



PRECISION SENSITIVE DIGITAL TACHOMETERS
INSTALLATION & OPERATION MANUAL
MADE IN THE USA

8402R-DS	LED DISPLAY, DIESEL ENGINE
8402R-G	LED DISPLAY, GAS ENGINE
8905R-DS	LCD DISPLAY, DIESEL ENGINE
8905R-G	LCD DISPLAY, GAS ENGINE

READ THIS MANUAL CAREFULLY AND SAVE FOR FUTURE REFERENCE.

GENERAL:

Aetna Engineering Precision Digital Tachometers are premium quality instruments. They use microprocessor technology to provide an instrument guaranteed accurate to one RPM, which never requires calibration and performs reliably in the marine environment.

Aetna tachometers are available with either a red Light Emitting Diode (LED-Model 8402R) or Liquid Crystal Display (LCD-Model 8905R) readouts. The LED is best suited for use in shaded sunlight, while the LCD should be used in applications where the tachometer will be exposed to direct un-shaded sunlight. Both are self-illuminated for night viewing.

The tachometers are supplied with a choice of black anodized aluminum or a polished stainless steel bezel and have an overall diameter at the bezel of 3 9/16". The tachometer fits into a 3 3/16" hole. A black plastic trim ring is available for optional purchase and will bring the overall diameter out to 3 7/8". They are available in both diesel and gas versions. Call 1.800.776.7962 to order.

SETUP:

Determine the correct PPR (Pulses per Revolution) setting for the type of engine the tachometer will be installed on. To do so, consult the Engine PPR Selection Guide in the back of the manual. The examples below are common PPR settings for gas and diesel applications.

<u>Gas Applications</u>	<u>PPR Setting</u>
4-Stroke Inboard Engine	# of Cylinders/2
2-Stroke Outboards Motor	# of Poles on Alternator
<u>Diesel Applications</u>	<u>PPR Setting</u>
Aetna Mechanical Sender	8
Magnetic Pickup	# of Teeth on Gear

(*If senders are installed after a reducer the reducer ratio will apply to the PPR. Example: A 1:2 reduction would result in a PPR of 4.

Once the PPR has been identified, set the dip switches by referencing the PPR Settings Guide in back of manual.

NOTE: The tachometer is shipped with #6 dip switch on in SW1, which is the correct setting for 4 PPR.

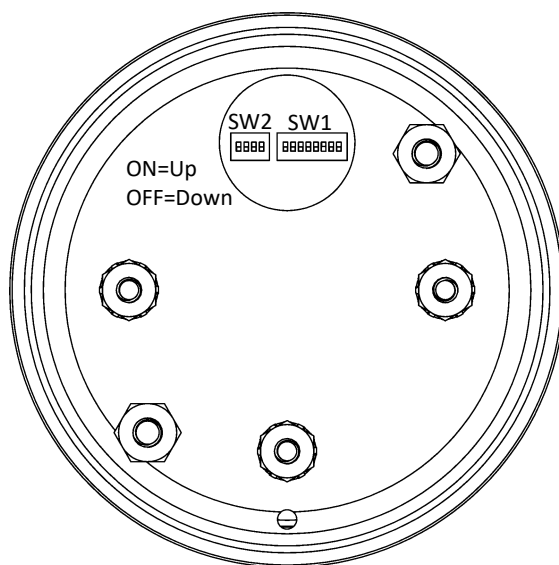
SETTING THE PPR:

Access the internal dip switches by removing the plastic cap on the rear of the tachometer.

Using the plastic tuning stick provided with the tachometer, set the dip switches as needed.

See PPR table at the end of manual for settings. The red portion of the switch must be moved to the upper position for ON (1) and moved to the lower position for OFF (0).

CAUTION: Do NOT use a pencil, a broken-off pencil point could cause an internal short, so only use the plastic tuning stick or a small metal probe.



If you have are experiencing erratic RPM readings on a gas or outboard engine, the settings shown at the back of the manual can be applied to act as a signal filter and should stabilize the RPM reading.

MOUNTING:

Select a mounting location where the tachometer can be easily read. The front of the tachometer has a gasket formed glass-to-metal seal making it suitable for use in locations exposed to rain and spray.

The unit may be installed in a standard 3-3/16" diameter hole. It will fit holes up to 3-7/8" when used with the optional black trim ring. If placing the tachometer under a protective cover, be sure that it is adequately ventilated to keep the maximum temperature of the case below 158°F (70°C).

Mount the tachometer using the bale and hardware provided. In exposed locations it should be bedded down with a bead of sealant behind the flange. Place the tachometer in the raised trim ring if it is to be used. If the trim ring is positioned so that it will collect water, drill a 3/16" drain hole at the lowest point on the ring. Bend or cut the clamp legs to accommodate for thicker panels.

WIRING:

Disconnect negative battery cable or turn off master power switches while wiring.

Connect the NEG terminal on the tachometer to the battery negative.

Connect the “+12V” terminal to a circuit that is energized when the ignition is switched on. In most cases, power and ground are available by wiring to the terminals on an adjacent temperature or oil pressure gauge. The “+12V” terminal on the model 8905R and model 8402R tachometers may be safely connected to a 12, 24 or 32 volt system.

The SIG terminal connects the RPM information signal from the engine to the tachometer. This connection should be made using well insulated stranded wire. For multiple stations two or more tachometers may be connected in parallel. We recommend 18 or 20 gauge, two-conductor wire for this purpose. For the best possible signal use a twisted-shielded cable. Connect the shield to the engine block only.

Gasoline:

This signal wire may already exist in the dash wiring. If not, proceed as follows:

Conventional Ignition:

Connect the SIG wire to the minus (-) terminal on the coil.

Transistorized Ignition:

Connect the SIG wire to either the plus (+) or minus (-) terminal on the coil.

C-D (Capacitive Discharge) Ignition:

DO NOT CONNECT TO THE COIL!

Connect the SIG wire to the “Tachometer” terminal on the amplifier. Damage to the tachometer will result if connected to the coil.

Diesel:

Diesel engines require a sender (see below for detailed sender installation). Connect the two sender wires to the tachometer; one wire to the SIG terminal and the other to the NEG terminal. There is no polarity between the wires, so each can be connected to either terminal.

In installations where only a single wire exists from the engine to the tachometer, it is possible to connect the second wire from the sender to the tachometer ground through an electrical ground at the engine. However, this method is not recommended because erratic readings may result from electrical noise in the ships wiring.

DIESEL SENDER INSTALLATION:

Models 8901 and 8902 are mechanically driven senders which attach to the tachometer drive fitting found on many diesel engines and generate the electrical RPM. They fit the standard 7/8"-18tpi SAE tachometer drive. The units come standard with a 3/16" (0.187") diameter round key drive, other key drives are available. A 7/8"-18tpi SAE output is also provided on the top of the sender to allow a pass-through connection. The units produce 8 pulses per revolution.

Install the sender by screwing the sender nut onto the mechanical tachometer drive fitting on the engine. Position the drive pin so that the key engages the mating slot. Tighten the sender securely so that it will not rotate from vibration. Maximum torque is 8 foot-pounds.

NOTE – damage due to cross-threading or over-tightening voids the warranty.

When a mechanical cable is used to control another device, such as a synchronizer or mechanical tachometer, be sure to mount the mechanical sender directly to the engine. This will avoid fluctuating reading caused by "whip" in the drive cable. The drive cable may then be connected to the output fitting on the top of the sender.

DIESEL SENDER INSTALLATION:

Models 8910, 8912, and 8922 are magnetic flywheel pickups which are threaded into the flywheel bell housing and generate pulses as the flywheel teeth slide by. The 8910 and 8912 are 3/4"-16tpi and the 8922 is 5/8"-18tpi. The sensors should be installed so that there is a 0.050" air gap between the sensor and the top of a flywheel teeth. The tachometer will need to be set to the tooth count of the flywheel.

CAUTION – damage due to cross-threading or installing sensor too far voids the warranty.

TESTING:

Reconnect the battery and turn the ignition on. The display should illuminate and show:

8.8.8.8

The first display is to verify that all segments are working correctly. If there was a damaged segment it would be noticed here. If the tachometer's digits fail to show at all, the problem is in the power wiring to the tachometer, check for voltage at the + and the – terminals.

XXX.0

The second display indicates the PPR setting for the gauge. Make sure that the number reflects the dip-switch setting used. If it doesn't, the switches may have gotten damaged during setup.

000X

The third display is the software REV.

0

The final display is the RPM. Start the engine and verify that the display indicates correct engine RPM. When the engine is cold and idling without load the right hand digits may seem to "jump".

If the tachometer shows all zeros with the engine running, check the signal wiring to the signal source and that the source is functioning properly.

If the indicated RPM is in error, check that the dip switches are set properly and compare to startup sequence.

Specifications

Operating Voltage.....9 to 38 V dc

Power Consumption (@13.6V dc)...20 to 70 mA

Operating Temperature Range.....-32°C to 70°C (-25°F to 158°F)

TWO (2) YEAR LIMITED WARRANTY

This Warranty is in lieu of all other express or implied Warranties.

Seller warrants title, materials, and workmanship on Aetna Engineering equipment, and assigns the original manufacturer's warranty on those components manufactured by others, as permitted. Seller's warranty shall be for a period of two (2) year from the date of sale to the ORIGINAL CONSUMER. Aetna Engineering does not assume the costs of removal and/or installation of the product or any other incidental costs which may arise as a result of any defect in materials or workmanship. Any non-conforming equipment returned to the Seller at Buyer's expense and risk shall be repaired or replaced at Seller's option, provided that:

- (a) the product has not been subjected to abuse, contamination, neglect, accident, incorrect wiring not our own, improper installation or servicing, or used in violation of instructions furnished by Aetna Engineering;

- (b) The product has not been repaired or altered by anyone other than Aetna Engineering;

- (c) The serial number has not been removed, defaced, or otherwise changed;

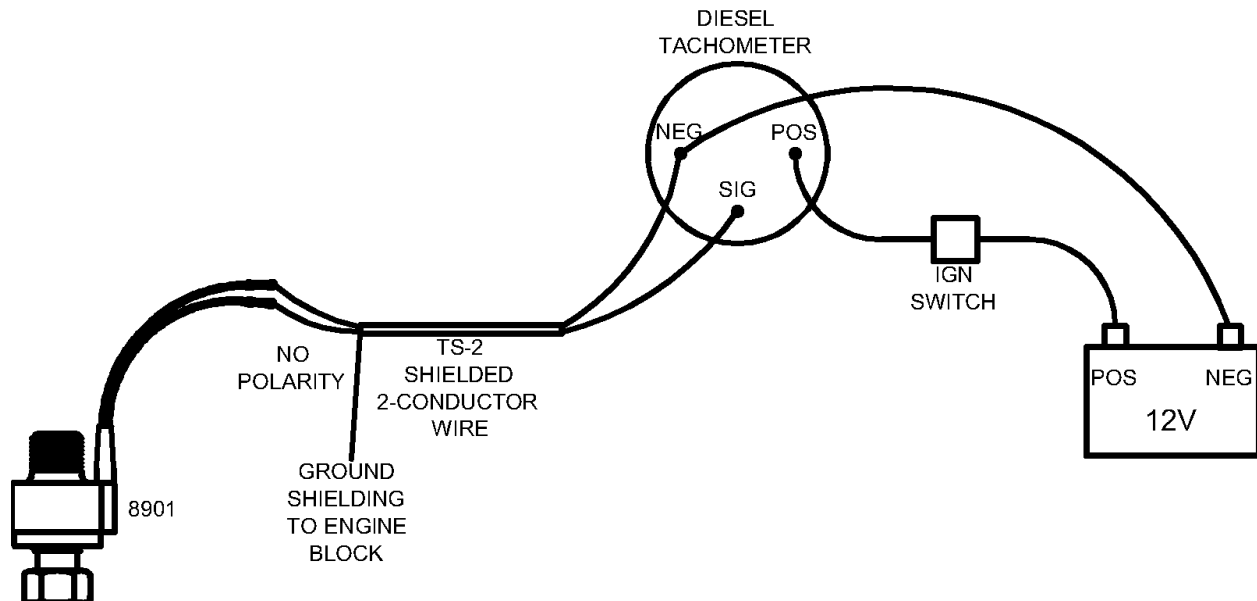
- (d) The product is determined to contain defective materials or workmanship; an

- (e) Use of the product is discontinued upon discovery of defective materials or workmanship and Aetna Engineering is notified immediately.

