

INSIDER

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July–August 2011

The Pacifics Are Here!

In the late 1980's, I took my kids to Washington and the Smithsonian Institution in Washington, D.C. On display there was this magnificent Pacific as shown above and I was enthralled by the majesty of this giant loco that dominated the hall. I never forgot that experience and when it came time to make a large steam locomotive, the Pacific was the automatic choice. It was primarily a passenger loco, but also a high-speed freight locomotive. It was a natural for our Aristo-Craft product line and has been made several times over our history.

The newest rendition has a new way of holding the wheels to the axles including a collet of a different material than the shaft to stop any wheel sliding on the shaft. We have also moved most circuitry to the tender, where the DCC/Revolution socket is now situated. We also made the coal load removable to allow easy access to the port and switches. In addition we added pickups to alternate tender wheels and the power goes through the tender wires to the locos power pick up for the motor.

This is in addition to the great motor block patented gearing system added several years ago. It's a real puller and can pull as many standard heavy weights as the real trains did..

It's a true crowd-pleaser and will be the prize of your collection.

All the best,

Lewis Polk



Southern Railway No. 1401
Smithsonian Institute, Negative #: 63164

Far from ordinary were the Class Ps-4 type steam locomotives of the Southern Railway.

The Ps-4 type was “among the most celebrated passenger locomotives operated in the United States...” [John H. White, Jr.]

Inspired by handsomely painted British locomotives, the Ps-4's green and gold livery set these locomotives apart from the funereal black associated with most American steam locomotives in the 20th century. The distinctive green was exclusive to locomotives on the Southern that were assigned to the company's principal passenger trains, such as the 'Crescent Limited,' the 'Piedmont Limited,' and others.

Built to a standard design, the first group of Ps-4s was constructed

for the Southern Railway in 1923 by the American Locomotive Company (ALCo). These locomotives were patterned only partly on the successful Pacific design developed in 1918 by a design committee organized by the United States Railroad Administration, when U.S. railroads were under federal control during and after World War I.

In 1926, ALCo built for Southern a second order of Ps-4s at its Richmond Works, in Richmond, Virginia. The 1401 was included in this order. The 1401 was assigned for most of its operating life (1926-1952) to the Charlotte Division of the Southern Railway. (Hence the name, 'Charlotte' painted in small letters on the side of 1401's cab.)

(Continued on page 2.)

The Pacifics Are Coming! *(Continued)*

The Charlotte Division was part of the Southern's Washington-Atlanta mainline, with extension of the mainline to Birmingham and New Orleans on trackage leased by Southern. The Charlotte Division included the line between Greenville, S.C. and Salisbury/Spencer, N.C. Thus the 1401 rarely, if ever, ran north of Spencer, the location of the Southern's vast Spencer Shops for the heavy repair of locomotives from throughout the system.

A Ps-4 was capable of hauling 12-15 steel passenger cars, about 700-1000 tons, at 80 mph on level track. (The 'hill and dale' profile of the Charlotte Division, however, kept average speeds to about 50-60 mph.) The 14,000 gallons of water in the tender permitted runs of about 150 miles – the full length of the Division – between water stops, although

mid-April 1945. (The locomotives were used in 'doubleheaded' pairs, each pair heading the train on the four Divisions between Atlanta and Washington.) The 1401, with the 1385 immediately behind, headed the train from Greenville to Spencer. It was mostly a slow procession at 20-25 mph, slowing to 10 mph at every hamlet and stopping briefly at larger towns, so that the people who lined the track over the complete distance could view the train.

"There was a solid line [of people] on both sides of the track," said Box Childers, fireman that day on the 1385. "I believe you could have walked on their heads all the way [from Greenville] to Salisbury. And they all looked so sad."

Engineer of the 1401 that day was Richard 'Easy' Cooksey, of Charlotte. Fireman of 1401 was recorded as a Mr. Cox, of Fairforest, S.C.

represent the 'age of steam railways' in American history.

From 1953 to 1961, the 1401 was stored at Alexandria, VA. When the new National Museum of History & Technology (now NMAH – under construction from 1959) was ready, the Southern gave the 1401 and its tender a full external restoration, with new paint and striping, in October-November 1961.

Two 250-ton-capacity railway steam cranes of the Southern lifted 1401 from a rail spur located about two miles from downtown, where 1401 had been moved. The two cranes set the engine (sans tender) on a special, 200-ton-capacity, multi-tire trailer. Late on the night of November 25/early on the morning of November 26, 1961, the engine and its tender were moved (part of the way on Constitution Avenue) to their new home in Washington.



Aristo-Craft's Pre-Production Pacific

there would be one intermediate water stop normally scheduled. Fuel (16 tons of bituminous coal) in the tender was good for the full 150 miles.

As was the practice with all mainline steam locomotives, a locomotive on a through train was 'changed' at 'division points' (such as Greenville and Spencer) – i.e., the arriving engine was uncoupled and sent to the roundhouse for fueling and servicing, while a freshly prepared locomotive was coupled onto the train in its place for the continuation of the run.

The 1401 was one of eight Ps-4s used to haul President Franklin Roosevelt's funeral train from Warm Springs, Georgia, to Washington in

Engineer of 1385 was O.B. Surratt of Spencer. [Source for Childers quote: Greenville (S.C.) News, September 23, 1962; the reporter interviewed the retired Mr. Childers for an article about the 1401's move into the National Museum of History & Technology (now NMAH) in November 1961.]

1401 ended its days hauling local trains. It was last 'shopped' (fully repaired) at Spencer Shops in 1951.

The locomotive was retired from service in 1952. A Regent of the Smithsonian, who was also on the board of directors of the Southern Railway, headquartered in Washington, D.C., persuaded the Regents to accept the 1401 in 1953 as a gift from the Southern – to

Another eleven days were required to place the engine and tender in the museum. The east end of the new museum was completed around the installed 1401. In January 1964, the museum opened to the public.

Details

PASSENGER STEAM LOCOMOTIVE: Class 4-6-2 'Pacific' (also Class 'Ps-4' on Southern Railway). Complete locomotive includes engine and its – very necessary – tender, which carries the locomotive's fuel for the firebox and water to feed the boiler, to make steam for propulsion.

DIMENSIONS: 91'11⁷/₈" L × 14'11" H × 10'2" W.

(Continued on page 3.)

The Pacifics Are Coming! *(Continued)*

WEIGHT: Total, engine and tender in 'working order' with coal in firebox and tender and water in boiler and tender is 561,600 lbs. or 281 tons. Includes 92 tons of fuel and water in engine and tender. Total weight of engine and tender as displayed is 189 tons.

