Atlantic Shore Line Locomotive 100
Curatorial Report no. 11
14 January – 25 February 2008
by Donald G. Curry

Up into the air - well not really. But with deck and associated framework now complete and it was necessary to raise it about a foot higher so we can work comfortably (?) under it to install the under-body equipment. This was accomplished with **Randy Leclair's** help using the very useful screw jacks that are even older than the car they're lifting. Their big advantage is they're high with fairly large round bases so they're stable. We easily lifted the deck about a foot and repositioned the car body horses under the side bearings of the steel body bolsters. This makes more working height under the car and gets the horses further out toward the end of the car where we need the area to work. We were trying to estimate the weight of what we were lifting and came out with about 3 tons. Does that sound right?

Completing the frame – After the new side sills (nos. 1 and 8) were installed they and the two needle beams were clamped in place and a pair of 13/16 in. holes drilled up through from the bottom for the long square-head bolts which anchored them[1]. The next and more tricky step was installing the end sills. Last summer **Tom Dow** had created the big 8 x 8 end sill for the no. 1 end. This included the 16 mortises to receive the tenons on the ends of the long sills. He was able to copy the remnants of the sill from the other end since the sill from the no. 1 end had long since returned to the dust from which it was made.

Actually installing the sill over the tenons was not as easy as we had hoped. The fit of the tenons in the mortises was quite tight. We had started late in the afternoon but I had to leave for an appointment so that left a crew consisting of **Randy Leclair, Norman Down** and **Lloyd Rosevear,** using various sizes of 'persuaders' to complete the installation. When I came back the next morning it was done—almost but there was still about another inch to do to close the gap between the end sill and the ends of the long sills. **Lloyd Rosevear** diligently filled and sanded all the defects in the 'picture' side of the side and end sills. He then applied the first coat of gray primer.

Normally this would be done with big clamps but we didn't happen to have one 30+ feet long however we did have the center through-rods which ran from one end of the car out through the other. These held the couplers in place and, at 1 ¼ in. diameter, are quite strong. So, on the no. 1 end, they were threaded through the end sill and big washers and nuts installed. Then on the no. 2 end, a heavy bar with similar holes was placed across the end, Because there was no sill there yet, it was necessary to put a pair of 18 in. long pipes over the rods so when the nuts and washers were put on them, the pipe would push against the ends of the long sills and pull through to the other end of the locomotive and pull the no. 1 cross sill quite nicely into place. (Getting ahead of ourselves, may we say that this worked similarly well on the no. 2 end.)

We made the sill for the no. 2 end the same way. First it was necessary to level the ends of the eight long sills. Over the last 100 years they had become uneven, some from the weight of the coupler and others may never have been even. Using a block which spanned across sills 2 through 7, on two big jacks on the floor, things were brought to an approximate level. Then, using another smaller jack[2], the top of each sill was made even with the side sills, so there now was a straight line across the top of all sills. Using the ubiquitous battery-powered fork lift, we raised the big end sill into position against the ends of the eight longitudinal sills and carefully measured out the ends of each of their double tenons and traced them on the sill. Depending on how the repairs had been made on the long sills, some were all 'new' wood and others were a combination of original and 'new'.

The big sill was then taken to the floor mounted drill press and set on a pair of roller stands—one on each side of the drill press table, making it possible for one person to manipulate the heavy sill from hole to hole. Using various sizes of multi-spur bits[3], the holes were drilled to 2 ½ in depth, creating a mountain (actually trash barrel) full of aromatic SYP (southern yellow pine) chips. The corners were then chiseled out and the sides straightened. It was then taken back to position and lifted back even with the top. In the meantime the ends of the tenons (following Laconia's original practice) were beveled on the ends and side corners to make them insert and slide more easily into the mortises.

---

[1] We encountered some problems doing this with the drill jamming up in the hole. You would think the 100+ year-old wood would be dry but inside many of the beams are still filled with resin. When the drill goes through it the chips expand and bring the drill to a stop. Finally **Randy** figured out that a shot of PB Blaster (penetrating oil) on the drill would let them slide out. We were concerned that the oil might stain the wood but it didn't and the drilling went on much more successfully.

[2] Some time ago we purchased a small but tall hydraulic jack. With its approximate 24 in stroke, and convenient light weight, it's easy to lift such items as the end of an air tank or, in this case, individual sills. Its capacity is about 3 tons. Additionally we purchased a very small 4-ton jack (for under $30) which is useful in tight places.

