



The PLS GAZETTE

A Newsletter of the Pennsylvania Live Steamers, Inc.

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Yellow Signals Ahead

Please note I have changed the title of this editorial to *Yellow Signals Ahead* instead of my traditional *Green Signals Ahead*. I believe this title better describes the current state of the PLS railroad at the present time. It is April 1, 2021, the pandemic is still very much with us and we are currently seeing significant increases in the virus in many U.S. States, one being Pennsylvania. More important to us is Montgomery County, the home of PLS, which has seen a large increase in the virus over the past several weeks. The positivity rate is up from a recent 4.8% to a current rate 8.3%. COVID-19 was on the decrease when we published the 2021 PLS calendar with a near normal schedule. It is still our intent to cautiously open the railroad to all Members with the first run day on April 25, 2021. Some of the precautions we will take involves all that enter PLS property. All will be required to wear a face mask and maintain social distancing. We will be taking the temperature of all entering the property using an electronic non-touch digital thermometer. All will be asked a few questions such as; do you feel sick, have you been exposed to anyone with the virus, do you have a fever, do you have a cough? Once on the property, family members that live together can stay close as a group. It is our plan to have the PLS club train available for train rides. We plan on running the club train with extra cars and will space out riders to maintain a safe distance while on the train. Some cars will be loaded with family members seated closer together, others with only two riders. Our train will be carrying fewer pas-

sengers and this may cause a queue of riders at the stations. Please maintain a safe distance should you have to stand in line. We will have a number of hand sanitizer stations setup near the stations, the covered area at Building 1 and the steaming bays. We will have two Porta-Potties with hand sanitizers. The state of Pennsylvania currently has a 250 person limit for outdoor gatherings, although unlikely, this may require us to turn some members away should we reach maximum capacity. Please help us stay safe and follow the above guidelines when on PLS property.

As mentioned in the last PLS Gazette all scheduled events in 2020 were canceled. We did manage to schedule four (4) membership meeting in July, August, September and October. All meetings were outdoors with the Annual Business Meeting that normally takes place in March delayed until July. Throughout the summer and into the winter months a few members safely performed maintenance and worked on railroad improvements. The Board of Directors meetings were also held outdoors until November when the weather became too cold to continue with outdoor meetings. The Board did experiment with four (4) internet-based meetings. Those meetings meet the requirements outlined in *Roberts Rules of Order* and proved to be safe and successful. We also had our 2021 March Annual Business Meeting as scheduled and successfully elected the following: President – Frank Webb, Secretary – Mark Cahill, Treasurer – Bob Morris and three new members to the Board; Steve Leatherman, Pete Brown and Paul Rice. Congratulations to all. I would also like to thank the three (3) members who are leav-

ing the Board: Jim Miller, Jim Salmons and George Cooper. Thank you to all!

I cannot stress enough that we will need more help and a strong presence from our members at the Gate this running season. Please do your part to help with Gate Duty. The more people that help, the shorter the time you and other members will have to spend on Gate Duty.

The Spring Meet will be coming up May 28, 29 and 30, 2021. The good news is we currently expect to have a Spring Meet. The bad news is we do not expect to have our kitchen open which means no hot food service. We will not have our Saturday night potluck event. The snack table will still be available as will our soft drink and water vending machine. We will have a handout with the names and addresses of nearby eating establishments, the closest being Vincent's, just a short walk up the trail. There is no membership meeting in July as this month is set aside for our annual Picnic. At this time, it is too early to say if we will have food service or not. It is also too early to forecast what we may or may not do with food service at the Fall Meet, but hopefully as more people become vaccinated, we will be faced with fewer restrictions. Just to be very clear, the PLS calendar is a **TENTATIVE** schedule and subject to change. An increase in the current virus positivity rate of 8.3% could cause the state to re-introduce restrictions, the most severe would be another stay at home order.

Here's hoping the signals will soon be Green.

Frank Webb,
President PLS

PLS Election Results

Elections were held at the regular membership meeting on Saturday, March 20, 2021. Frank Webb, Mark Cahill and Bob Morris, running unopposed, were confirmed as President, Secretary, and Treasurer respectively.

There were five names on the ballot for three open positions on the board of directors. Pete Brown, Steve Leatherman and Paul Rice were elected. Rounding out the Board with one year remaining on their two year terms are Ross Magee, Paul Miller and Pat Murphy.

Congratulations and best wishes to those elected.

