



THE WHISTLE

The Official Publication of the BRITISH COLUMBIA SOCIETY OF MODEL ENGINEERS
Operators of the BURNABY CENTRAL RAILWAY Vol. 38 ♦ Issue 07 ♦ July 2008



Paul Ohannesian showing off the Northern to some interested customers photo Rampai Varajapana (Noi)

Next Meeting: .
Wednesday July 2nd, 7:30 P.M.
Rainbow Creek Station
120 North Willingdon Ave
Burnaby BC

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Monthly meetings are held on the first Wednesday of each month (unless it is a public holiday), usually at 7:30 PM at Rainbow Creek Station.

Executive meetings are usually held on the last Wednesday of the month at 7:30 PM at Rainbow Creek Station. Members are welcome at executive meetings.

The opinions expressed in The Whistle are those of the individual contributors, and do not necessarily represent BCSME policy.

Alf Spence has donated a floor model drill press for use in our shop, this is a much needed addition.

Thank you from all of us who use the shop

Boiler Tests

If you are planning on firing up a boiler at the Burnaby Central Railway site you must have a current valid Boiler Certificate. If you do not have a certificate or are not sure contact Bill Mellors or Steve Harvey. Copper boilers must be tested every two years and steel boilers every year.

Please give our Boiler Inspectors some warning of your needs so they can serve you best.

You can contact them at these numbers:

Bill @ 604 461 3073,
Steve @ 604 590 5155.

We welcome your articles, photos and notices on or before the dates posted. Please include the word **“Whistle”** as part of your subject line if submitting by e-mail to: edwin-bc@shaw.ca. We thank everyone whose continuing contributions over the years make this club newsletter possible.

Edwin Bussey , editor

Myrtle MacGregor

Wife and mother to life and long time members Alistair , Phil , and Ian MacGregor passed away peacefully on June 5 , 2008 at Powell River , B. C. As matriarch of the Haggis Haven Railroad her loving presence will be sorely missed by her large and extended family and friends. She will be missed by all who knew her.

BCSME TRACK MEETS for 2008

Annual Meet July 5, 6,

Bring Your Own BBQ supper after 5 PM Sat. July 5th. Members are asked to bring their own gourmet morsels to BBQ and to contribute one item to a pot-luck supper. Coffee, tea etc supplied. Out of town modelers should see Catherine McDonnell.

BYO BBQ supper Saturday July 26

5 PM same arrangements as for July 5.

Train Festival Meet August 8,9,10

(80th Birthday meet)

We came into existence in 1928 as the Vancouver Model Engineers. The name was changed in the 30's to BC Society of Model Engineers. We are going to recognize our Octogenarian history at the dinner on Sat. Aug 9th after 5 PM, at the track.

Next Meeting:

Wednesday 2nd July 2008, 7:30 PM

We will be voting on the proposed amendment to our constitution

Work Sessions around the track every Saturday and also Tuesday evenings.

ERRATA

In the June issue of 'The Whistle there was an article on Dan Parsons' 2-4-2 "Comet". Due to Bill Gates' fever or something similar, the last paragraph lost some of its content. It should have read, *Let us hope that Dan brings 'Comet' back often as a memorial to Cliff and to Ron, who died last year.*

Thank you,

Joe

Notice of Motion (July 2008 Meeting) to Amend BCSME Constitution

The Canada Revenue Agency (CRA) has asked the BCSME to make changes to its constitution in order to receive Charitable status.

Changes involve replacing the purposes section of the society with the new section below. **MOVED** – to delete the present purposes section of the constitution of the BCSME and replace it with:

2. The purposes of the Society are:
 - a. To advance education by providing programs such as:
 - i. History programs to students describing the history and relationship between the development of Canada and the development of railways using the items from the museum collection;
 - ii. Safety programs to students such as "All Aboard for Safety"; and
 - iii. Workshops to seniors and the disabled to provide an opportunity to carry out mechanical and other maintenance needed to keep the railway amenity operational.
 - b. To maintain and operate a museum for the purpose of:
 - i. housing model rail equipment and interpretative displays;
 - ii. maintaining and displaying prototypes or scale models of early or original railway engineering for the benefit of the public; and
 - iii. providing, operating and maintaining small-scale steam or other powered railways, capable of carrying the public; and
 - c. To undertake all such activities as are incidental and ancillary to the attainment of the above purposes.

