

# **TECS200**

ENGINE MANAGEMENT SYSTEM

# **TECgt200**

DIRECT MANAGEMENT SYSTEM



**ELECTROMOTIVE**  
ENGINE CONTROLS



**ELECTROMOTIVE**  
ENGINE CONTROLS

# **XDi200**

DIRECT IGNITION SYSTEM



**ELECTROMOTIVE**  
ENGINE CONTROLS

**TECgt200, TECS200, XDI200**  
**PRELIMINARY**

**Product Installation Manual**  
**& User's Guide**

**DRAFT**

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## Appendix VIa. TECgt200 Connector Pin Out Summary

Pin	EMI Color	Gauge	Function	Alternate Color	Assigned Function
1	Bare (A)	16 TST	Coil Shield		
2	White(A)	16 TST	Coil A1		
3	Red(A)	16 TST	Coil B1		
4	Black(A)	16 TST	Coil C1		
5	Blk/Gray	20TXL	DoC A1		
6	Blk/Red	20TXL	DoC B1		
7	Blk/Grn	20TXL	DoC C1		
8	Tan	20TXL	Ground		
9	Orange	20TXL	Knock		
10	Blk/Blue	20TXL	DoC A2		
11	Blk/Pink	20TXL	DoC B2		
12	Blk/Org	20TXL	DoC C2		
13	Bare (B)	16 TST	Coil Shield		
14	White(B)	16 TST	Coil A2		
15	Red(B)	16 TST	Coil B2		
16	Black(B)	16 TST	Coil C2		
17	Blk/Wht	20TXL	Ground		
18	Blk/Wht	20TXL	Ground		
19	Gray/Red	20TXL	5V Ref		
20	Gray/Red	20TXL	5V Ref		
21	Gray/Red	20TXL	5V Ref		
22	Org/Red	20TXL	GPI2		
23	Org/Grn	20TXL	GPI3		
24	Org/Blue	20TXL	GPI4		
25	Org/Ppl	20TXL	GPI5		
26	Org/Pink	20TXL	GPI6		
27	Org/Tan	20TXL	GPI7		
28	Org/Yel	20TXL	GPI8		
29	Org/Gray	20TXL	GPI9		
30	Brown	7cond	Ground		
31	Orange	7cond	RXD		
32	Blue	7cond	TXD		
33	Red/Wht	18TXL	12 volt in		
34	Org/Blk	20TXL	Speed In		
35	Black/Shield	7cond	USB GND		
36	Red	7cond	USB PC5V		
37	White	7cond	USB D-		
38	Green	7cond	USB D+		
39	Yel	20TXL	CAM in		
40	Yel/Ppl		CAM 2		

41	Black/Wht	20TXL	Ground		
42	Red	24 TSP	Crank Sensor in		
43	Blk/Shld	24 TSP	Ground		
44	Green	20TXL	MAP		
45	Blue	20TXL	TPS		
46	Gray	20TXL	CLT		
47	White	20TXL	MAT		
48	Org/Wht		EG RTD		
49	Purple	20TXL	EGO Std		
50	Ppl/Tan		EGO W.B.		
51	Yel/Pink	20TXL	CAN H		
52	Grn/Pink	20TXL	CAN L		
53	Red/Wht	18TXL	12 volt in		
54	Wht/Grn		GPO 7		
55	Wht/Red		GPO10		
56	Wht/Org		Data log stat		
57	L.Grn	20TXL	FPR		
58	White/Blk	20TXL	GPO1		
59	Pink	20TXL	CE		
60	D.Blu/Wht	20	IACB / GPO4		
61	D.Blu/Blk	20	IACA / GPO3		
62	Brown	20TXL	Tach		
63	Wht/Ppl		GPO9/VVT		
64	Wht/Blue		GPO8/VVT		
65	D.Grn/Wht	20	IACD / GPO6		
66	D.Grn/Blk	20	IACC / GPO5		
67	Yel/Blk	20TXL	Inj1		
68	Yel/Red	20TXL	Inj2		
69	Yel/Grn	20TXL	Inj3		
70	Yel/Blue	20TXL	Inj4		
71	L.Blue/Blk	20TXL	Inj5		
72	L.Blue/Red	20TXL	Inj6		
73	Black	12TXL	Main Gnd		