COLOR: Green set off with gold striping, aluminum-painted running board edges and tires, and chrome-plated steel rods and valve gear (the chrome plating – never applied to any locomotive's rods because chrome-plating weakens steel – simulates the brightly polished steel rods and valve gear typical of Ps-4 locomotives in service, 1926-1953).

FIREBOX GRATE AREA: 75 sq. ft.

CYLINDERS: 2, with one on each side, at front; these propel the locomotive– 27 × 28.

DRIVING WHEELS: 73" dia.

STEAM PRESSURE: 210 lb/sq. in.

FUEL: Coal (16 tons coal, plus 14,000 gallons of water, in tender)

DATE MADE: 1926

DATES USED: 1926–1952

LOCATIONS: Alabama, District of Columbia, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Virginia

NOTE: States on routes of Southern Railway

CREDIT: Gift of Southern Railway

HISTORY: The 4-6-2 'Pacific' type steam locomotive, for passenger trains, was introduced late in the 19th century and perfected after 1910.

Among the most numerous type of steam locomotives for passenger trains operated in the United States, from circa 1910 to 1955, was the 'Pacific' type. This type was characterized by 4 leading or 'pilot' wheels, arranged in a 'truck' to guide the locomotive in curves; 6 large-diameter driving wheels for power and speed; and a pair of 'trailing wheels' in a 'trailing truck' under the rear of the engine to help support its great weight.

Related People, Places, and Events

MANUFACTURER: American Locomotive Company, Richmond Works

PLACE OF MANUFACTURE: Richmond, Virginia (1926)

RELATED PLACE: Spencer Shops, Spencer, N.C. #1401 was repaired at Spencer many times, the last time being in 1951. Spencer was the northern end of Charlotte Division. 1401 usually dispatched on trains from either Spencer or Greenville.

RELATED PLACE: Greenville, S.C. Southern end of Charlotte Division. 1401 was normally dispatched on trains from either Greenville or Spencer.

PLACE OF USE: Charlotte, N.C. A roundhouse and locomotive servicing point for the Charlotte Division at Charlotte ♦

All excerpted from various Smithsonian articles.



REVOLUTION:

—a dramatic and wide-reaching change in the way something works or is organized or in people's ideas about it...

The REVOLUTION R/C is a triumph of both ideas and technology at the same time. It was an idea waiting for technology to catch up, since virtually all models like airplanes, boats, cars and robots are all run by R/C. Model airplanes are controlled up to a mile away and at speeds of 100+ miles per hour and R/C allows delicate surface controls that are extremely sensitive for rolls and loops etc. as well as speed controls using electric motors as trains do. If you're flying a \$1,000 plus airplane, you want total security and control and 2.4 GHz has won that kind of trust in its glitch-less operation along with sophisticated surface controls.

The software was relatively easy once we had an electronic platform

(Continued on next page.)



The New Dash-9 in BNSF Colors

REVOLUTION (Continued)

to work with and frankly, we could do more if needed. We put enough into the mix to make it operationally exquisite for 98% of the users, and we know the people who want that last 2% would never leave DCC anyway.

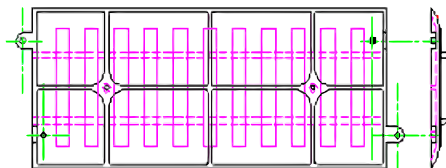
As a major track producer, we saw the commodity prices for copper limiting the growth of our industry and we had to break the hold of metal rail over the operation of DC trains. The trend in all consumer products was to battery operation and in trains it had been a 100-year-



old tradition to run a-c or d-c power from the "mains." Instead of being tied to this restrictive operation style, we felt the battery operation tied to R/C control would open the horizon to the best operational combination of 21st Century techniques along with multiple train control on a lower cost track. The signal bypasses the normal conduit of the track by sending the signal from a hand held transmitter directly to a receiver mounted inside the loco.

The heart of the concept and production came from a new Radio Frequency Chip all-inclusive on a single board along with super high speeds that gave the kind of control resolution we needed. Coupled with this chip was the knowledge we obtained as a train manufacturer for what was needed in the way of controls. To make this user-friendly we incorporated a graphic, backlit screen that could help the user program and control their locos without the need to reference manuals just to set it. Frankly, once you understand the concepts you will not have to look at the manual again, and this will be within a few days of use.

We are developing a plastic roadbed track with self-plastic rails using an engineering plastic that is rock hard and U.V. protected, while allowing the use of radio control and the battery paid for by the massive savings in track costs. It's



the economics that will sell both the track and radio system in tandem, so ARISTO-CRAFT/Crest as a company will offset the loss of track dollar sales with the sale of even more

REVOLUTIONS. It's an elegant plan, but will take several years to gel.

To enhance the entry of "Newbies" into the hobby we will make a simplified "basic," low cost version of the 2.4 Ghz control that will only control one train at a time. This will only be a substitute controller function replacing a power pack and will come with a Lithium Ion pack and charger to get someone going in the hobby. If, and likely when they want a more sophisticated controller, the Revolution is an easy conceptual upgrade.

I like it when a plan comes together, and this plan will benefit the Large Scale train hobby along with ARISTO-CRAFT. We have a small niche market that is restrained in the ability to produce many products, but this could increase the size of the market frequently. While gardening is the number one hobby in America, this combination of engineering plastic roadbed and battery R/C control could make this a staple hobby around the tree at Christmas or Summer long in everyone's garden. ♦

EDITOR'S NOTE: For a detailed article on the installation and operation of the REVOLUTION, see: <http://www.aristocraft.com/techinfo/revolution/OVGRS/index.html>

Coming for the Fall 2011 Show

ARISTO CRAFT TRAINS

PENNSYLVANIA POWER & LIGHT COMPANY

SERVING THE INDUSTRIAL EAST

FALL 2011 ECLSTS Show Car
PPLX 100 Ton Hopper

The **Fall Show Car** will come with three road numbers: 102, 105, 107 and have plastic wheels. The cost of the car will be \$50.00 each. You will be able to purchase metal wheels at the show for a show price of \$20.00 per pack (one pack does one car).

Available **ONLY** at the show. No reservations, no mail orders. *Arrive early, buy early. If you can't make it to the show on friday, have a friend purchase your show cars for you.*

Avoid the disappointment of an early sellout.

Mallet versus Articulated Locomotives

The first compound-compression locomotive with an articulated pair of drive wheel assemblies was designed by Swiss engineer Anatole Mallet (pronounced “Malley”) in France. The front driver assembly included two low-pressure cylinders. The rear driver assembly included two high-pressure cylinders. The single boiler was rigidly attached to the rear driver assembly.