Associate Members

Membership cards for 2021 have been mailed to all Associates who returned their Renewal paperwork by April 10th. Dues for 2021 were waived, but completed paperwork is still required. If you need another renewal form, please email: secretary@palivesteamers.org or write to PLS at: P.O. Box 26202, Collegeville, PA 19426

Club Membership News

PLS welcomes new Associate member Richard Schickling and new Probationary member Michael Tillger.

Also, we are sad to learn of the death of longtime Associate Member, Lee A. Kendter, Sr. Our sympathy goes out to his wife Sandra and the Kendter family.

PLS Upcoming Events 2021

Saturday, April 17	Board of Directors Meeting - 9:30 AM Membership Meeting - 12:30 PM Spring Clean Up in AM
Sunday, April 25	Run Day - Members & Guests Boiler Testing (Rain Date May 2)
Saturday, May 15	Board of Directors Meeting - 9:30 AM Membership Meeting - 12:30 AM Afternoon/Evening Run (See Note)*
Sunday, May 23	Run Day - Members & Guests
Friday, May 28	Spring Meet - Members & Guests
Saturday, May 29	Spring Meet - Members & Guests
Sunday, May 30	Spring Meet - Members & Guests
Saturday, June 19	Board of Directors Meeting - 9:30 AM Membership Meeting - 12:30 PM Afternoon/Evening Run (See Note)*

***Note:** Rides may not be available at afternoon/evening run days following membership meetings due to possible limited participation by equipment owners. All members and their guests are welcome to attend with the understanding that rides are not guaranteed at these events.

Donation Acknowledgements

PLS wishes to thank the following members for donations received during February and March: Don Maleta, Dennis Hornberger, William Shields, Fred Daddi, Roy Nelson, Sharon Connelly, Rich Falzone, Thomas Toth, Pat Heller, David Taylor, Rose Ann Wagner, Ronald Drenth, Ronald Vertrees, Frank Behrle, and Michael Yingling Sr.

Storage Track Payments are Due

To regular members who have storage tracks at PLS: your annual fees were due as of April 1. If you have not already paid, please see Bob Morris with your payment or send to PLS c/o the Treasurer.

Membership Gauge

As of March 31, 2021 PLS has:

105 Regular Members

152 Associate Members

5 Honorary Members

Pennsylvania Live Steamers, Inc.

President	Frank Webb	77 Roundwood Circle, Collegeville, PA 19426	president@palivesteamers.org
Secretary	Mark Cahill	22 Tice Lane, Perkasio, PA 18944	mark.cahill@verizon.net
Treasurer	Robert Morris	3034 Black Swift Road, Norristown, PA 19403	rmorris1171@verizon.net
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Board of Directors: Peter Brown, peteprivate@yahoo.com; Steve Leatherman, steveleatherman@gmail.com; Paul Rice, ricepaul@verizon.net
Ross Magee, mrrmagee@gmail.com; Paul Miller, pava77@comcast.net; Pat Murphy, patrickmurphy129@gmail.com

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Management of Small Live Steam Locomotives

Part 3

By Bob Thomas

The first two parts of this series described the limited range of locomotive sizes being considered (2.5" to small 4.75" ga.) and the details of operating them to extract best performance. We now move to secondary, perhaps mundane factors, that also affect locomotive performance.

LOCOMOTIVE PERFORMANCE

This section deals with the intrinsic performance of a locomotive, i.e., how well the engine itself was designed and constructed. If there was a fundamental design flaw, such as a grossly incorrect flue length/diameter ratio, or incorrect valve gear dimensions, the locomotive will not be a good steamer no matter what, short of a major rebuild. Additionally, sloppy machine work during construction can undo the good attributes of a faultless design. These are properties of the locomotive and are largely independent of the operating skills of the Engineer. However, marginal performance deficiencies encountered in an engine with basically sound design and construction can often be corrected by appropriate adjustments or, at worst, comparatively minor mechanical revisions.

Assuming a locomotive is well designed and has been built with reasonable precision, the most important element in its performance is the accuracy of its valve events. A wheezing, huffing, chuffing exhaust is a good indication of worn or improperly set valves (and/or "blow-by" around worn piston/cylinder fits). What we should strive for is a sharp, crisp exhaust bark that results from precise valve setting. This topic has been covered in minute detail by the live steam model press for the past 120 years and is much too complex and engine-specific to be treated here. But correct valve timing is so fundamental to good engine performance that no effort should be spared to achieve it with any

locomotive expected to provide satisfying operation and respect on the track.