## Appendix VIb. TECs200 Connector Pin Out Summary

Pin	EMI Color	Gauge	Function	Alternate Color	Assigned Function
1	Bare (A)	16 TST	Coil Shield		
2	White(A)	16 TST	Coil A1		
3	Red(A)	16 TST	Coil B1		
4	Black(A)	16 TST	Coil C1		
5	Blk/Gray	20TXL	DoC A1		
6	Blk/Red	20TXL	DoC B1		
7	Blk/Grn	20TXL	DoC C1		
8	Tan	20TXL	Ground		
9	Orange	20TXL	Knock		
10					
11					
12					
13					
14					
15					
16					
17	Blk/Wht	20TXL	Ground		
18	Blk/Wht	20TXL	Ground		
19	Gray/Red	20TXL	5V Ref		
20	Gray/Red	20TXL	5V Ref		
21	Gray/Red	20TXL	5V Ref		
22	Org/Red	20TXL	GPI2		
23	Org/Grn	20TXL	GPI3		
24	Org/Blue	20TXL	GPI4		
25	Org/Ppl	20TXL	GPI5		
26	Org/Pink	20TXL	GPI6		
27					
28					
29					
30	Brown	7cond	Ground		
31	Orange	7cond	RXD		
32	Blue	7cond	TXD		
33	Red/Wht	18TXL	12 volt in		
34	Org/Blk	20TXL	Speed In		
35	Black/Shield	7cond	USB GND		
36	Red	7cond	USB PC5V		
37	White	7cond	USB D-		
38	Green	7cond	USB D+		
39	Yel	20TXL	CAM in		
40	Yel/Ppl		CAM 2		

41	Black/Wht	20TXL	Ground		
42	Red	24 TSP	Crank Sensor in		
43	Blk/Shld	24 TSP	Ground		
44	Green	20TXL	MAP		
45	Blue	20TXL	TPS		
46	Gray	20TXL	CLT		
47	White	20TXL	MAT		
48	Org/Wht		EG RTD		
49	Purple	20TXL	EGO Std		
50	Ppl/Tan		EGO W.B.		
51	Yel/Pink	20TXL	CAN H		
52	Grn/Pink	20TXL	CAN L		
53	Red/Wht	18TXL	12 volt in		
54	Wht/Grn		GPO 7		
55	Wht/Red		GPO10		
56	Wht/Org		Data log stat		
57	L.Grn	20TXL	FPR		
58	White/Blk	20TXL	GPO1		
59	Pink	20TXL	CE		
60	D.Blu/Wht	20	IACB / GPO4		
61	D.Blu/Blk	20	IACA / GPO3		
62	Brown	20TXL	Tach		
63					
64					
65	D.Grn/Wht	20	IACD / GPO6		
66	D.Grn/Blk	20	IACC / GPO5		
67	Yel/Blk	20TXL	Inj1		
68	Yel/Red	20TXL	Inj2		
69	Yel/Grn	20TXL	Inj3		
70	Yel/Blue	20TXL	Inj4		
71					
72					
73	Black	12TXL	Main Gnd		