The Aristo-Craft Mallet is coming into stock again about June 1, 2011

Mallet locomotives in the USA followed the design created by Anatole Mallet and were called Mallet locomotives as a result. Like Anatole’s original design, these locomotives used compound expansion where steam was first used the two high-pressure cylinders and then exhausted to be used a second time in the two larger low-pressure cylinders in the front of the locomotive.

The USA later experimented with the same basic design but with four high-pressure cylinders. These were still articulated locomotives but were no longer true “Mallets” because they used simple expansion instead of compound expansion. Unfortunately, no good name for this design ever emerged, and they tended to be loosely called ‘Mallets’ as well.

Some people loosely use the term “Mallet” to describe any articulated locomotive. However, I prefer to be more specific and use the term “articulated” to describe a single-expansion, articulated steam locomotive. Periodically, I hear a Big Boy or Yellowstone referred to as a “Mallet” type locomotive. Technically, this is not true. Anatole Mallet designed a steam locomotive with two important characteristics.

This locomotive was (1) articulated, and (2) used compound expansion (high and low pressure cylinders).

The Big Boys, Yellowstones, as well as many other articulated steam

locomotives, used simple expansion (high pressure cylinders all around), and thus, according to the strictest definition of the term, are not true mallets. Look at this picture of a Big Boy. Notice that the front and rear cylinders are the same size.



Because they are both the same size, they operate using the same (high) pressure.

Articulated locomotives such in the N&W Y-class did use compound expansion and therefore are true “mallets”. Look at this picture of a 2-8-8-2. Notice the much larger (low pressure) front cylinders. That is your best clue that the locomotive is a true mallet.” (Thanks to Steam



Locomotive Dot Com for the reference material and donations to them are appropriate)

We set out to make a sophisticated articulated loco that was the crown jewel of our line. We had a proven drive, but the goal was to articulate both drives to allow the loco to make an 8' diameter circle with a minimum of overhang.

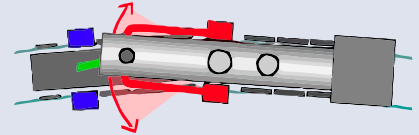
This loco was a big hit in HO, but would it sell in G as not everyone in G had big radius curves? There is always skepticism about the ability of our making a double articulated pair of trucks, but we knew we could do it and published the drawings to quell

(Continued on page 6.)

mal•let (mäl'īt) n.

Overview

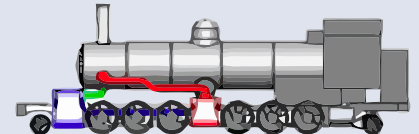
Designed by the locomotive engineer and inventor Anatole Mallet (1837-1919), a **Mallet**-type locomotive is a four-cylinder, compound articulated locomotive. Mallet locomotives have essentially two steam engines mounted under the same boiler. The rear engine is rigidly attached to the boiler, while the front engine is able to swing laterally around a pivot point located near the rear, high-pressure cylinders (see figure below). This articulation allows the locomotives to negotiate curves that would not accommodate a large rigid-frame locomotive.



RED=steam from boiler
BLUE=exhaust steam from high pressure cylinders
GREEN=exhaust steam to stack

Compound Mallets

On a compound **Mallet**, live steam from the boiler enters the rear cylinders, and it is the exhaust from the rear engine that powers the forward low-pressure cylinders (see figure below).



To compensate for the lower temperature and pressure of the exhaust steam, the low-pressure cylinders are much larger in diameter than the rear set. This compounding system allows for savings on fuel and water, however the difficulties in setting valves to deal with the volume of low pressure steam, and the slow speeds of compound **Mallets** led to most American railroads abandoning compounds by the 1920s. Exceptions to this were such locomotives as Norfolk & Western’s famous Y-class 2-8-8-2s, which were still being built as compounds into the 1950s, and of course the logging **Mallets**, of which all but six were compounds. What distinguishes this locomotive from other large steam engines is that not only are there 4 cylinders and four sets of driving wheels, but also that

(Continued on page 6.)

Mallet v. Articulateds

(Continued from page 5.)

the noise about the impossibility of the chore.

Unlike our Pacific, some 20 years earlier, we wanted to put as much detail into the molds as the capability of mold making had dramatically improved since we were making molds in Korea. Not that Korea couldn't match this skill level now, but the intervening years had shown a dramatic ability in detail for injection molds everywhere.

In our opinion, we had the best drive on the market, the best tool making skills, a double articulation, huge pulling power and a beautiful accompanying Vanderbilt tender. Thus the risk was spread out over a bevy of features and the fact that unlike Big Boys and Hudson's, there were a wide number of road names that had used this particular locomotive. When we build such a costly model, the cost needs to be amortized over many years and we were convinced that this model would have a long lasting following.

So...we're into a second iteration of

this model and have added a DCC/ REVOLUTION port into the tender along with tender power pickup.

All and all, this is a model that is the flagship of ARISTO-CRAFT and the lucky future owners will find great crown appeal and operation when visitors come to your layout. This is the best of the best and we want this to be a trouble free operation and the loco you go to when you want the most operational fun.

Naturally, our artwork by Michael J, is top notch in accuracy and the art work application by Sanda Kan is a super high level quality product. Hundreds of people have had a hand in the production of this model and each step is hand crafted to bring you the best possible product of mass production without mechanization. This is not a toy train and it takes an adult eye to see and understand the perfection of detail in the product.

ARISTO-CRAFT has a proud history and this loco is one of the main reasons. We will send out a full listing of the road names shortly.

Enjoy! ♦

Lewis Polk

PARTS, PARTS, PARTS

New for this issue of the *INSIDER*, is a parts list for your future reference. It is located on page 26.

You can locate and identify these parts from our exploded view diagrams at our web site and then get pricing from our Internet Store by searching for these part numbers or from the drop-down listing on the right and searching for parts. If you have an account you can pre-order or order these parts and pay for them by charge card. You will not be billed until ordered and you can see if they are in stock or not.

This list is of recently received parts and we are likely to have these in stock. As each item is re-run we will have parts accompanying the delivery. We can only order the parts when we order the product. The new C-16 drive and the SD-40 and E-8 exploded views are in the process of being drawn now as is the Consolidation. ♦

mal·let (mäl'īt) *n.* (Cont.)

the steam is used twice, first by the high pressure cylinders, then by the low pressure cylinders. The result is an engine with great pulling power, though not great speed, and moderate efficiency compared to a standard 4 cylinder engine.

The LGB Uintah **Mallet** is not a true **Mallet**. This is because it has 4 equal-sized cylinders, and the steam to each is used just once before being exhausted up the stack. It is articulated, meaning that the front drivers can pivot for following winding tracks, but it is not a **Mallet**.

