

Atlantic Shore Railway Locomotive 100

Curatorial Report no. 11
24 February – 23 May 2008
by Donald G. Curry
Manager Town House Shop

When report no. 10 was composed, there was a still lot of snow still to fall. Now I can look out across my freshly mowed back lawn and await the next *Downeaster*, now seen with no interference. This translates into longer daylight hours in the Shop accompanied by refreshing breezes off the Atlantic through the open doors.

It's all for accessibility - The first changes an infrequent visitor would note with 100 is the different elevations of the deck, *i.e.* it's way up in the air one day and down a couple of feet the next. It was at its maximum height of about 5 ft. to gain access for installing the air piping and motor wiring, areas that are now complete, and now down to about four ft. for easier access to the tops of the sills.

The frame including all the sills is now complete. Imitating the original, the sill tops were painted with 'unleaded' white lead, *i.e.* white latex house paint (donated by **Chuck Griffith**). This includes some authentic appearing runs down the sides of the sills as on the original. Before that was done all the cracks and nails holes which could allow water to seep down, which would duplicate the original rot in time, were filled either with West System epoxy or gray *Phenolseal* latex caulk.

Air brake situation - With help from **Bernie Bisnette**, the air piping is now installed plus the various brake levers are mounted under the sills. Only the brake piping sticks up. The three reservoirs have been tested and installed. The big General Electric CP 30 air compressor has been overhauled and tested by A. C. Electric at their Auburn facility. We were startled at the \$5,250 this work cost. It would have been more except, because they used it as fill-in work, they did not charge the full labor rate. Because of its size we have asked them to keep it until the deck is completed and the cab installed.

Wiring – To make it easier to lay out the motor and controller wiring, four 4 x 8 ft. sheets of oriented strand board (OSB) were laid, creating a safe working surface over most of the deck. Then the number one K35-G2 controller was hoisted up with the battery fork lift and set in place in the cab area. This gave an indication of how long each wire should be. (Some leads come in closer to the bottom and others reach up about three ft. near to the top of the controller.)

Although the original GE specifications for K35 controllers and four 40 h.p. motors called for no. 6 wire, we could only get no. 4 (which is slightly heavier), so there will be plenty of capacity.¹ The power and ground wires are 1/0, an even heavier gauge.

The wires were laid out on the deck, and cut to their approximate length as they were unrolled from the reel. Since there are two controllers, connected in parallel, there is a full set of 23 wires running from one to the other. (The ground was run separately.) By 1904 the following code was in use:

A = armature positive
AA = armature negative
F = field positive
FF = field negative

Note: To reverse the motors the field wires are reversed by contacts in the controller reverse drum.

¹ Some wires conduct current for one motor and others for two motors. The specs call for no. 6 for one motor and no. 4 for two. (The higher the number, the smaller the wire.)

The armature wires (A1 – A3) and (A2 – A4) feed two motors. All current for the four motors flows through the R (resistor) wires while the AA, F and FF wires carry the current for only one.

(It's very difficult to explain this in words that make any sense. So, at the end of this report we've included a couple of wiring schematics.) All wires are tapped off under one controller to the other as well as running to their respective area: motors 1, 2, 3 and 4 and resistors 1, 2, 3, 4, 5, 6 and 7.

Duplicating the original method, the wires are bundled in old fashioned rubber-lined canvas hose, obtained from the Biddeford Fire Department by **Dave Johnston**, who was working in the Seashore Shop in the 1970s. There are 23 wires running to each controller. The G (ground) and T (trolley) wires are kept separate. The seven R (resistor) wires are in one bundle (hose) and the 14 (A, AA, F, FF) wires are in two bundles of seven each.

The 2-inch hose we had was exactly big enough for the seven wires but required the team of **Bernie, Randy** and myself to pull it through using *Aquagel II* wire pulling lubricant and lots of tugging to get them through. First a regular steel wire snake was pushed through the hose and firmly taped to the seven wires of the bundle which were then slathered with the pulling lubricant. Then, with Randy on the floor, anchoring himself to the locomotive's coupler with Bernie and myself pulling as hard as we could, it was barely possible to get each bundle through.



