility check	signal erratic or out of position										
	P0392	circuit low	signal permanently low										
	P0393	circuit continuity or high	signal permanently high										

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Ignition Coil													
circuit continuity													
Cylinder #1	**P0351**	circuit continuity - open	Voltage >	20	revs	engine speed	>	1400	rpm	approx.	engine	4 sec	two driving
	P2300	circuit continuity - ground		20	revs	engine speed	<	5000	rpm	1 sec	cycle	continuous	cycles each
	P2301	circuit continuity - voltage		20	revs	battery voltage	>	10	V		frequency	or 50 sec	with: 4 sec
Cylinder #2	**P0352**	circuit continuity - open				battery voltage	<	18	V			cumulative	continuous
	P2303	circuit continuity - ground									continuous		or 50 sec
	P2304	circuit continuity - voltage											cumulative
Cylinder #3	**P0353**	circuit continuity - open											
	P2306	circuit continuity - ground											
	P2307	circuit continuity - voltage											
Cylinder #4	**P0354**	circuit continuity - open											
	P2309	circuit continuity - ground											
	P2310	circuit continuity - voltage											
Cylinder #5	**P0355**	circuit continuity - open											
	P2312	circuit continuity - ground											
	P2313	circuit continuity - voltage											
Cylinder #6	**P0356**	circuit continuity - open											
	P2315	circuit continuity - ground											
	P2316	circuit continuity - voltage											
Catalyst Bank 1	**P0420**	oxygen storage of catalyst	normalized oxygen storage	1	factor	exhaust gas mass flow	>	5.00	g/sec	approx.	0.01 sec	4 sec	two driving
Catalyst Bank 2	**P0430**		less than normalized oxygen storage			exhaust gas mass flow	<	15.56	g/sec	1000 sec		continuous	cycles each
			of a limit catalyst <			catalyst temp. model	<	750	° C	during	one		with: 4 sec
						catalyst temp. model	>	500	° C	active	completed		continuous
						engine speed	>	1040	rpm	driving	test per		or 50 sec
						engine speed	<	3240	rpm		driving		cumulative
						engine load	>	15 …. 18	%	one test	cycle		
						engine load	<	35 …. 45	%				
						modeled catalyst temp. gradient	<	1	° C / sec	(average			
						exhaust gas mass flow gradient	<	3.89	g/sec^2	of 4			
						fuel system closed loop	active	-	-	checks)			
						time after engine start	>	340	sec	per driving			
						ambient temperature	>	-30	° C	cycle			
						error: secondary O2 aging	not set	-	-				
						error: fuel system	not set	-	-				
						scheduled by System Manager	TRUE	-	-				

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Evaporative System and Leak Monitor

Small Leak - 0.020 "	**P0442**	natural pressure/vacuum	filtered fault index >	0.6	-	Eng. Running Vac. pull down	not set	(see P0455 for details)		approx.	0.1 sec	filtered	immediate
		in tank				or vac. pulldown suspect leak	0.020" leak	(see P0455 for details)		600 sec	once per	value	
			based on:			est amb air temp	>	1.5	° C	each test	engine off	exceeds	once code
			(peak pressure - peak vacuum) <	540 . . . 1430	Pa	est amb air temp	<	32.25	° C		cycle	threshold	has
						Engine stop coolant temp	>	74.25	° C	approx.		then	been set
						engine run time	>	600	sec	8 test		4 sec	
						trip distance travelled	>	5.1	miles	average		continuous	approx.
						@ vehicle speed above	>	1.6	mph	run length			8 test
						evap fuel volatility factor	<	8	factor				average
						fuel level	>	11.6	%				run length
						fuel level	<	88.4	%				
						fuel level change from keyoff	<	10.2	%				(The MIL
						error: vehicle speed	not set	-	-				actually is
						error: engine coolant temp	not set	-	-				requested
						error: purge valve	not set	-	-				during shut
						error: fuel tank pressure	not set	-	-				down soak.
						error: system voltage	not set	-	-				It becomes
						error: air mass meter	not set						visible on
						error: intake air temp	not set						the
						error: canister vent valve	not set	-	-				following
						altitude adaption	valid	-	-				drive.)
						tank vacuum out of range	FALSE	-	-				
						start (coolant - intake air)	<	9.75	° C				
						start engine coolant temp	<	42	° C				
						Start intake air temp	>	1.5	° C				
						Start intake air temp	<	32.3	° C				
						time since previous test	>	0	sec				
						amb pressure	>	68	kPa				
						battery voltage	>	10.8	V				
						vehicle odometer	>	12.5	miles				

Evaporative Emission System

Purge Solenoid	**P0443**	circuit continuity - open	Voltage	IC Internal	-	engine speed	>	80	rpm	0.01 sec	0.01 sec	4 sec	two driving
Control Circuit	**P0458**	circuit continuity - ground				battery voltage	>	10	V		continuous	continuous	cycles each
	P0459	circuit continuity - voltage				battery voltage	<	18	V			or 50 sec	with: 4 sec
						output	activated and deactivated for complete checking					cumulative	continuous
or 50 sec													or 50 sec
cumulative													cumulative

2006   2.8L (LP1),   3.5L (LY7) *used in these vehicles:* **LaCrosse, Allure, CTS, STS, SRX, Rendezvous**
ENGINE DIAGNOSTIC PARAMETERS

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Evaporative System and Leak Monitor

Component	Code	Malfunction Criteria	Threshold	Value	Unit	Secondary Parameters	Comp	Value	Unit				
Tank vent valve	P0446	underpressure in tank	tank pressure <	-800	Pa	fuel system status	closed loop	-	-	approx.	0.1 sec	4 sec	two driving
						vehicle speed	<	1.9	mph	5 sec		continuous	cycles each
						engine	idling	-	-		one		with: 4 sec
						battery voltage	>	10.5	V	Only one	completed		continuous
						battery voltage	<	18.1	V	test per	test per		or 50 sec
						fuel tank pressure	>	-2500	Pa	will be	driving		cumulative
						fuel tank pressure	<	1000	Pa	completed.	cycle		
						ratio: (MAP Model / Baro)	<	0.555	-				
						est amb air temp	>	1.5	° C	The test			
						est amb air temp	<	32.25	° C	will attempt			
						fuel level	>	11.6	%	to run up			
						fuel level	<	88.4	%	to 10 times			
						engine start temp - amb. temp	<	9.75	° C	until it			
						time after engine start	>	600	sec	successfully			
						or fuel mixture adaptation	stable	-	-	completes			
						amb pressure	>	68	kPa	a test			
						maximum number of attempts	<	10	-				
						error: mass air flow	not set	-	-				
						error: coolant temp	not set	-	-				
						error: intake air temp	not set	-	-				
						error: fuel tank pres	not set	-	-				
						error: system voltage	not set	-	-				
						error: purge valve	not set	-	-				
						error: vehicle speed	not set	-	-				
						error: canister vent valve	not set	-	-				
						error: purge valve flow	not set	-	-				
						error: accelerator pedal	not set	-	-				
Evap Vent Solenoid	P0449	circuit continuity - open	Voltage	IC Internal	-	engine speed	>	80	rpm	0.01 sec	0.01 sec	4 sec	two driving
Control Circuit	P0498	circuit continuity - ground				battery voltage	>	10	V		continuous	continuous	cycles each
	P0499	circuit continuity - voltage				battery voltage	<	18	V	Only one		or 50 sec	with: 4 sec
						output	activated and deactivated for complete			test per		cumulative	continuous
or 50 sec													or 50 sec
													cumulative
Fuel Tank	P0451	rationality - signal oscillation	sensor signal >=	813	Pa	time after start	>	3	sec	25.5	0.1 sec	4 sec	two driving
Pressure Sensor		rationality - signal increment check	sensor signal <=	63	Pa	number of checks	=	3	checks	10 sec	continuous	continuous	cycles each
		rationality - signal range check	sensor signal >=	1500	Pa	vehicle speed >=	>=	0	mph	25sec		or 50 sec	with: 4 sec
			sensor signal >=	-2970	Pa	vehicle speed <=	<=	18.75	mph	25sec		cumulative	continuous
	P0452	circuit continuity - ground	sensor signal <	-3969	Pa	ratio: (MAP Model / Baro)	<=	0.805	ratio	10 sec			or 50 sec
	P0453	circuit continuity - voltage	sensor signal >	1719	Pa	engine	running						cumulative
						fuel level	>	11.6	%				
						fuel level	<	88.4	%				
						evap purge	activated						