Think you have all the **Mallet** answers? Test your knowledge by answering the questions below. You can find the answers at the back of this *INSIDER*.

Do you know...?

- 1) Which **Mallet** got all the press? No hint needed.

- 2) Which **Mallet** took the winters off, and regularly pulled its loaded consist downhill? Hint: No MTH copy has been made yet.

- 3) If you count only engine and tender and do not add an auxiliary water tender, which **Mallet** was the longest of all piston-driven steam engines? Hint: It regularly ran at 80 mph.

- 4) If you count only engine and tender and do not add an auxiliary water tender, which **Mallet** was the heaviest of all piston-driven steam engines? Hint: It could do 100 mph, downhill!

- 5) Which **Mallet** had the highest horsepower rating of all piston-driven steam engines? Hint: 7498 horsepower.

- 6) Which **Mallet** had the highest starting capability of all piston-driven steam engines?

- 7) Of all super powered heros, which **Mallet** had the highest starting capability of all piston-driven steam engines? Hint: Big Boy produced 5300 Hp at 25 mph. This puppy also produced 5300 Hp at 25 mph!

- 8) Which **Mallet** had the largest number of its class built and simultaneously operated by a single company. Hint: Its first appearance was not the same as the first MTH issue.

- 9) This **Mallet** was known to wonder. Why?

- 10) This **Mallet** had the most wheels.

- 11) These railroads built engines that looked like **Mallets**, but where rigid frame monsters. Please name all the rigid flavors.

- 12) This engine was built because the president of the company got stuck out in nowhere, USA, by its underpowered predecessor. ♦

Adapted by permission from the August 2004 *SEPGRS* Newsletter.

The Aristo-Craft REVOLUTION 2.4 GHZ CRE57002 Onboard Receiver versus the CRE57005 Base Station/Super Receiver

There is a difference!

by Stan Cedarleaf

It seems that there might be some confusion about the two REVOLUTION receivers. As with any new product introduced to the marketplace, we as modelers can take something that was designed for a specific purpose and try to make it do all kinds of things. Some of which work quite well and others might fall short of our expectations because the product wasn't designed to do those things. I guess that's just our curious minds.

When the REVOLUTION was introduced in early 2009, the CRE57002 onboard receiver was the only receiver available. It was designed for onboard installation to control locomotive speed, direction, lighting and control up to six functions with the auxiliary wiring harness. It could be powered with onboard batteries or by constant voltage from track power. A single capacitor and a larger six-capacitor module were used to allow the possibility of "dirty" track interruption. Both battery and track power have been used very successfully.

Then the experimentation started. Several users found that they could use the CRE57002 receiver as a trackside unit just like the earlier 27 MHz 10-amp trackside receivers. Users reported that the CRE57002 worked very well in this application except it was limited to five amps of constant load with an 8-amp peak versus the 10-amp rating for the 27 MHz CRE55471 receiver.

Other users started wiring multiple locomotives together in one consist and controlling them with a single 57002 receiver. Many of these "tests," even one instance of powering

a four-unit ARISTO-CRAFT FABBA consists were very successful but were reaching the upper limits of the 57002 receivers capabilities. It seems that we always want to see just how far we can push the "envelope." While the 57002 receiver was designed for "single unit" use, it was becoming quite apparent that the addition of higher performance/higher amperage units would be advantageous.

These reports were taken very seriously by the folks in Irvington and plans for higher performance products transferred from creative minds to the drawing board and the CRE57005 Base Station/Super Receiver was born. It has the same features as the 57002 but with a much larger capability of 15 amps. This provided much greater possibilities to power larger track powered locomotives running as single or multiple units.

With the increased 15-amp performance, the 57005 RX had to be made larger than the 57002 onboard. The dimensions of the board increased from the original onboard size of 1³/₈"×2³/₈" inches to 2¹¹/₁₆"×4¹/₁₆" inches and it is polarity sensitive on the input side. DC power input must be plus to input plus and minus to input minus as the warning label advises. Like the 75002, it was designed with the same 6-function auxiliary harness, but has an additional power socket for sound modules.

With the new capabilities and features of the CRE57005 Super (Base) Receiver, it can also handle the additional load of multi-locomotive consists using battery power. The increased size of the 57005 board does require some special considerations when used as an



onboard receiver. Many folks who used the older 55471 27 MHz 10-amp receivers in battery cars, larger locomotive shells and tenders, find that the 57005 can be installed the same way. The image below shows a Super Receiver installed in a standard box car used to control a four-unit ARISTO-CRAFT FABBA consist operating as a single unit.

This particular installation is controlling a Soundraxx Sierra Diesel module and shown with the ARISTO-CRAFT CRE57090 TE PWC-to-Linear adapter which must be used with the Sierra Diesel modules when



using either the 57002 or the Super Receiver.

With a bit of creativity, the Super Receiver can be installed in many different diesel locomotive shells and larger steam tenders to provide the amperage and control necessary to run larger locomotives and larger locomotive consists such as Big Boys, Challengers and brass 1:20.3 steam locomotives.

The CRE57005 2.4 GHz REVOLUTION Base Station/Super Receiver is a very versatile product that can be used to control both trackside and onboard applications with DC input of 12 to 30 volts. And, like its little brother, it has the same features, programs the same way, can trigger as many as six functions, and can provide power to sound modules and lighting. ♦

2011 Aristo-Craft Club Car



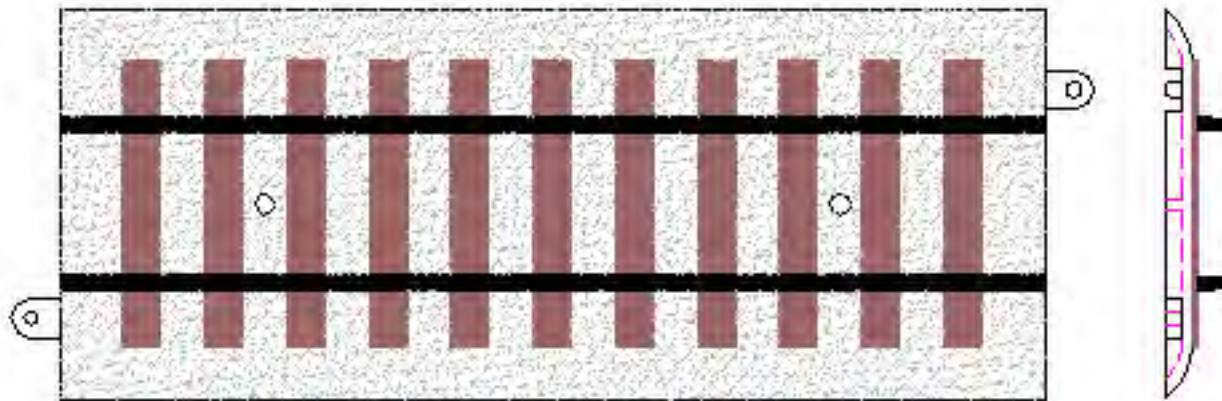
2011 Club Car • 2-Bay Hopper, Public Service

The **2011 Official Aristo-Craft Club Car** will be a 2-Bay Hopper with plastic wheels at \$50.00.* It's a Reddy Kilowatt Public Service car. You may add a metal wheel car set for an additional \$20.00 when ordered along with the car. We're only making two road numbers on this one, so there will only be two order numbers for the car and one for the special metal wheel car set at the special price.

