ENGINE DATASHEET - MODEL 4000 TACH/TIMER

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This document provides electrical connections and tachometer settings for many popular engines. In addition, it presents general information applicable to any engine or rotating machinery. Please read the Model 4000 User's Manual first which discusses the location and function of each of the tach configuration jumpers, then refer to this document to find the recommended setting for your engine. Note that settings for AVERAGING are not provided, as this is a matter of user preference. A brief description of the various electrical connections that are possible is given first. Wiring involves only two wires; RED and BLACK and the issue is where to connect these. The tach also has a bare shield wire that may need to be grounded. If the tach is powered from a 9V battery, connect this bare shield to ground. If the tach is powered from aircraft power leave this wire unconnected, as aircraft power negative is usually grounded and will provide the needed tach ground.

LIGHTING COILS: Many small engines incorporate a lighting coil that is used to power accessory lighting or charge a 12V battery. Technically, it is an alternator since it outputs AC just like the device in your car. The term "lighting coil" is a carryover from snowmobiles where AC produced by the alternator directly powered all of the running lights. The coils are part of the flywheel assembly and as such, the frequency of the AC produced is directly proportional to engine speed. It provides an ideal output to drive a tachometer. Most small engine manufacturers use heavy yellow wires (one may be yellow/black) for the lighting coil output. The tach can be connected to a lighting coil in either of two ways. One is RED – EITHER YELLOW, BLACK – OTHER YELLOW. Alternately, if a rectifier/regulator and 12V battery are connected to the lighting circuit, the tach may be wired RED – EITHER YELLOW, BLACK – GROUND.

BELT-DRIVEN ALTERNATORS: Belt-driven alternators are subject to slipping and an inexact relationship between engine RPM and AC frequency. For this reason, they are not suitable to drive a tachometer.

DEDICATED TACH OUTPUT: Many engines have a dedicated output intended to drive a tach. The popular Rotax engines are among these and the output is usually a gray wire fed from a coil in the flywheel assembly. Connect RED – GRAY and BLACK – GROUND. The Rotax 4-stroke engines have different connections. See details in the list of engines that follows.

ELECTRONIC IGNITION: Most modern electronic ignitions based on capacitive discharge have an output that is compatible with the tachometer. The output is typically a very "clean" and stable +12V pulse. Unfortunately there is no standard in terms of wire color or connector pin and the location of this pulse varies greatly. Some (but not all) ignition manufacturers provide documentation that will identify where to access it. If not, you can probe the ignition system with an oscilloscope in an attempt to locate it. Some of the popular electronic ignition systems that we have had experience with are listed.

TACH SENDER: For Lycoming and Continental engines, our Model 4002 Hall Effect tach sender is the ideal solution. It is a small device that screws into the engine fitting normally reserved for a mechanical tach cable. The output is a square wave with frequency proportional to RPM. This fitting is connected to the camshaft so the sender spins at half the engine RPM.

MAGNETO "P" LEAD: The "P" lead of some magneto systems provides a suitable signal to drive the tach, but there are drawbacks. First, the "P" lead is notoriously noisy and difficult to interface to. It may require a lot of trial and error in terms of tach configuration to get it to work well at all engine speeds. It also may require the rectifier inside the tach to be enabled (see P6 of User's Manual). Second, with dual magneto systems commonly used with aircraft engines, you will have to make a decision as to which of the two mags you are going to connect to. As such you will not be able to do a "mag drop test" during run up as you will get no RPM indication when that mag is shut down. If possible, use a tach sender. It will provide a tach signal as long as the engine is turning even if both mags are shut down.

BREAKER POINTS: Older type ignition systems with breaker points can be used to drive the tach. It will be necessary to disconnect a capacitor inside the tach. Page 7 of the User's Manual covers this in detail. Connect RED – POINTS and BLACK – GROUND.

MAGNETIC PICKUP: For applications where none of the above is possible or for those where an engine is not involved (gyrocopter rotor blade, windmill, stationary bicycle, etc.), a magnetic pickup can be used. Something as simple as a magnet fixed to the rotating item and a magnetic reed switch that it comes in proximity to will suffice for slow speeds. The reed can switch the +5V accessory output from the tach and 5V pulses will be generated proportional to RPM. At high speeds the magnetic reed switch just can not operate quickly enough and an electronic version is needed. This is called a Hall Effect device. It's basically an electronic device that outputs a voltage when it senses the presence of a magnet. Hall Effect devices require power and again the +5V accessory output of the tach is ideal. Detailed installation instructions are provided with the Hall Effect pickup that we manufacture.