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Evaporative System and Leak Monitor													
Large leak	**P0455**	vacuum pulldown slope	absolute value			fuel system status	closed loop	-	-	11 sec	0.1 sec	4 sec	two driving
						vehicle speed	<	1.9	mph		continuous		cycles each
			of vacuum pulldown slope <	30 . . . 70	Pa	engine	idling	-	-	Only one	one		with: 4 sec
				KLGGRTED05		battery voltage	>	10.5	V	test per	completed		continuous
			OR			battery voltage	<	18	V	driving cycle	test per		or 50 sec
Stuck Closed Purge valve	**P0455**	vacuum pulldown slope				fuel tank pressure	>	-2500	Pa	completed.	driving		cumulative
			tank vacuum >	-1.221	Pa	fuel tank pressure	<	1000	Pa		cycle		
						ratio: (MAP Model / Baro)	<	0.555	-	The test			
						est amb air temp	>	1.5	° C	will attempt			
						est amb air temp	<	32.25	° C	to run up			
						fuel level	>	11.6	%	to 10 times			
						fuel level	<	88.4	%	until it			
						engine start temp - amb. temp	<	9.75	° C	successfully			
						time after engine start	>	600	sec	completes			
						or fuel mixture adaptation	stable	-	-	a test			
						amb pressure	>	68	kPa				
						error: mass air flow	not set	-	-				
						error: coolant temp	not set	-	-				
						error: intake air temp	not set	-	-				
						error: fuel tank pres	not set	-	-				
						error: system voltage	not set	-	-				
						error: purge valve	not set	-	-				
						error: vehicle speed	not set	-	-				
						error: canister vent valve	not set	-	-				
						error: purge valve flow	not set	-	-				
						error: accelerator pedal	not set	-	-				
Fuel Level Sensor Circuit													
fuel level sensor 1													
	P0461	rationality	fuel level sensor signal movement <	1.5	%	difference between fuel	>	45.6	%	300 sec	0.1 sec	4 sec	no
						consumed by engine and					continuous	continuous	
						change in fuel level signal						or 50 sec	
						time	>	300	sec			cumulative	
						sensor signal without failure	TRUE	-	-				
						fuel level state stable	TRUE	-	-				
						vehicle speed	>	0	mph				
						engine starting	complete	-	-				
	P0462	range check low	voltage <	0.25	V	battery voltage	>=	10.5	V	approx.	0.1 sec	4 sec cont.	no
						battery voltage	<=	18	V	60 sec	continuous	or 50 sec	
						engine starting	complete	-	-			cumulative	
	P0463	range check high	voltage >	3.2	V	battery voltage	>=	10.5	V	approx.	0.1 sec	4 sec cont.	no
						battery voltage	<=	18	V	60 sec	continuous	or 50 sec	
						engine starting	complete	-	-			cumulative	
Cooling fan 1 relay	**P0480**	circuit continuity - open	Voltage	IC Internal	-	engine speed	>	80	rpm	0.01 sec	0.01 sec	4 sec	two driving
Control Circuit	**P0691**	circuit continuity - ground				battery voltage	>	10	V		continuous	continuous	cycles each
	P0692	circuit continuity - voltage				battery voltage	<	18	V			or 50 sec	with: 4 sec
						output						cumulative	continuous
Cooling fan 2 relay	**P0481**	circuit continuity - open	Voltage	IC Internal	-								or 50 sec
Control Circuit	**P0693**	circuit continuity - ground											cumulative
	P0694	circuit continuity - voltage											

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Evaporative System and Leak Monitor

Leaking purge valve	**P0496**	underpressure in tank	tank pressure loss gradient <	-60	Pa	fuel system status	closed loop	-	-	about 4 sec	0.1 sec	4 sec	two driving
						vehicle speed	<	1.9	mph		continuous		cycles
						engine	idling	-	-	Only one	one		with: 4 sec
						battery voltage	>	10.5	V	test per	completed		continuous
						battery voltage	<	18	V	driving cycle	test per		or 50 sec
						fuel tank pressure	>	-2500	Pa	completed.	driving		cumulative
						fuel tank pressure	<	1000	Pa		cycle		
						ratio: (MAP Model / Baro)	<	0.555	-	The test			
						fuel level	>	11.6	%	will attempt			
						fuel level	<	88.4	%	to run up			
						engine start temp - amb. temp	<	9.75	° C	to 10 times			
						time after engine start	>	600	sec	until it			
						or fuel mixture adaptation	stable	-	-	successfully			
						amb pressure	>	68	kPa	completes			
						maximum number of attempts	<	10	-	a test			
						est amb air temp	>	1.5	° C				
						est amb air temp	<	32.25	° C				
						error: mass air flow	not set	-	-				
						error: coolant temp	not set	-	-				
						error: intake air temp	not set	-	-				
						error: fuel tank pres	not set	-	-				
						error: system voltage	not set	-	-				
						error: purge valve	not set	-	-				
						error: vehicle speed	not set	-	-				
						error: canister vent valve	not set	-	-				
						error: purge valve flow	not set	-	-				
						error: accelerator pedal	not set	-	-				

Idle Speed System

	P0506	functional check	desired rpm - actual rpm >	100	rpm	load (for underspeed only)	<	35	%	10 sec	0.1 sec	4 sec	two driving
						coolant temp.	>	-10.5	° C		continuous	continuous	cycles each
	P0507		desired rpm - actual rpm <	-200	rpm	intake air temp	>	-10.5	° C			or 50 sec	with: 4 sec
			or			vehicle	at idle					cumulative	continuous
			fuel cut off due to overspeed >	3	count	altitude factor (sea level = 1.0)	>	0.703	factor				or 50 sec
			during this idle			evap purge (high HC conc.)	FALSE						cumulative
						intrusive evap test	not active						
						error: throttle position	not set						
						error: vehicle speed	not set						
						error: coolant temperature	not set						
						error: intake air temperature	not set						
						error: evap system	not set						
						error: evap purge valve	not set						