73 IS BACK IN ACTIVE SERVICE

I had just returned from a grindingly boring project logging drill core in Highland valley and I was spending Sunday working on my final report. The phone rang; it was Edwin. I was just about to tell him that I was too busy to run trains at the Burnaby Central Railway when he breached all of my defences. He said, "73 is serviceable. All of the steam leaks are fixed. You should come out and run your favourite locomotive."

I replied, "Maybe I will make it if I can get enough work done." No more work got done. I hung up the phone, and drove to Burnaby Central Land and the chance to run 73.

Some of our track managers don't like our 2-6-0, No. 73 very much because it can only pull two ride-astride passenger cars efficiently. Our northern, 3601 can pull six of them in dry weather. However, when I am running 73, I don't need a conductor, and if I can move through the station area efficiently, I can carry a lot of passengers during a day.

My record number of runs for a day was achieved on 73 in 2004. I did 24 runs with fully loaded 2-car trains. That evening, I went home and immediately fell in bed. No dinner; just bed. The next morning, my eyes were glued shut with steam oil. By the middle of the week I could see properly.

73 used to blow steam-oil bubbles at you when you ran it around the track. Edwin has ameliorated that problem. However, if you are going to run 73 with fully loaded trains, you still must be efficient with your steam generation and consumption. 3601 is an amazing locomotive in that it can generate immense clouds of steam. You can be totally inefficient and still get 3601 over the road with 5 loaded ride-astride passenger cars. You can't get away with that with 73.

In my opinion, (because I am a water chicken) 73 should be run with $\frac{3}{4}$ of a glass of water and at least 100 psi of steam pressure. By doing that, I have enough pressure to get up the hills and lots of water ready to burst into steam as the pressure drops going up the grades.

The only way that I can accomplish that, is to be parsimonious with steam consumption. The boiler on 73 is small, so it can't take being drowned in cold water. I keep an injector on for no more than 1 or 2 minutes at a time, but every time I am running on a flat or down hill, I am injecting water. If I am going across the flat south of the station and I have only $\frac{1}{4}$ glass of water and 80 psi in the boiler, I will try to get the pressure up to 100 psi before injecting

water. If 73 is leaking, that may not be possible and in that situation it is easy to spiral down into a "death roll" (a sailing term about spinnakers) where you have insufficient water and insufficient steam. If things just get out of hand, then you may have to stop and build steam and water. In its current good condition, 73 should not do that to you.

However, this brings up an important point. 73 can only produce steam at a certain rate, which is far slower than lightning. If you are flying around the track at 6 mph, you will be using steam faster than if you are poking along at 3.5 mph. If you are inefficient at using steam, probably you will be able to get 73 through a run with a heavy train at 3 mph. If you are efficient, then you will be able to take a heavy train around a circuit at 5 mph. With our hills, 5 mph with 2 full ride-astride passenger cars is about the limit for little 73. And to accomplish that, you have to use some conservation techniques.

The blower on 73 seems is a little oversize for the locomotive. If you are climbing a hill with more than 50% throttle, you don't need the blower. As one hand opens the throttle, the other should be closing the blower. Just remember, at the top of the hill as you turn down the throttle, turn up the blower accordingly. Also, 73 is propane-fired. That gives you instant control over the fire. As you are climbing a hill and you are turning the throttle up and the blower off, turn the fire up as well. All of that must be re-adjusted at the top of a hill.

Both George Massey and I ran 73 with pulling 2 heavy ride-astride passenger cars today. Often, we had to inject water to keep the boiler pressure under control upon returning to the station. 73 is back in active service! Thank you, Edwin.