**BERNIE BISNETTE, DONALD CURRY & RANDY LECLAIR
INSTALLING CONTROLLER WIRING**

Enough extra wire was left on each end for connecting to the controller and the appropriate motor on the other. Each wire was then labeled with an aluminium wire tag as well as a duplicate in green masking tape for easy identification.²

The ground wire was run separately and fastened to the side of a longitudinal sill using a small piece of galvanized steel, wrapped around it and held with a 1 in. galvanized roofing nail, just as the original. The three bundles were anchored with leather strips, also held by roofing nails, as was the original. There is no trolley 'bus' as such. The wire comes from the trolley base to the overhead circuit breakers and down a window post near each controller.

² The original tags were brass but they are no longer available in that metal.

The ground wires terminate where they are bolted to the bottom member of each bolster. No special connectors were used; the three wires being wrapped around a ½ in. diameter bolt. Two of these wires go to the two motors at that truck and the headlight ground is wrapped along with them. We have not run the air compressor or heater grounds yet. (The heater ground wire(s?) was apparently a rather late addition because it was a piece of no. 10 solid wire wrapped around but not soldered to the ground bus wire.)

The portable headlight sockets on each end are fed by a no. 14 wire running from the headlight resistor, fastened to the cab inside the no. 1 hood. The ground for the light runs from a bolt on the headlight bracket, extending through the deck to the ground 'bus'. These lighter wires are held by the original small brass strips, fastened by ordinary upholstery tacks.

All wire used was type RHW rubber insulated, copper covered. Because of the lead time and uncertain delivery of black, we have settled with gray. Otherwise it's the same spec. as the original.

All joints were soldered, as the original. Each wire was splayed out to its individual strands, which were then wrapped around the 'through' wire. (Most joints were taps at 90°) They were then given a double-wrap of ¾ in. 3M electrical tape followed by a double-wrap of friction tape, the latter to give the appearance of the original.



OUR ORIGINAL EXAMPLES

We had wanted to replicate the original wiring arrangement but soon found that it was impossible because it had been patched and repaired so many times. The fire hose had largely rotted away and was replaced with ropes or just bunches of loose wires. We did note that the motor leads had been spliced out about 18 in. at some time, using a home-made copper tube as the connector. We're uncertain why this is so because, to our knowledge, the present motors are the originals.

Controller confusion – Back in the late 50s when 100 was at Seashore's Terminal operation on U. S. Route 1, near the railroad overpass, one of its K-35-G 2 controllers was stolen by an unknown individual. Fortunately, because of the neat way the wires leading into the controller were hacksawed off, they didn't short and the car operated for another 50 years (albeit it had multitudes of other problems, but not electrical)! Seashore has several spare K-35s so last month the energetic members of the Shop Crew, while I was away on vacation, wrestled one out of the boxcar where it was stored and brought into the Shop as a replacement. Apparently it was stored in the dark because recently we noticed it was a K-35G. So, should the secondary suffix '2' make any difference? After some study by **Randy**, of the way the contacts are made on the drum, we have decided the controller will work.

This concern came as the result of the same combination on Wheeling 639 on 16 May. Again **Randy** studied the no. 2 controller, the K35-G and found there was a difference in the wiring that had been made some time

before S.T.M. got the controller, which will require a slight modification of the wiring to the drum fingers. (+2 and R4) Done with great success, 22 May 2008.

Preparing for the cab – When we removed the cab so we could access the deck, it took quite a while to figure out just what held it down, and it was held down quite firmly! First we had to cut the Ten $\frac{3}{4}$ in. rods that extend from the roof to under the sills. But the cab wouldn't raise up despite jacking and prying. It turned out that between the outer and inner wainscoting, all around the bottom of the cab except at the doorways, is a (approx.) 3 x 3 in. ash sill. Through this also go another bunch of $\frac{3}{4}$ in. bolts. We ended up destroying much of that sill when we finally tore the cab off and rolled it to its present location, off the deck and in the south end of the 'box'. Fortunately very little actual damage was done because this ash sill had suffered from water that dropped down through the window pockets and some was badly warped. Still there was just enough to use as a pattern.