[3] Although the original tenons were the same 1 ½ in. thickness, for various reasons, mainly because of the condition of the remaining original wood, the new ones varied from 1 ½ up to 2 in.

Using the same 'screw-clamp' method, but with the no. 1 end in place, it was possible to pull the no. 2 end sill up quickly so, it's now in place. (Bring on the next one!)

Completing the end framing – The end sill completes the framing of the deck and also is the mounting for the coupler and the pilot. So the end is actually made of three hefty pieces of SYP bolted into one vertical 'sandwich'. In order to prevent moisture from creeping between surfaces, those which would soon be hidden as the end was assembled, were coated with "Seep 'n Seal". Then the pilot and coupler mounting beams were located below them, raised to position with the fork lift and clamped together.

The components of the end sills –

Top sill	9⅝ x 8 x 105 in.
Pilot support (middle)	5 ¾ x 8 x 84 in.
Coupler/train line support (bottom)	3 3/8 x 8 x 42 ½ in.

Using measurements taken from the original no. 2 end sill[4] we drilled eighteen 13/16 in. holes down through the sills. These were of various lengths depending on how many sills they went through from 12 in. on the ends to over 18 in. in the middle. The STM-made square-headed bolts were then dropped down through each hole and the whole assembly clamped tight. With the bolts and the "Seep 'n Seal" they're pretty well 'glued' together.

Randy Leclair raising the frame to new Heights.

Doug Carrier painting pole pocket aluminium.

Coupler mounting – The actual coupler mounting socket is held on with the two 'through-rods' and two 1 ½ x 17 in. bolts at the bottom, projecting through the socket casting and held in place with four large hex nuts. The original ends of the through rods had become badly beaten, mutilating the threads so last summer, **Dean Look** had welded on new ends (about 6-8 in. of N/C threaded rod), so the nuts threaded on easily. To clear the pilot (which has the old style foot boards, making it even wider), the coupler was set out by a pair of 6 ¾ x 5 ¾ x 16 ¾ in. SYP spacing blocks, through which the rods and bolts went. These two blocks are also 'mated' by a pair of vertical bolts which also anchor steel bars extending down to the bottom of the pilot.

Out of sight, under sills 4 and 5, are two Laconia-made wrought iron brackets. They are bolted up through those sills and through a heavy reinforcing plate (YUCo-installed) on top of them with two ¾ in bolts holding each in position. The two large (original Laconia?) bolts extend out through the coupler support beam, through the spacing blocks and the coupler mount. Despite the banging these must have received over the years, they were in remarkably good condition although those on the no. 2 end required just a bit of 'tweaking' on the hydraulic press to make them fit properly.

It's hard to imagine how these structures withstood the punishment they must have been given over the years—*e.g.* see the photo at the end of this article

Cab mounting sills – There are two hidden but substantial sills, 5 x 7 ¾ x 120 in. These are bolted to the inside of the outer (no. 1 & 8) sills and support the cab structure. Laconia used some special 'button-head' carriage bolts of their own manufacture to hold these sills in place. They are visible because they appear like 'rivets' along the side sills. We special ordered ⅝ x 11 in. carriage bolts knowing their lengths would be o.k. but the heads would have to be modified for appearance. (Modern carriage bolts have a flatter

[4] The no. 1 end sill had disappeared long before we began this restoration.

head.) So **Dean** built their heads up with welding and, using a specially shaped cutter turned them to size on the metal lathe. We did find six originals which could be restored and used them to hold the right-hand sill.

Poles and trusses – Along and under each side, if you look carefully you can see the long truss rod which starts with a very large square nut on the poling pocket casting on the corner, extends behind the side sill, running on top of the bolster, through a channel iron 'saddle' where it bends down at about a 15° angle running through another 'saddle'[5] under the needle beam, threads its way through the various blocks supporting the air reservoirs before doing the same thing in reverse at the other end of the car.

These were removed last summer, scraped and painted with *Chassis Magic* black and *Awlgrip* Super Jet Black. The threads one each of their ends were quite beat up and had to be filed and 'chased' so the square retaining nuts would screw on. These threads must have been to some antique standard because a standard die wouldn't go over them. **Dean Look** carefully reshaped them with a file.