John Ostler

73 Warning

The throttle on 73 is like a kitchen water faucet. You rotate it counter clockwise to open it and rotate it clockwise to close it.

Please do not open it more than 1 complete turn. Opening it wider makes almost no difference to steam flow. If you open it too far, like a kitchen tap, you can jam it wide open (not a good idea for a steam locomotive throttle).

Edwin Bussey

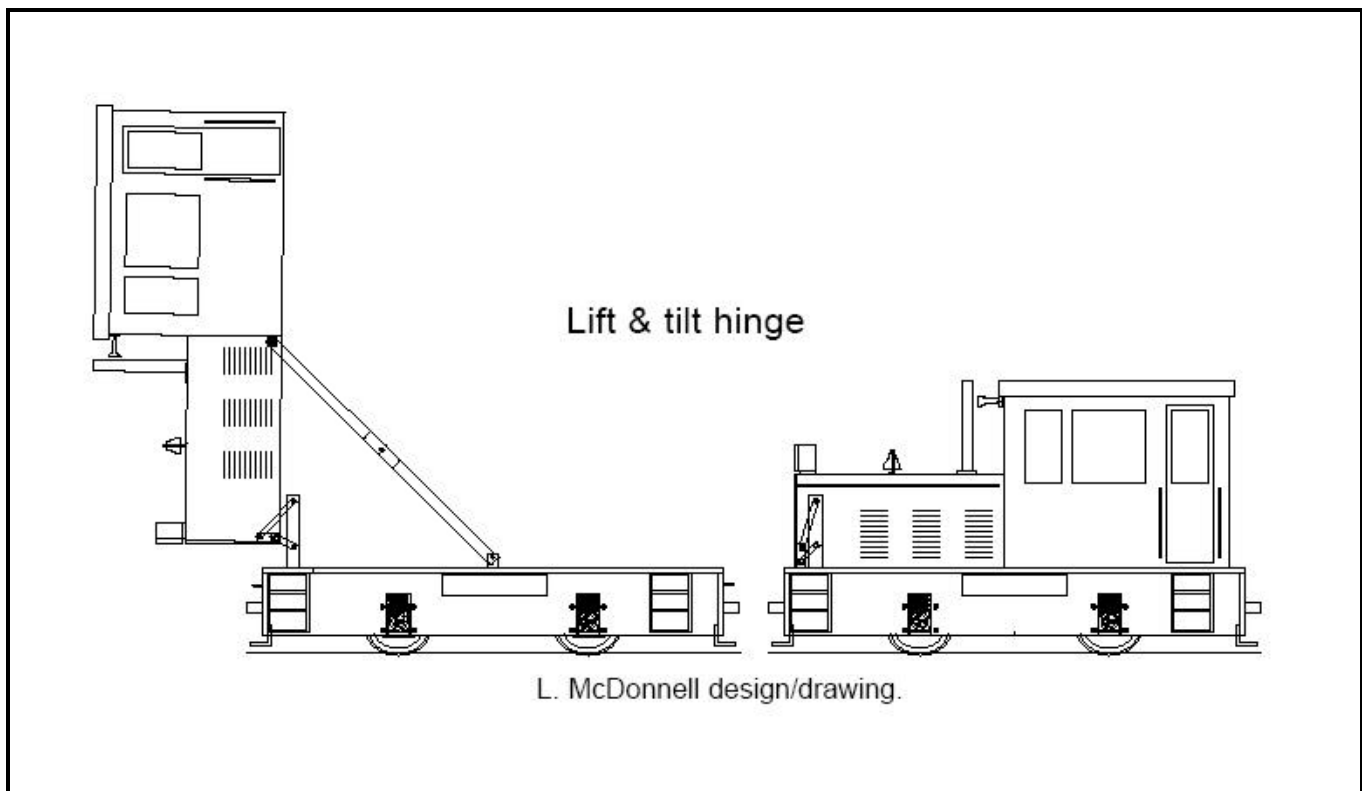
Lift and Tilt Hinge for small locos.