ANY WARRANTY IMPLIED BY LAW, INCLUDING WARRANTIES OF MERCHANT- ABILITY OR FITNESS, IS IN EFFECT ONLY FOR THE DURATION OF THE EXPRESS WARRANTIES SET FORTH ABOVE. NO PERSON IS AUTHORIZED TO GIVE ANY OTHER WARRANTY, OR TO ASSUME FOR AETNA ENGINEERING ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ITS PRODUCTS. AETNA ENGINEERING SHALL NOT BE LIABLE FOR LOSS OF USE, REVENUE, PROFIT, INJURY, OR ANY OTHER CONSEQUENTIAL OR INCIDENTAL DAMAGES. BUYER IS NOT RELYING ON SELLER'S JUDGMENT REGARDING BUYER'S PAR- TICULAR REQUIREMENTS, AND HAS HAD AN OPPORTUNITY TO INSPECT THE PRODUCT TO BUYER'S SATISFACTION.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state

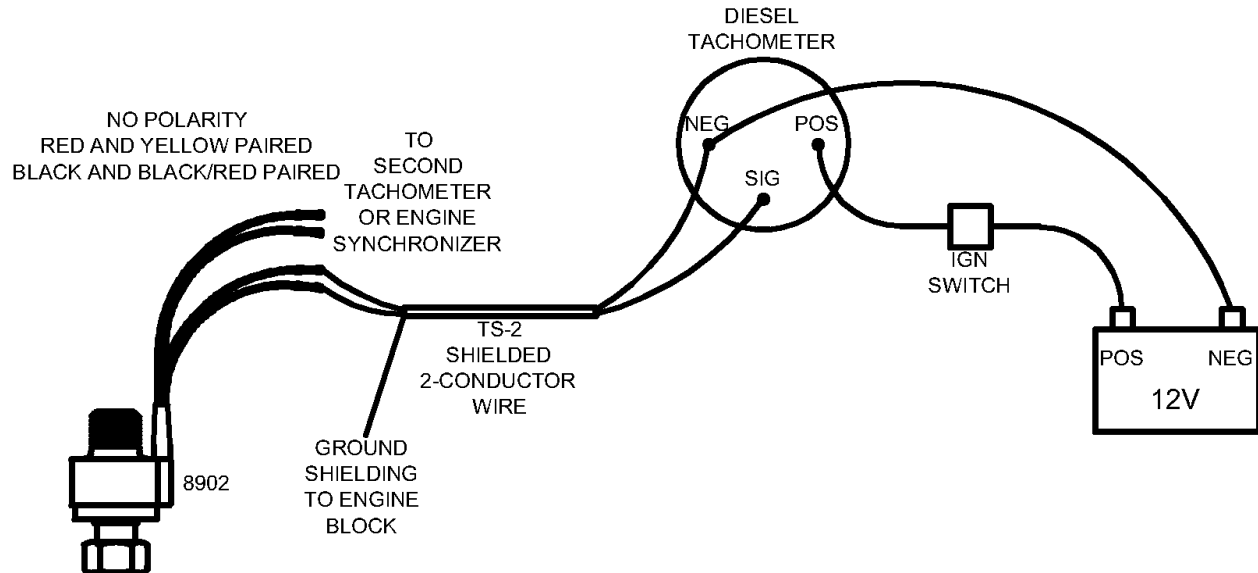
8901



Verify that you have the correct size/style pin for the engine, and thread the unit onto the tachometer drive on the engine. Using shielded, 2-conductor wire, our part number TS-2, run the signal wire to the desired location. There is no polarity between the 2 wires, connect one to the SIG post and one to the NEG post on the tachometer. Provide the tachometer with power from the ignition switch and a clean battery ground.

NOTE: Ground the cable shield at the engine side of the signal wire only.

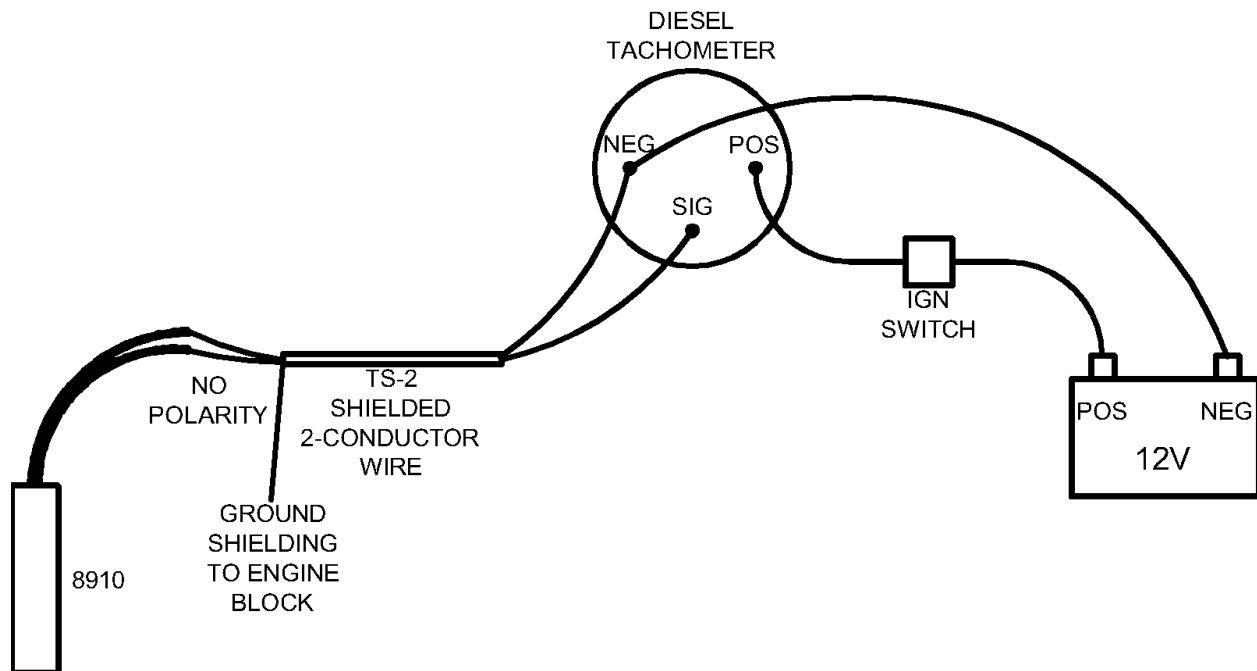
8902



Verify that you have the correct size/style pin for the engine, and thread the unit onto the tachometer drive on the engine. Using shielded, 2-conductor wire, our part number TS-2, run the signal wire to the desired location. There is no polarity between the 2 wires, connect one to the SIG post and one to the NEG post on the tachometer. The red and yellow wires one pair, and the black and black/red are another pair. Provide the tachometer with power from the ignition switch and a clean battery ground.

NOTE: Ground the cable shield at the engine side of the signal wire only.

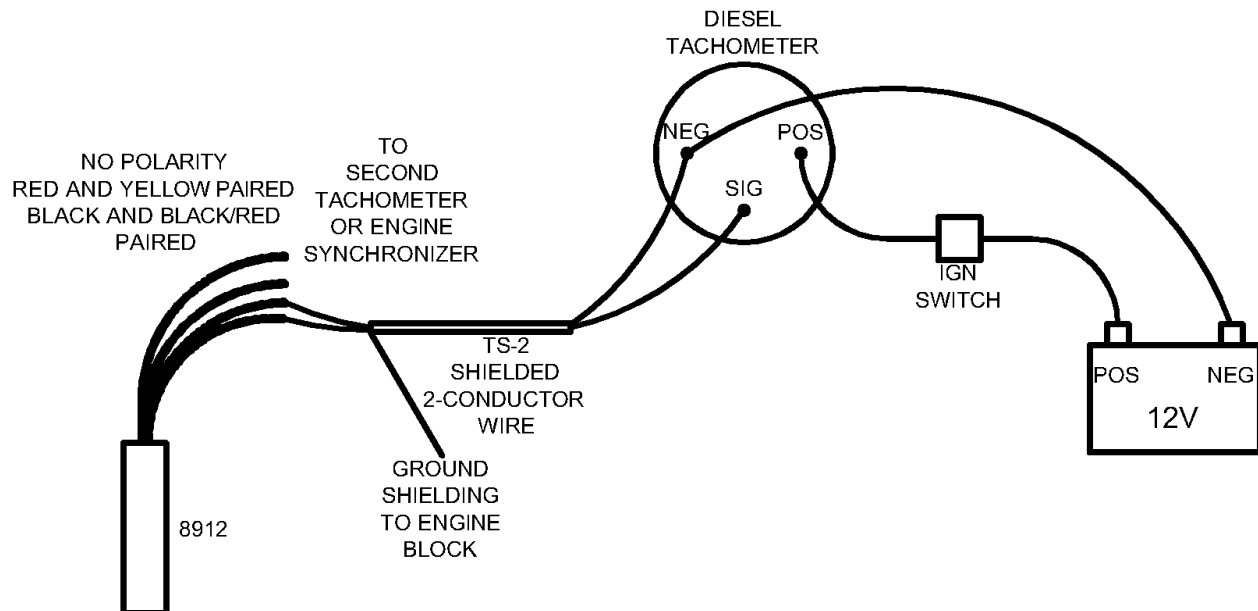
8910



Verify that there is a 3/4"-16tpi hole in the flywheel bell housing. Line up the top of a flywheel tooth with the center of the threaded hole. Thread sensor until it touches the top of the flywheel tooth, then back the sensor back half a turn. Secure sensor using the provided hex nut. Using shielded, 2-conductor wire, our part number TS-2, run the signal wire to the desired location. There is no polarity between the 2 wires, connect one to the SIG post and one to the NEG post on the tachometer. Provide the tachometer with power from the ignition switch and a clean battery ground.

