

What the heck is an injector?

- from *THE WPRR COMPANY THE DIESEL ENGINE OPERATING DEPARTMENT TRAINING MANUAL*

The fuel system, often referred to as the heart of the diesel engine, squirts the proper amount of fuel into the cylinder at the proper time. The most important part of the system is the injector, which measures out the right amount of fuel, injects it into the cylinders under high pressure, and reduces it to a fine spray.

In the four-stroke-cycle engine, air is drawn into the cylinder through the intake valve as the piston descends on the intake stroke. The intake valve then closes and the piston goes up on the compression stroke, compressing the air within the cylinder. Fuel is injected through the injector while the air is compressed, and combustion occurs. The combustion, with resultant pressure, drives the piston back down on the power stroke. The piston rises again on the exhaust stroke and expels the air through the exhaust valve, a process called scavenging,

Piston action in the two-stroke-cycle engine is basically the same. A difference in scavenging accounts for two strokes rather than four. Air entering the intake port pushes the oxygen-depleted air, left from the previous combustion, out through the exhaust valves. The compression stroke then occurs. Air ordinarily enters the cylinder at atmospheric pressure. The amount of fuel entering the cylinder is therefore limited because it has to be related to the amount of oxygen available to mix with it. If too much fuel enters the cylinder and is left unburned, it settles on the cylinder wall and piston and dilutes the lube oil film. This prevents a tight fit and causes leakage of air and loss of power. Therefore, the amount of entering fuel must be carefully regulated. Also, it must enter the cylinder so that the first fuel entering begins burning before the rest of the fuel enters, providing gradual, even combustion. If all the fuel enters the cylinder before ignition begins, it all burns at once, explodes and a loud knock from the explosion, called combustion knock, occurs.

A pressure-charged engine provides a method of putting more air, more fuel and resulting greater power into the cylinder. By this method, sometimes called super- or turbo-charging, power can be increased 50 percent in a four-stroke engine and 35 percent in a two-stroke engine. Extra air is made to enter the intake valve or intake port by compression. A number of air-compressing devices have been used to furnish supercharging air. The kind most commonly used on diesel-electric locomotives is the turbine compressor, operated by a gas turbine in the exhaust system. It is the most logical place for this turbine because a great deal of energy is wasted through exhaust of burned gases. Heat balance figures show the loss to be as much as 40 percent of the energy liberated from the fuel by combustion. This energy is captured to run the turbine which is connected to the compressor that delivers air under pressure to the engine.

Fuel Injectors Status at WPRM

Our Mechanical Department has been dealing with fuel injector issues recently. This is a summary from acting CMO David Elems' August report to the board of directors.

WP 917D - Leaking Injectors: Eleven of sixteen injectors leak at the main body seal just as we had with the injectors in WP 2001. Two of the eleven are very bad, but two or three out the other nine leak excessively. The fuel contamination by the end of this season will likely put the locomotive out of service for next season unless a full oil change is done due to the fire/explosion hazard. Changing of injectors would need to be done to prevent further contamination.

Like what we did with WP 2001 last November, I recommend that all sixteen injectors be replaced, oil filters replaced and the crankcase be drained and new oil added. Due to the nature of the contamination being a fuel leak, the engine does not need to be flushed, but inspections of the main bearings and crankpin and bearing will need to be done. Assuming that we are able to purchase injectors at \$128

per unit and the price for a 55 gallon drum of oil stays in the \$900 range, we are looking at around \$6000 dollars for all injectors and 2/3 of a crankcase worth of new oil (four drums.)

WP 707 - Leaking injectors: Nine of sixteen injectors leak at the main body seal. At the moment the oil hasn't been contaminated beyond use provided enough fresh oil is added when the crankcase level is topped off. I recommend not using the locomotive until it has a full injector replacement. Otherwise, we will run into the same safety issues with fuel dilution like the one we had with WP 2001 (until last year) and WP 917. A full set of sixteen injectors will run about \$2400 assuming a unit price of \$128 each plus the shipping.

Note from the editors...

- Paul Finnegan

At the October 2018 FRRS Board Meeting, it was decided to change the publication schedule for the Train Sheet. Starting in 2019 it will be a quarterly publication. The new submission deadlines will be the last day of March, June, September and December.

2018 RAL Report

- Ethan Doty, RAL Scheduler

	2017	2018
April	9	7
May	12	15
June	37	30
July	36	36
August	26	26
September	33	14
October	12	10
November	0	2
Total	165	140

Previous years:

- 2016: 131
- 2015: 153 (1857 pulled out end of season)
- 2014: 157 (1857 entered service)
- 2013: 119 (608 ended service, it was listed but not run)
- 2012: 158
- 2011: 174



Help wanted - WP Headlight

- Kerry Cochran

The Western Pacific Headlight Magazine is looking for new writers and people who love the Western Pacific to help us boost the variety of stories publish through our Headlight Magazine.

We're looking for:

Writers and reporters with experience, story-telling ability, curiosity, and a willingness to be part of the Headlight staff.

What's Needed:

- A passion for Western Pacific railroading in all its forms.
- Experience meeting deadlines and staying calm under pressure.
- Eagerness to take assignments from editors and to "own" topics of special interest.
- Ability and willingness to learn and use the latest technology available to for digital publishing.
- Demonstrated skill in writing and photography gathering and digital production.

Compensation:

This is an all Volunteers run process and magazine (No pay, No salary)

How to apply:

Send an email to the editors at:
www.wplives.org

In your email message, tell us in a few paragraphs why you think you would do well working with us.

Please make sure to tell us your full name, home location, and how to contact you.

Headlight editors will contact the applicants they believe will best fit the magazine's needs.