## Appendix VIc. XDI200 Connector Pin Out Summary

Pin	EMI Color	Gauge	Function	Alternate Color	Assigned Function
1	Bare (A)	16 TST	Coil Shield		
2	White(A)	16 TST	Coil A1		
3	Red(A)	16 TST	Coil B1		
4	Black(A)	16 TST	Coil C1		
5	Blk/Gray	20TXL	DoC A1		
6	Blk/Red	20TXL	DoC B1		
7	Blk/Grn	20TXL	DoC C1		
8	Tan	20TXL	Ground		
9	Orange	20TXL	Knock		
10	Blk/Blue	20TXL	DoC A2		
11	Blk/Pink	20TXL	DoC B2		
12	Blk/Org	20TXL	DoC C2		
13	Bare (B)	16 TST	Coil Shield		
14	White(B)	16 TST	Coil A2		
15	Red(B)	16 TST	Coil B2		
16	Black(B)	16 TST	Coil C2		
17	Blk/Wht	20TXL	Ground		
18	Blk/Wht	20TXL	Ground		
19	Gray/Red	20TXL	5V Ref		
20	Gray/Red	20TXL	5V Ref		
21	Gray/Red	20TXL	5V Ref		
22	Org/Red	20TXL	GPI2		
23	Org/Grn	20TXL	GPI3		
24	Org/Blue	20TXL	GPI4		
25	Org/Ppl	20TXL	GPI5		
26	Org/Pink	20TXL	GPI6		
27	Org/Tan	20TXL	GPI7		
28	Org/Yel	20TXL	GPI8		
29	Org/Gray	20TXL	GPI9		
30	Brown	7cond	Ground		
31	Orange	7cond	RXD		
32	Blue	7cond	TXD		
33	Red/Wht	18TXL	12 volt in		
34	Org/Blk	20TXL	Speed In		
35	Black/Shield	7cond	USB GND		
36	Red	7cond	USB PC5V		
37	White	7cond	USB D-		
38	Green	7cond	USB D+		
39	Yel	20TXL	CAM in		
40	Yel/Ppl		CAM 2		

41	Black/Wht	20TXL	Ground		
42	Red	24 TSP	Crank Sensor in		
43	Blk/Shld	24 TSP	Ground		
44	Green	20TXL	MAP		
45	Blue	20TXL	TPS		
46	Gray	20TXL	CLT		
47	White	20TXL	MAT		
48	Org/Wht		EG RTD		
49	Purple	20TXL	EGO Std		
50	Ppl/Tan		EGO W.B.		
51	Yel/Pink	20TXL	CAN H		
52	Grn/Pink	20TXL	CAN L		
53	Red/Wht	18TXL	12 volt in		
54	Wht/Grn		GPO 7		
55	Wht/Red		GPO10		
56	Wht/Org		Data log stat		
57	L.Grn	20TXL	FPR		
58	White/Blk	20TXL	GPO1		
59	Pink	20TXL	CE		
60	D.Blu/Wht	20	IACB / GPO4		
61	D.Blu/Blk	20	IACA / GPO3		
62	Brown	20TXL	Tach		
63					
64					
65	D.Grn/Wht	20	IACD / GPO6		
66	D.Grn/Blk	20	IACC / GPO5		
67					
68					
69					
70					
71					
72					
73	Black	12TXL	Main Gnd		