The numbers are **ART41898C-A** and **ART41898C-B** and the metal wheel set only when ordered with the club cars is **ART29111C**.

These can be ordered online through the ARISTO-CRAFT Online Store under Club. As soon as you login to the Online Store, you go to the right hand side of the page where it says PRODUCT LINE. Click on it and go down to where it says CLUB ITEMS. Then click the SEARCH button. Please note that SHIPPING CHARGES WILL BE APPLIED TO THESE ITEMS.

Why is Aristo-Craft developing plastic track?



ARISTO-CRAFT is a full-service manufacturer, with a great overview of the marketplace. We have seen over a million people visit a great layout in Pomona, California and not has a single person purchased a starter set when retailers have set up a small on-site store. Everyone loves a train – especially in the garden. *Garden Railway Magazine* is the most reliable guide for enthusiasts in the hobby, and their readership is some 33,000. Not bad, but why not 3,000,000, or more as gardening is the number one hobby in the country.

We think it's the cost of track, the intricacies of wiring and conductivity, use of an expensive power pack, the need to trench out the layout, the building of trestles to keep the layout relatively level, the intricacies of DCC and somewhat less the REVOLUTION, the cleaning of the track regularly, reverse loop wiring and just the fear of electricity out-of-doors.

So... What can ARISTO-CRAFT do in order to expand the size of the marketplace?

We've decided to make a basic REVOLUTION using 2.4 GHz, but not with the expensive hopping used in DSSS. This will be a lower cost version that will link with a receiver, but not to hop. With this system will be Li-On batteries, but limited to a lower voltage to keep the costs down. The receiver, kept in a trailing car, will operate the consist

for at least an hour and the battery can be quickly recharged. You may alternatively have a second battery always in charge to be swapped out as needed. Fortunately, we are capable of making the radio control portion with less operational features and thus a lower cost.

The less costly, but reliable, glitchless radio will help in itself, but when paired with plastic track makes for a more affordable hobby. Since your train is operated by battery, you no longer need metal track (track prices resulting from increased copper costs have risen in price exponentially over the last several years).

Our plastic track will be made out of an engineering plastic with chopped carbon fibers for toughness and minimization of expansion. The temperature range will be from 160° to -60°F., and thus operable anywhere in the United States. The track will have its own roadbed and thus make it easily usable indoors without carpet dust problems. It can also be laid directly on the ground without digging a trench as it has its own drainage and locks together without joiners. In the northern part of the country you might want to put the track on bricks which have a stronger base that does not move like track mounted on gravel in a dug pit. Heaving during winter can be a big problem and track often has to be adjusted each spring.

This is not an extruded rail that is

difficult to hold its curves, but rather a single-track block that is molded with its roadbed in a single piece. Each section is molded separately, and the rail cannot lose its shape. The rail is a super hard, engineered plastic and will withstand the friction of the metal wheels commonly used.

This is a project for 2012 and will not be released until full testing is done. The drawing designs are completed, and we will be testing in the last quarter of the year. It is our belief that this will allow many times more people to get into the hobby – especially children. We want millions of hobbyists involved, and these are the moves we think will make it happen.

We can make track out of a lower cost plastic for indoor use or for outdoor use using the same molds, so the prices will be available both ways. However, we need a long period of testing to make sure it does what we want. We have designed a joiner that will allow the new track to match up with current switches and crossings, but if the concept is accepted, we will also make switches and crossings in plastic.

While we don't like talking about projects in advance, this is so new conceptually that we want you to contemplate how you can use this new combination of R/C and track.

All the best, ♦

Lewis Polk

An INSIDER Newsletter Look at the Revolution

- Obviously, we chose to make an alternative to DCC, as we would be just another player in a long list of DCC competitors. It was partially a commercial decision and partially a desire to expand the market with a less “techies” way to operate trains.
- Just as obviously, we thought there were many pluses to radio control using 2.4 GHz and a Wi-Fi like system or we wouldn't have made the extreme effort to make an option to the way trains are controlled. Therefore, we need to point out some of the differences.
- Yes, we think our REVOLUTION is different than DCC, though we have yet to implement all of the features. While it's true that a few dozen experts have worked on DCC, hundreds of thousands have worked on the 2.4 GHz Wi-Fi standards for use with computer wireless networks and telephone communications protocols.
- Our engineer is a highly experienced one from Hitec in the model RC field and knew how to implement RC to the train field as a designer of our trains for many years as well. This was not a stab in the dark, but a concerted plan based on experience in both fields.
- Firstly, the signals in the REVOLUTION go directly to the engine, without sending a signal to the track that is not always electrical continuous or relatively clean as does DCC.
- Our transmitter was made to look like a comfortable old style mobile phone, so our older market will not be intimidated in usage. We were not looking for the teenage game player market.
- Our transmitter can store an unlimited number of locos, not just the fifty we've told you about. Just change groups up to 999 times 50, which is more than even a Guinness record would ever conceive. No more memory modules need to be added ever as we have selected a chip with a huge amount of memory to start with. The groups are practical for clubs using modules or running multiple layouts in the same vicinity, at a show for example.
- You can link as many locos as you want within the fifty in a group and see the assignments on the graphic, backlit screen by pressing the “*”. We hide the actual link number as there are 64,000 possible links and it's inconceivable that two will ever overlap the computer-generated number. The computer chip checks to see what is open when it assigns a link and will hop to another number if that one is in use.
- Due to the assignment of frequency of the transmitter to the receiver, you can't copy from one transmitter to another at this time, but two different transmitters can control the same locomotive. You can copy one loco to another within the same transmitter, so at worst you manually have to re-enter the general settings one time in each transmitter and then make the minor adjustments needed.
- Four digits to identify the road number of a loco is the real world as no loco has more than four numbers as a road number. Since it's unlikely any one transmitter will be controlling more than fifty locos at a time, it is a theoretical mind game to worry about more locos that only design engineers would worry about. Such logic adds overkill complications to what most users really want in a system.
- We didn't add test to label faster or slower on the buttons on the transmitter as no one reads these while operating and it's so obvious, even my three-year-old grandson figured it out in seconds by following the arrow indicators. Again, only a theoretical type engineer would obsess about such a thing and not care about real world usability.
- We only allow six cabs in a consist. Certainly, we could have made any number allowed up to thousands, but again in the real world not many have more than six locos running together in a consist in our G market. We went for practical and easy to understand reality, not theoretical possibility. If anything, we can make it ten locos if there is a demand for it.
- With the revolution you can get a loco to crawl even without any perceptual motion. There is no BEMF in the Revolution at this time, as we don't believe it actually sees the correct feed back; especially if there are two to four motors to choose from. In H.O. there is usually just one motor and it does work correctly in that circumstance. We can achieve similar crawling results with our speed curve settings as R/C plane operators have controlled speeds for decades. Just set the start speed to zero and speed step controls to one, plus a momentum setting of zero and see a virtually imperceptible crawl.
- You can change the loco's characteristics even while the train is running and no programming track is needed