I have built a small 0-4-0 switcher for Harold Tyldesley, with two 24v EMD electric motors and two 12v batteries. The motor gearboxes are under the main floor. The steel body, laser cut from 1/8" steel sheet, sits on top of the floor with the batteries, controller and digital sound system. I thought for quite a while how I was going to fasten and remove the body to top up batteries and do other maintenance. Then I remembered how Bruce Wilson had come up with a hinge on the F7 electrics I had built. So I sat down at the computer with my CAD program, and using Bruce's principles, drew up a smaller altered version that would fit this loco I was building. It is simple to make as it consists of steel bars and

stainless steel 1/4" cap screws with nylok nuts. The sizes shown are exact and need to be to have accurate operation. Make sure both sets are exactly the same. The vertical main bar is welded to the floor (or frame) and then the smaller bar is welded vertically to the body. The body should lift as it tilts and moves forward so as to clear any obstructions. A standard hinge would not do that. I find that the body moves past vertical and then the bottom arm contacts the body and the body will stay safely in that position. You may want to put a strut in to hold it at what angle you want. Where the back of the cab comes down, is a locating piece so the body sits correctly in place. Now getting at the batteries is easy.

Happy railroading.

Lindsay McDonnell



Summary May 28 executive meeting

Directors reports were given. A first aid/medical list has been put up in the concession, office, and shop kitchen.

The steam tractor has been licensed for the Hat's Off Day parade.

Our member John May has passed away.

We have conditional approval of our charitable status. The condition is we must make some changes in our Constitution. A notice will go in the June Whistle for a vote at the JULY meeting.

Foam for a faux rock mountain over the north tunnel portal was donated.

The Raised track traverser is almost complete. Next comes the steaming bays.

Ken Klakowich has resigned from the expansion project.

New member Fermino "Scotty" Scedellaro was voted in.

A wood stove was donated for heating the shop, and looks as though it will be suitable to replace the present stove. We must check if the heat pumps considered can be set at 5 degrees Celsius.

Moved – That anyone who begins shouting or otherwise becomes belligerent, or insults someone without a valid complaint behind it, must apologise or leave the meeting. – defeated 4-3

Most shops turned down the Hudson reconstruction project.

The executive confirmed the decisions of the Expansion committee to amend the constitution as requested by the Canada Revenue Agency, to get quotes for further work from Pottinger Gaherty Environmental (PGL), and that the Ostler/Massey track plan be used as the basis for the engineering work.

The club will purchase a new low-end lawnmower and a new fridge for the upstairs suite.

Cutoff

Cutoff. For model engineers, it's not what you do to your nose to spite your face, or even what happens to your finger if you stick it into moving machinery (Always remember safety!) Instead, in a steam locomotive, cutoff is what portion of the piston stroke steam is being let into the cylinder. Cutoff is one of the most important adjustments an engineer can make while driving to improve efficiency and reduce steam demand.

In some of the early steam locomotives, steam was always let into the cylinder for the entire length of the piston stroke. This would be "100%" cutoff. Then the steam exhaust valve would open and all that steam would go "HUMP" out the blast pipe and chimney. Engineers wondered if they could make use of some of that wasted energy. Valve gears were evolved which could be set to different cutoffs. Imagine a cylinder which is set to 50% cutoff. For the first half of the piston stroke, the steam admission valve into the cylinder is open and the pressure in the cylinder is more-or-less boiler pressure. Then the steam admission valve closes. Thanks to the expansive properties of steam, the pressure does NOT immediately drop to zero. Instead, the pressure drops gradually. When the piston reaches the end of its stroke, the volume in the cylinder has doubled over what it was when the steam valve closed. This means that the pressure in the cylinder is HALF of what it was when the steam valve closed. Now let's add up all the forces. For the first half of the stroke the pressure, and therefore the force, pushing on the piston is "full force". In the second half, the force starts at "full" and ends up at "half", for an average force (second half) of just under $\frac{3}{4}$. The average force for the entire stroke is just under $\frac{7}{8}$ of the full force. Now remember, we only let in steam for half the stroke, therefore using half as much steam as 100% cutoff. But we still have almost $\frac{7}{8}$ (85%) of the force. Half the steam consumption for $\frac{7}{8}$ of the force is a pretty good tradeoff! And you can do better. 25% cutoff (and therefore 25% of the steam consumption) gives you about 60% of the possible force, an even better deal.