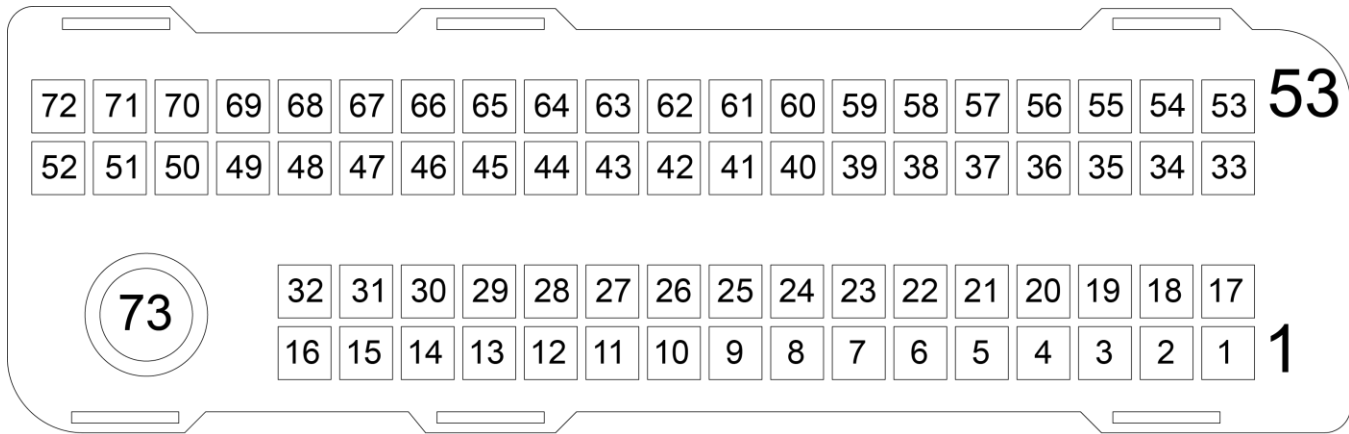


## Appendix VII. TECgt200, TECs200, XDI200 Connector View

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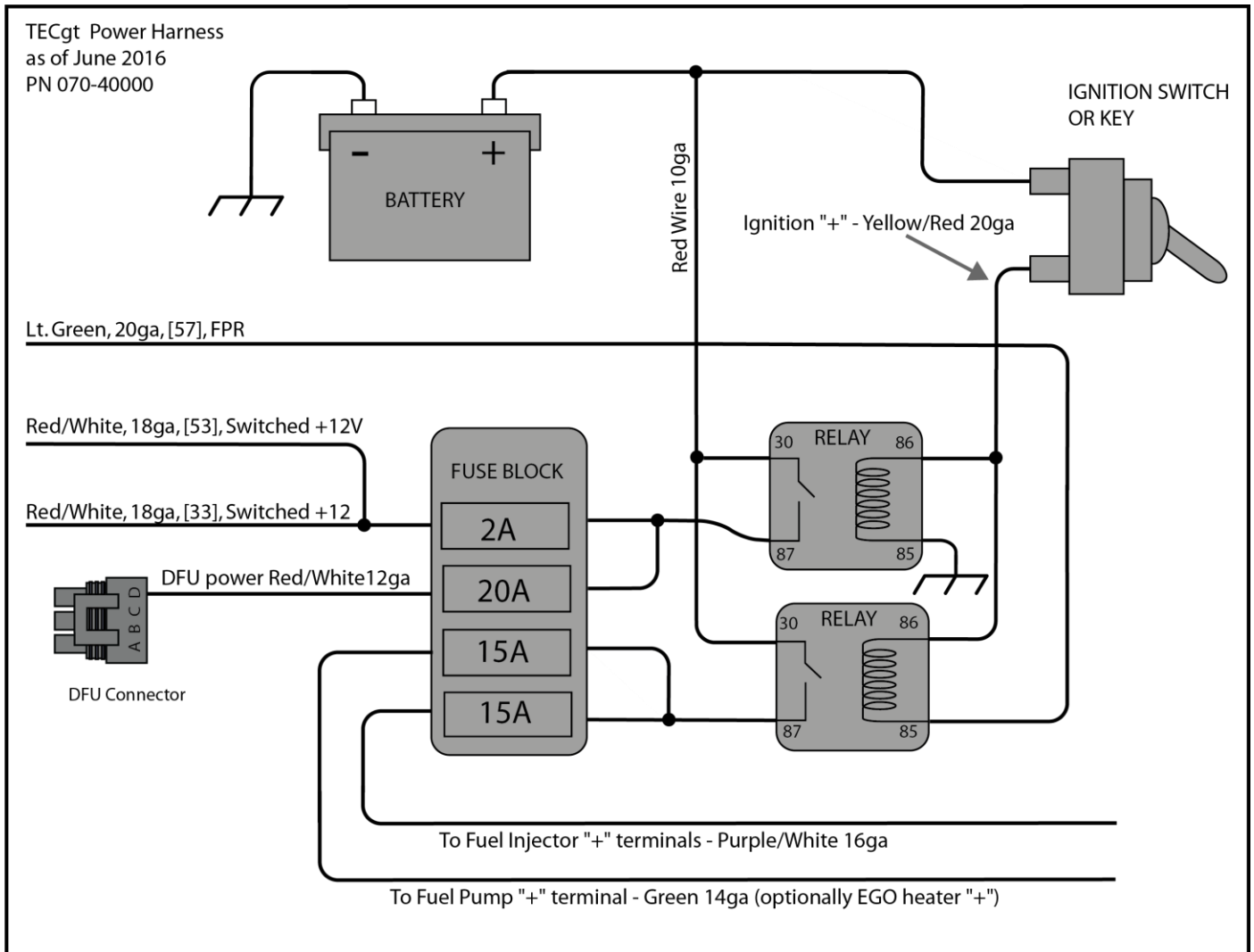
[http://www.molex.com/pdm\\_docs/as/AS-34566-001.pdf](http://www.molex.com/pdm_docs/as/AS-34566-001.pdf)