(Cont'd on next page.)

ever. The only thing you need to have the train stopped for is the linking process as the train will immediately change and perhaps derail if the new settings are not similar. You only have to link once in the life of the loco unless you want to, but with DCC, I believe you have to reprogram any time you have your base station shut down with a track short. While DCC is trying to modify the need for a programming track, the REVOLUTION is still far ahead in the ease of programming. You do not have to memorize hundreds of different code settings: you can program on the fly and without needing to refer to a manual. It's all on the screen and saved in the transmitter! All your locos are saved in the transmitter saving the need for using a base station. This is less costly and more efficient.

- Also, the programming is kept forever and never loses the commands as they are in the transmitter with a CMOS style memory that is maintained forever even when the battery is out. DCC locomotive chips can and do lose memory, and need to be re-programmed.
- Yes, you might need to reprogram characteristics of a loco when removed from a consist, but this can be done on the fly from the transmitter without having to re-link. Changing a light direction couldn't be easier and can be done in seconds.
- Lights take more current capacity than does a train motor, so we have moved this need off the main board onto a smoke/accessory add-on board. Lights and smoke do more to damage boards than anything else and need to be segregated. We're sure many others will follow this design concept in the future.

➤ The REVOLUTION is a complete network system, not a centralized computer like a mainframe. Most computers today are independent computers, not relying on the mainframe (base station) for all instructions like they were some thirty years ago. Our chip in the transmitter allows for control of some 64,000 nodules without time degradation and there can be up to 64,000 functions controlling up to 64,000 locos. This is a ridiculous amount of numbers to consider for a model train layout, but again it's the theoretical engineers who worry about this. In the real world it just works with blazing speed without you having to consider how it works.

- How many of you have waited in airports, because the central computer was down or the same for the base station at clubs using DCC. Well, this will never happen with the REVOLUTION, as it's a dispersed network.
- We have heard of some overheating of the receivers, but it's unlikely unless you are using more than one locomotive per receiver. The five amp continuous current is a real QC standard and it's highly unlikely a single engine could cause an overheat condition. If the engine has that amount of draw as perhaps a huge die cast engine might, then we recommend our fifteen amp super receiver. Overheating problems we have physically received in house have been mis-wiring, usually to lights.
- We have never been able to duplicate a dropping of a signal and all we can think of is a low battery condition or a users cold soldering, so check your batteries before beginning a day of running.
- We did take three years to develop the REVOLUTION, but that was because we purchased

development systems from several chipmakers and it took a long time to analyze which best fit our needs. It only took six months for actually getting the system developed once we chose the winning chip from Texas Instruments.

- The REVOLUTION does use eight mosfets to control heat and motor control, which works as designed. We have never seen a heating problem returned to us unless it was mis-wired.
- We used a frequency of 17.9 kilohertz and motor hum is not heard within the human hearing range at that level.
- The six output pins can and do operate at 50 kHz, but only is typically used one at a time. The theoretical combined three Ohms will never likely be reached.
- We had a single bad first production of the positive and negative wires on one run for the single capacitors and have replaced any boards with bad wiring as we were notified. This should not have happened and will never happen again. The current capacitors will continue to be used and have not operated incorrectly if wired correctly, as they are now.
- Some other soundboard makers have not added needed bridge rectifier boards and have caused our boards to burn up. We make an inexpensive bridge rectifier available until other makers learn to add these themselves to their boards.
- We do have two-way communication, so the speed indication is accurate to the motor speed without needing inaccurate BEMF readings and we do have a direct overheat warning coming directly from temperature sensing of the motor.

(Continued on next page.)

INSIDER *(Continued)*

Also in the works is a triggering device with unlimited number of inputs for use with signals, crossing gates and other remote triggering accessories. This is an infrared system that will work out of doors for 15 ft. even in sun light. So many sensors are being made for hand washing systems that the prices are now reasonable and will work millions of times between failures (MTBF).

In general, we have created a new system that operates differently and is more in line with the Wi-Fi world that most people are used

to today. The ease of use and the combined track power or battery options, as well as the backlit graphic screen, have given the marketplace a clear choice. So far the public is voting with their dollars and our growing sales are a clear indication of their direction. We will have a basic train engineer at 2.4 GHz to introduce people to the REVOLUTION and they will likely trade up to the full model as soon as they see all these advantages.

Both Microsoft and Apple changed our technology when new single computers on a

chip became available and they introduced personal computers. It was reasonable to also bring new technology to the model train field when new RF chips were developed in 2.4 GHz with a complete network on a chip. We are not likening ourselves to these companies, but change is inevitable.

As a company with our feet in both the RC and the model train field, we were positioned to make this happen. Competition is the way of America and we are glad to participate in this venue.