NOTE: Ground the cable shield at the engine side of the signal wire only.

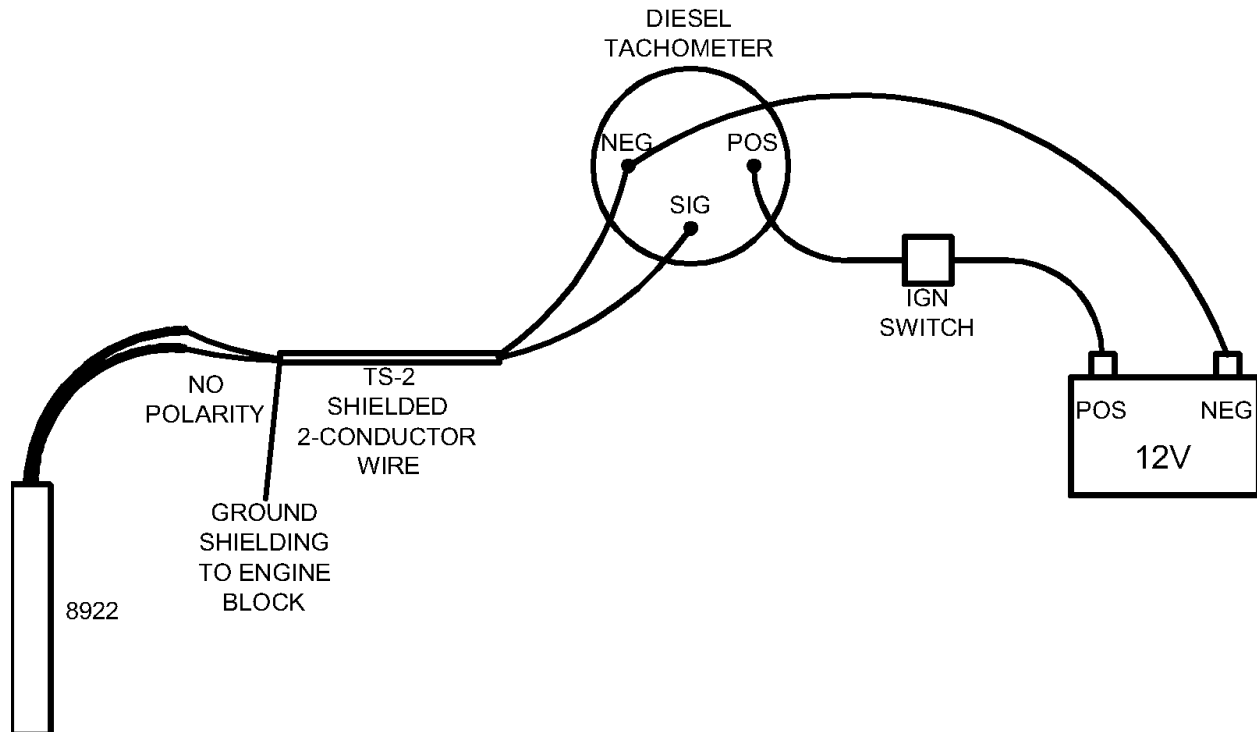
8912



Verify that there is a 3/4"-16tpi hole in the flywheel bell housing. Line up the top of a flywheel tooth with the center of the threaded hole. Thread sensor until it touches the top of the flywheel tooth, then back the sensor back half a turn. Secure sensor using the provided hex nut. Using shielded, 2-conductor wire, our part number TS-2, run the signal wire to the desired location. There is no polarity between the 2 wires, connect one to the SIG post and one to the NEG post on the tachometer. The red and yellow wires one pair, and the black and black/red are another pair. Provide the tachometer with power from the ignition switch and a clean battery ground.

NOTE: Ground the cable shield at the engine side of the signal wire only.

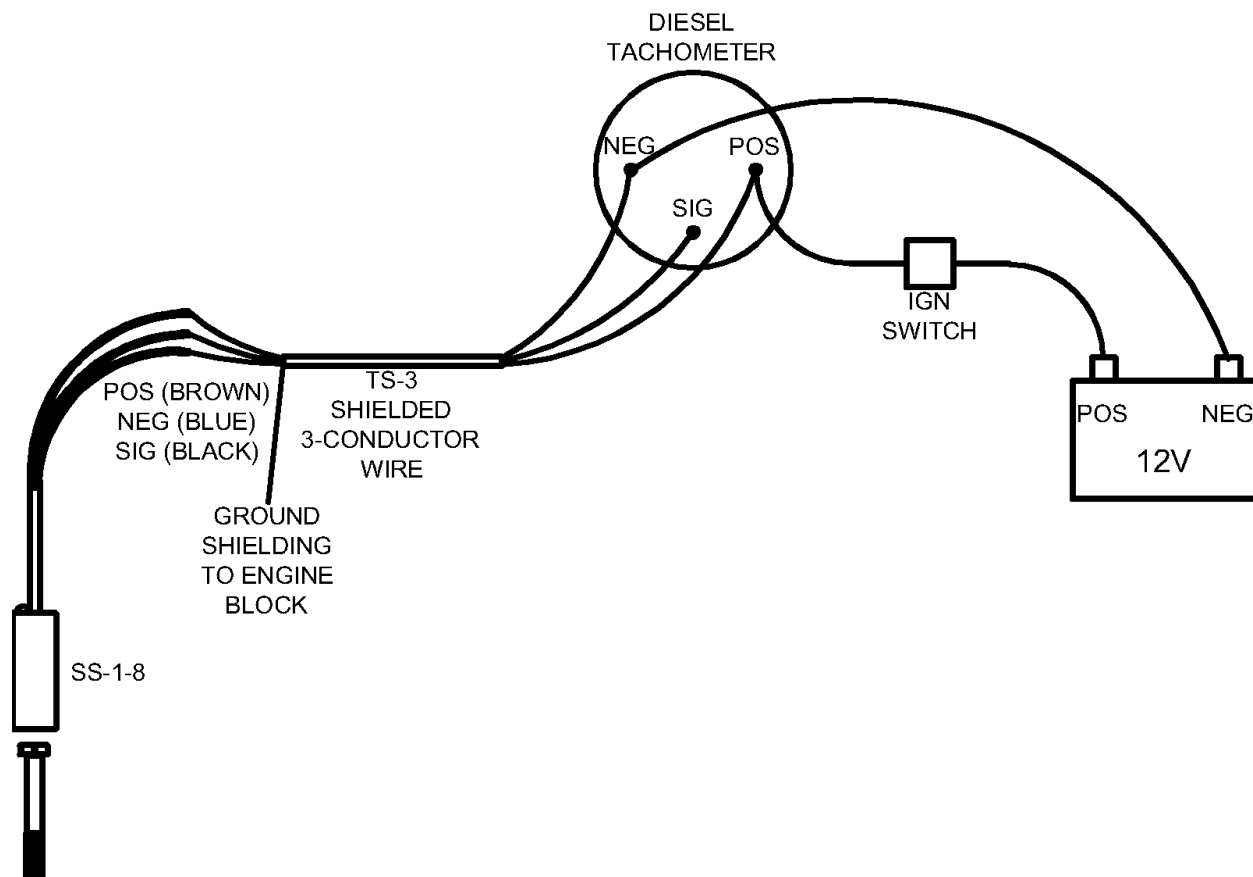
8922



Verify that there is 5/8"-16tpi hole in the flywheel bell housing. Line up the top of a flywheel tooth with the center of the threaded hole. Thread sensor until it touches the top of the flywheel tooth, then back the sensor back half a turn. Secure sensor using the provided hex nut. Using shielded, 2-conductor wire, our part number TS-2, run the signal wire to the desired location. There is no polarity between the 2 wires, connect one to the SIG post and one to the NEG post on the tachometer. Provide the tachometer with power from the ignition switch and a clean battery ground.

NOTE: Ground the cable shield at the engine side of the signal wire only.

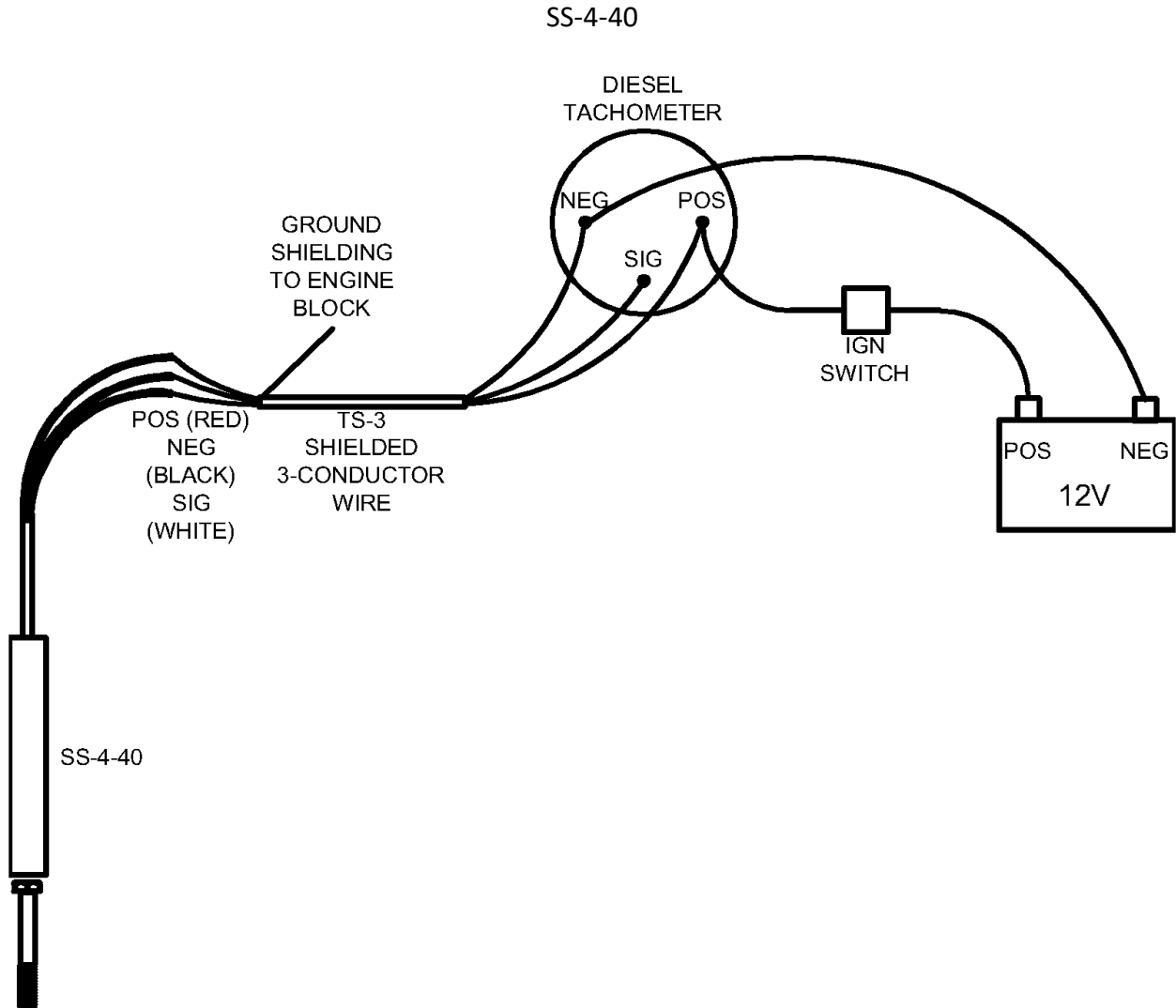
SS-1-8



Mount a customer furnished bracket into position so that the sensor will face the top of the bolts on the shaft coupling. Install the sensor in the bracket approximately 1/4" from the top of the targets. Secure the sensor using provided hex nuts on each side of bracket. Using shielded, 3-conductor wire, our part number TS-3, run the signal wire to desired location. Connect Brown wire to the POS post, Blue wire to the NEG post, and Black wire to the SIG post on the tachometer. Be sure not to wire them incorrectly because this may damage the sensor. Provide the tachometer with power from the ignition switch and a clean battery ground. Test the sensor by rotating the shaft. The LED should only come on when a target is directly in front to the sensor.