It has important information on handling the TECgt200's new Molex connector.

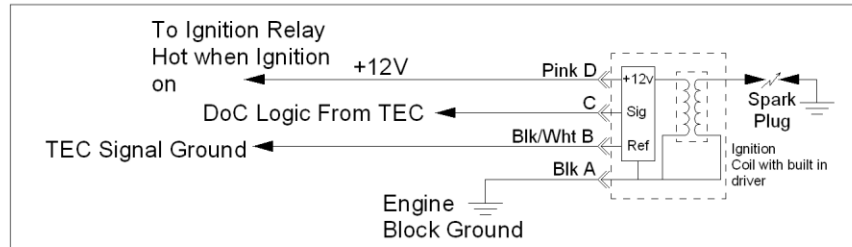


# Molex 73 Circuit MX123 Wire Side Shown

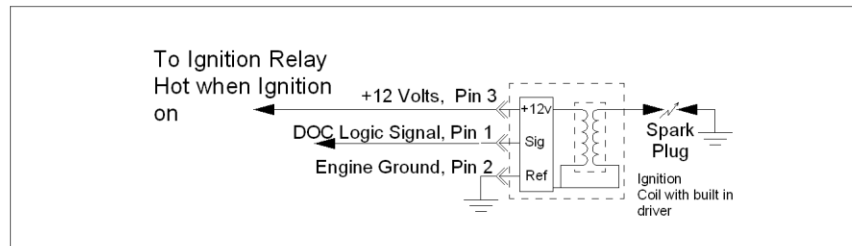
# Appendix VIII. TECgt200 Power Harness Schematic



## Appendix IX. TECgt200 Driver on Coil Schematic



**4 Wire Driver On Coil Ignition Coil  
(Example shown is GM LS coil)**



**3 Wire Driver On Coil Ignition Coil  
(Example shown is Hitachi, Honda coil)**

TECgt200 Pin	Function	Wire Color	4 Cylinder	6 Cylinder	8 Cylinder
		Firing Order	1,3,4,2	1,5,3,6,2,4	1,8,4,3,6,5,7,2
17	ECU Ground	Blk/Wht			
5	DoC A1	Blk/Gray	1 & 4	1 & 6	1 & 6
6	DoC B1	Blk/Red	2 & 3	5 & 2	4 & 7
7	DoC C1	Blk/Grn		3 & 4	
17	ECU Ground	Blk/Wht			
10	DoC A2	Blk/Blue			5 & 8
11	DoC B2	Blk/Pink			2 & 3
12	DoC C2	Blk/Org			

**Wiring of TECgt200 Driver on Coil Logic outputs to Cylinder Coils**

## Appendix X. Glossary of Terms

**Advance:** As applied to ignition timing, advancing the timing refers to firing the spark plug comparatively sooner.

**ATDC (After Top Dead Center):** When a piston is moving downward, after TDC.

**Bar:** A Bar is a measurement of pressure. One Bar equals 101.3kPa or 14.7psi. Standard atmospheric pressure is 1-Bar absolute, or 0-Bar relative (gauge). An engine running 1-Bar of turbo boost is actually running 2-Bar absolute, so it requires a 2-Bar MAP sensor.