Lewis Polk ♦

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The Aristo-Craft Railroad Club: A Bit of History (Year Two—1995)

by Harry Hartman

The second year of the ARISTO-CRAFT Railroad Club was a special year for the Polk's, as it was the 60th anniversary of Polk's Model Craft Hobbies, Inc. To commemorate that milestone, and the second year of the club, the club offering would be an ARISTO-CRAFT Covered Hopper. There were some different graphics found on each side of the grey covered hopper. The ARISTO-CRAFT Club lettering and car data information



were the same on both sides. What was different was on one side of the car was a drawing of a five or six story building with POLK at the top of it. Above this building were the word “Commemorating”, then off to the right corner of the car it said “our 60th year, 1935-1995.” To the left of the building was a blue circle with graphics of some of the hobby lines the store carried. Again, for 1995, the car carried the names of Erwin and Nathan Polk. If you turned the car around to the opposite side, on the right

hand side of the car it said “Today, Tomorrow, and for the Future.” Under that you found the now, very recognizable RED diamond with the wording we all know when we see the red diamond, “ARISTO-CRAFT Trains” and the words ARISTO-CRAFT in a crest with the same blue circle found on the other side in the top middle of this crest but smaller. Again, it contained four graphics of lines of products ARISTO-CRAFT carried (it appears they were airplanes, trains, boats, and electronics). It truly was a “billboard” railroad car – very colorful. The top was blue with black hatches with black ends and under frame. Lots of brass rails and grab irons all over the car. The 1995 application blank said the cars would be available AFTER March 1st, 1995. This was my first year as a member of the club. I received a letter that told me what all I would receive for my 1995 membership. I received a membership card, signed by Lewis with my membership number on it. A membership certificate, suitable for framing, the 1995 price list, an ARISTO-CRAFT Trains Pin, and the 1995 Color Catalog. The 1995 membership fee was \$50.00.

There was no doubt what you were receiving in the mail when you received your “Official Club Car.” The long side of the shipping box said in big lettering “ARISTO-



CRAFT Trains Railroad Club” and in smaller letters below it said “1995 Special Edition 2-Bay Covered Hopper.” The end of the box gave the ARISTO-CRAFT catalog number for the car, which is ART41295, ARISTO-CRAFT Trains Railroad Club and then Serial Number with a blank line for the cars serial number to be handwritten in. Mine was not written in and I assume it was to be your membership number. ♦

2011 ARISTO-CRAFT FALL ECLSTS CAR



- ☞ 100-ton Pennsylvania Power & Light Coal Car
- ☞ Comes in **three** road numbers (102, 105, 107)
- ☞ **Comes with plastic wheels**
- ☞ Price: \$50.00
- ☞ Metal wheels will be available for purchase at the *Show Car Booth* and will cost \$20.00 a pack. (One pack will do one car.)
- ☞ Remember to **buy your show cars early. if you can not make it to the show on friday, get a friend to pick up your cars for you.** Avoid the disappointment of an early sellout.



Parts List • March–April 2011



Parts List • May–June 2011



Parts List • July–August 2011



All About Parts & Aristo-Craft

by Lewis Polk

While parts seem like a staple of business, I have found that it's far more complicated than it seems. First, we need a finished product with all changes made. Then, we hire a specialist cad-cam engineer to make the exploded view drawings, which is a special skill set. After it's drawn, we have to make new style numbers that are easily identifiable using the actual style number of the product, plus a separate number.

After this is properly assigned the drawing is sent to the factory, where a team of people enter this list into their computer. Once it's in their computer a group of engineers have to price out the parts along with the source and lead time to make along with minimum quantities. Our minimum on parts is 1,000, but we can get 200 of each when ordered simultaneously with the purchase order from us. At that point the factory is just adding on 200 to the production quantities and it's far more efficient.

Once the costs are figured, the factory sends the quotes back to us, and we have to enter it into our database with the costs. Fortunately, as these parts, descriptions, and prices are entered into our computer the part instantly is available for the customers to see. Six months later the parts arrive, and we now enter the receipt along with the quantity that arrived.

At least now we have entered the most common parts that have been ordered over the last 10 years, and the computer can control the inventory as it sells out. We can only re-order after the product has sold out, and we are making a re-order of the product. However, we now have a handle on the process and will be able to judge the rate of sales. Our goal is to have 90% of the parts on hand always, and computerization will allow this to happen.

As our purchase cycle completes through all our products, we will achieve this level of inventory. It takes a lot of time for the cycle to reach goal and a lot of computer entry work for the factory and us as well. Formerly, we would just say add 5% parts, but after a few runs we're out of the key components and we have a multi-year hangover of slow moving parts.

No one understands how important it is to have parts to fix very expensive products more than we do. Making it happen took much cooperation with our production factory and their willingness to computerize the parts in coordination with our effort. We used to print a parts book in the past, but today we have it up on the Internet as a PDF, so everyone can print out a copy of their Aristo product and then order the part on our Internet store. You will be able to see what parts are on

hand, coming in and on order.

In the past few weeks we received full stocks of parts for the Mallet, Pacific and the new Consolidation. You can see a full listing of the parts received in this Insider, and we will continue to update you on the parts receipts in each issue of the Insider.

Please don't forget it's a 6-month interval before ordering and receipt of the goods, but we will try to keep a year's supply on hand. We are catching up with a few more exploded parts drawings of the GP-40 and the E-8, which should be done about the time you are reading this. However, we still have to get parts quotes after the numbers are assigned to place an order.

I hope that other maker's will provide you this level of service, and I'm sorry that the decline and bankruptcy of our old factory did not allow us to make this happen until now.

You can imagine the entering of tens of thousands of parts, pricing all those parts at the factory and then entering the receipts was a large effort by many people. However, our large enterprise computer did make this possible and the factory also put in a new computer and software that was complicit in allowing this all to happen.

The receipt of the parts in this issue indicates parts that will start coming in the next 12 months. ♦

Are you ready?

The Fall ECLSTS is right around the corner!



The Fall ECLSTS will be here before you know it. As the old song lyrics said, "She'll be coming round the mountain..." September 23rd and 24th is not that far away. I don't think we will have to worry about the four letter word then... S-N-O-W. As I am writing this, it is noon and it is 92 degrees—*good railroading weather!*

The Fall ECLSTS for 2011 will be a little different from the previous Fall shows. We are not going to rent the layout hall. We will be concentrating on filling the vendors hall. Yes, we will have a couple displays. As I write this, I know of two displays that will be there. The decision was made to concentrate on the vendors hall until the economy gets moving again. Many of you garden railroaders enjoy coming to the East Coast Large Scale Train Shows because you know it will be 95% G Scale. Yes, occasionally another scale will sneak in, but we try to keep it 100% garden railroading. Many of you like the two-show format, and we plan on keeping it that way. In watching the ARISTO-CRAFT Forum, I have seen some new people come aboard

and several of you have suggested that they come to the ECLSTS. I am sure you realize that by getting more people to the shows helps you. It will create more attendance, cause more vendors to want to participate, and buy some booth space, which will cause more people to attend. This cycle will help the show to grow as more vendors will cause more people to come to look for those items and buy them at the show. Your "word of mouth" advertising of the shows is much more cost effective than buying some TV/cable advertisements at several thousands of dollars. As I have said before, you can help your local club grow and help the show by submitting an article about your club members going to the ECLSTS as well as putting in a plug for your club, dates and times. It all works together.