At each corner in the end sills is a 1 $\frac{1}{4}$ x 4 x 1 $\frac{1}{2}$ in deep mortise. At the stiles of each window frame extends from the roof to the sill into which it is held by a 1 $\frac{1}{4}$ x 1 $\frac{1}{2}$ x 1 $\frac{1}{4}$ in. Between the each window frame and at some of the corners run the vertical tie-rods. To get the mortises in the sill exact each piece was held against the cab posts and measured off on to the sill.

With the help of **Bernie Bisnette** and **Dick Avy** these ash sills were cut using the band and circular saws and the big 16 in. jointer. Because of the size of the mortises, it was necessary to drill out much of the wood with a 1 $\frac{1}{4}$ in. wood bit with cleaning up the corners with a $\frac{1}{2}$ in. hollow chisel mortiser. Then these sills were laid out on the long sills of the body, clamped in position and then a 13/16 in. drill was run up against them from the bottom through the original holes, thus ensuring their accuracy. The sills were then fastened down with 20 in. square-headed bolts, the heads of which were mortised into the sills to keep them from turning.



DONALD CURRY USING THE GREENLEE HOLLOW CHISEL MORTISER

The flooring and decking – To preserve the 'patina' and wear marks of the original floor, we preserved the boards for the inside of the cab and under the hoods. We had 'new' (recycled) red oak milled by Barnstormers! for the outer parts of the deck. Where some of the original is too badly deteriorated, it will be replaced with new.



THE CAB SILLS

RANDY LECLAIR AND TRIAL FIT OF THE ORIGINAL CAB FLOORBOARDS

Poling Pockets - These four castings provide interesting highlights on 100's frame. Thanks to Dann Chamberlin's reading of an old *Trains* magazine, we have a perspective on their history.

The Perilous Push Pole

Trains Magazine, March, 1993, pps. 67-69 by David Jones.

Railroading has never had an innovation like it. The device was cheap, fitted any equipment, and needed no skilled labor. But it could main or kill, and did so frequently.

The push pole came in many sizes and assorted names. Different railroads made their own and there was no AAR standard. Some of the names are : "bunt pole", "poling bar," "spar" or "stake".

One could be 8 to 16 ft. long, 3 to 5 in. diameter at the ends and 6 – 8 in. in diameter at the middle.

They were a solution to numerous tricky situations arising on railroads such as: car brakes sticking thus fouling another track by half or a quarter car-length, even feet or inches. A car might be spotted in the wrong place on the track parallel to an engine. Or perhaps it is too far down a curve that is too tight for a switcher.

The reasoning behind the pole's invention was, if something is put diagonally in between the engine and car, and then the engine shoves, a quick and easy movement can occur.

It probably wasn't fully developed by any one individual but evolved. For instance, the first poles were hard to hold in place while shoving, so someone thought of putting little pockets to support the ends of the wood: one pocket on the engine and one on the car. Over time they evolved from square, cast iron, and sallow to round, steel and concave. Eventually they were more or less standardized on the shape found on the corners of ASL 100. They had various names: "cup", "pilot shoe," "socket," "push pole bracket," "pilot pushing shoe," "iron," "push-block," and "switching eye."



According to John H. White, Senior Historian of the Smithsonian Institution, the earliest photo of one he found was on a Baldwin builder's print of a Detroit & Milwaukee locomotive of 1868. They soon became design features of no fewer than 14 locomotive builders. Refinements followed including banding the pole with steel and wrapping steel around the ends which extended a pole's life. Some railroads hammered rings into the pole to allow them to be hung on hooks under the tender.