**Boost:** When a pressure that is greater than the ambient atmospheric pressure is forced into the intake manifold. Turbo- and superchargers create boost.

**BTDC (Before Top Dead Center):** When a piston is moving upward, but has not yet reached TDC.

**Cam Sensor:** A device used to provide a once-per-engine cycle pulse to the **TECgt**. This establishes the stage of engine operation that is occurring for a given TDC.

**Closed Loop:** When an oxygen sensor reading is used to correct the air-fuel mixture through the manipulation of the fuel injector pulse widths.

**Coolant Enrichment:** A coolant temperature-based fuel enrichment that is used to add fuel when an engine is cold. This feature is the electrical equivalent of the choke plate on a carburetor.

**Coolant Temperature Sensor:** A device that measures the coolant temperature of an engine.

**Crank Sensor:** A device that can “read” a crank trigger wheel, and output a voltage signal that can be used by an engine management system.

**Crank Trigger:** A device used to measure the crankshaft position and speed, typically composed of a crank trigger wheel and a crank sensor.

**Detonation:** When the air-fuel mixture is ignited by the spark plug, then a high cylinder temperature “spontaneously” ignites another portion of the unburned mixture. A knocking sound is produced when detonation occurs, and knock sensors are designed to hear this knocking. Engine damage can be caused by detonation.

**DFU:** Direct Fire Unit. Electromotive coil packs are referred to as DFUs.

**Duty Cycle:** The percentage of time that a pulse width modulated output is turned on. A duty cycle of 100% indicates a fully turned-on modulation output.

**ECU:** Electronic Control Unit. A device that is used to process several inputs for the control of several outputs.

**Exhaust Gas Oxygen (EGO) Sensor:** A device that compares the oxygen content of the exhaust gases with the oxygen content of the ambient atmosphere. An air-fuel ratio approximation can be made with an EGO sensor.

**Enrichment:** A software parameter that adds injector pulse width (typically as a percentage) to the values defined by the raw fuel curve.

**Fuel Pressure Regulator:** A device that regulates the fuel rail (and thus the fuel injector) pressure. Generally equipped with a vacuum port referenced to manifold vacuum/boost to adjust fuel pressure on a 1-to-1 basis with manifold pressure. For examples, a regulator will increase fuel pressure by 1psi for every psi increase in manifold pressure.

**Gamma:** See TFPW. This number is no longer used with **TECgt** systems.

**General Purpose Inputs (GPI):** Input channels that the **TECgt** can use to process data from sensors that are not related to the core engine management sensors. Switches and vehicle speed sensors can be run to the GPIs.

**General Purpose Outputs (GPO):** Output channels from the **TECgt** that can be used to trigger external devices such as thermo fans, torque converters, etc.

**Horsepower (HP):** A measurement of the rate at which an engine can perform work. One HP = 550 lb-ft per second.

**Idle Air Control (IAC) Motor:** A device that is used to meter air into an engine at idle. Air from the outside of the intake manifold is regulated into the intake plenum by the IAC motor.

**Ignition Timing:** The amount of degrees before Top Dead Center that a spark plug fires.

**IOT/POT:** Injector Offset Time. (a.k.a. Pulse-width offset time) This number adds or subtracts a fixed pulse width from the raw fuel curve. The value of IOT/POT is the amount of time (in milliseconds) that will be added or subtracted.

**Knock Sensor:** A device used to measure detonation.

**Knocking:** see 'Detonation'

**Lean Mixture:** An air-fuel mixture that carries less fuel than the stoichiometric air-fuel ratio.

**Load:** The amount of work that an engine must provide at a given instant. Load is measured by using the MAP sensor to estimate the cylinder pressure on **TECgt** systems. Higher loads result in higher MAP readings.

**Manifold Air Pressure (MAP) Sensor:** A device that measures the absolute pressure of the intake charge for an engine.

**Manifold Air Temperature Enrichment:** An inlet air temperature-based enrichment that is used to add fuel when the incoming air is cold, and therefore denser than usual.