Another important influence on engine performance is "drafting," which refers to the path of air and combustion gases through firebox, flues and smokestack. While partly a matter of initial design, the physical vagaries of gas flow in small locomotives make drafting as much an art as a science, so there is plenty of scope for "tweaking" a nominally good design to extract peak performance.

The item of greatest potential for adjustment of drafting characteristics is the diameter of the blast nozzle. If there are no serious deficiencies in your engine, but the fire seems to take too long to recover from new coal or does not make sufficient steam to sustain reasonable performance in continuous operation, try *decreasing* the diameter of the hole in the exhaust nozzle. That will increase the velocity of exhaust gasses through the stack, resulting in a higher smokebox vacuum which, in turn, will increase the draft to make the fire burn more vigorously. Conversely, if the fire is usually too hot and the safety valve keeps lifting when running fast, *enlarge* the exhaust nozzle hole to decrease air flow through the fire by virtue of lower smokebox vacuum. In practice, variations in nozzle hole diameter are best implemented by making several nozzles, each with a different diameter hole, and designed with a screw base to facilitate interchange. Nozzle height is related to the hole diameter (larger hole, longer nozzle; smaller hole, shorter nozzle) to fill the stack with the cone of exhaust blast. Other factors influencing front-end drafting are stack taper, use of exhaust "chokes," and petticoat design, but these complex issues are more a matter of design than experimentation, although they can be modified with moderate effort. The great British locomotive designer, G.J. Churchward, summarized the arcane nature of drafting when he wrote, "Any fool can get steam into a cylinder, but it takes someone with rather more brain to get it out again."

Another potential "tweak" to drafting is optimization of grate bar width-to-space ratio. A sluggish fire will benefit from

more air space relative to bar width whereas, a fire that runs too hot will yield to less air through a new grate with increased bar width. For example, 1-inch scale 2-4-0 "Nellie" had a sluggish fire on the original cast iron grate with a 64/36 bar/air ratio, but it now generates a more responsive fire with a new grate made from $\frac{3}{16}$ " x $\frac{1}{2}$ " stainless steel bars having a 47/53 ratio. In contrast, my $\frac{1}{2}$ "-scale 4-6-0 produces an abundance of steam with a grate of only 7 sq. in. made from stainless steel strips with a 38/62 bar/air ratio. That locomotive might well benefit from a new grate with a 50/50 ratio to reduce the rate of combustion, however, with such a small fire, the crucial factors of operational flexibility and rapid recovery would be put at risk by such a change. A situation often encountered with Reading Camelbacks and other wide-firebox locomotives, is a fire that burns brightly in the center while the sides are significantly cooler. That situation usually can be alleviated by grading the bar/space ratio across the width of the grate for greater air flow at the edges of the grate relative to the center.

Every locomotive exhibits unique drafting requirements that can only be satisfied by equally unique treatment. Hours of on-track operation and careful observation might be required to determine what best suits your particular engine. Churchward was right.

COAL

Aside from the locomotive itself, the most influential factor in track performance is the coal used. Coal is available in several types, specifically, anthracite (hard coal), bituminous (soft coal) and semi-bituminous. The type of coal you should use depends somewhat on the kind of grate your locomotive has and the operational characteristics you want to achieve. Good anthracite burns slowly and evenly at moderate temperature with little smoke and minimal attention from the fireman. Engines with wide, large-area grates benefit from anthracite's characteristics, but it also performs quite well in deep, narrow fireboxes. High grade anthracite generates flakes of ash that break-off and are blown out the stack by the locomotive's exhaust.

(Continued on Page 4)

(Continued from Page 3)

Poorer grades tend to burn to a solid lump of ash the size of the original piece of coal. That dead ash glows bright red by virtue of heat absorbed from the surrounding fire, giving the illusion it is burning. However, it merely occupies firebox volume without contributing to heat output and, if allowed to accumulate, will eventually bring the locomotive to a standstill. Poorer grades of anthracite sometimes are subject to forming “clinkers”, masses of a glass-like residue that smothers large areas of the fire. Ash and clinker accumulations can be disposed of to some extent by frequent vigorous raking-down against the grate bars, but that inevitably fails to clear all the inert matter, whereupon the only answer is to pull the dead fire out of the firebox and start anew. Sometimes that can be done right on the track without completely shutting down, but it often necessitates pulling into the steaming bay, cleaning out the firebox, and starting a brand- new fire.