However poles were very dangerous, especially when wet or in the snow. When there was slack, there was danger. The locomotive might jolt forward and ram the pole. Or the pole might be cracked or rotten allowing it to jack-knife or splitting and bursting loose.

ICC statistics indicated that in 1913 poles killed 12 trainmen and injured 250 more. This article cites one killing a yard conductor as late as 1963.

Poles seem to have fallen through the legal cracks. In 1893 the great killers were link-and-pin couplers, hand brakes and irregular grab irons but push poles escaped the heat of the movement for safety. White noted that poles were made illegal around 1960 but was not certain if it was an ICC action or not.

We don't have any indication of the ASL or YUCo took advantage of the sockets on their locomotives. We do note that there are none on their earliest locomotives, 1, 31 or 99.

Recording progress – Every few weeks **Phil Morse**, the project coordinator, interviews me on just what we have done, recording it as a video and making DVDs. So we have a virtually complete record of each step of the work. For those who want to follow it 'live', he has also posted the various clips on YouTube, where it may be accessed at www.youtube.com by typing mainetrolleys in the "search" window. Each of the more than 120 clips are found by the date they were filmed. As an example, ASL-100 5-15-08 O1 is the title of the first clip of five, that were filmed on May 15, 2008. The first in the series of clips was ASL-100 11-3-06 A1.

Recently he was able to obtain three "Flip Video" cameras. So we are now able to record progress when Phil is not present, then swap the video cameras out with Phil so he can then edit and process the footage.

The trucks – One of **Bernie Bissnet's** first jobs was to disassemble truck no. 2. This was done outdoors, sometimes in a snow storm. As was the first truck, this one had a number of well worn and corroded pieces. The larger ones such as the big rectangular main frame, went to A. C. for blasting and painting. Bernie has spent considerable time using his welding skills to build up the worn or missing areas.

Several of the brake levers were broken and/or worn beyond reclamation so **Chuck Griffith** cut and milled new ones from 1 x 3 ½ in. bar stock. These and other brake parts have hardened steel bushings pressed into the holes

on their ends and many had to be replaced. One was lost so Bernie, with our New School ‘apprentice’, **Landon Knittweiss** case hardened a new one they had made.

The parts which fitted into our own sand blast cabinet were cleaned up over many hours by **Phil Morse, Norm Down, Steve Hemeon** and **Brendan Barlow**. Each has now been primed and painted and are nearly ready for re-assembly.

We also sent the eight motor axle bearing caps and gear cases for cleaning. After removing the very thick layers of dried out crater gear grease, we found the malleable iron gear cases had a number of cracks which Bernie has welded and patched.

The eight journal bearings (for the ends of the axles) had long ago been babbitted. **Dean Look** is now scraping the soft babbitt metal to fit the irregularities of the axle surfaces, making each bearing unique. He has wired the completed ones in place so they won’t get mixed up. (We felt the axles were in good enough condition so they didn’t require their journal surfaces to be turned.)