System Voltage

	P0560	rationality	powertrain supply relay feedback input	2.54	V	-	-	-	-	2 sec	0.1 sec	4 sec	no
			voltage								continuous	continuous	
	P0562	range check low	voltage	10	V	time after engine start	>	180	sec			or 50 sec	
												cumulative	
	P0563	range check high	voltage	18	V	time after engine start	>	180	sec				

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ENGINE DIAGNOSTIC PARAMETERS

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System	DTC	Monitor	Fault description	Value	Units	Condition	Op	Value	Units	Time1	Time2	Time3	Action
ECM monitoring													
	P0601	rationality	wrong ROM checksum	-	-	checksum calculation at power	TRUE	-	-	30 sec	0.01 sec	4 sec	code set
						down in the last driving cycle					at key off	continuous	then 5 sec
						completely finished							
		rationality	wrong cyclic ROM checksum of	-	-	partial checksum on critical				30 sec	0.01 sec	4 sec	code set
			critical regions			variables					at key on	continuous	then 5 sec
	P0602	rationality -	service ECU bit set in calibration	service ECU b	-	-	-	-	-	1 sec	0.01 sec	4 sec	code set
		programming incomplete									at key on	continuous	then 5 sec
	P0604	functional check	RAM writeability check			power down calculation	completly	-	-	5 sec	0.01 sec	4 sec	code set
			read and write test			in the last driving cycle	finished				at key off	continuous	then 5 sec
		cyclic RAM-check	writeability check of RAM										
	P0606	Electronic Throttle Control (ETC) checks				power down calculation	completly	-	-	5 sec	0.01 sec	4 sec	code set
		ETC monitoring torque comparison				in the last driving cycle	finished				continuous	continuous	then 5 sec
		ETC monitoring engine speed signal										or 50 sec	
		ETC monitoring volumetric efficiency signal										cumulative	
		ETC mon. vol. Eff., spark advance, A/D conv. grp. A, reaction crosscheck											
		ETC monitoring throttle crosscheck											
		ETC monitoring A/D conv group B, A/D converter supply voltage crosscheck											
		ETC monitoring redundant pedal signal											
		ETC monitoring controller reset											
Electronic Throttle Control													
	P0638	motor control range check	| powerstage duty cycle | >	80	%	battery voltage	>	7	V	0.6 sec	0.01 sec	4 sec	code set
		short term	(absolute value)							(recoverable	continuous	continuous	then 5 sec
										or 50 sec			
		motor control range check								5.0 sec		cumulative	
		long term								(latched)			
MIL Control Circuit		P0650	circuit continuity - open	Voltage	IC Internal	-	engine speed	>	80	rpm	0.01 sec	0.01 sec	4 sec	no
		circuit continuity - ground				battery voltage	>	10	V		continuous	continuous	(but is
		circuit continuity - voltage				battery voltage	<	18	V		or 50 sec		shown in
						output	activated and deactivated for complete checking					cumulative	Mode $03)
Transmission Control Module	P0700	OBD emission fault	signal input	-	-	-	-	-	-	0.01 sec	4 sec cont.	code set
MIL Illumination Request		detected by the TCM									continuous	or 50 sec	then 5 sec
	(Specific TCM DTC shown in freeze frame)										cumulative	
Vehicle speed sensor													
Manual Transmission	P0721	rationality	vehicle speed	171.9	mph	-	-	-	-	2 sec	0.1 sec	4 sec	two driving
		(high range check)									continuous	continuous	cycles each
	P0722	rationality	vehicle speed	3.1	mph	engine speed	>	1800	rpm	3 sec		or 50 sec	with: 4 sec
		(low range check)				engine speed	>	3520	rpm			cumulative	continuous
						fuel shut off	TRUE	-	-				or 50 sec
						coolant temperature	>	40	° C				cumulative
Clutch Pedal Switch	P0833	rationality -	detected clutch pedal press count <	6	count -	gear changes detected	>	20	count	approx.	0.1 sec	4 sec	two driving
Manual Transmission		input switch state changes			switch	(ratio of engine speed to				500 sec	continuous	continuous	cycles each
					presses	vehicle speed -- range change)						or 50 sec	with: 4 sec
					detected	with brake pedal	not applied	-	-			cumulative	continuous
						Delay between shift detections	>	4	sec				or 50 sec
						vehicle speed	>	9.4	mph				cumulative
						between gear change detects							
Engine Metal													
Overtemperature Protection	P1258	engine coolant temperature	engine coolant temperature >	129	° C	engine run time	>	30	sec	1 sec	0.1 sec	4 sec cont.	code set
(Limp Home Function Active)		too high				error: engine coolant temp	not set	-	-		continuous	or 50 sec	then 5 sec
												cumulative	

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Electronic Throttle Control

	P1551	limp-home throttle position	throttle position <	1.8	%	vehicle speed	<=	0	mph	5 sec	0.01 sec	4 sec	two driving
		out of range	OR			engine speed	<	40	rpm		at key on	continuous	cycles each
			throttle position >	13.1	%	engine coolant temperature	>=	5.25	° C			or 50 sec	with: 4 sec
						engine coolant temperature	<=	84.75	° C			cumulative	continuous
						intake air temperature	>=	5.25	° C				or 50 sec
						intake air temperature	<=	60	° C				cumulative
						battery voltage	>	10.0	V				
						accelerator pedal position	<	14.9	%				

Air / Fuel Ratio Sensor (primary A/F)
integrated circuit interface

bank 1	**P167A**	A/F sensor IC operating voltage	low voltage	TRUE	-	battery voltage	>	10.7	V	10 sec	0.1 sec	4 sec	two driving
bank 2	**P167B**	too low				battery voltage	<	18	V		continuous	continuous	cycles each
		A/F sensor IC SPI interface	communication error	TRUE	-	engine	running	-	-	0.1 sec			or 50 sec	with: 4 sec
		communication error										cumulative	continuous
		A/F sensor IC circuit write error	write error	TRUE	-	engine starting	complete	-	-	0.1 sec			or 50 sec

Fuel Level Sensor Circuit
fuel level sensor 2

	P2066	rationality	fuel level sensor signal movement <	1.5	%	difference between fuel	>	45.6	%	300 sec	0.1 sec	4 sec cont.	no
						consumed by engine and					continuous	or 50 sec	
						change in fuel level signal						cumulative	
						time	>	300	sec				
						sensor signal without failure	TRUE	-	-				
						fuel level state stable	TRUE	-	-				
						vehicle speed	>	0	mph				
						engine starting	complete	-	-				
	P2067	range check low	voltage <	0.25	V	battery voltage	>=	10.5	V	approx.	0.1 sec	4 sec cont.	no
						battery voltage	<=	18.1	V	60 sec	continuous	or 50 sec	
						engine starting	complete	-	-			cumulative	
	P2068	range check high	voltage >	3.2	V	battery voltage	>=	10.5	V	approx.	0.1 sec	4 sec cont.	no
						battery voltage	<=	18.1	V	60 sec	continuous	or 50 sec	
						engine starting	complete	-	-			cumulative	