Bituminous coal has entirely different properties than anthracite; it contains a large proportion of tars and petroleum distillates that give it that extraordinary aroma and thick, black smoke we all yearn for. Because of the volatility of soft coal, there is less tendency for the fire to “sag” from inattention than with anthracite because new fuel easily bursts into combustion immediately. In fact, it has been said of some bituminous coal that, “You can light it with a match!” During the burning process, a soft, gooey blanket of molten fuel might form, restricting air flow through the fire bed. The remedy, of course, is to break-up the blanket with a poker, but do that carefully or the entire mat of molten coal will be pulled off the grate in one piece or, even worse, it will pull the grate up with it! When the distillates have been burned or evaporated from the coal, the remainder is coke, an almost pure carbon substance that burns at very high temperature, so high, it can warp a cast iron grate, so care in firing must be exercised to prevent an excessive rate of combustion. Not all the tar and distillates go up the stack to enhance realism – a large proportion condense on inner surfaces of the flues and smokestack, causing

rapid deterioration of drafting efficiency and making clean-up of clogged tubes a real chore. Bituminous coal also has a greater propensity to form clinkers than anthracite. If you want to see *really* big clinkers, throw a few pieces of soft coal on top of your anthracite fire to show off your engine with prototype smoke effects: that’ll put an end to your running day! In short, different types of coal don’t mix. Big locomotives, i.e., most 1½”-scale and the larger 1”-scale, are reasonably tolerant of soft coal’s drawbacks, and can use it to advantage, but smaller engines are generally not compliant enough to cope with its numerous encumbrances.

Between hard and soft coal obviously lie semi-bituminous varieties, the best of which is renowned Welsh steam coal, that seems to combine the best attributes of anthracite and bituminous with few of their disadvantages. The reputation of Welsh coal has suffered of late, even British model engineers lamenting that, “it isn’t like it used to be,” although some newly introduced sources might reverse that trend. Some U.S. enginemen import their coal from Wales and take great pride from the performance their locomotives extract from it. Domestically, Pocahontas coal is a practical candidate but, as with its plain bituminous relative, it is laden with some exasperating foibles.

The size of coal you should use depends on the size of your locomotive and type of coal. For anthracite, which requires a relatively compacted bed to distribute air evenly and initiate combustion of new coal from the existing fire, pieces about ¾” to 1½” are about right for locomotives in the smaller end of the range we are considering, with ½” to 5/8” for ¾” for the largest engines we are considering here. Bituminous and semi-bituminous coal can be somewhat larger than those recommendations because more air is initially required to burn the petroleum products and individual pieces will tend to blend together anyway as the coal burns to coke.

WATER

The most important element in steam locomotive management is maintenance of proper water level. It is assumed the read-

er thoroughly understands the potentially catastrophic effects of excessively low water level as well as the embarrassment – if not possible damage to the engine – resulting from a too *high* a level. Between those extremes is the range of water levels that must be maintained for efficient locomotive performance, as explained in an earlier section. Also previously described are the attributes of an “ideal” water gauge, i.e., one in which the top of the visible water column in the gauge glass corresponds precisely with the actual level of water in the boiler. For example, if the bottom of the gauge is located at the same height as the crown sheet (the “roof” of the firebox) and the top of the gauge corresponds to the highest point in the boiler, the gauge *tends* to indicate the full range of boiler water capacity. Thus, when water just disappears at the bottom of the gauge glass you will know the water level is dangerously low and the crown sheet temperature is liable to be soaring. Conversely, when water level is at the very top of the gauge, the boiler is completely full, leaving no space for steam, and creating the possibility of cylinder damage by carry-over of incompressible water.

Note the emphasis above on “*tends* to indicate.” An effect often overlooked in water gauges is the capillary attraction of water at the internal surface of the gauge glass, which causes the water column to rise higher than a true reading. This effect is related to the internal diameter of the gauge glass tubing, and in extreme circumstances, e.g. gauge glass bore of 1/8” or less, the error will be quite large. It will even exist to some extent in gauges with less than ½” bore. Another source of error can arise due to the connections between the top of the gauge and the top of the boiler; these passages should be no less than the diameter of the bore of the gauge glass.