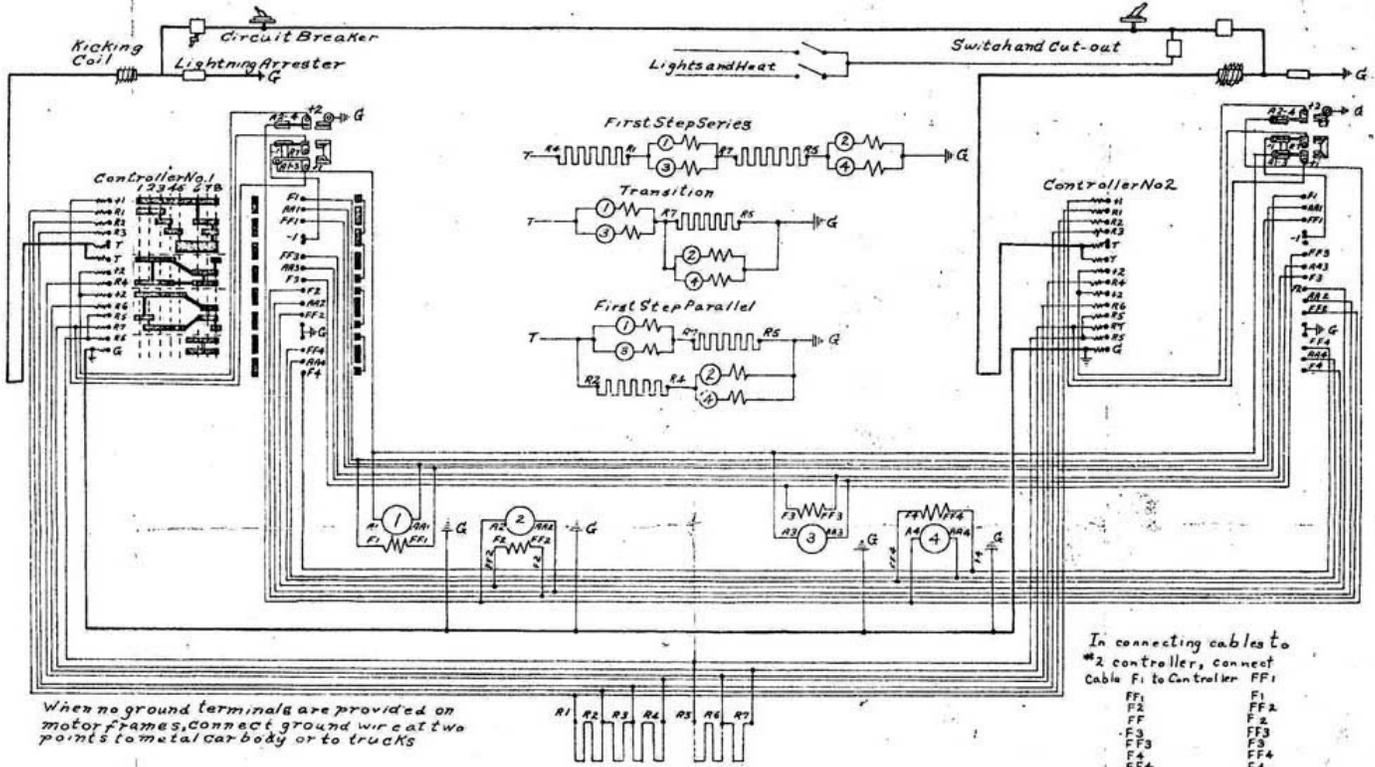


DEAN LOOK SCRAPING BABBITT TO FIT JOURNALS

The bolster springs are supported from underneath on a ‘spring plank’, consisting of a heavy 8-in. channel, with wood blocks and castings on each end to take the swing links which actually support the bolster. **Lloyd Rosevear** has fabricated and fitted said oak blocks.

Cab sash – **Bob Reich** and **John Fatula** have overhauled nine of the cab sash and primed them so they are now ready for glazing. **Lloyd** fabricated an entire new one for the 10th from ash, replacing the original that had warped beyond any possibility of reclamation.

Connections of K-35-G-2 Controllers and Four Motors



When no ground terminals are provided on motor frames, connect ground wire at two points to metal car body or to trucks