CAUTION – Damage due to incorrect wiring or contact with targets voids the warranty.

NOTE: Ground the cable shield at the engine side of the signal wire only.



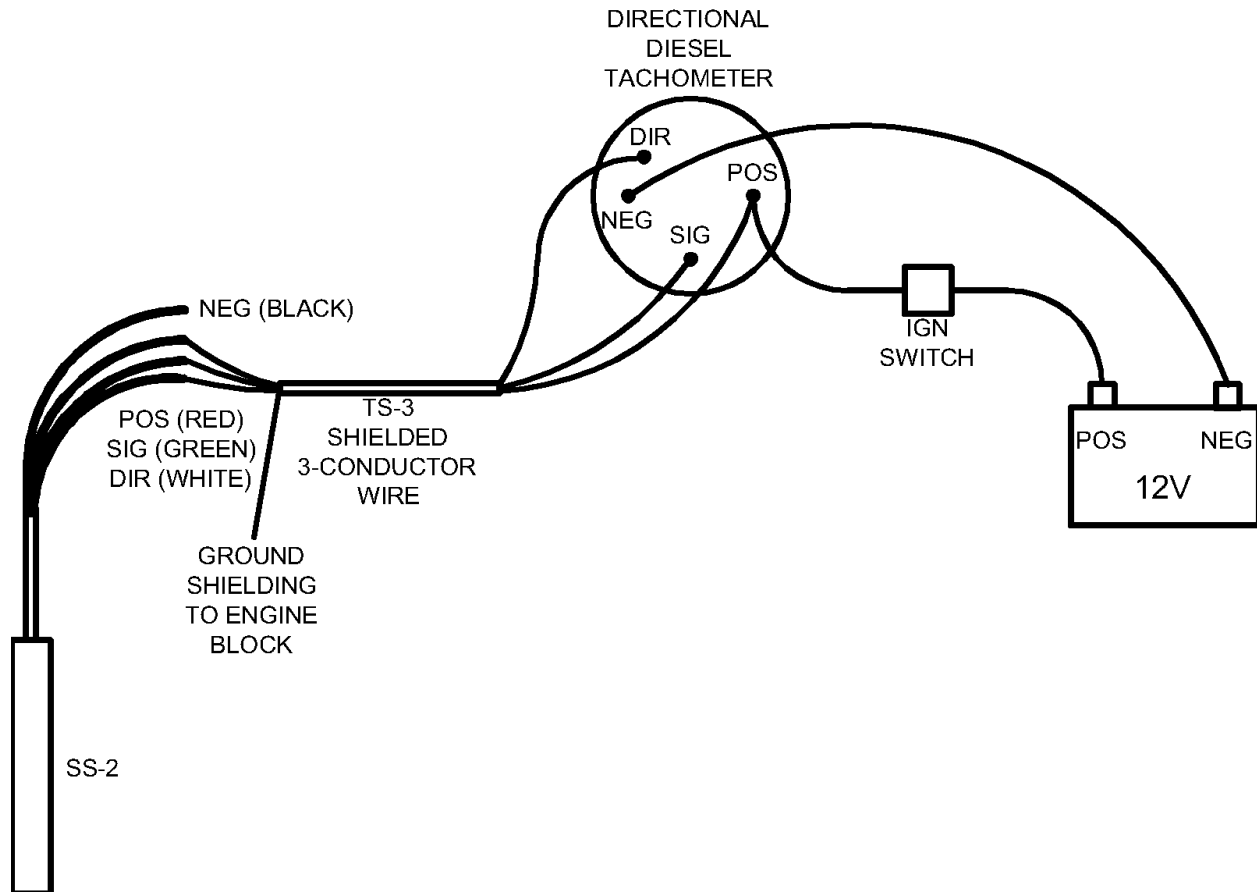
Mount a customer furnished bracket into position so that the sensor will face the top of the bolts on the shaft coupling or tach-tape. Install the sensor in the bracket approximately 1/4" from the top of the targets. Secure the sensor using provided hex nuts on each side of bracket. Using shielded, 3-conductor wire, our part number TS-3, run the signal wire to desired location. Connect Red wire to the POS post, Black wire to the NEG post, and White wire to the SIG post on the tachometer. Be sure not to wire them incorrectly because this may damage the sensor.

Provide the tachometer with power from the ignition switch and a clean battery ground.

CAUTION – Damage due to incorrect wiring or contact with targets voids the warranty.

NOTE: Ground the cable shield at the engine side of the signal wire only.

SS-2

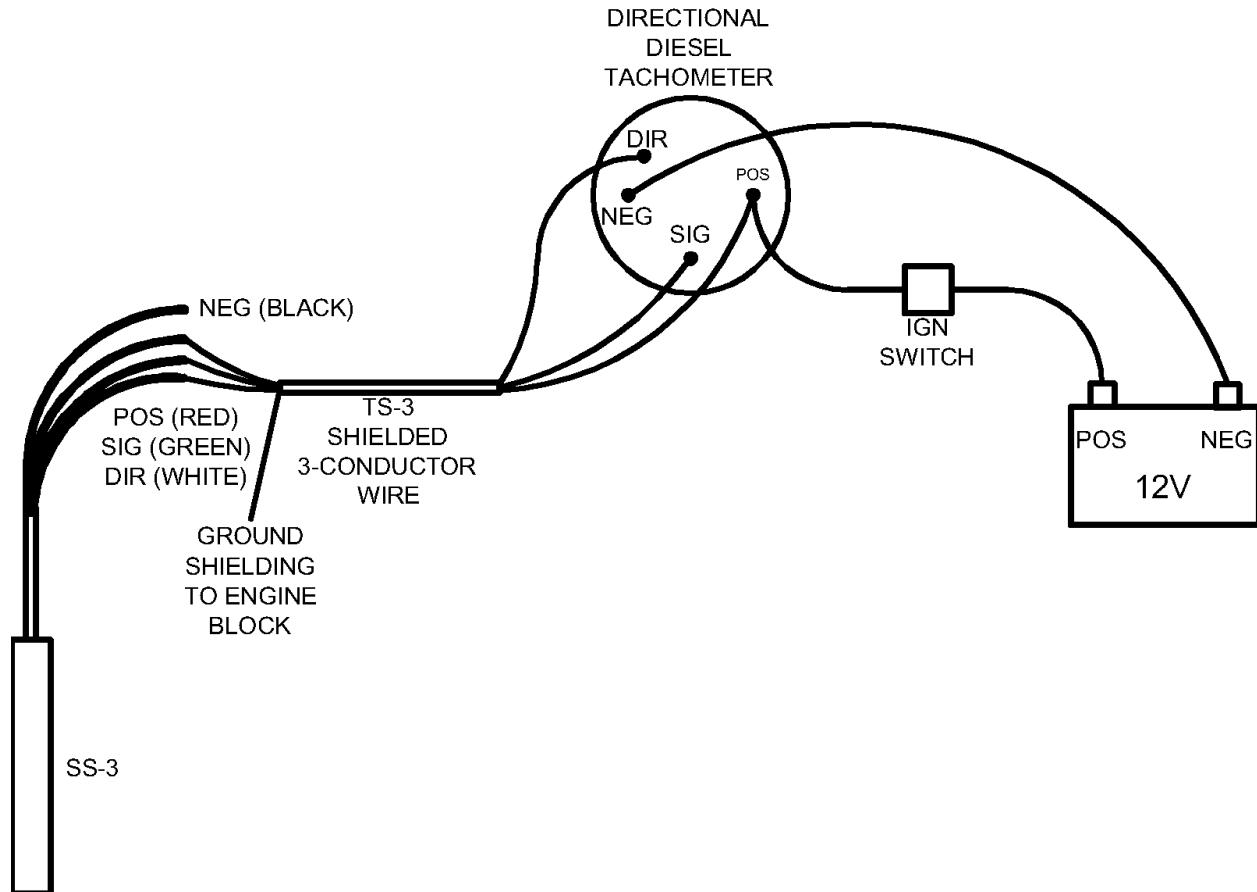


Mount a customer furnished bracket into position so that the sensor will face the top of the bolts on the shaft coupling. Install the sensor in the bracket approximately 1/8" from the top of the targets. The orientation notch must be aligned with the direction of rotation. Secure the sensor using provided hex nuts on each side of bracket. Using shielded, 3-conductor wire, our part number TS-3, run the signal wire to desired location. Connect Red wire to the POS post, White wire to the SIG post, and Green wire to the Dir post on the tachometer. Connect Black wire to a clean battery ground. Be sure not to wire them incorrectly because this may damage the sensor. Provide the tachometer with power from the ignition switch and a clean battery ground. Test the direction indication by rotating the shaft. Rotate the sensor 180° if the indicator reads incorrectly.

CAUTION – Damage due to incorrect wiring or contact with targets voids the warranty.

NOTE: Ground the cable shield at the engine side of the signal wire only.