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	engine starting	complete	-	-	2 sec	0.1 sec	4 sec	two driving
Bank 2	**P2098**	trim - rich shift	integral control <			secondary O2 trim active	TRUE	-	-		continuous	continuous	cycles each
		- correction below threshold				and secondary O2 oscillation	TRUE	-	-			or 50 sec	with: 4 sec
						check finished						cumulative	continuous
primary A/F signal LEAN / secondary O2 signal RICH						then timer	>	40	sec				or 50 sec
Bank 1	**P2097**	A/F sensor long term secondary	secondary O2 sensor trim	0.03	lambda	scheduled by System Manager	TRUE						cumulative
Bank 2	**P2099**	trim - lean shift	integral control >			sec. O2 trim - fast lean correction	FALSE						
		- correction above threshold				sec. O2 trim - fast rich correction	FALSE						
						suspicion A/F sensor lean shift	FALSE						
						secondary O2 oscillation test	checked OK						

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Electronic Throttle Control													
	P2100	powerstage circuit switch-off	output circuits not deactivated	-	-		-	-	-	0.1 sec	0.01 sec	4 sec	code set
			as commanded								at key on	continuous	then 5 sec
	P2101	difference between set and	difference between set and	4 . . . 50	%	electronic throttle adaptation	not active	-	-	0.5 sec	0.01 sec	4 sec cont.	code set
		actual position of throttle blade	actual position of throttle blade >	dep. on rate of change		battery voltage	>	7	V		continuous	or 50 sec	then 5 sec
												cumulative	
	P2105	Electronic Throttle Control (ETC) checks				power down processing	completly	-	-	5 sec	0.01 sec	4 sec	code set
		ETC monitoring watchdog shutdown path				in the last driving cycle	finished				at key on	continuous	then 5 sec
	P2119	functionality of return spring	throttle blade return response	0.56	sec	vehicle speed	<=	0	mph	0.56 sec	0.01 sec	4 sec	code set
						engine speed	<	40	rpm		at key on	continuous	then 5 sec
						engine coolant temperature	>=	5.25	° C	once			
						engine coolant temperature	<=	84.75	° C	per			
						intake air temperature	>=	5.25	° C	ignition			
						intake air temperature	<=	60	° C	on			
						battery voltage	>	10.0	V				
						accelerator pedal position	<	14.9	%				
Accelerator Pedal Position	P2122	range check low	voltage	0.84	V	battery voltage	>	7	V	0.2 sec	0.01 sec	4 sec cont.	code set
Sensor 1	P2123	range check high		4.82	V						continuous	or 50 sec	then 5 sec
												cumulative	
Accelerator Pedal Position	P2127	range check low	voltage	0.66	V	battery voltage	>	7	V	0.2 sec	0.01 sec	4 sec cont.	code set
Sensor 2	P2128	range check high		4.82	V						continuous	or 50 sec	then 5 sec
												cumulative	
Accelerator Pedal	P2138	plausibility	voltage difference >	0.21	V	-	-	-	-	0.24 sec	0.01 sec	4 sec	code set
Position 1 versus Position 2			idle range	0.27	V						continuous	continuous	then 5 sec
			voltage difference	0.27	V							or 50 sec	
			pedal partially pressed >									cumulative	
			voltage difference >	1.07	V								
			pedal fully pressed										
		plausibility when leaving idle range	votage pedal 1 >	1.17	V								
			voltage difference pedal 2 >	0.04	V								
Electronic Throttle Control													
	P2176	throttle exchange detection	range check poti1 value at lower stop			vehicle speed	<=	0	mph	1 sec	0.01 sec	4 sec	code set
		learn fail	throttle potentiometer 1 voltage <	0.212	V	engine speed	<	40	rpm		at key on	continuous	then 5 sec
		or	or			engine coolant temperature	>=	5.25	° C	once			
		initial throttle learn failed	throttle potentiometer 1 voltage >	0.865	V	engine coolant temperature	<=	84.75	° C	per			
		or				intake air temperature	>=	5.25	° C	ignition			
		learning prohibited due to	range check poti2 value at lower stop		0	intake air temperature	<=	60	° C	on			
		secondary parameters not met	throttle potentiometer 2 voltage <	4.14	V	battery voltage	>	10.0	V				
		or	or			accelerator pedal position	<	14.9	%				
		minimum throttle position	throttle potentiometer 2 voltage >	4.84									
		out of range											
Fuel System Lean	P2177	fuel trim limits exceeded	delta lambda correction >	1.23	factor	fuel system status	closed loop	-	-	approx.	0.1 sec	4 sec	two driving
Multiplicative	P2178	range - multiplicative	or delta lambda correction <	0.78	factor	long term fuel trim status	active	-	-	300 sec	continuous	continuous	cycles each
and Additive		(load > threshold and air flow > threshold)				engine coolant temperature	>	60	°C	from engine		or 50 sec	with: 4 sec
	P2187	range - additive	delta fuel load correction >	7.0	%	purge control	not active	-	-	start (after		cumulative	continuous
	P2188	low speed and low load	or delta fuel load correction <	-7.0	%	intake air temperature	<=	60	°C	adaptation			or 50 sec
						fuel level	>	11.6	%	has		After	cumulative
						or fuel level error	set	-	-	stabilized)		detection,	
Fuel System Rich	P2179	fuel trim limits exceeded	delta lambda correction >	1.23	factor	integrated air mass	>=	7000	g			diagnostic	
Multiplicative	P2180	range - multiplicative	or delta lambda correction <	0.78	factor							can only	
and Additive		(load > threshold and air flow > threshold)										pass if	
	P2189	range - additive	delta fuel load correction >	7.0	%							similar	
	P2190	low speed and low load	or delta fuel load correction <	-7.0	%							conditions	
												are	
												encountered	