GENERAL CONSIDERATIONS: Even if your engine isn't listed, most have some electrical signal available that is proportional to engine RPM and the tach can be configured to be compatible with this signal. In general the tach can not be damaged by connecting or configuring it wrong (BUT DON'T CONNECT IT DIRECTLY TO A SPARK PLUG!), so feel free to experiment and try a few approaches yourself. With sensitivity set to J3 the tach can be connected directly to household 115VAC. This is a good accuracy test. With PPR set to 6 the tach should read exactly 600. Start by experimenting with the SENSITIVITY. Set it to J3 (least sensitive) and see if the tach gives and indication at all. Do these tests at a one speed, preferably a high idle. If no RPM indication is obtained change to J2 and test again. If still no indication, try J1 (most sensitive). Once an RPM indication is obtained (even if obviously wrong) then try different PPR settings to get it to read correctly. If it seems to be indicating 2X actual, double the PPR setting. If it seems to indicate half of actual, halve the PPR setting. Keep in mind that you must turn the tach off then on again to recognize PPR setting changes. Now determine the correct FILTERING by trying the tach at low and high speeds to see if it responds correctly across the full RPM range. Refer to the last paragraph on page 5 of the User's Manual to set the FILTERING jumpers. Also, the black wire is not grounded so try reversing the red and black wires. Sometimes this will correct a problem. If you successfully configure the tach for an unlisted engine please send us the details so we can add it to the list.

ENGINE OR SENDER TYPE – COMMENTS	CONFIGURATION			CONNECTIONS	
	SENS.	FILTER	PPR	TACH	ENGINE or SENDER
Taskem 4002 Hall effect tach sender – connected to mechanical tach output of Lycoming, Continental or other aircraft engine.	J2	J5	4	RED BLK	WHITE BLACK
Magneto "P" lead. Enable full wave rectifier if unable to get consistent readings at all speeds. See "General Considerations".	J3	J6	Half the # of cylinders	RED BLK	P LEAD GND
Arrow – all models	J2	J5	7	See "Lighting Coils"	
Cayuna, Hirth, Kawasaki, Kohler, Rupp, Zenoah – all models	J2		2	See "Lighting Coils"	
Generac * Either white wire on rectifier/regulator module.	J2		9	RED BLK	*WHT GND
HKS – all models * Any of three white wires at rectifier/regulator.	J2		6	RED BLK	*WHT GND
Honda GX610/620/670 Series * Either green wire in rectifier/regulator module.	J2	J6	3	RED BLK	*GRN GND
Compact Radial Engines – MZ 34, 35i, 201, 202	J2				
Rotax – Older 277, 447, 477, 503 models with points.	J2	J5 & J6	2	See "Lighting Coils"	
Rotax – 447 SCDI & 503, 582, 618 DCDI (Ducati) systems.	J2	J5	6	RED BLK	GRAY GND
or .	J2	J5	6	See "Lighting Coils"	
Rotax – 912 & 914 four-stroke. * Wires are housed in a 2-pin connector.	J2	J5	1	RED BLK	*WHT/YEL BLU/YEL
or .	J2	J5	5	See "Lighting Coils"	
Solo 15HP with CDI	J3		1	RED BLK	KILL SW GND
Subaru Legacy * White wire on diagnostic computer monitor plug. This is usually accessible in dash auto wiring harness.	J2		0.5	RED BLK	*WHT GND
Four-stroke auto or marine engine with battery-powered points-type distributor ignition. Remove filter capacitor in tach.	Try J3. If no reading change to J2.		Half the # of cylinders	RED BLK	POINTS GND
Light Speed Engineering CDI system – all Plasma models * Tachometer output pin on "D" connector. See LSE manual.			Half the # of cylinders	RED BLK	*OUTPUT GND
MSD Electronic Ignitions – Series 6, 7, 8, 10 and DIS models * Tachometer Output Terminal	J2		Half the # of cylinders	RED BLK	*OUTPUT GND
Jabiru – 2200, 3300 models * Depends on model and serial number. All newer units use 6 PPR.	J2	J5	*4, 5 or 6	See "Lighting Coils"	
UL Power * Any of three yellow wires at rectifier/regulator.	J2	J5	6	RED BLK	*YEL GND
Polini Thor 303 Red wire from voltage regulator (VR) to red of tach	J2	J5	3	RED BLK	Red from VR GND