(This is the point where I'll put in the fine print. I'm completely ignoring things like the cooling of the steam as it expands, clearance volumes, condensation if not superheated enough, loss of pressure due to losses in the steam pipes and valves, and so forth. The general principles I describe remain correct. Also, for most locomotives the steam admission and steam exhaust valves are (quite literally) two sides of the same valve.)

Now since the less (shorter) the cutoff the greater the effi-

ciency, you might think you should always drive with very short cutoffs all the time. Sadly, there are some practical limits to how short a cutoff you can use. The first limit is the force needed. If the cutoff you are at (and the boiler pressure, if low) does not produce enough force for the grade and train weight you have, you need to increase the cutoff. Second is starting. When the cutoff is below 50% there are some positions of the wheels where no steam is being let into either end of either cylinder, and the locomotive will not start regardless of how light the load is. Once moving, the expansive effects of the steam carry you through the parts where the steam valve is closed, and you can shorten the cutoff. Third, if you drop below a critical speed for that cutoff the wheels start to feel the individual power impulses. This could jerk the wheels lose from the rail and thereby start slipping. In full size the fly-wheel effect of all those tons of wheels carries you through the part of the stroke where the pressure is lower, but in 7.5 inch gauge there might not be enough momentum, so stalling is also possible. Finally, shorter cutoffs magnify any errors in either the timing or the construction of the valve gear. An engine which seems perfectly timed at its normal maximum cutoff (say 80%) could be timed so badly as to be un-runable at 25% cutoff. (Many model engineers never realize their timing is incorrect because they always run at "full gear".) Even with perfect timing and construction, all the common valve gears have inherent problems which usually prevent cutoffs shorter than 15%.

Now what does all the theory mean for running? Even in full size, an engineer rarely knew what % cutoff he had. Instead, you go by the positioning notches in the control handle (Johnson bar). I'm going to use as an example the BCSME Northern with a fully loaded (3 ton) train. I'm going to call the neutral "zero" notch and the maximum notch fourth notch. I know from experience that second notch is less than 50% cutoff, since there are some positions of the wheels where the locomotive will not start, so I start in third notch. As soon as I'm moving, I "notch up" to second notch. As I approach the grade westbound out of the station, I make sure that I am above the critical speed (about 3 mph in second notch). With dry rail and throttle fully open, second notch climbs the grade no problem. When I reach the top of the grade, the question becomes "do I notch up to first notch?" First notch has enough force to pull a fully loaded train on the level. But what about the gear errors? The Northern's valve gear is worn enough that the play in the joints is larger than the permissible error in the valve motion. If all the play takes up in the same direction, with the same lubrication, it works. The notch is un-runable if there is the slightest change in wear or lubrication. So I have to test each day. I put it in first notch, and see if the rear of the locomotive gives a jerk (not a waddle) up and to the side once per revolution of the drivers (the first sign of trouble on the Northern). If