2006   2.8L (LP1),   3.5L (LY7) *used in these vehicles:* **LaCrosse, Allure, CTS, STS, SRX, Rendezvous**
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Oxygen Sensor (secondary O2) Trim of Air / Fuel Ratio Sensor (primary A/F)													
Bank 1	**P2195**	secondary O2 sensor operation	secondary O2 sensor voltage >	0.85	V	A/F sensor measured lambda	>	1.08	lambda	approx.	0.1 sec	4 sec	two driving
Bank 2	**P2197**	too rich - strong correction				short term fuel trim	= MAX	1.25	factor	100 sec	continuous	continuous	cycles each
						A/F sensor	ready	-	-			or 50 sec	with: 4 sec
		A/F sensor measured too lean	or			secondary O2 sensor	ready	-	-			cumulative	continuous
						then							or 50 sec
						accumulated exhaust gas mass	>	200	g				cumulative
			secondary O2 sensor voltage >	0.85	V	A/F sensor measured lambda	>	1.08	lambda				
						secondary O2 sensor fuel trim	>	0.003	lambda				
						proportional trim dominating							
						secondary O2 aging diagnosis	complete	-	-				
						secondary O2 circuit diagnosis	complete	-	-				
						secondary O2 fuel trim active	TRUE	-	-				
						A/F sensor	ready	-	-				
						secondary O2 sensor	ready	-	-				
						then							
						accumulated exhaust gas mass	>	200	g				
			secondary O2 sensor voltage >	0.85	V	target lambda	>	1.04	lambda	2 sec			
						A/F sensor	ready	-	-				
						secondary O2 sensor	ready	-	-				
						lambda closed loop control	active	-	-				
						secondary O2 circuit diagnosis	complete	-	-				
						short term fuel trim (o.k.)	> MIN	0.75	factor				
						then							
						accumulated exhaust gas mass	>	800	g				
Oxygen Sensor (secondary O2) Trim of Air / Fuel Ratio Sensor (primary A/F)													
Bank 1	**P2196**	secondary O2 sensor operation	secondary O2 sensor voltage <	0.15	V	A/F sensor measured lambda	<	0.92	lambda	approx.	0.1 sec	4 sec	two driving
Bank 2	**P2198**	too lean - strong correction				short term fuel trim	= MIN	0.75	factor	100 sec	continuous	continuous	cycles each
						A/F sensor	ready	-	-			or 50 sec	with: 4 sec
		A/F sensor measured too rich				secondary O2 sensor	ready	-	-			cumulative	continuous
						then							or 50 sec
						accumulated exhaust gas mass	>	200	g				cumulative
			secondary O2 sensor voltage <	0.15	V	A/F sensor measured lambda	<	0.92	lambda				
						secondary O2 sensor fuel trim	<	-0.003	lambda				
						proportional trim dominating							
						secondary O2 aging diagnosis	complete	-	-				
						secondary O2 circuit diagnosis	complete	-	-				
						secondary O2 fuel trim active	TRUE	-	-				
						A/F sensor	ready	-	-				
						secondary O2 sensor	ready	-	-				
						then							
						accumulated exhaust gas mass	>	200	g				
			secondary O2 sensor voltage <	0.15	V	target lambda	<	0.96	lambda	2 sec			
						A/F sensor	ready	-	-				
						secondary O2 sensor	ready	-	-				
						lambda closed loop control	active	-	-				
						secondary O2 circuit diagnosis	complete	-	-				
						short term fuel trim (o.k.)	< MAX	1.25	factor				
						then							
						accumulated exhaust gas mass	>	800	g				

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Component	Code	Malfunction	Condition	Value	Unit	Secondary condition	Op	Value	Unit				
Barometric Pressure Sensor	**P2227**	rationality	barometric pressure signal							2 sec	0.1 sec	4 sec	two driving
(ambient air pressure sensor)		signal discontinuity	jump while measuring of >	5	KPa	enabled by scheduler for time	>	20	sec			continuous	cycles each
												or 50 sec	with: 4 sec
			within	20	sec							cumulative	continuous
													or 50 sec
			or										cumulative
			barometric pressure signal pressure										
			jump from previous key off >	30	KPa	Baro from previous drive	valid	-	-				
						difference: Baro substitute	>	30	kPa				
						model versus sensor							
						air mass from throttle flow model	>	11.11	g/sec				
						and							
						ratio: MAP to Baro	<=	0.9	-				
						both for time	>	3	sec				
	P2228	range check low	sensor signal <	50	KPa	enabled by scheduler for time	>	1	sec	2 sec			
	P2229	range check high	sensor signal >	115	KPa	enabled by scheduler for time	>	1	sec	2 sec			
Air / Fuel Ratio Sensor (primary A/F)													
electrical													
wire to wire short circuit		sensor short to heater	A/F sensor voltage gradient	0.08 . . . 0.2	V	within time after heating on/off	<	0.01	sec	10 sec	0.01 sec	4 sec	two driving
bank 1 sensor 1	**P2231**		at heater control turn on >	KLSDULSUP		heater duty cycle	>	5	%		continuous	continuous	cycles each
bank 2 sensor 1	**P2234**					A/F sensor fully heated for	>	10	sec	additional		or 50 sec	with: 4 sec
			A/F sensor voltage gradient	-0.08 . . . -	V	volumetric efficiency gradient	<	30	% / sec	time if		cumulative	continuous
			at heater control switch off <	KLSDULSUN		all injectors activated	TRUE	-	-	fuel level			or 50 sec
			(magnitude greater +/- compare)			battery voltage	<	18	V	is low and			cumulative
						battery voltage	>	10.5	V	not failed			
			total of above occurrences	35	count	critical misfire rate detected	FALSE	-	-				
			within 10 second monitoring periods			catalyst heating activated	FALSE	-	-	600 sec			
						A/F sensor IC diagnosis	complete	-	-				
						error: A/F sensor IC	not set	-	-				
						modeled exh. gas temp.	<	800	° C				
Oxygen Sensor													
sensor circuit (secondary O2)													
bank 1 sensor 2	**P2232**	sensor line short circuit	secondary O2 sensor			secondary O2 heating stable	>	10	sec	10 sec	0.01 sec	4 sec	two driving
bank 2 sensor 2	**P2235**	to heater output line	voltage gradient >	2	V	and mod. Exhaust-gas temp.	>	250	° C		continuous	continuous	cycles each
			within time after heater turn off <	0.04	sec	for time	>	90	sec			or 50 sec	with: 4 sec
			for occurrences >	4	count	engine running	TRUE	-	-			cumulative	continuous
			out of heater turn offs	6	count	battery voltage	>	10.5	V				or 50 sec
						mod. exhaust-gas temp.	<	800	° C				cumulative
						time after dew point exceeded	>	10	sec				

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Air / Fuel Ratio Sensor (primary A/F)

pumping current circuit open		lambda control factor change	absolute value of lambda control factor	0.1	lambda	battery voltage	<	18	V	1.5 sec	0.1 sec	4 sec	two driving
bank 1 sensor 1	**P2237**	above threshold	change from the point when the			battery voltage	>	10.7	V		continuous	continuous	cycles each
bank 2 sensor 1	**P2240**		secondary conditions are met >			engine	running	-	-			or 50 sec	with: 4 sec
						engine starting	complete	-	-			cumulative	continuous
						A/F sensor voltage	<	1.52	V				or 50 sec
						A/F sensor voltage	>	1.48	V				cumulative
						A/F sensor electrical trimming	not active	-	-				
						A/F sensor heater at op.temp.	TRUE	-	-				
						A/F sensor warm up control	complete	-	-				
						lambda closed loop control	TRUE	-	-				
						forced fuel trim amplitude	TRUE	-	-				
						| fuel trim forced amplitude |	>	0.02	lambda				
						catalyst warm up control	stable	-	-				
						sec. O2 sensor proportional trim	stable	-	-				
						lean mixture inhibit	stable	-	-				
						lambda closed loop control init	FALSE	-	-				
						closed loop control startup	FALSE	-	-				

Air / Fuel Ratio Sensor (primary A/F)

pumping current circuit open		A/F sensor voltage within upper	A/F sensor voltage <	1.52	V	battery voltage	<	18	V	approx.	0.1 sec	4 sec	two driving
bank 1 sensor 1	**P2237**	and lower thresholds	and A/F sensor voltage >	1.48	V	battery voltage	>	10.7	V	8 sec	continuous	continuous	cycles each
bank 2 sensor 1	**P2240**	and desired lambda is outside				engine	running	-	-	once the		or 50 sec	with: 4 sec
		of upper or lower threshold				engine starting	complete	-	-	driving		cumulative	continuous
						target lambda above upper limit	>	1.03	lambda	condition			or 50 sec
						or below lower limit	<	0.97	lambda	is met			cumulative
						closed loop control	TRUE	-	-				
						A/F sensor heater	TRUE	-	-				
						at operating temperature							
						A/F sensor electrical trimming	active	-	-				
						A/F sensor dynamic response	not slow	-	-				
						error: A/F sensor heating	not set	-	-				
						integrated exhaust gas mass	>	200	g				