When these rods were removed during disassembly we found the wooden blocks supporting the channel 'saddles' over the bolsters as well as those under the needle beams in very poor condition. They were obviously 'latter' day and held in place with large common nails (at least 20d). The blocks were spruce. To give a stronger support and stability, new blocks over the bolsters were fabricated from some old oak planking that was around the Museum. These were then fastened in place with lag screws. With the solid new end sills through which these rods pass it is now possible to take up the proper tension on the truss rods, pulling them straighter where they now exert an upward force. The former exaggerated spacer blocks are now greatly reduced in thickness as the truss rod assumes its proper configuration.[6]

Truss rod ends before and after.

A feature of old railroading was 'poling' whereby a car on an adjacent track from the locomotive could be pushed along without the locomotive being on the same track. These poling 'pockets' are for a wooden pole about eight feet long with an iron band around each end to protect it from splitting. The pole is held by a ground man who inserts it in the respective sockets on the locomotive and car. After the car is in motion, the locomotive stops, the car coasts to wherever and the pole falls to the ground. (We're not planning any demonstrations!)

Danny Cohen – tells of the Type III snow ploughs in Boston that were equipped with 'poles' to push unwary automobiles out of their path. He says the best place to apply the pole was in the middle of the trunk lid which would then form its own 'poling pocket'. He thinks we have one which could be part of 100's exhibition equipment.

Norman Down and **Lloyd Rosevear** sand blasted and painted them. In the colour scheme we are planning to use on 100, the pockets were painted in aluminium. As they were scraped many traces of that colour were found under the latter day black.

---

[5] Originally there were four special castings with a lug that went into the hole under the end of each needle beam and with a curved area for the rod to seat. Over the years of its operation in Sanford, all but one of those castings disappeared. YUCo replaced them with 5 in. of 3 x 1 ¼ in. channel iron held in place rather crudely by wood blocks and common nails and (now) very rusted-out wood screws. We replaced several of these channels with new, slightly heavier (3 x 1 ½ in. with a bit thicker web because that's all we had) pieces of channel. But, if you look at the left side, no. 1 end needle beam, you can still see the original casting.

[6] We wonder how necessary or effective they were as trusses given the eight massive longitudinal sills which would very likely have remained straight for these 100 years, even without. But we'll never know now.

One of the pocket castings had a significant chunk that had been broken out years ago. With his welding skill **Dean Look** pieced in a piece of steel and we defy anyone to find which one it was.

Pole pocket showing aluminium paint under the black.

On the front side is a large hole for the truss rod. On the side are two holes for the bolts which go through the side sill. When we took the car apart the pocket castings that remained on the car were fastened with both round head and square head bolts. It was obvious that the original was the round head, something that Laconia Car Company had made themselves. **Dean Look** took some ¾ x 6 in. square head bolts, turned the heads round and built them up with welding, made a special cutter; then turned them to the proper 'antique' shape. Unnoticed is a trick he used so they wouldn't turn in the hole: welding on a blob that would cause it to stick in the hole without rotating as it was tightened.

The poling pockets were a bit difficult to get to fit tightly. After applying *Phenolseal* caulking under the casting, the nuts on both ends of the truss rod were tightened, first on one end of the car; then the other. To get them suitably tight it was necessary to use our giant sized crescent wrench extended by a two-foot pipe. This has pulled them up tightly.

Doug Carrier applied the two coats of aluminium paint to the pockets and the coupler mounting, giving the car a 'touch of class?'

Under the body – Now that the deck framing is completed, but before the flooring (decking) is applied, it's time to work underneath in this order: from least flexible to most flexible:

- Large air brake equipment—reservoirs and brake cylinder
- Brake levers and their pivots
- Other smaller hardware
- The air piping
- The motor and control wiring

Brake cylinder – Like most cars of its period, 100 has one brake cylinder: 10 in. diameter made by New York Air Brake Co. of Watertown, NY. **Chuck Griffith** and **Dick Avy** have disassembled and cleaned it, replacing its leather piston cup with a newer one of neoprene rubber. They tested the cylinder and found it leaked only very slightly.[7]

The cylinder is mounted on a very large oak block about 5 in. thick and 16 in. wide which, over time, had developed a number of splits. However because of its size, we pulled it together with clamps, filled in the gaps with wood and applied epoxy filler to the remaining spaces. It is now as strong as new and holds the cylinder up against the bottom of sills 1 and 2.

