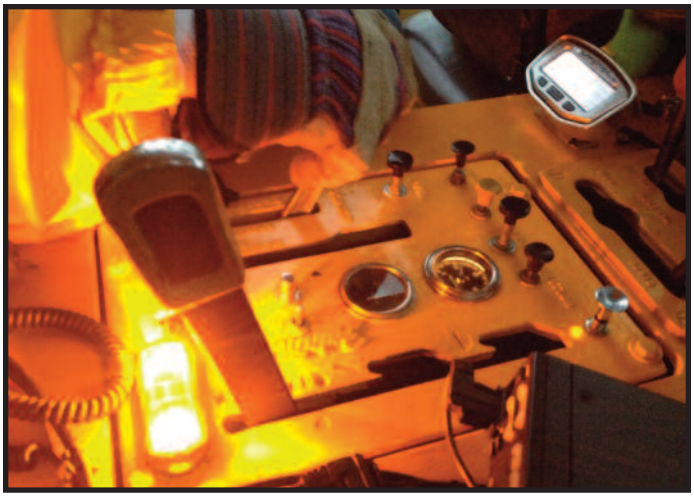
Onan Instrumentation Update

By Robin Douglas

The changes in the NARCOA rules regarding the use of electronic devices has re-opened the subject of how to know how fast we are going in real-time and how far we have travelled. The use of cell phones with their internal GPS is no longer a choice. Adding a speedometer with odometer plus other automobile gauges to a railroad motorcar has been addressed by others but here is a new approach using recent hardware adapted from a different motorsport.



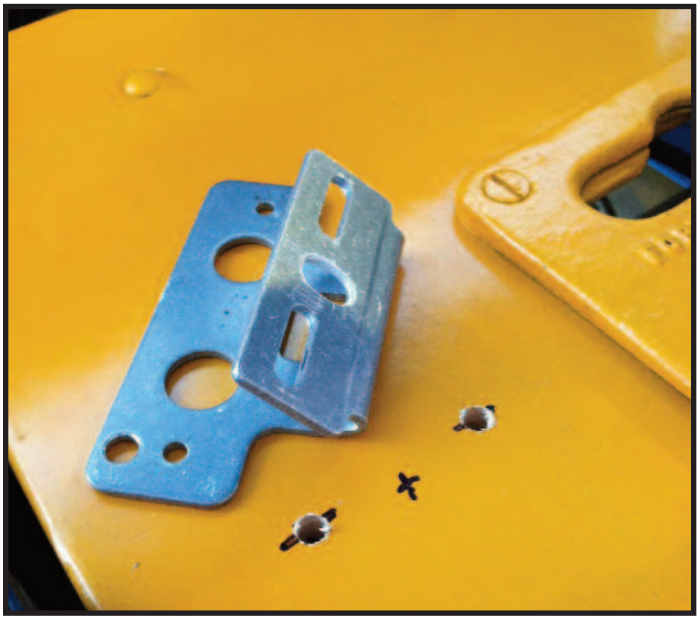
All of us face 3 common instrumentation issues with our motorcars. The basics are covered by the oil pressure gauge and ammeter, but I was not satisfied I really had good data to work with. I realized that waiting until the engine smelled hot was probably not the best method of judging temperature. Trying to decide when to shift by sound was not easy and I didn't really want to calculate speed from mile-markers and my watch. As operators we'd like more information, and Fairmont just didn't see the need. We want to know how fast we are going, how fast our engine is turning over and how the engine is doing.

After getting my MT-14 running fairly well by following many of the tips in the back issues of The Setoff, I found a great article from 2001 by Dave Sigafoose describing adding automotive gauges. While his engineering was sound, some things including the speedometer seemed just a bit too complicated for me. I also did not want to create a full secondary instrument panel. Beyond a speedometer, for me the most important gauge to install was a tachometer, but most everything on the market seemed to be for 4, 6 or 8 cylinder applications; certainly not a two cylinder where both plugs fire every stroke. Various people on the blog suggested TinyTach but it didn't seem very robust. I realized that many motorcycles share ignition features and are air-cooled just like our Onan engines. And motorcycles use a wide variety of wheel sizes. After a bit of research, I found Trail Tech and a product they call Vapor to be a perfect fit.

The Vapor is a compact yet easy to read combination instrument that includes a tachometer, engine temperature readout and speedometer. It is designed for the hard knocks and outdoor exposure of off-road use. It is offered in many configurations but the one I chose is part number 75-2020 as it seems to be the best fit for our hardware.

This model Vapor is sold to be installed on the handlebars of a Yamaha Blaster, a 200 cc air-cooled single-cylinder two-stroke all-terrain 4 wheeled vehicle that also has zero instrumentation. Since we don't have handlebars, some sort of mounting in a convenient spot would be necessary.

The Vapor is about 4 ½" wide, 2 ½" tall and 1" thick. The space on the top of the engine cover on the left side of the transmission levers was my choice as it is in the driver's line of sight and has nothing below. The Vapor



can be mounted onto any flat surface using screws, however they also sell an angled aluminum bracket (Part Number 022-OEB) that will index it 90 degrees to a vertical position. Neither horizontal nor vertical seemed right so I clamped the bracket in a vise and gently hammered it back to around 45 degrees. I also drilled a hole through the mounting surface so the wires

could go straight down. I marked the doghouse cover and drilled the needed holes. When doing this, make sure to allow enough clearance for the connectors to pass through one at a time.