Air / Fuel Ratio Sensor (primary A/F)

pumping current circuit open		A/F sensor not lean enough	A/F sensor voltage <	1.7	V	battery voltage	<	18	V	2 sec	0.1 sec	4 sec	two driving
bank 1 sensor 1	**P2237**	during fuel shut off operation				battery voltage	>	10.7	V		continuous	continuous	cycles each
bank 2 sensor 1	**P2240**					engine	running	-	-			or 50 sec	with: 4 sec
						engine starting	complete	-	-			cumulative	continuous
						time after fuel shut off	>	3	sec				or 50 sec
						A/F sensor heater	TRUE	-	-				cumulative
						at operating temperature							

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Air / Fuel Ratio Sensor (primary A/F)													
reference voltage circuit open		A/F sensor voltage	A/F sensor voltage <	0.2	V	battery voltage	<	18	V	2 sec	0.1 sec	4 sec	two driving
bank 1 sensor 1	**P2243**	above upper threshold	A/F sensor voltage >	4.7	V	battery voltage	>	10.7	V		continuous	continuous	cycles each
bank 2 sensor 1	**P2247**	or below lower threshold				engine	running	-	-			or 50 sec	with: 4 sec
						engine starting	complete	-	-			cumulative	continuous
			for time	1	sec	A/F sensor heating normal	>	20	sec				or 50 sec
						operation range for time							cumulative
						error: A/F sensor heater circuit	not set	-	-				
						A/F sensor internal resistance	>	570	Ohms				
Air / Fuel Ratio Sensor (primary A/F)													
reference ground circuit open		A/F sensor heater coupling	A/F sensor voltage gradient >	0.010	V	battery voltage	<	18	V	10 sec	0.1 sec	4 sec	two driving
bank 1 sensor 1	**P2251**	occurs due to	for number of times	20	count	battery voltage	>	10.7	V		continuous	continuous	cycles each
bank 2 sensor 1	**P2254**	max heating control reached	monitored in 10 sec intervals			engine	running	-	-			or 50 sec	with: 4 sec
		due to reference ground circuit	with monitoring within 0.05 sec			engine starting	complete	-	-			cumulative	continuous
		disconnection	of each heater circuit activation event			modeled exhaust gas	<	900	° C				or 50 sec
						temperature at A/F sensor							cumulative
						A/F sensor voltage	<	1.53	V				
						A/F sensor voltage	>	1.47	V				
						A/F sensor heating normal	>	20	sec				
						operation range for time							
						A/F sensor internal resistance	>	570	Ohms				
						error: A/F sensor heater circuit	not set						
						A/F sensor heating ready	TRUE	-	-				
						and engine	running	-	-				
						and A/F heater control shut off	FALSE	-	-				
						and finished fuel cutoff for >	>	2	sec				
						and battery voltage	>	10	V				
						for time	>	30	sec				

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ENGINE DIAGNOSTIC PARAMETERS

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Oxygen Sensor

sensor response (secondary O2)

Component	DTC	Malfunction Criteria	Threshold description	Value	Unit	Enable Conditions	Value	Value	Unit				
bank 1 sensor 2	**P2270**	oscillation check low	secondary O2 sensor voltage <	0.582 . . . 0.661	V	secondary O2 sensor	ready	-	-	approx.	0.1 sec	4 sec	two driving
bank 2 sensor 2	**P2272**		for time >	100	sec	for time	>	10	sec	600 sec	continuous	continuous	cycles each
			then			secondary O2 closed loop control	active	-	-			or 50 sec	with: 4 sec
			ramping in enrichment by	0.3	lambda	all injectors activated	TRUE	-	-	additional		cumulative	continuous
			at gradient	0.17	λ / sec	engine air flow (intrusive test)	>	5.56	g/sec	time if			or 50 sec
			for time (after enrichment limit reached)	10	sec	and engine air flow	<	33.33	g/sec	fuel level			cumulative
						for time	>	3	sec	is low and			
						engine air flow (passive monitor)	>	9.72	g/sec	not failed			
						sec. O2 trim - fast lean correction	FALSE			600 sec			
						sec. O2 trim - fast rich correction	FALSE						
						engine	running						
						scheduled by System Manager	TRUE						
bank 1 sensor 2	**P2271**	oscillation check high	secondary O2 sensor voltage >	0.582 . . . 0.661	V	secondary O2 sensor	ready	-	-	approx.	0.1 sec	4 sec	two driving
bank 2 sensor 2	**P2273**		for time >	100	sec	for time	>	10	sec	600 sec	continuous	continuous	cycles each
			then			secondary O2 closed loop control	active					or 50 sec	with: 4 sec
			ramping in enleanment by	0.07	lambda	all injectors activated	TRUE					cumulative	continuous
			at gradient	0.17	λ / sec	engine air flow (intrusive test)	>	5.56	g/sec			or 50 sec	or 50 sec
			for time (after enleanment limit reached)	10	sec	and engine air flow	<	33.33	g/sec				cumulative
						for time	>	3	sec				
						engine air flow (passive monitor)	>	9.72	g/sec				
						sec. O2 trim - fast lean correction	FALSE						
						sec. O2 trim - fast rich correction	FALSE						
						engine	running						
						scheduled by System Manager	TRUE						
bank 1 sensor 2	**P2271**	fuel cut off check high	secondary O2 sensor voltage >	0.202	V	secondary O2 heating stable	>	10	sec	0.2 sec	0.1 sec	4 sec	two driving
bank 2 sensor 2	**P2273**		time after fuel cut off >	4	sec	secondary O2 dew point exceeded	TRUE	-	-		continuous	continuous	cycles each
						for time	>	30	sec			or 50 sec	with: 4 sec
						air passed after fuel cut off	>	15	g			cumulative	continuous
						modeled exhaust temp	>	350	° C				or 50 sec
						at secondary O2 sensor							cumulative
						scheduled by System Manager	TRUE	-	-				
						error: cam sensor	not set	-	-				
						error: evap canister purge sys.	not set	-	-				
						error: evap purge valve ckt	not set	-	-				
						error: battery voltage	not set	-	-				

Air / Fuel Ratio Sensor (primary A/F)

Component	DTC	Malfunction Criteria	Threshold description	Value	Unit	Enable Conditions	Value	Value	Unit				
sensor voltage		A/F sensor voltage	A/F sensor voltage >	3.7	V	A/F sensor heater	TRUE	-	-	10 sec	0.1 sec	4 sec	two driving
bank 1 sensor 1	**P2297**	exceeds threshold	and			at operating temperature					continuous	continuous	cycles each
bank 2 sensor 1	**P2298**	but not out of full range	A/F sensor voltage <	4.81	V	engine starting	complete	-	-	additional		or 50 sec	with: 4 sec
						desired A/F	<	1.6	lambda	time if		cumulative	continuous
			or			all injectors activated	TRUE	-	-	fuel level			or 50 sec
						scheduled by System Manager	TRUE	-	-	is low and			cumulative
			AF sensor voltage >	2.5	V					not failed			
			and							600 sec			
			A/F sensor voltage <	3.06	V								
			(if using rich calibration										
			curve characteristic)										