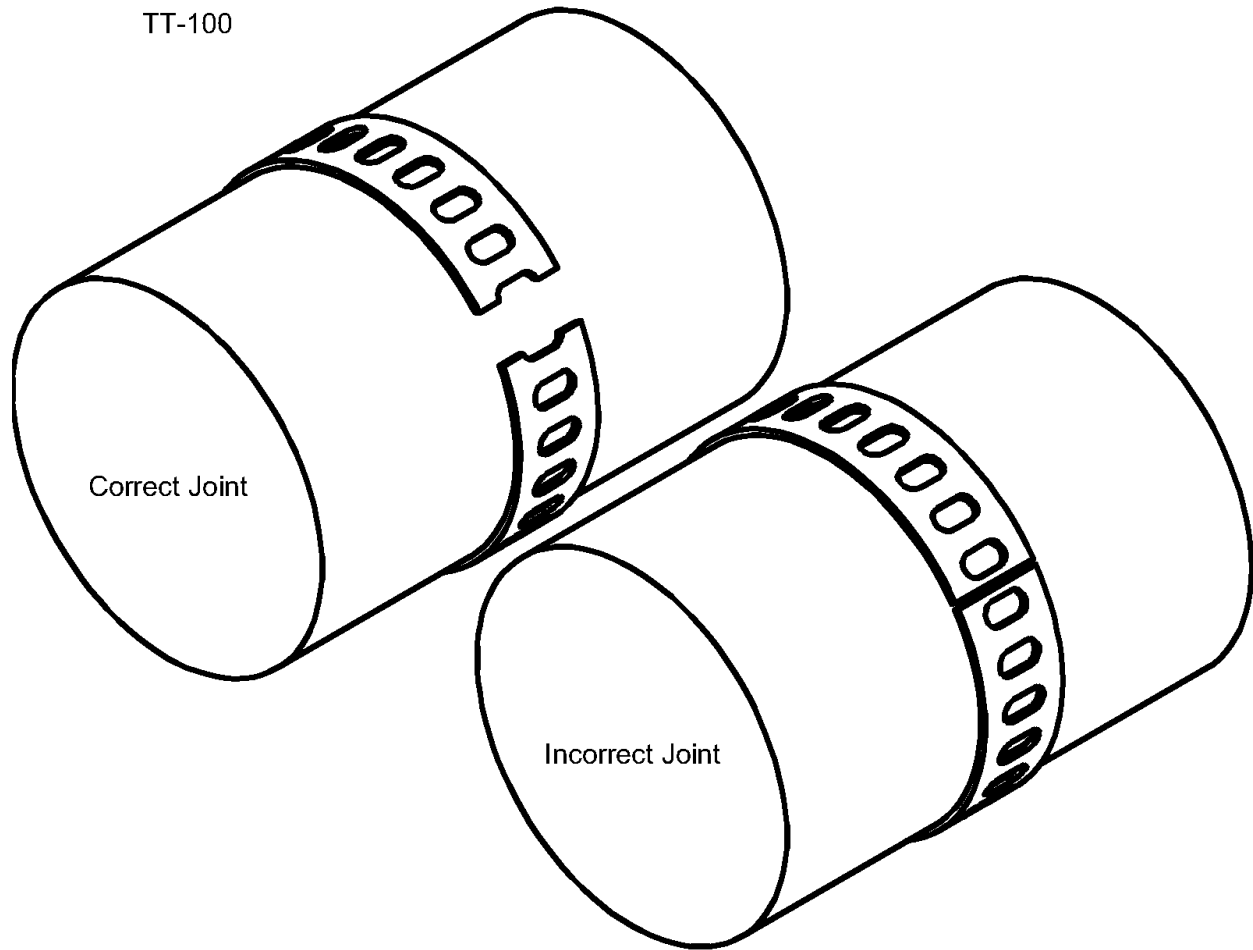
SS-3



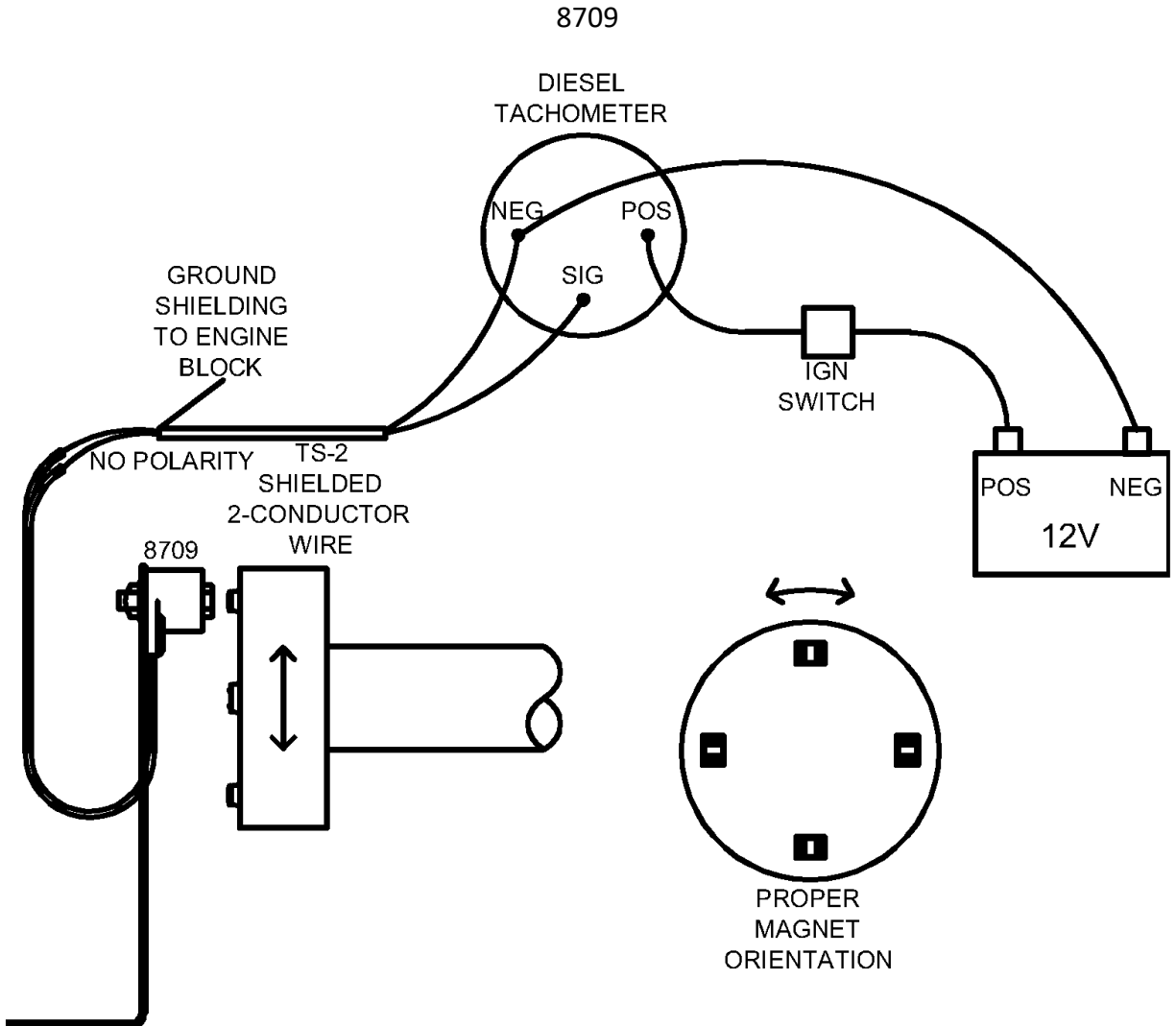
Mount a customer furnished bracket into position so that the sensor will face the tach-tape installed on the shaft. Install the sensor in the bracket approximately 1/8" from the top of the target. The orientation notch must be aligned with the direction of rotation. Secure the sensor using provided hex nuts on each side of bracket. Using shielded, 3-conductor wire, our part number TS-3, run the signal wire to desired location. Connect Red wire to the POS post, White wire to the SIG post, and Green wire to the Dir post on the tachometer. Connect Black wire to a clean battery ground. Be sure not to wire them incorrectly because this may damage the sensor. Provide the tachometer with power from the ignition switch and a clean battery ground. Test the direction indication by rotating the shaft. Rotate the sensor 180° if the indicator reads incorrectly.

CAUTION – Damage due to incorrect wiring or contact with targets voids the warranty.

NOTE: Ground the cable shield at the engine side of the signal wire only.



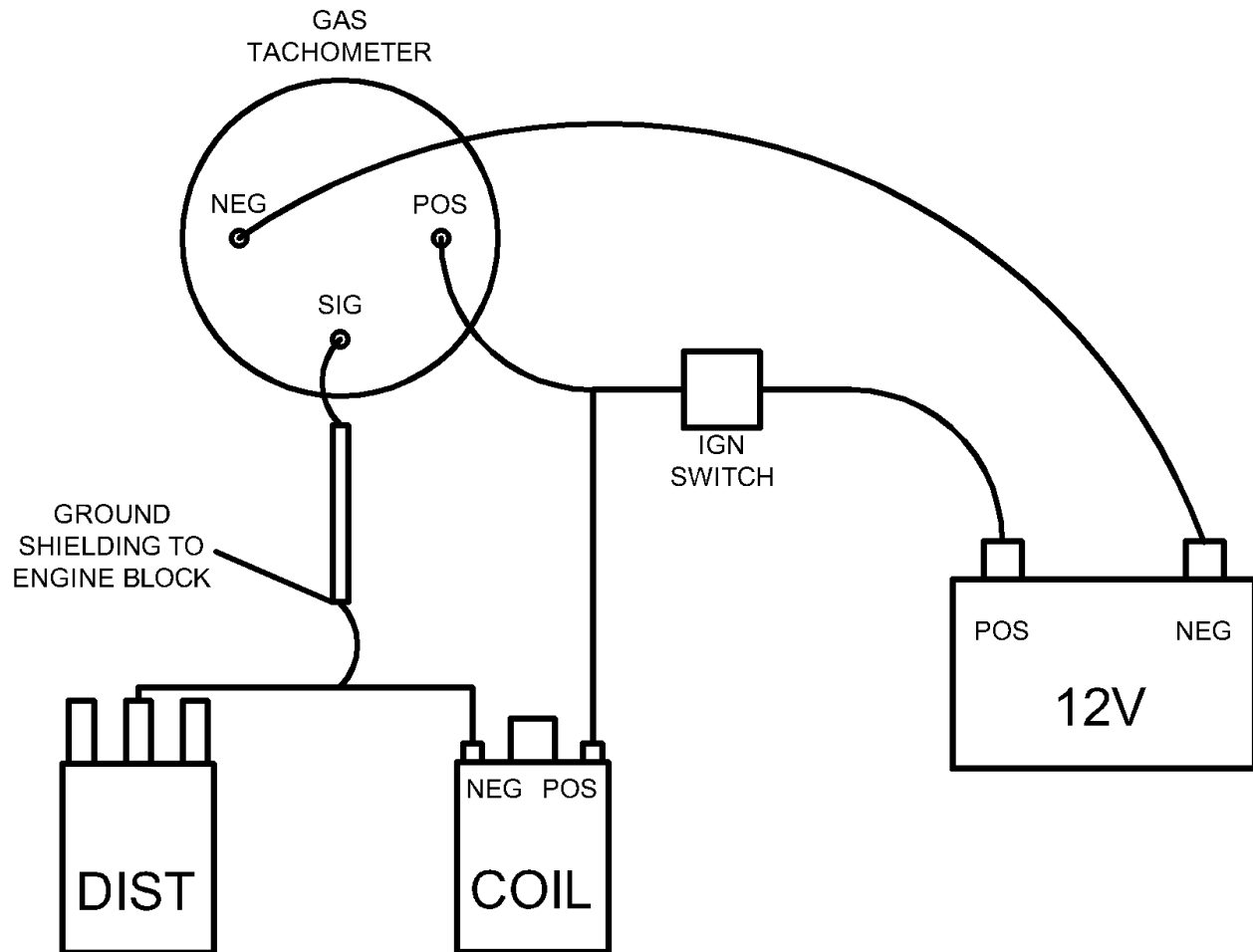
Calculate the length of tach-tape. Clean the area that the tape will be adhering to. Wrap the tape around the shaft and make sure that the joint completes a full oval. In higher speed applications, reinforce the tach-tape with a fiberglass-plastic tape. Wrapping the in the opposite direction that the shaft will spin to keep the trailing end from peeling. Never allow the tach-tape to come into contact with a high AC or DC magnetic field because this will damage the tach-tape.