not, first notch is fine and I've halved my steam consumption on the level. On downhill sections there is zero steam consumption, but say I'm now coming to the ruling uphill grade. First notch, even when runable, has slight over-compressions, so I don't use it for a grade even if it appears to have the needed force. I increase cutoff to second notch. With pressure above 80 psi this will climb the grade no problem, although this is the point you find out there is a whole second half to the throttle swing that you use nowhere else. When testing to see which notch you need to climb a hill, test the LOWER cutoff first. The Northern struggles in third notch up our ruling grade because all that steam you're using has to get OUT of the cylinder when the exhaust valve opens, and the extra steam from third notch can't get out fast enough at speed and produces back-pressure. Testing in third notch tells you nothing about whether second notch has enough force. I only go to third notch if I drop below 3 mph, my pressure goes below 80 psi, or I start slipping. Now you'll notice I haven't mentioned using fourth notch yet. Fourth notch is for starting a loaded train on a steep grade (Yes, you must be able to start your train on a steep grade, preferably without "helper service" from the conductor.) Fourth notch is VERY hard on the locomotive. 20 feet in fourth notch probably causes as much wear as the entire day in second notch. If you're moving more than 20 feet or 2 mph in fourth notch, you're doing something wrong. As soon as you're moving, notch back to third notch.

Overall, you want to run at the shortest cutoff that your mechanical condition, the needed force, and operational factors like slipping and critical speed permit. Cutoff is one of the biggest factors that you can adjust to lower your steam consumption. So try adjusting your cutoff. You have nothing to lose but the fuel bill.

Doug Bach



Photo Sean Laurence

MESSAGE FROM THE PRESIDENT

Hi Everyone! We are now coming up to our Annual meet on July 5th and 6th. It would be nice to have a really good turnout of members for the meet. The next meet is our Trainfest on August 8th, 9th, and 10th, where we do some advertising and try to haul as many passengers as possible.

2008 marks the 80th anniversary of the BCSME, and our 15th year of operation on the present track site. Doesn't it seem such a short time ago that we were celebrating our opening day on the "new" site? We'll hold the official anniversary celebration at Trainfest. Anyone who has some ideas of how to celebrate our anniversary let me or another member of the executive know.

The Hat's Off Day parade on June 7th was rather more exciting than we would have liked. As our Case traction engine was going down the hill towards our assigned waiting point for the parade, a front left wheel bearing seized. This caused the traction engine to veer left into a guy wire for a power pole. The guy wire broke off the stack and bent the governor, but there were no injuries other than peoples' moods. After surveying the damage, the crew split into two groups. One group went to salvage our entry into the parade. There was a hurried swap of vehicles, since the only vehicle present that was capable of towing the trailer was about to head to a wedding. (Thanks, Tom!) Decorations were hurriedly transferred from the previously decorated trailer to the van and the trailer hooked up. The parade entry ahead of us had an accident and we had to go around, but ultimately we had as our entry into the parade a decorated van pulling our large trailer with signs and decorations, two 7.5" gauge steam locomotives on stands, and our full size locomotive bell being rung by two waving members.

Meanwhile, the other half of the crew was dealing with the traction engine. After pulling all the burning

wood out of the firebox (!) and extinguishing it, the engine could be blown down. Then came pulling the engine uphill away from the guy wire, and then downhill onto a flatbed tow truck, all with that seized wheel bearing! Two tow trucks donated their services. Once back at the track site, that bearing was again the problem with getting the engine off the tow truck. Finally, with the engine on the ground and the wheel off, a temporary bearing was made so the engine could be gotten back into its shed. All in all, not the parade we were hoping for! Thank you to all the volunteers who worked so hard to solve all these problems.

Now that we are running many different routes at the track site, this is a good time to remind engineers to check ALL directions before entering an interchange. Just because last trip an engine going the other way did not use the diamond in front of you does not mean that the same thing will happen this time. If you have a stop or yield sign you must stop for any other engine until it is definitely past any switch which could put it in front of you. Check all directions, and if in doubt, WAIT! Even if the switch in front of you seems to keep you clear of other trains, would there be a collision if you "picked the point" and went the wrong way?

At the July general meeting we will have the vote on the constitution changes to satisfy Revenue Canada for our charitable status application. We must have a quorum for this, so please come on out. Also, don't forget that we are running on weekends and holidays, and we need crews to run the site. See you all soon. Remember,

Let's have more fun

Doug Bach