Air / Fuel Ratio Sensor (primary A/F)

Component	DTC	Malfunction Criteria	Threshold description	Value	Unit	Enable Conditions	Value	Value	Unit				
measuring (trim) current		A/F sensor voltage	A/F sensor voltage >	4.81	V	battery voltage	<	18	V	4 sec	0.1 sec	4 sec	two driving
circuit open		above threshold				battery voltage	>	10.7	V		continuous	continuous	cycles each
bank 1 sensor 1	**P2626**					engine	running	-	-	additional		or 50 sec	with: 4 sec
bank 2 sensor 1	**P2629**					engine starting	complete	-	-	time if		cumulative	continuous
						fuel cut off	TRUE	-	-	fuel level			or 50 sec
						modeled exhaust temp	<	750	° C	is low and			cumulative
						in front of catalyst				not failed			
						A/F sensor heater	TRUE	-	-				
						at operating temperature				600 sec			

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	Code	Fault	Condition	Value	Unit	Parameter	State			Time 1	Time 2	Time 3	Notes
Fuel Level Sensor Circuit													
fuel transfer pump	**P2636**	transfer pump failure	fuel level 1 <	10.6	%	sensor signal without failure	TRUE	-	-	240 sec	0.1 sec	4 sec cont.	no
			and			fuel level state stable	TRUE	-	-		continuous	or 50 sec	
			fuel level 2 >	22.8	%	engine starting	complete	-	-			cumulative	
OBD ISO-15765 Communication Bus													
	U0001	ISO-15765 Bus Error	Invalid Message Received			CAN Bus	initialized			1 sec	0.01 sec	4 sec	code set
			or Dual Port Ram Hardware Error;			consisting of:	and ready			0.01 sec	continuous	continuous	then 5 sec
			or No Communication / Bus Off			ignition on for	>	3	sec	0.02 sec		or 50 sec	
						battery voltage	>	10.5	V			cumulative	
						battery voltage	<	18	V				
						normal bus communication	running	-	-				
	U0101	Communication with TCM	TCM Message Timeout	message		Automatic Transmission	equipped	-	-	2.5 sec	0.01 sec	4 sec	code set
	P0864		or Invalid Message Content	missing,		CAN Bus	initialized	-	-		continuous	continuous	then 5 sec
				delayed,		consisting of:	and ready					or 50 sec	
				or		ignition on for	>	3	sec			cumulative	
				invalid		battery voltage	>	10.5	V				
				content		battery voltage	<	18	V				
						normal bus communication	running	-	-				

2006   2.8L (LP1),   3.5L (LY7) *used in these vehicles:* **LaCrosse, Allure, CTS, STS, SRX, Rendezvous**
ENGINE DIAGNOSTIC PARAMETERS

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Look-up Tables (Engine Cal)

P0011, P0021 — KFDWNWDMXE / 2 (internal manufacturer cross reference)

Maximum Allowed Deviation - Intake Camshaft Position

degrees crank | Modeled Engine Oil Temperature (°C)

Engine Speed (rpm)	0	60	80	100	130
800	5.00	5.00	6.00	8.00	10.00
1200	5.00	5.00	5.00	5.00	6.00
1600	5.00	5.00	5.00	5.00	6.00
2000	5.00	5.00	5.00	5.00	5.00
2500	5.00	5.00	5.00	5.00	5.00
4000	5.00	5.00	5.00	5.00	5.00

P0014, P0024 — KFDWNWDMXA / 2 (internal manufacturer cross reference)

Maximum Allowed Deviation - Exhaust Camshaft Position

degrees crank | Modeled Engine Oil Temperature (°C)

Engine Speed (rpm)	0	60	80	100	130
800	5.00	5.00	6.00	7.00	8.00
1200	5.00	5.00	5.00	5.00	6.00
1600	5.00	5.00	5.00	5.00	6.00
2000	5.00	5.00	5.00	5.00	6.00
2500	5.00	5.00	5.00	5.00	6.00
4000	5.00	5.00	5.00	5.00	6.00

P0102 — KFMLDMN (internal manufacturer cross reference)

Mass Air Flow Threshold - Minimum

Mass Air Flow (kg / h) | Percent Throttle (%)

Engine Speed (rpm)	0	5	15	25	40	50	60	100
320	-5	-5	-5	-5	-5	-5	-5	-5
560	1	1	5.2	8.5	12.2	13.9	14.9	14.9
1000	1	2.4	8	19.3	28.2	31.2	32.7	34.5
1520	1.3	3.6	10.9	28.8	47.2	54.6	56	57.9
2000	1.7	4.4	14	36.3	61.7	71	75.1	78.4
3000	2.6	4.8	19	53	99	123.8	127.9	134.8
4000	2.8	5	23.8	72	138	165.8	173	187.8
5000	3	5	27.3	81.5	168	206.3	218.5	236.9
6000	3	5	30.4	81.5	192	238.1	255.3	277.1

Mass Air Flow (g / sec) | Percent Throttle (%)

Engine Speed (rpm)	0	5	15	25	40	50	60	100
320	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4
560	0.3	0.3	1.4	2.4	3.4	3.9	4.1	4.1
1000	0.3	0.7	2.2	5.4	7.8	8.7	9.1	9.6
1520	0.4	1.0	3.0	8.0	13.1	15.2	15.6	16.1
2000	0.5	1.2	3.9	10.1	17.1	19.7	20.9	21.8
3000	0.7	1.3	5.3	14.7	27.5	34.4	35.5	37.4
4000	0.8	1.4	6.6	20.0	38.3	46.1	48.1	52.2
5000	0.8	1.4	7.6	22.6	46.7	57.3	60.7	65.8
6000	0.8	1.4	8.4	22.6	53.3	66.1	70.9	77.0

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P0103	KFMLDMX	(internal manufacturer cross reference)							
	Mass Air Flow Threshold - Maximum								
	Mass Air Flow (kg / h)	Percent Throttle (%)							
	Engine Speed (rpm)	0	5	15	25	40	50	60	100
	320	300	300	300	300	300	300	300	300
	560	115	126	142	154	163	165	185	206
	1000	139	149	173	184.5	195	199	201.3	215
	1520	173	190	223	250	274	281	282	284.9
	2000	206	229	282	321	364	381	384	385
	3000	208	230	328	450	546	583	590	592
	4000	217	243	372	529	674	741	745	750
	5000	224	249	403	570	778	865	868	871.4
	6000	230	271	428	600	819	927	940.4	992.8
	Mass Air Flow (g / sec)	Percent Throttle (%)							
	Engine Speed (rpm)	0	5	15	25	40	50	60	100
	320	83.3	83.3	83.3	83.3	83.3	83.3	83.3	83.3
	560	31.9	35.0	39.4	42.8	45.3	45.8	51.4	57.2
	1000	38.6	41.4	48.1	51.3	54.2	55.3	55.9	59.7
	1520	48.1	52.8	61.9	69.4	76.1	78.1	78.3	79.1
	2000	57.2	63.6	78.3	89.2	101.1	105.8	106.7	106.9
	3000	57.8	63.9	91.1	125.0	151.7	161.9	163.9	164.4
	4000	60.3	67.5	103.3	146.9	187.2	205.8	206.9	208.3
	5000	62.2	69.2	111.9	158.3	216.1	240.3	241.1	242.1
	6000	63.9	75.3	118.9	166.7	227.5	257.5	261.2	275.8