Clean the mounting surface down to the bare metal and roughen the surface for good adhesion with a two part epoxy. Position the magnets around the surface with equal spacing between them. When a magnet is at the top of the rotation, the two ridges must be vertical. Mount the coil so that the head of the provided bolt is 1/8" from the ridges on the magnets. Be sure that the bracket is mounted so that it cannot vibrate and cause a collision with the magnets or any other moving components. Using shielded, 2-conductor wire, our part number TS-2, run the signal wire to the desired location. There is no polarity between the 2 wires, connect one to the SIG post and one to the NEG post on the tachometer.

NOTE: Ground the cable shield at the engine side of the signal wire only.

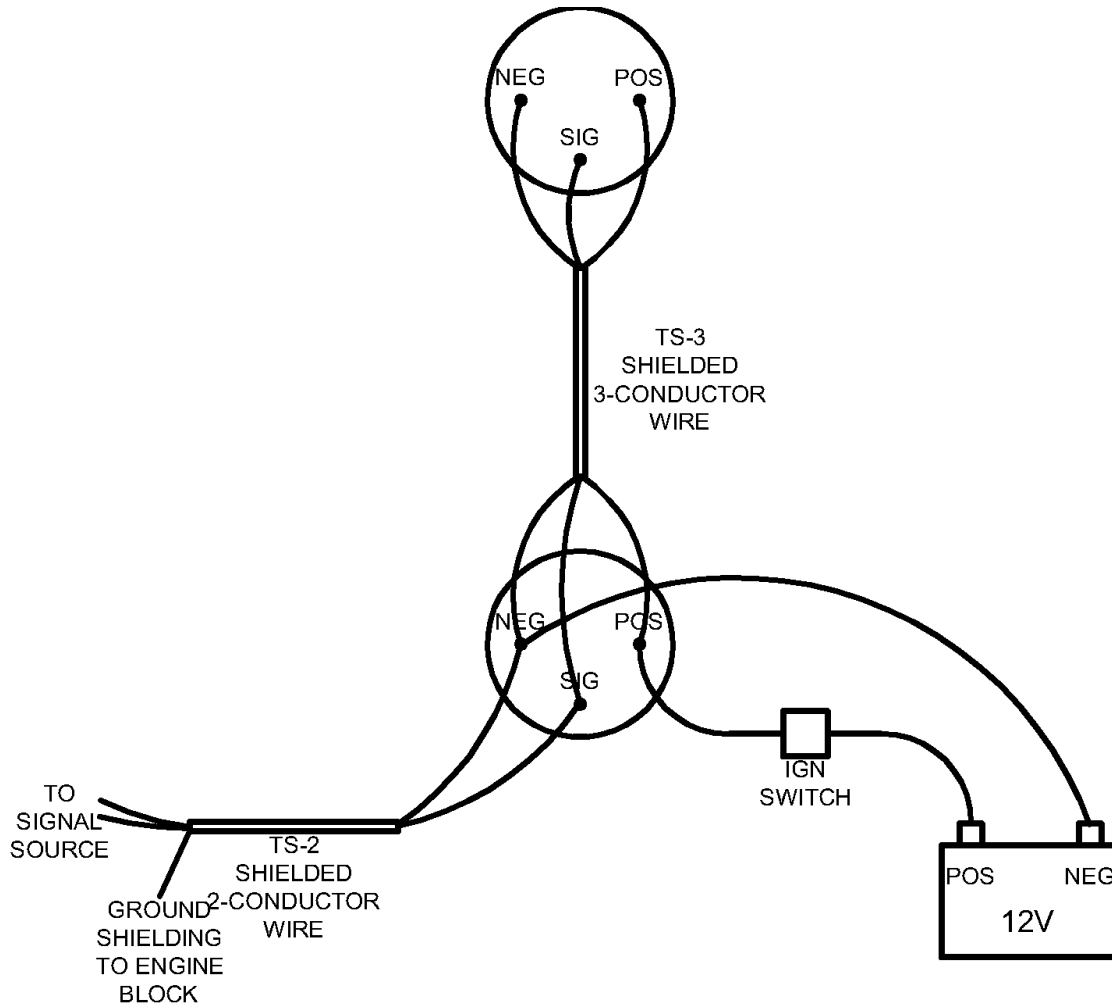
GAS ENGINE



To install a tachometer on a Gas engine with a conventional ignition, provide power to the tachometer from the ignition switch and the battery ground. Using shielded wire, connect the negative side of the coil to the SIG post on the tachometer.

NOTE: Ground the wire shield at the engine side of the signal wire only.

DUAL STATIONS



Follow the instructions for the correct signal generator while connecting to the first tachometer. Using shielded, 3-conductor wire, our part number TS-3, run the wiring to the second location. Connect the SIG to the SIG post, the POS to the POS post, and NEG to the NEG post on the second tachometer.

NOTE: Ground the cable shield at the engine side of the signal wire only.

Engine PPR Selection Guide

Common Diesel Engines			
Manufacturer	Model	Signal Source	PPR
Caterpillar	ELECTRONIC	N/A	12
	D336	8901/8902	8*
	D346		
	D348		
	D398		
	D399		
	D353	8922	151
	C-15	8922	112/130/132
	C-12	8922	113
	3176		
	3196		
	3406		
	3408DI		
	3412		
	3306TA	8922	132/156
	3208	8901/8902/8922	8*/126/134
	3116	8901/8902/8922	8*/126
	3126-B	8922	126
	3056		
	C32A	8922	136
	3512	8922	183
	3516		
Cummins	555	8901/8902	8*
	B SERIES	8910/8912	159
	C SERIES	8910/8912	127
	KTA19M3	8910/8912	142
	MTA855		
	KT1150M	8910/8912	118
	QSM-11		
	KTA-50	8910/8912	168
Detroit	DDEC	N/A	12
	53 SERIES	8910/8912	8*
	71 SERIES		
	71 SERIES TURBO	8910/8912	8/3.9**
	92 SERIES	8910/8912	8*
	92 SERIES TURBO	8910/8912	8/4.1**
	8.2 LITER	8910/8912	126
	4-71	8910/8912	102
	12V71	8910/8912	118
	12V92		
EMD	MECHANICAL SENDER	8901/8902	8*
	FLYWHEEL SENSOR	8910/8912	265
Ford Lehman	MECHANICAL SENDER	8901**/8902**	8*

Manufacturer	Model	Signal Source	PPR
Hino	MECHANICAL SENDER	8901/8902	8*
John Deere	MECHANICAL SENDER	8901/8902	8*
	FLYWHEEL SENSOR	8910/8912	129
Lugger	FLYWHEEL SENSOR	8910/8912	148
MAN	INLINE	8901-D/8902-D	8*
	VEE	8901/8902	8*
	826	8910/8912	143
	2840	8910/8912	160
	2842		
	2848		
	2866		
	2886		
MTU	MECHANICAL SENDER	8901/8902	8*
Perkins	1980 AND OLDER	8901**/8902**	8*
	4-236		
	6-354		
	4-107		
	4-108		
	4-154	8709	N/A
	M-135	8910/8912	126
	M-225TI		
	M-300TI		
	M-30	8910/8912	96
	M-800TI	8901**/8902**	8*
Volvo	3	Metric Thread Sensor	28
	17		
	60		
	30	Metric Thread Sensor	33
	40		
	42		
	43		
	41	Metric Thread Sensor	41
	61	Metric Thread Sensor	30
	71		
	100C		
	102		
	121C		
	122		
	2010		
	2020	Metric Thread Sensor	88
	2030	Metric Thread Sensor	96
	2040	Metric Thread Sensor	109

Manufacturer	Model	Signal Source	PPR
Yanmar	1GM-30	Metric Thread Sensor	97
	2GM-20		
	2GM-30		
	3GM-30		
	3QM-30		
	2QM-15	Metric Thread Sensor	114
	3HM-35		
	6LPSTE	Metric Thread Sensor	117
	6LPASTP2		
	2QM-20	Metric Thread Sensor	126
	3QM		
	4JH	Metric Thread Sensor	127
	4LH		
	6LHA-DTE		
	6CXM	Metric Thread Sensor	129
	6LY		

*Unless using sender other than 8901/8902 or a reduction gear.

**May need adapter to connect to engine.

Common Gasoline Engines		
Manufacturer	Model	PPR
Chrysler	35Hp, 70Hp & up	12
	55Hp & 60 Hp	20
Evinrude/Johnson	9.2Hp - 15 Hp 4 stroke after 2001	6
	All 2 cylinders less than 70Hp	10
	9.9HP & 15HP (2 cylinder) (4 stroke), 25-35HP 3CYL, 40-50HP, 2 Cylinder (1993 and later)	12
	60HP, 3 Cylinder 1985 and later, 70HP & greater, Inc. sea drive, All FICHT models, All E-Tech 40HP - 250HP	12
Force	50Hp through early 1987 (A & B models)	8
	35Hp (1986 & later), 40Hp (1991 & later), 50 Hp (1992 B models & later)	12
	70Hp (1991 & Later), 90-120 Hp L-Drive (1991 B & later), 145 Hp L-Drive (1991 & later)	12
	50Hp (1987 C thru 1992 A), 90-120 Hp (Before 1991 B), 85-125Hp L-Drive (1989)	20
Honda	8,9.9, 15 Hp require Honda Harness	4
	BF 75/100A, BF 25/30, BF 75/90, BF 40/50 (2006 & later), BF 115/130HP, BF 135/150HP, BF 200/225HP	4
	BF 35/45, BF 40/50 HP (thru 2005)	6
	BF 8D, 9.9D, BF 15D/20D - includes Power Thrust Models	12
Mercury/Mariner	Less than 40Hp, 48, 60Hp Mariner (40Hp serial # 582399 and older)	4
	8.9.9 & 50Hp (4 stroke), 40Hp (after serial # 582399), 45Hp (1987), 50Hp and above	12
	135Hp,150Hp,200Hp,225Hp, DI, 3OL, EFI 225 & 250Hp, Pro Max 3OL 300Hp EFI	12
OMC	All 2 cylinders less than 70Hp	10
	9.9Hp & 15Hp (2 Cylinder 4 stroke), 50Hp, 2 Cylinder (1993 & later), 60Hp, 3 Cylinder (1985 & later)	12
	70Hp & greater, including sea drives, All FICHT models	12
Suzuki	Less than 55HP (All), 60Hp, 65Hp, (through 1985), 50-60Hp Cabrea	4
	9.9Hp & 15Hp (4 Stroke), 25Hp & 30Hp, (1993 and later), 55Hp & 65Hp (1985 and later)	6
	75Hp & up (1985 & later), 75Hp and up (Cabrea), 115Hp and up (1988 & later)	12
Tohatsu/Nissan	8Hp through M40C (all 2 Cylinder)	4
	M40D through M90A (all 3 cylinder)	6
	115Hp, 120Hp, 140Hp (all 4 cylinder)	12
Yamaha	6Hp-25Hp (2 Cylinder) C25-C40 (Except C30)	4
	F/T 9.9, C30 & C60, 25 U2 (3 cylinder), 30Hp, 40Hp, 50EJ, 50T-70	6
	F/T 50, P75, C75-C150, 90-250	12