In connecting cables to #2 controller, connect Cable F1 to Controller FF1

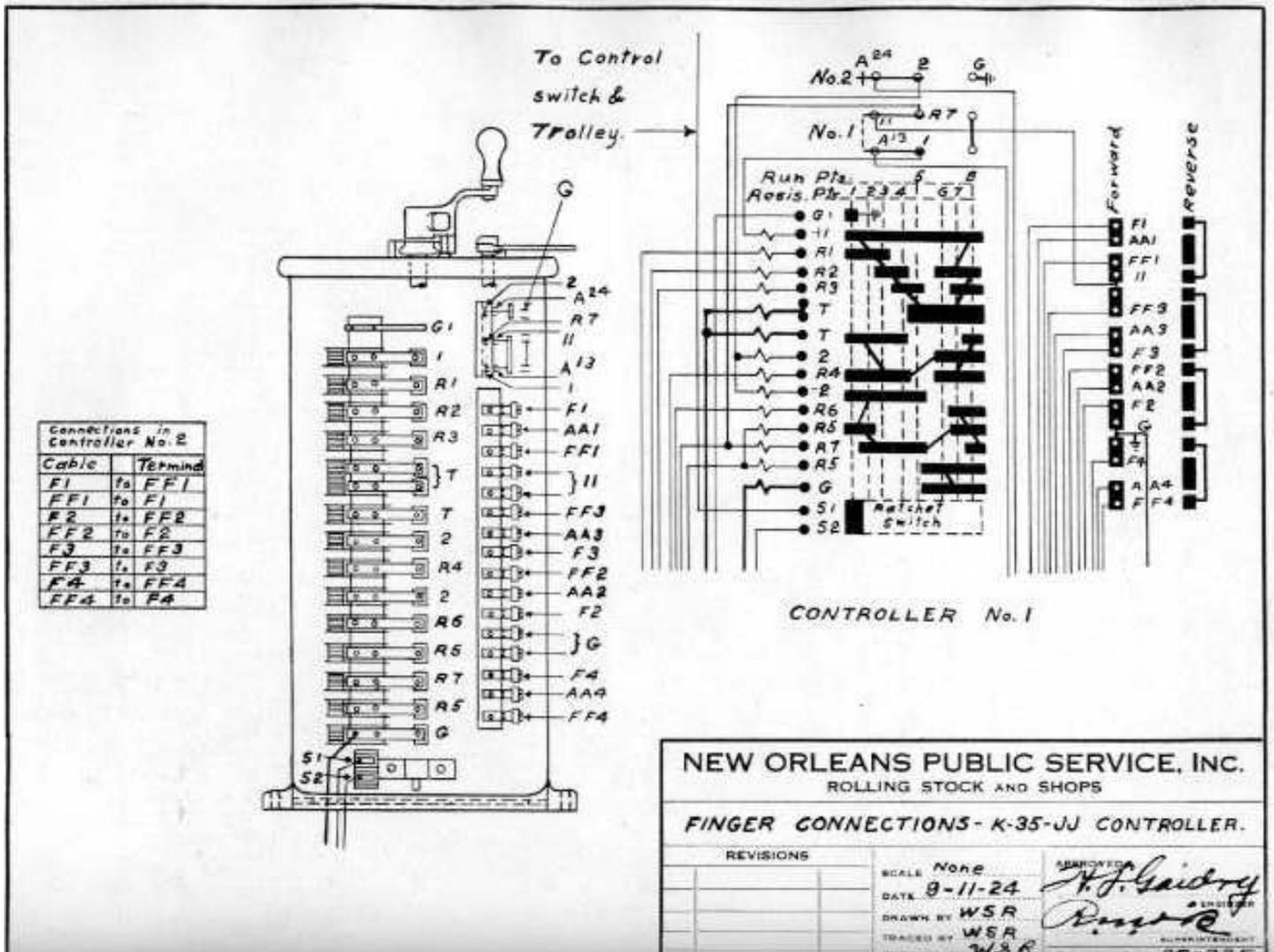
FF1	F1
FF2	FF2
FF3	F2
FF4	FF3
	F3
	FF4
	F4

Traced D.G.C 12/29/65
S.E.R.Y.
23 Aug 1913

Engineering Dept.
General Electric Company

DS39302

100 does not have a line switch so the small auxiliary contacts do not exist. This is just a very clear diagram of a K-35 type controller.



NEW ORLEANS PUBLIC SERVICE, INC.
 ROLLING STOCK AND SHOPS

FINGER CONNECTIONS-K-35-JJ CONTROLLER.

REVISIONS	SCALE	APPROVED
	NONE	<i>V. J. Gaidry</i> SUPERINTENDENT
	DATE 9-11-24	
	DRAWN BY WSR	<i>W.S.R.</i> SUPERINTENDENT
	TRACED BY WSR	