Air reservoirs – In report no. 9 we described the condition of the air reservoirs. No. 1 main reservoir, after passing its hydro-test, was sent to A. C. Electric for sand blasting and priming. It has since come back, been retested by **Chuck Griffith** and painted with black *Awlgrip*, as did the replacement for no. 2 main reservoir. These reservoirs are 'cradled' in oak blocks held to the outer two sills by two bolts which also hold the mounting straps. Of the three pairs of original blocks, only one block was suitable to be re-usable. Replacements were made from some extra red oak given us by barnstormers! Because it was not quite wide enough we grafted chunks

[7] We hated to change the leather cup because it was in very good condition but it has been preserved as an exhibit.

salvaged from remains of the original pieces using West System epoxy as glue. After everything was cut to the proper shape, it was still necessary to fill a number of worm holes and crack in the old oak with epoxy. Then everything was primed with *Awlgrip* 545 gray primer.

The auxiliary tank, made in 1999, looked quite good, seemingly requiring some minor scraping. However outdoor storage, under snow had done its dirty work and, with every stroke of the carbide scraper showed more and more rust pockets, so it was necessary to sandblast the entire tank. (Fortunately it fitted easily in our sandblast cabinet.) **Dean** and **Chuck** ground off its mounting brackets so the tank could be mounted with the traditional ¼ x 1 ¼ in. straps (bands). The tank was then primed (with Fine Paints of Europe's gray primer) and given a coat of Super Jet Black *Awlgrip*. When it was mounted we made sure the modern label was on the inside where only the car inspectors could see it.

To 'hang' the tanks on the locomotive's right hand side required the use of the battery fork truck. With **Chuck's** assistance and lots of tweaking and trimming on the mounting blocks main reservoir tank no. 1 went up as did the auxiliary reservoir. (For some reason the mounting straps couldn't pull up tight against the notches in the mounting blocks despite their being copied exactly from the originals.) However they are quite solidly mounted being 'nestled' in the curve of the mounting blocks.

The main reservoir tank on the other side presented more of a challenge. Because the space on the floor beside 100 is somewhat taken up with a big chunk of the now-replaced sill no. 8 and some other large pieces of wood, it was not possible to get the fork truck in there. So, with **Chuck's** help, we constructed a 'hoist' using two 3-step ladders with a bar between from which a cable puller was hung. From that went down between sills 7 and 8, a pair of nylon straps arranged as a 'basket' around the tank. With this arrangement it went up easily. If you will recall, this tank is 60 in. long *vs.* the 48 in. of the now defunct original. But there is plenty of room on this side because the space beyond it was occupied by 100's first compressor. As we were working under the car yesterday, we noticed traces of where its mounting brackets used to be on sill no. 6. (Those on the no. 8 sill had long ago disappeared when that sill was replaced by STM.)

Auxiliary reservoir no. 1 and brake cylinder mounted under 100.

Other underbody 'stuff' – In the center of the car is the 'swaybar' and its pivot. On each end is a clevis and chain which runs via a pulley assembly to the hand brake operating shaft which extends down through the floor. The pivot is a strong assembly made of ½ in. flat bar. It is mounted up under the floor under the center sills (4 and 5) to a pair of oak blocks with holes spaced exactly right to hold the pivot but don't appear to have been used. However, for whatever reason, the pivot was mounted about 2 – 3 in. toward the no. 2 end with a sort of 'Mickey Mouse' arrangement using extra blocks and a couple of steel straps. We have gone for the original arrangement because of its simplicity however **Dean Look**, who has done quite a bit of work on other cars' handbrakes, has wondered if this is going to work. We shall see and changing the mount to the later version won't be hard. The two cast iron pulleys and their brackets have been blasted, painted and primed as have the brackets on which the shafts from the hand brake wheels (in the cab) and are now mounted using original square-head lag screws. (Thanks to **Doug Carrier** for his work in preparing them for mounting.)

The 'live' and 'dead' levers and equalizing (adjustable) turnbuckle, all of which attach to the brake cylinder, have been prepared for remounting.

Air piping – Some time ago we purchased a supply of schedule 40 galvanized pipe of various diameters from ¼ through 1 ¼ in. to replace most of the piping on 100. Last week we purchased $214.46 worth of various fittings including unions, elbows, couplings, reducers, etc., again to replace most of what is now on 100. After all the other components are installed the piping can be run.

Wiring - The last of the underbody work will be the motor wiring, most of which is still intact. This will be assembled into bundles laid out on a temporary deck; then fastened in place with leather strapping, some of which remains as examples. Some of the wiring is in fire hose, some bundled with friction tape and some is just loose, depending on what the last 'episode' was in its life. We will try to use as much fire hose as possible but it is difficult to get it to 'come out right'.