PPR Settings

PPR	SW2				SW1							
	1	2	3	4	1	2	3	4	5	6	7	8
1	0	0	0	0	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	0	0	0	0	1	0
3	0	0	0	0	0	0	0	0	0	0	1	1
4	0	0	0	0	0	0	0	0	0	1	0	0
5	0	0	0	0	0	0	0	0	0	1	0	1
6	0	0	0	0	0	0	0	0	0	1	1	0
7	0	0	0	0	0	0	0	0	0	1	1	1
8	0	0	0	0	0	0	0	0	1	0	0	0
9	0	0	0	0	0	0	0	0	1	0	0	1
10	0	0	0	0	0	0	0	0	1	0	1	0
11	0	0	0	0	0	0	0	0	1	0	1	1
12	0	0	0	0	0	0	0	0	1	1	0	0
13	0	0	0	0	0	0	0	0	1	1	0	1
14	0	0	0	0	0	0	0	0	1	1	1	0
15	0	0	0	0	0	0	0	0	1	1	1	1
16	0	0	0	0	0	0	0	1	0	0	0	0
17	0	0	0	0	0	0	0	1	0	0	0	1
18	0	0	0	0	0	0	0	1	0	0	1	0
19	0	0	0	0	0	0	0	1	0	0	1	1
20	0	0	0	0	0	0	0	1	0	1	0	0
21	0	0	0	0	0	0	0	1	0	1	0	1
22	0	0	0	0	0	0	0	1	0	1	1	0
23	0	0	0	0	0	0	0	1	0	1	1	1
24	0	0	0	0	0	0	0	1	1	0	0	0
25	0	0	0	0	0	0	0	1	1	0	0	1
26	0	0	0	0	0	0	0	1	1	0	1	0
27	0	0	0	0	0	0	0	1	1	0	1	1
28	0	0	0	0	0	0	0	1	1	1	0	0
29	0	0	0	0	0	0	0	1	1	1	0	1
30	0	0	0	0	0	0	0	1	1	1	1	0
31	0	0	0	0	0	0	0	1	1	1	1	1
32	0	0	0	0	0	0	1	0	0	0	0	0
33	0	0	0	0	0	0	1	0	0	0	0	1
34	0	0	0	0	0	0	1	0	0	0	1	0
35	0	0	0	0	0	0	1	0	0	0	1	1
36	0	0	0	0	0	0	1	0	0	1	0	0
37	0	0	0	0	0	0	1	0	0	1	0	1
38	0	0	0	0	0	0	1	0	0	1	1	0
39	0	0	0	0	0	0	1	0	0	1	1	1
40	0	0	0	0	0	0	1	0	1	0	0	0
41	0	0	0	0	0	0	1	0	1	0	0	1
42	0	0	0	0	0	0	1	0	1	0	1	0

PPR	SW2				SW1							
	1	2	3	4	1	2	3	4	5	6	7	8
43	0	0	0	0	0	0	1	0	1	0	1	1
44	0	0	0	0	0	0	1	0	1	1	0	0
45	0	0	0	0	0	0	1	0	1	1	0	1
46	0	0	0	0	0	0	1	0	1	1	1	0
47	0	0	0	0	0	0	1	0	1	1	1	1
48	0	0	0	0	0	0	1	1	0	0	0	0
49	0	0	0	0	0	0	1	1	0	0	0	1
50	0	0	0	0	0	0	1	1	0	0	1	0
51	0	0	0	0	0	0	1	1	0	0	1	1
52	0	0	0	0	0	0	1	1	0	1	0	0
53	0	0	0	0	0	0	1	1	0	1	0	1
54	0	0	0	0	0	0	1	1	0	1	1	0
55	0	0	0	0	0	0	1	1	0	1	1	1
56	0	0	0	0	0	0	1	1	1	0	0	0
57	0	0	0	0	0	0	1	1	1	0	0	1
58	0	0	0	0	0	0	1	1	1	0	1	0
59	0	0	0	0	0	0	1	1	1	0	1	1
60	0	0	0	0	0	0	1	1	1	1	0	0
61	0	0	0	0	0	0	1	1	1	1	0	1
62	0	0	0	0	0	0	1	1	1	1	1	0
63	0	0	0	0	0	0	1	1	1	1	1	1
64	0	0	0	0	0	1	0	0	0	0	0	0
65	0	0	0	0	0	1	0	0	0	0	0	1
66	0	0	0	0	0	1	0	0	0	0	1	0
67	0	0	0	0	0	1	0	0	0	0	1	1
68	0	0	0	0	0	1	0	0	0	1	0	0
69	0	0	0	0	0	1	0	0	0	1	0	1
70	0	0	0	0	0	1	0	0	0	1	1	0
71	0	0	0	0	0	1	0	0	0	1	1	1
72	0	0	0	0	0	1	0	0	1	0	0	0
73	0	0	0	0	0	1	0	0	1	0	0	1
74	0	0	0	0	0	1	0	0	1	0	1	0
75	0	0	0	0	0	1	0	0	1	0	1	1
76	0	0	0	0	0	1	0	0	1	1	0	0
77	0	0	0	0	0	1	0	0	1	1	0	1
78	0	0	0	0	0	1	0	0	1	1	1	0
79	0	0	0	0	0	1	0	0	1	1	1	1
80	0	0	0	0	0	1	0	1	0	0	0	0
81	0	0	0	0	0	1	0	1	0	0	0	1
82	0	0	0	0	0	1	0	1	0	0	1	0
83	0	0	0	0	0	1	0	1	0	0	1	1
84	0	0	0	0	0	1	0	1	0	1	0	0

PPR	SW2				SW1							
	1	2	3	4	1	2	3	4	5	6	7	8
85	0	0	0	0	0	1	0	1	0	1	0	1
86	0	0	0	0	0	1	0	1	0	1	1	0
87	0	0	0	0	0	1	0	1	0	1	1	1
88	0	0	0	0	0	1	0	1	1	0	0	0
89	0	0	0	0	0	1	0	1	1	0	0	1
90	0	0	0	0	0	1	0	1	1	0	1	0
91	0	0	0	0	0	1	0	1	1	0	1	1
92	0	0	0	0	0	1	0	1	1	1	0	0
93	0	0	0	0	0	1	0	1	1	1	0	1
94	0	0	0	0	0	1	0	1	1	1	1	0
95	0	0	0	0	0	1	0	1	1	1	1	1
96	0	0	0	0	0	1	1	0	0	0	0	0
97	0	0	0	0	0	1	1	0	0	0	0	1
98	0	0	0	0	0	1	1	0	0	0	1	0
99	0	0	0	0	0	1	1	0	0	0	1	1
100	0	0	0	0	0	1	1	0	0	1	0	0
101	0	0	0	0	0	1	1	0	0	1	0	1
102	0	0	0	0	0	1	1	0	0	1	1	0
103	0	0	0	0	0	1	1	0	0	1	1	1
104	0	0	0	0	0	1	1	0	1	0	0	0
105	0	0	0	0	0	1	1	0	1	0	0	1
106	0	0	0	0	0	1	1	0	1	0	1	0
107	0	0	0	0	0	1	1	0	1	0	1	1
108	0	0	0	0	0	1	1	0	1	1	0	0
109	0	0	0	0	0	1	1	0	1	1	0	1
110	0	0	0	0	0	1	1	0	1	1	1	0
111	0	0	0	0	0	1	1	0	1	1	1	1
112	0	0	0	0	0	1	1	1	0	0	0	0
113	0	0	0	0	0	1	1	1	0	0	0	1
114	0	0	0	0	0	1	1	1	0	0	1	0
115	0	0	0	0	0	1	1	1	0	0	1	1
116	0	0	0	0	0	1	1	1	0	1	0	0
117	0	0	0	0	0	1	1	1	0	1	0	1
118	0	0	0	0	0	1	1	1	0	1	1	0
119	0	0	0	0	0	1	1	1	0	1	1	1
120	0	0	0	0	0	1	1	1	1	0	0	0
121	0	0	0	0	0	1	1	1	1	0	0	1
122	0	0	0	0	0	1	1	1	1	0	1	0
123	0	0	0	0	0	1	1	1	1	0	1	1
124	0	0	0	0	0	1	1	1	1	1	0	0
125	0	0	0	0	0	1	1	1	1	1	0	1
126	0	0	0	0	0	1	1	1	1	1	1	0
127	0	0	0	0	0	1	1	1	1	1	1	1
128	0	0	0	0	1	0	0	0	0	0	0	0