Another option I chose to purchase was the protective aluminum housing seen in this photo. While the plastic housing is tough, I wanted a bit more insurance against impact damage. You can see the wires with connectors are routed through the bracket allowing for a very clean installation to the top of the cover. The instructions and wiring diagram from Trail Tech are very clear and each wire is labeled to match. Each connector is a different size so a cross connection is pretty much eliminated. When running the power, I chose to make the connection via a dedicated fuse with low amperage rating directly off of the main power buss.

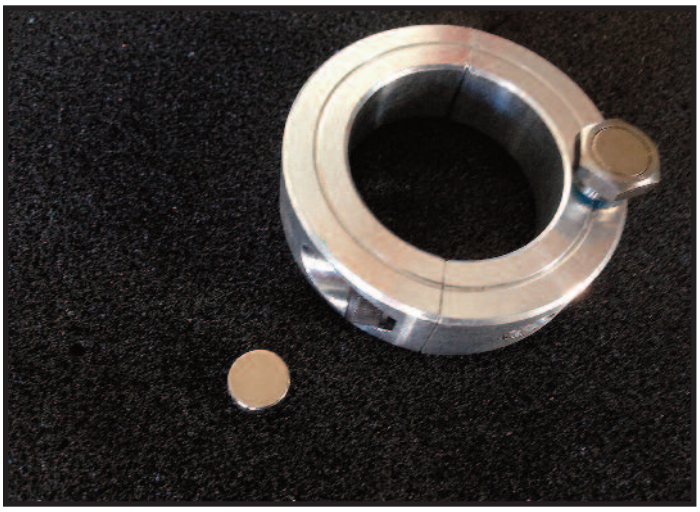
All the connections will now be made on the bottom of the engine cover. Since the engine cover hinges at the rear, you will need to route the wires toward the pivot point before their final destination. This method will require extra wire length but will keep the wiring out of your way when the cover is open. I chose to protect them with a corrugated wire loom and then secure that to the underside of the cover with ring-type zip-ties.

The tachometer hook-up can be done in two ways. They suggest wrapping the small red lead around a spark plug wire. When I tried this I found the signal strength was weak and readings inconsistent. The second method is to connect the red lead to the positive side of the coil then the small black wire to ground. This was simple using spade connectors and has proven dependable.

The next item was the temperature sensor. For the Onan engine, with no coolant to measure, the sensor is

a ring that goes onto the threaded end of a spark plug. The 75-2020 Vapor kit includes the correct ring to fit the 14mm size plug. The plug compresses it firmly against the cylinder head. No drilling or tapping is needed. Make certain to route the wire away from the head and exhaust pipe. The standard wire length is 36" which is not long enough. They offer a 72" extension (part number V-300-72) with mating plugs on both ends. The longer wire made it easy to install the temp sensor wire along with the tach wire from the engine up to the Vapor. If you are installing it on a water cooled engine, there are several other sensors to choose from that can be adapted as appropriate.

Next comes the speedometer hook up. The sensor detects the field from a magnet attached to the axle. This creates a pulse for each revolution of the wheel. The sensor comes with a mounting bracket and two magnets. One is a bolt and one is a small disk. So now you're wondering, how am I going to get a magnet on the axle? McMaster Carr offers a two-piece, clamp on shaft collar #6436K147. It is made of aluminum and fits on the 1 7/16" axle perfectly. You can drill a hole and epoxy the magnet into it. You could drill and tap from the edge of the collar and thread the bolt in. I chose to reduce the diameter of the magnetic bolt that came with the kit and rethread it to 10-24; next I drilled



and tapped the side of the collar to match. Once the collar with a magnet is on the axle, simply mount the sensor bracket so the end of the sensor is close to the magnet. The sensor is threaded as is the bracket, so adjustment is easy. A single bolt is fine to secure the bracket. Be certain to secure the cable for the speed sensor as you route it up through the doghouse to the Vapor. The hard part is done!

You will need to set up some factors when you power up the Vapor. The tach setting must be set for 2 pulses

per revolution since both plugs fire every time. The other factor to enter is the wheel circumference in millimeters. The instruction manual gives the math details, but for our 16" wheels it is 1277mm. Once you

enter this into the correct screen, both your speed and distance will automatically display in miles per hour.

Here is the final result. The temp is displayed in the upper left hand corner, the engine RPM is in the lower right corner and the speed is shown in the center. There are several other readouts that can be brought up by pressing the black buttons across the bottom such as the miles and duration for the current trip as well as a non-resettable odometer. Indicator lights at the top can be set for maximum RPM as well as warning for temperature. I have found that when running in the hills it is easy to stay in high gear too long and the engine temperature quickly climbs. I am now able to see at a glance important motorcar operating information via a digital design instrument. With this permanent, weatherproof set-up, I know I am in compliance with NARCOA rules so I can safely enjoy the scenery.