TASKEM CORPORATION

Developers and Manufacturers of Quality Electronic Products

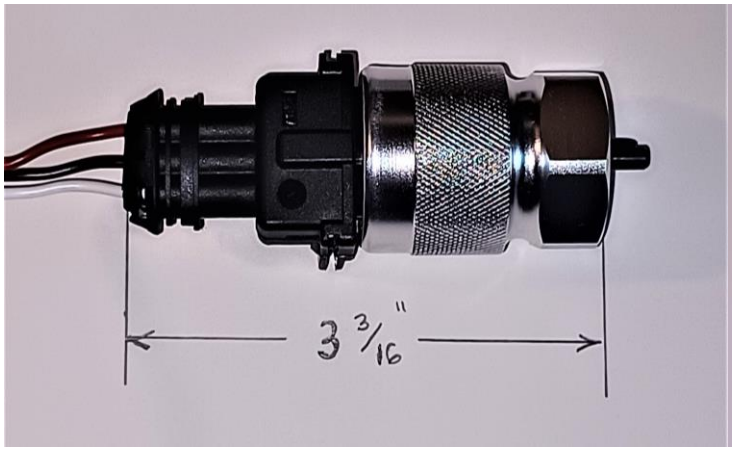
MODEL 4002 HALL EFFECT TACH SENDER

The Taskem Hall Effect sender is compatible with the mechanical tachometer port on Lycoming, Continental and many other popular aircraft engines. For these it is the ideal companion to our Model 4000 tachometer. It is not dependent on magnetos so RPM is always displayed regardless of shutting either mag off during run up. This combination is so sensitive and stable that a noticeable difference in top RPM can be seen during run up when facing into or away from the wind.

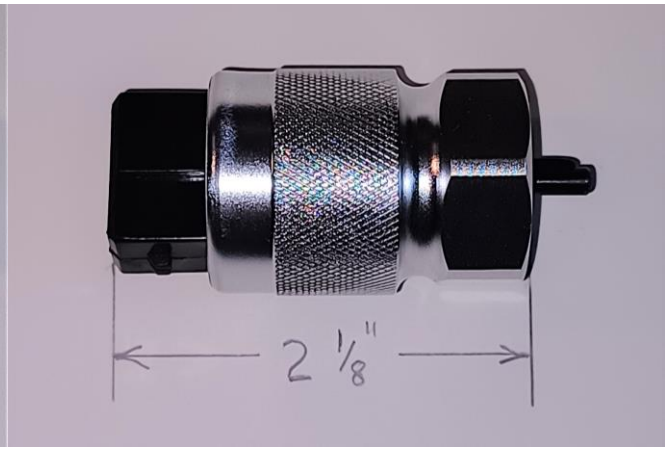
The sender outputs 8 pulses per revolution (ppr), but since the mechanical tach port is driven from the camshaft, it spins at half the engine RPM. Thus, the tachometer must be set to 4 ppr.

The sender requires 12 VDC power for operation and although current drain is very low, a means to remove power from the sender when the engine is off must be provided, else the battery will eventually be drained. This is usually accomplished by accessing 12V via the aircraft MASTER switch.

One problem that many installers run into is available room. Quite often, the size of the sender is prohibitive. One traditional solution has been a “right angle adapter” which as the name implies has the ability to relocate the sender slightly. Unfortunately, these don’t always fit and are very expensive. Our tach sender is very small and dimensions are given in the following diagram. It incorporates a waterproof integral connector which adds to its overall length as shown. If this is too long for your particular installation, a waterproof in-line connector pair can be located at the end of a short pigtail, thus resulting in a very small package. The connector is not shown in the photo below as it is separated several inches from the sender. Call if you need this option.



With Integral Connector



With In-line Connector