PPR	SW2				SW1							
	1	2	3	4	1	2	3	4	5	6	7	8
129	0	0	0	0	1	0	0	0	0	0	0	1
130	0	0	0	0	1	0	0	0	0	0	1	0
131	0	0	0	0	1	0	0	0	0	0	1	1
132	0	0	0	0	1	0	0	0	0	1	0	0
133	0	0	0	0	1	0	0	0	0	1	0	1
134	0	0	0	0	1	0	0	0	0	1	1	0
135	0	0	0	0	1	0	0	0	0	1	1	1
136	0	0	0	0	1	0	0	0	1	0	0	0
137	0	0	0	0	1	0	0	0	1	0	0	1
138	0	0	0	0	1	0	0	0	1	0	1	0
139	0	0	0	0	1	0	0	0	1	0	1	1
140	0	0	0	0	1	0	0	0	1	1	0	0
141	0	0	0	0	1	0	0	0	1	1	0	1
142	0	0	0	0	1	0	0	0	1	1	1	0
143	0	0	0	0	1	0	0	0	1	1	1	1
144	0	0	0	0	1	0	0	1	0	0	0	0
145	0	0	0	0	1	0	0	1	0	0	0	1
146	0	0	0	0	1	0	0	1	0	0	1	0
147	0	0	0	0	1	0	0	1	0	0	1	1
148	0	0	0	0	1	0	0	1	0	1	0	0
149	0	0	0	0	1	0	0	1	0	1	0	1
150	0	0	0	0	1	0	0	1	0	1	1	0
151	0	0	0	0	1	0	0	1	0	1	1	1
152	0	0	0	0	1	0	0	1	1	0	0	0
153	0	0	0	0	1	0	0	1	1	0	0	1
154	0	0	0	0	1	0	0	1	1	0	1	0
155	0	0	0	0	1	0	0	1	1	0	1	1
156	0	0	0	0	1	0	0	1	1	1	0	0
157	0	0	0	0	1	0	0	1	1	1	0	1
158	0	0	0	0	1	0	0	1	1	1	1	0
159	0	0	0	0	1	0	0	1	1	1	1	1
160	0	0	0	0	1	0	1	0	0	0	0	0
161	0	0	0	0	1	0	1	0	0	0	0	1
162	0	0	0	0	1	0	1	0	0	0	1	0
163	0	0	0	0	1	0	1	0	0	0	1	1
164	0	0	0	0	1	0	1	0	0	1	0	0
165	0	0	0	0	1	0	1	0	0	1	0	1
166	0	0	0	0	1	0	1	0	0	1	1	0
167	0	0	0	0	1	0	1	0	0	1	1	1
168	0	0	0	0	1	0	1	0	1	0	0	0
169	0	0	0	0	1	0	1	0	1	0	0	1
170	0	0	0	0	1	0	1	0	1	0	1	0
171	0	0	0	0	1	0	1	0	1	0	1	1
172	0	0	0	0	1	0	1	0	1	1	0	0

PPR	SW2				SW1							
	1	2	3	4	1	2	3	4	5	6	7	8
173	0	0	0	0	1	0	1	0	1	1	0	1
174	0	0	0	0	1	0	1	0	1	1	1	0
175	0	0	0	0	1	0	1	0	1	1	1	1
176	0	0	0	0	1	0	1	1	0	0	0	0
177	0	0	0	0	1	0	1	1	0	0	0	1
178	0	0	0	0	1	0	1	1	0	0	1	0
179	0	0	0	0	1	0	1	1	0	0	1	1
180	0	0	0	0	1	0	1	1	0	1	0	0
181	0	0	0	0	1	0	1	1	0	1	0	1
182	0	0	0	0	1	0	1	1	0	1	1	0
183	0	0	0	0	1	0	1	1	0	1	1	1
184	0	0	0	0	1	0	1	1	1	0	0	0
185	0	0	0	0	1	0	1	1	1	0	0	1
186	0	0	0	0	1	0	1	1	1	0	1	0
187	0	0	0	0	1	0	1	1	1	0	1	1
188	0	0	0	0	1	0	1	1	1	1	0	0
189	0	0	0	0	1	0	1	1	1	1	0	1
190	0	0	0	0	1	0	1	1	1	1	1	0
191	0	0	0	0	1	0	1	1	1	1	1	1
192	0	0	0	0	1	1	0	0	0	0	0	0
193	0	0	0	0	1	1	0	0	0	0	0	1
194	0	0	0	0	1	1	0	0	0	0	1	0
195	0	0	0	0	1	1	0	0	0	0	1	1
196	0	0	0	0	1	1	0	0	0	1	0	0
197	0	0	0	0	1	1	0	0	0	1	0	1
198	0	0	0	0	1	1	0	0	0	1	1	0
199	0	0	0	0	1	1	0	0	0	1	1	1
200	0	0	0	0	1	1	0	0	1	0	0	0
201	0	0	0	0	1	1	0	0	1	0	0	1
202	0	0	0	0	1	1	0	0	1	0	1	0
203	0	0	0	0	1	1	0	0	1	0	1	1
204	0	0	0	0	1	1	0	0	1	1	0	0
205	0	0	0	0	1	1	0	0	1	1	0	1
206	0	0	0	0	1	1	0	0	1	1	1	0
207	0	0	0	0	1	1	0	0	1	1	1	1
208	0	0	0	0	1	1	0	1	0	0	0	0
209	0	0	0	0	1	1	0	1	0	0	0	1
210	0	0	0	0	1	1	0	1	0	0	1	0
211	0	0	0	0	1	1	0	1	0	0	1	1
212	0	0	0	0	1	1	0	1	0	1	0	0
213	0	0	0	0	1	1	0	1	0	1	0	1
214	0	0	0	0	1	1	0	1	0	1	1	0
215	0	0	0	0	1	1	0	1	0	1	1	1
216	0	0	0	0	1	1	0	1	1	0	0	0

PPR	SW2				SW1							
	1	2	3	4	1	2	3	4	5	6	7	8
217	0	0	0	0	1	1	0	1	1	0	0	1
218	0	0	0	0	1	1	0	1	1	0	1	0
219	0	0	0	0	1	1	0	1	1	0	1	1
220	0	0	0	0	1	1	0	1	1	1	0	0
221	0	0	0	0	1	1	0	1	1	1	0	1
222	0	0	0	0	1	1	0	1	1	1	1	0
223	0	0	0	0	1	1	0	1	1	1	1	1
224	0	0	0	0	1	1	1	0	0	0	0	0
225	0	0	0	0	1	1	1	0	0	0	0	1
226	0	0	0	0	1	1	1	0	0	0	1	0
227	0	0	0	0	1	1	1	0	0	0	1	1
228	0	0	0	0	1	1	1	0	0	1	0	0
229	0	0	0	0	1	1	1	0	0	1	0	1
230	0	0	0	0	1	1	1	0	0	1	1	0
231	0	0	0	0	1	1	1	0	0	1	1	1
232	0	0	0	0	1	1	1	0	1	0	0	0
233	0	0	0	0	1	1	1	0	1	0	0	1
234	0	0	0	0	1	1	1	0	1	0	1	0
235	0	0	0	0	1	1	1	0	1	0	1	1
236	0	0	0	0	1	1	1	0	1	1	0	0
237	0	0	0	0	1	1	1	0	1	1	0	1
238	0	0	0	0	1	1	1	0	1	1	1	0
239	0	0	0	0	1	1	1	0	1	1	1	1
240	0	0	0	0	1	1	1	1	0	0	0	0
241	0	0	0	0	1	1	1	1	0	0	0	1
242	0	0	0	0	1	1	1	1	0	0	1	0
243	0	0	0	0	1	1	1	1	0	0	1	1
244	0	0	0	0	1	1	1	1	0	1	0	0
245	0	0	0	0	1	1	1	1	0	1	0	1
246	0	0	0	0	1	1	1	1	0	1	1	0
247	0	0	0	0	1	1	1	1	0	1	1	1
248	0	0	0	0	1	1	1	1	1	0	0	0
249	0	0	0	0	1	1	1	1	1	0	0	1
250	0	0	0	0	1	1	1	1	1	0	1	0
251	0	0	0	0	1	1	1	1	1	0	1	1
252	0	0	0	0	1	1	1	1	1	1	0	0
253	0	0	0	0	1	1	1	1	1	1	0	1
254	0	0	0	0	1	1	1	1	1	1	1	0
255	0	0	0	0	1	1	1	1	1	1	1	1
256	0	0	0	1	0	0	0	0	0	0	0	0
257	0	0	0	1	0	0	0	0	0	0	0	1
258	0	0	0	1	0	0	0	0	0	0	1	0
259	0	0	0	1	0	0	0	0	0	0	1	1
260	0	0	0	1	0	0	0	0	0	1	0	0

PPR	SW2				SW1							
	1	2	3	4	1	2	3	4	5	6	7	8
261	0	0	0	1	0	0	0	0	0	1	0	1
262	0	0	0	1	0	0	0	0	0	1	1	0
263	0	0	0	1	0	0	0	0	0	1	1	1
264	0	0	0	1	0	0	0	0	1	0	0	0
265	0	0	0	1	0	0	0	0	1	0	0	1
266	0	0	0	1	0	0	0	0	1	0	1	0
267	0	0	0	1	0	0	0	0	1	0	1	1
268	0	0	0	1	0	0	0	0	1	1	0	0
269	0	0	0	1	0	0	0	0	1	1	0	1
270	0	0	0	1	0	0	0	0	1	1	1	0
271	0	0	0	1	0	0	0	0	1	1	1	1
272	0	0	0	1	0	0	0	1	0	0	0	0
273	0	0	0	1	0	0	0	1	0	0	0	1
274	0	0	0	1	0	0	0	1	0	0	1	0
275	0	0	0	1	0	0	0	1	0	0	1	1
276	0	0	0	1	0	0	0	1	0	1	0	0
277	0	0	0	1	0	0	0	1	0	1	0	1
278	0	0	0	1	0	0	0	1	0	1	1	0
279	0	0	0	1	0	0	0	1	0	1	1	1
280	0	0	0	1	0	0	0	1	1	0	0	0
281	0	0	0	1	0	0	0	1	1	0	0	1
282	0	0	0	1	0	0	0	1	1	0	1	0
283	0	0	0	1	0	0	0	1	1	0	1	1
284	0	0	0	1	0	0	0	1	1	1	0	0
285	0	0	0	1	0	0	0	1	1	1	0	1
286	0	0	0	1	0	0	0	1	1	1	1	0
287	0	0	0	1	0	0	0	1	1	1	1	1
288	0	0	0	1	0	0	1	0	0	0	0	0
289	0	0	0	1	0	0	1	0	0	0	0	1
290	0	0	0	1	0	0	1	0	0	0	1	0
291	0	0	0	1	0	0	1	0	0	0	1	1
292	0	0	0	1	0	0	1	0	0	1	0	0
293	0	0	0	1	0	0	1	0	0	1	0	1
294	0	0	0	1	0	0	1	0	0	1	1	0
295	0	0	0	1	0	0	1	0	0	1	1	1
296	0	0	0	1	0	0	1	0	1	0	0	0
297	0	0	0	1	0	0	1	0	1	0	0	1
298	0	0	0	1	0	0	1	0	1	0	1	0
299	0	0	0	1	0	0	1	0	1	0	1	1
300	0	0	0	1	0	0	1	0	1	1	0	0

Special Settings for Ignition Coils on Gas Engines

PPR	SW2				SW1							
	1	2	3	4	1	2	3	4	5	6	7	8
1	0	0	0	1	0	0	1	1	0	0	0	1
2	0	0	0	1	0	0	1	1	0	0	1	0
3	0	0	0	1	0	0	1	1	0	0	1	1
4	0	0	0	1	0	0	1	1	0	1	0	0
5	0	0	0	1	0	0	1	1	0	1	0	1
6	0	0	0	1	0	0	1	1	0	1	1	0
7	0	0	0	1	0	0	1	1	0	1	1	1

Additional Settings		
Switch	Terminal	Function
1	SW2	On = 10 RPM Resolution Off = 1 RPM Resolution
2	SW2	On=Low Signal Filter Off = High Signal Filter
3	SW2	On = Decimal for tenths place

*Switch 2 function on REV B to current only.

Red portion of switch in upper position = ON (1)
Red portion of switch in lower position = OFF (0)