

Operation

Electronic tachometers work by counting pulses generated by the ignition system, alternator, tach signal generator, or magnetic pickup sender. The tach is hooked up to +12VDC, Ground, and one of the signal sources listed above. By selecting the right tach and setting the switch on the back to the correct position, you let the tachometer know how many pulses are sent per each engine revolution. From this information, the tach displays the correct engine speed. See Appendix I for tachometer dimensions. Instrument part numbers are located on a label attached to the outside of the case (i.e. TC0000A).

Application

4 cycle engines: The tach signal terminal is connected to the negative terminal on the ignition coil or to a transistorized tach driver circuit connected to the ignition system. This circuit will have a wire (usually gray) for connection to the tach. The correct tachometer will have a white label on the side indicating which switch position is for each engine type. This label will include 4, 6, and 8 cylinder engines for positions 1, 2, and 3.

Outboard engines: The tach signal terminal is usually connected to the unrectified AC output of the alternator/lighting coil. Sometimes it is hooked directly to the stator output wire (usually yellow) other times a gray tach output lead is provided. The correct tach for this application will have a white label on the side with switch positions for 4, 6, 8, 10, or 12 pole alternators. The number of poles on the alternator can be determined by checking the *Faria*® Outboard Tachometer Application table. (See Appendix II)

Diesel engines: The tachometer signal terminal is hooked up to 1 of 3 things: a) the alternator, b) a tach signal generator that is spun by the mechanical take-off, or c) a magnetic pickup sensor which counts gear teeth.

- a) The alternator tach, which is also called a variable ratio tach, is hooked up to the AC output terminal on the alternator. This terminal can be marked in a variety of different ways: AC, AUX., S, R, TACH, or nothing at all. Once installed, the tach is then calibrated to that specific engine by using a shop tach or a known “no load” governor speed. The white label on this tach gives the formula: $[\text{Crankshaft pulley dia.}/\text{alternator pulley dia.} \times \text{No. of Alt. Poles} = N]$. “N” is used to determine the correct switch setting. Another adjustment on the back allows for fine tuning.
- b) The Switching Diesel Tach is hooked up to a tach signal generator which is spun by the engines’ mechanical take-off. One of the signal generator’s wires is grounded to the engine and the other is connected to the tach’s signal terminal. The white label on this tach is marked: ½:1, 1:1, 1.5:1, 2:1, which corresponds to the different mechanical take-off ratios.
- c) The Mag Pickup Tach hooks up to a magnetic pickup sensor which counts gear teeth. Here neither of the wires is grounded to the block. They are both routed up to the tachometer as a twisted pair. One hooks to the signal terminal and the other to the ground terminal on back of the tach. The switch is set to the approximate number of teeth that the sensor sees on each engine revolution. Another adjustment on the back allows fine tuning to the exact number of teeth. The label is marked in ranges generally from 80 to 200 gear teeth.

Calibration

Set up a calibrated “shop tach” or “strobe tach” to monitor the engine’s true RPM. Start the engine and (after an appropriate warm-up period and with the shift in neutral) increase it’s speed to the boat’s normal cruising RPM read on the shop tach. Set the coarse adjustment switch to the proper position described on it’s label. Remove the stop-plug or paper label corner (at the 8-o’clock position on the rear of the case for most) and insert a 5/64” Allen wrench into the “fine adjustment” trimpot, rotating it CW or CCW as necessary to indicate the true RPM.

Troubleshooting

Symptom recognition is the first step in effective instrumentation troubleshooting. Tachometers usually exhibit the following symptoms: a) dead, b) pegged, c) erratic, d) reading high, e) reading low, and f) sticky. More thorough tests of all tach's can be conducted using the *Faria® Instrumentation Tester*. (See Appendix III).

Symptom:

A. Dead - This is usually caused by: a) No power applied, b) No signal supplied, or c) Tach damaged by electrical transients caused by disconnecting the battery with the engine running.

1. Check to see if power is applied to tach by switching the instrument power supply switch on and off. As power is applied, the pointer should jump slightly. If it does not, check to see that the wires are installed on the correct terminals and that 12 volts are actually applied to the terminals themselves.
2. If tach indicates that power is applied, check for the presence of a signal on the signal terminal. Measure the signal between the signal and ground terminals. This should read in excess of 2 volts DC.
3. If power and signal are present, then it is possible that the tach has been damaged by electrical transients. See the enclosed technical bulletin for details.

B. Pegged - This condition occurs on tach's with internal mechanical pointer stops. It is caused by removing power from the tach while it is running in excess of mid-scale RPM's or by the switch on back of the tach being in between positions. When power is re-applied, the tach pointer attempts to go clockwise to zero but cannot because the internal stop is in the way. Read "Marine Instrumentation Facts" for details on how to correct this condition.

C. Erratic - This symptom is caused 99% of the time by an intermittent connection between the wire and the ring or spade connector. Often the wire's insulation is pushed into the crimp area and crimped. The center conductor casually touches the connector allowing the tach to work most of the time but causing a nightmare for the technician. Electrical noise also can cause erratic readings. See "Reading High" for further information.

D. Reading High - This is usually caused by the switch on the back of the tach being in the wrong position. If the number of cylinders or alternator poles selected by the switch is too low, the tach will read high. If a variable alternator or mag pick-up tach is being used, then further calibration may be necessary, as this calibration is done by the end user. See 'Calibration'. Excessive electrical noise may also cause the tach to read high. These noise spikes are counted by the tach as engine RPM's. The wire affected by the noise can be identified by connecting one wire at a time to the tachometer directly from the battery or the signal source on the engine.

E. Reading Low - If the number of cylinders or alternator poles selected by the switch is too high, then the tach will read low. If a variable ratio or mag pick-up tachometer is being used, further calibration by the end user may be necessary. See 'Calibration'.

F. Sticky - If the tach appears to "stick" during operation, slightly loosen nuts holding backclamp and check operation. If tach now operates properly and is not loose in panel, tach now should provide suitable service. If tach continues to stick during operation -- replace tach.