Painting the frame – Still to be done is scraping much of the underframe and applying the Cabot's Barn Red oil based decking stain—not a fun job but that's the way it was originally. Most of it is now covered with dust and dirt and some charring where there were fires.

Motors- **Randy** and I paid a second visit to A. C. Electric in Auburn, Maine, partially to introduce him to what they can do and to check out the status of the various motors they have. 100's motors are done and wait our ability to install them. We had asked Roger Paradie to place one outside overnight to see what happened to its insulation resistance. He did that, but it's not the time of year when much, if any condensation forms. With our new AEMC 1060 megger, we checked the resistance of all four motors and it ran up to 2.5 gigohms at 1,000 volts!! With our other megger that would have registered at infinity.

Next week we are scheduling a visit to A.C.'s Bangor facility where they do diesel engine traction motors, which are just 'grown-up' versions of what we have under our cars. We are investigating their V.P.I.[8] treatments. For years we have heard that they would not treat anything but rewound motors in this way for fear of contaminating their very expensive equipment but apparently this is not a problem any longer. They will steam clean or pressure wash the components prior to the V. P. I.

Our metal working team has fabricated four new motor support bars from heavy steel. These have just been sandblasted and primed at A. C. and are due to be returned on 28 February.

Roger Paradie preparing to test the insulation resistance of one of 100's motors at A. C. Electric Using STM's new AEMC 1,000 volt megger.

Truck work – **Bill Pollman** has assembled the rebuilt brake beams, brake shoe heads, safety chains, links and various pieces of hardware on the first truck. Yesterday afternoon, as I left, he was working on assembling the truck bolster-spring plank-leaf spring assembly. In his work in the Boston Engine Terminal, they have the weight of the locomotive on the trucks so they can compress the new springs they are installing by jacking up from below. When he tried this, because there was no weight on the truck, it simply lifted up with still 3 more inches to go to compress the springs so the retaining pins could be inserted in the links. We surmised that a clamp arrangement made of channel and some threaded rods or jacks will have to be fabricated to pull things together.

Dean is waiting for warmer weather so he can scrape the re-babbitted journal bearings to fit the individual wheel sets, now buried in snow. (Yes we did carefully rust-proof the bearing surfaces!)

Bent brake levers – At some time during its Seashore life, the air compressor governor stuck and the system over-pressured breaking off two truck brake levers and bending two of the turnbuckle-style slack adjusters (and an end of one of them). **Dean** and **Chuck** were

[8] Vacuum-pressure-impregnation

applying lots of heat, sledge hammers and a mighty 8-foot pipe wrench arrangement to break the clevises on the turnbuckles free. Using the hydraulic press they straightened the screws so things are almost finger-tight now. They have started making new brake levers from ¾ x 3 ½ in. plate. First they drilled the three holes in each for the pivots and pull points. Next they will have to mill them to shape.

If it doesn't work the first time get a hotter torch and a bigger hammer.
Dean and Chuck loosening up one of the truck turnbuckles.

Cab sash – Bob Reich completed the rebuilding of nine of the cab sash using epoxy on the corners and Minwax Wood Hardener to seal the ends and rabbetts of each component. The 10th sash will require rebuilding. Unlike the others, which are made of cherry, this one is made of white oak. There is a possibility that it was some scrap crate wood around the YUCo shop because it was certainly not kiln-dried when the sash was fabricated. Also the corner joints are not 'coped', instead all corners are '45'd'. **Lloyd Rosevear** thought he might be able to straighten the pieces but we felt it was better to start with new straight wood. So that's in progress. We only had to purchase two pieces of glass to replace what was broken or missing.

A new photo turns up – A very interesting photo turned up on the Maine History Network's (Have I got the right name?) website. Thanks to **Mike Simonds'** watchful eyes. While it doesn't show 100 it is the only view we have seen of sister locomotive 101 in its original form before being made into an express car in 1908. Further it shows 101 pushing six fully loaded gondola cars of coal up a steel ramp in Springvale. Possibly this coal was from the Cape Porpoise coal pocket or even directly unloaded from coal schooners at the Cape Porpoise pier. We are wondering how they made it up that grade. There are no weights in the locomotive to give it more traction and its K28 controllers must have taken quite a beating! We note the two men standing on the load. Was the one in the distance relaying 'stop!!!' to the nearer one who would then yell to the engineer?


Item #21694 - Maine Memory Network - www.MaineMemory.net
A project of the Maine Historical Society
101
ATLANTIC SHORE LINE RAILWAY
For Educational Use Only
©2000-2006 Sanford Historical Committee