**Manifold Air Temperature (MAT) Sensor:** A device that measures the temperature of the incoming air charge for an engine.

**Millisecond (ms):** A length of time equal to one one-thousandth of a second.

1 millisecond = 0.001 second

**Mixture:** A term used to describe the air and fuel entering the engine as a single entity.

**Multi-Port Injection:** The most common form of modern fuel injection, whereby each cylinder has its own fuel injector.

**Open Loop:** When an engine is running off of its base calibration with no EGO sensor feedback to correct the air-fuel ratio.

**Pinging:** See 'Detonation'.

**POT/IOT:** Pulse Width Offset Time (a.k.a. Injector Offset Time). This number adds or subtracts a fixed pulse width from the raw fuel curve. The value of POT/IOT is the amount of time (in milliseconds) that will be added or subtracted.

**Pre-Ignition:** When the air-fuel mixture is ignited by a hot spot in the combustion chamber BEFORE the spark plug fires. When pre-ignition occurs, it produces a similar effect to advancing the ignition timing too much. Engine damage may result.

**Pulse Width:** The amount time that an injector is turned on for a given operating scenario. Expressed in milliseconds (ms).

**Pulse Width Modulation (PWM):** When a variable pulsed voltage signal is supplied to a module, pulse width modulation is occurring. Fuel injectors are common examples of PWM-controlled modules.

**Stoichiometric Mixture:** An air-fuel mixture that has the chemically ideal ratio between incoming air and fuel. When combusted, the product of a stoichiometric mixture will carry no excess air or fuel.

**Retard:** As applied to ignition timing, retarding the timing refers to firing the spark plug comparatively later.

**Rich Mixture:** An air-fuel mixture that carries more fuel than the stoichiometric air-fuel ratio.

**Rising Rate Fuel Pressure Regulator:** A Fuel Pressure Regulator that is adjustable to provide a non 1-to-1 relationship between manifold pressure and fuel pressure. For example, a rising rate regulator may be used to supply 2psi of fuel pressure increase with every 1psi of manifold boost.

**Spark Knock:** See 'Detonation'

**TDC (Top Dead Center):** On piston engines, when a piston is at its highest point (closest to the cylinder head), and the combustion chamber is at its smallest volume, it is at TDC. TDC#1 refers to the case when the #1 cylinder is on TDC. On rotary engines, TDC occurs when the combustion chamber volume is smallest.

**TFPW:** Total Fuel Injector Pulse Width. This number defines that total modification to the raw fuel curve that is occurring at a given instant. A TFPW of 100% indicates that no modification is occurring to the raw fuel curve. A TFPW less than 100% indicates a leaner pulse width than the raw fuel curve value, while a TFPW greater than 100% indicates a mixture that is richer than the raw fuel curve value.

**Throttle Position Sensor (TPS):** A device used to measure the position of the throttle.

**TOG/UAP:** Time on for one Gama (a.k.a. User Adjustable Pulse Width) This number defines the slope of the raw fuel curve. When TOG/UAP is zero, the raw fuel curve will have zero pulse width at zero MAP sensor volts. When the MAP sensor is at +5 volts, the pulse width will be the number defined by TOG/UAP expressed in milliseconds.

**Torque (TQ):** A measurement of the work that an engine can perform, typically expressed in pound-feet (lb-ft).

**TPS/MAP Blend:** A feature of the WinTec software that allows the TPS and MAP sensor readings to be blended together. Typically, this feature is used on engines with radical cams or throttle-per-cylinder setups since these engines have poor MAP signals at idle and part throttle.

**Trigger Wheel:** A device attached to the crankshaft that provides a moving reference of speed and position of an engine's crankshaft.

**UAP/TOG:** User Adjustable Pulse Width (a.k.a. Time on for One Gama). This number defines the slope of the raw fuel curve. When UAP/TOG is zero, the raw fuel curve will have zero pulse width at zero MAP sensor volts. When the MAP sensor is at +5volts, the pulse width will be the number defined by UAP/TOG, expressed in milliseconds.