Your locomotive might have been constructed with a non-ideal water gauge position so that the top of the gauge is not even with the highest point in the boiler, and/or the bottom of the gauge does not correspond to the crown sheet. A situation that must be avoided is where the bottom of the gauge is *below* the crown sheet, for

that would convey false security to anyone assuming boiler water level is safe when it could actually be well below the crown sheet. To ascertain how your gauge corresponds to crown sheet height, proceed as follows: Measure inside the firebox from the top of the fire hole to the bottom of the crown sheet. Add to that dimension the thickness of the crown sheet plus any flanges included in your measurement. Transfer the corrected measurement to the outside of the back head from the top of the fire hole. Make a centerpunch mark on the back head corresponding to crown sheet height. Now compare your new reference mark to the bottom of the gauge glass. If the bottom of the gauge is above the reference, you will always enjoy a margin of safety at low water level because water will disappear from view before the crown sheet becomes uncovered. However, if the bottom of the gauge is *below* the crown sheet reference, you have a danger-

ous situation, but one that can be easily corrected. Obtain a piece of thin wall brass tube, that will just slip over the gauge glass, cut it to a length equal to the gauge position error, perhaps adding a little extra for safety. Disassemble the gauge, slide the brass tube over the gauge glass, then reassemble the gauge, making sure the new masking tube is pushed all the way down to the bottom of the tube.

The quality of water you put in your locomotive's boiler is important. If feed water contains solids or dissolved minerals, they will gradually accumulate inside the boiler, and possibly in pump valves and the water gauge. This occurs because, as steam is generated, water is consumed but all the impurities it brought with it remain in the boiler and associated equipment as "scale" and will gradually degrade their efficiency. If you have reason to believe water provided at the track is contaminated with solids or dissolved minerals, consider bringing

good quality tap water from home. Use of filtered dehumidifier or air conditioner condensate will avoid accumulations of insoluble scale on internal surfaces. If hauling water is impracticable because of the quantity used by your locomotive or for other reasons, an occasional pinch of a water softener like Calgon™ dropped into the full tender tank will help to counteract moderate concentrations of minerals in the local water supply. Opening the blowdown valve intermittently while running and completely blowing down at the end of each day should drive out contaminants. If scale still accumulates, put one-half ounce of common white vinegar per gallon of water in the last tender tank filling of the day. And if you operate a lot, thoroughly flush the boiler at yearly intervals.

[Next time, some useful accessories and, most important of all: safety!]



New 75th Anniversary Coffee Mugs

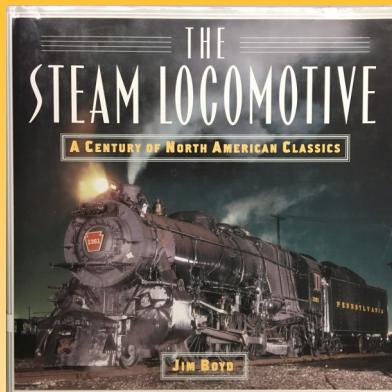


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PLS Library Book of the Month



Book Review

Looks at the exciting history of steam locomotives. It is lavishly illustrated with vintage B&W images of the original locomotives as well as the finest contemporary photographs of the restored machines.

For Information contact:

Joe Gottlewski Librarian

joegottlewski@gmail.com

Special Messages for the Membership

Kitchen Closed

Due to Covid, the PLS kitchen is closed until further notice. Also, there will be no Pot Luck dinner at our upcoming Spring Meet.

Snacks Needed

Snacks, soda, and juice will be sold at our Spring Meet. Donations of individually wrapped store bought or home baked snacks for us to sell, would be appreciated. Thank you.

Sales Table

We hope to have the Sales Table open during all Run Days and Meets. Our inventory is well stocked and includes both long sleeved and short sleeved denim shirts, tee shirts, PLS club pins, etc.

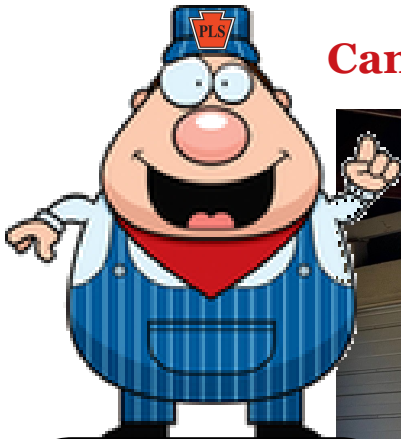
And be sure to check out the **75th Anniversary items** now available. These include 75th Anniversary tee shirts, ball caps, mugs, and magnets.



The PLS GAZETTE

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FIRST CLASS



Can You Identify the Prototype of this Scale Model?

Identify the builder and the model of the prototype of this 4-6-0 locomotive and receive a brand new PLS Lapel Pin.

The first correct answer
emailed to:

LarryMoss@outlook.com

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Photo by Pete Brown