P0135, P0155	KLTKERDCMN	(internal manufacturer cross reference)		
	Primary A/F Sensor Element (Ceramic) Temperature Threshold			
		Battery Voltage (V)		
		10.7	11	12	13
	Temperature (° C)	671	679	704	740

P0141, P0161	KFRINH / 2	(internal manufacturer cross reference)			
	Sensor Element (Ceramic) Impedance, Nominal Value - Secondary O2 Sensor				
	Ohms	Modeled Exhaust Gas Temperature at Secondary O2 Sensor (° C)			
	O2 Heater Power (watts)	360	400	440	480	520
	0.7	296	232	200	192	168
	0.8	208	168	152	144	144
	1.0	128	120	112	104	104
	FRINH1 / 2	(internal manufacturer cross reference)			
	Multiplication Factor for Internal Resistance KFRINH Nominal Value - Secondary O2 Sensor				
		Modeled Exhaust Gas Temperature at Secondary O2 Sensor (° C)			
		360	400	440	480	520
	factor	7.50	6.50	5.50	4.50	3.50

P0300	MISALUN	(internal manufacturer cross reference)							
	Minimum Load Threshold for Misfire Detection								
		Engine Speed (rpm)							
		800	1600	2400	3200	4000	4800	5600	6400
	Percent Torque (load - %)	10.5	10.9	10.9	11.3	16.8	22.3	27.3	29.3

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P0324 — DKROFN (internal manufacturer cross reference)
Voltage Gradient Limit of Knock Sensor Integrator Rise for zero test

Test Period (microseconds)						
1000	1500	2000	3000	4000	5000	
Voltage Rise (V / sec)						
60.0	50.0	45.0	40.0	40.0	40.0	

Test Period (sec)						
0.001	0.0015	0.002	0.003	0.004	0.005	
Voltage Rise (V / sec)						
60.0	50.0	45.0	40.0	40.0	40.0	

P0327, P0332 — UDKSNU (internal manufacturer cross reference)
Reference voltage threshold for knock sensor diagnosis - Lower Limit

Engine Speed (rpm)											
400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800
Peak RMS Voltage (V)											
0.53	0.53	0.53	0.57	0.66	0.74	0.90	1.00	1.09	1.19	1.31	1.50

P0328, P0333 — UDKSNO (internal manufacturer cross reference)
Reference voltage threshold for knock sensor diagnosis - Upper Limit

Engine Speed (rpm)											
400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800
Peak RMS Voltage (V)											
33	33	33	33	33	33	33	33	33	47	47	67

P0442 — KFEONVPT (internal manufacturer cross reference)
Vacuum / Pressure Threshold for Fuel Tank Leak Detection

Vacuum / Pressure (hPa) Ambient Temperature (Model) (C)

Fuel Level (%)	0	6.75	9.75	15	19.5	23.25	27	31.5	36	39.75
5	10.65	12.30	12.70	11.20	10.10	9.70	10.90	12.80	14.10	14.30
14	10.70	12.30	12.70	11.30	10.10	9.70	10.90	12.80	14.10	14.30
23	9.80	12.20	12.60	11.20	10.00	9.70	10.50	12.20	13.30	13.70
32	7.20	8.60	9.00	9.10	9.50	8.00	8.00	9.40	10.90	11.90
41	7.20	8.50	8.20	8.40	9.40	8.00	7.60	8.30	8.80	8.80
50	7.20	7.40	6.30	6.40	7.37	6.10	6.10	8.30	8.80	8.80
59	7.20	7.40	6.80	6.50	6.10	6.10	6.10	8.30	8.80	8.80
68	5.70	5.70	6.40	7.00	6.30	6.30	6.30	8.30	8.80	8.80
77	5.40	5.40	5.40	7.00	6.40	6.40	6.40	8.30	8.80	8.80
86	5.40	5.40	5.40	6.80	6.10	6.10	6.10	8.30	8.80	8.80
95	5.40	5.40	5.40	6.80	6.10	6.10	6.10	8.30	8.80	8.80
Tank Capacity	65.8 Liters									

Vacuum / Pressure (Pa) Ambient Temperature (Model) (C)

Fuel Level (%)	0	6.75	9.75	15	19.5	23.25	27	31.5	36	39.75
5	1065.0	1230.0	1270.0	1120.0	1010.0	970.0	1090.0	1280.0	1410.0	1430.0
14	1070.0	1230.0	1270.0	1130.0	1010.0	970.0	1090.0	1280.0	1410.0	1430.0
23	980.0	1220.0	1260.0	1120.0	1000.0	970.0	1050.0	1220.0	1330.0	1370.0
32	720.0	860.0	900.0	910.0	950.0	800.0	800.0	940.0	1090.0	1190.0
41	720.0	850.0	820.0	840.0	940.0	800.0	760.0	830.0	880.0	880.0
50	720.0	740.0	630.0	640.0	737.0	610.0	610.0	830.0	880.0	880.0
59	720.0	740.0	680.0	650.0	610.0	610.0	610.0	830.0	880.0	880.0
68	570.0	570.0	640.0	700.0	630.0	630.0	630.0	830.0	880.0	880.0
77	540.0	540.0	540.0	700.0	640.0	640.0	640.0	830.0	880.0	880.0
86	540.0	540.0	540.0	680.0	610.0	610.0	610.0	830.0	880.0	880.0
95	540.0	540.0	540.0	680.0	610.0	610.0	610.0	830.0	880.0	880.0

P0455 — KLGGRTED05 (internal manufacturer cross reference)
Vacuum Gradient Threshold for Fuel Tank Leak Detection

Fuel Level liters	0	10	20	30	40	50	60	70	75	80
hPa / sec	0.300	0.350	0.400	0.450	0.500	0.550	0.600	0.650	0.675	0.700
Tank Capacity	65.8 Liters									
Fuel Level (%)	0	15.2	30.4	45.6	60.8	76.0	91.2	106.4	114.0	121.6
Pa / sec	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	67.5	70.0

2006   2.8L (LP1),   3.5L (LY7) *used in these vehicles:* **LaCrosse, Allure, CTS, STS, SRX, Rendezvous**
ENGINE DIAGNOSTIC PARAMETERS

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P2101	DWDKSBAMX	(internal manufacturer cross reference)														
	Maximum Throttle Angle Deviation per computation cycle															
		Percent Throttle Opening (%)														
		0	0.3	1	5	15										
Percent Throttle Delta (%)		4	6	11	20	50										
P2231, P2234	KLSDULSUN	(internal manufacturer cross reference)														
	Sensor Voltage Delta Down Threshold - Maximum per Computation Cycle															
		Battery Voltage (V)														
		11	13	15	17											
Delta Voltage (V)		0.078	0.078	0.117	0.200											