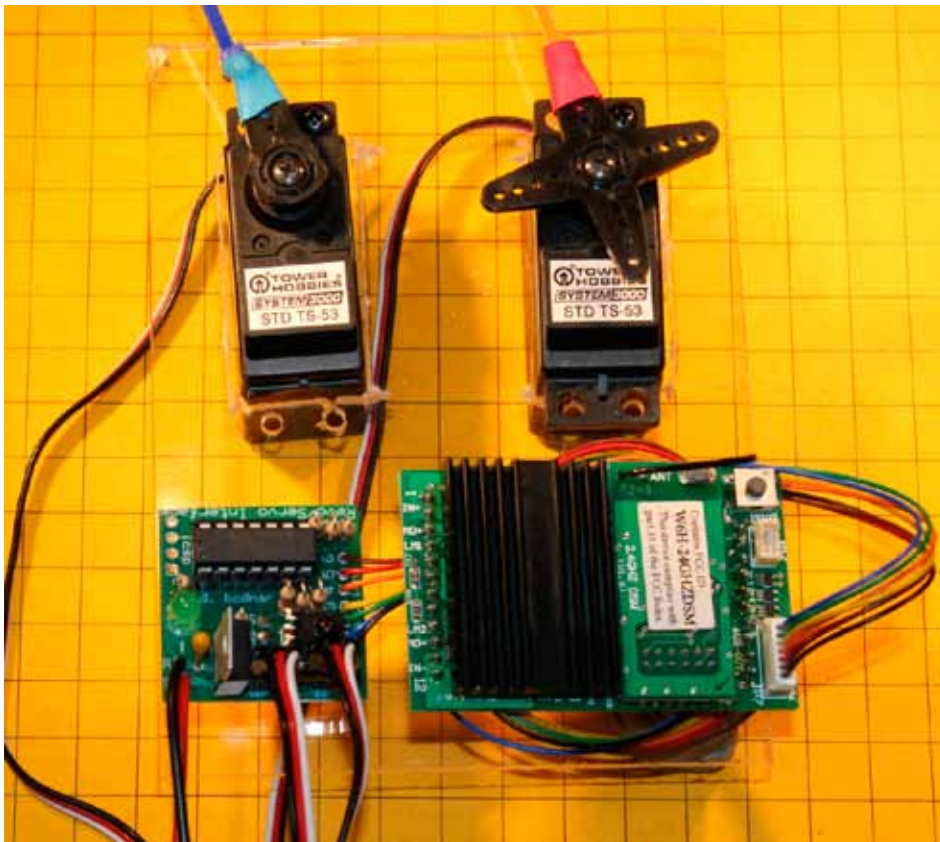
Don't forget about the Fall Show Car—the Pennsylvania Power and Light 100-ton Coal Hopper. It will come in three road numbers and have PLASTIC WHEELS. The switch to plastic wheels is to help keep the cost of the show car at \$50.00. There will be metal wheels available for purchase at the show car booth for

\$20.00 a pack. One pack will do one show car. I can't emphasize enough: *If you want any of the Fall show cars, you need to be at the Fall ECLSTS or have someone buy it for you.* Avoid the disappointment of an early sellout. Remember no mail orders and no phone orders; these cars must be purchased at the show. From the "talk" I hear about this car, it too may sell out early.

Don't forget to make your hotel reservations for the September show. The Holiday Inn Conference Center of York, Pennsylvania, is the official show hotel and is located at Route 74 & US 30, 2000 Loucks Road, York, Pennsylvania 17408. For reservations the hotel front desk phone number is 1-717-846-9500. In order to get the show discount you must use the group code of EAS. You can also make your reservations online. The show rate is \$89.00 for a double occupancy room (plus taxes). It features excellent rooms, nice breakfast bar, bar/lounge, and it is very convenient to the York Fairgrounds

Check the September-October issue of the *INSIDER* for a list of vendors and a list of seminars for the Fall Show. Ask your favorite vendor if he has signed up for the September show, and if he has not, encourage him to become a vendor for the Fall Show. The new shipment of mallets, pacific's, and consolidations will be available at the show. Hope to see you there. Remember, September 23rd & 24th will be here before you know it. Watch the ARISTO-CRAFT Forum and the www.largescaletrainshows.com for additional information as it becomes available. ♦





ARISTO-CRAFT REVOLUTION Servo Interface

by Dave Bodnar

I have been working with ARISTO-CRAFT on the development of the REVOLUTION radio control system since November of 2006. During that time the REVOLUTION has matured into a full featured, reliable and robust system for controlling our trains that has been adopted by many, many model railroaders.

There is, however, one thing that it does not do that keeps one group of garden railroaders from using the REVOLUTION: there is no built-in



capability to control a servo. As you may know, servos are small geared motors that are commonly used to move the control surfaces, steering arms, and throttles on radio control model airplanes, boats, and cars.

This lack of servo capability keeps the REVOLUTION from being used to control live steam locomotives and other vehicles or accessories that require that some lever or arm be physically moved to and held at a particular position. There is more information about servos on my web page at: <http://goo.gl/DfCkn>

This issue first came to my attention when a gentleman posted a question on the Aristo-Craft forum. He had tested the REVOLUTION receiver to control the speed of a Jersey City G Scale Tug Boat. It worked well with the electric motor but he could not use the system to steer the boat as there was no way to operate a servo that was

connected to the tug boat's rudder.

I saw his post and gave his problem some thought. My response was that using the REVOLUTION to control a servo certainly was doable and it could be accomplished by creating a microcontroller based interface between one or several of the six auxiliary control buttons on the transmitter and one or two servos. You may recall that there are six auxiliary outputs available on the REVOLUTION that are normally used to control a smoke unit or sound card. These are numbers 1 through 6 on the keypad.



What follows is a detailed look in the development and creation of the REVOLUTION Servo Interface, an accessory that allows the REVOLUTION to be embraced by most garden railroaders.

First Prototype

The Servo Interface started as a simple device that would use button 1 on the REVOLUTION transmitter to move a servo's arm to the left (counterclockwise), button 2 to move the arm to the center position and button 3 to move the arm to the right (clockwise). A second servo could be added that would be controlled in a similar fashion with buttons 4, 5, and 6.

I quickly discovered that what I had hoped would be a simple device with simple software would need some specialized features to deal with the way that the REVOLUTION reacted when a button was pushed on the transmitter. The problem that I ran into stems from the fact that each button push on the REVOLUTION's transmitter turns on the corresponding auxiliary output on the receiver

(Continued on next page.)

Servo Interface *(Continued)*

for not just a moment, as I had hoped and as the setting “momentary” implies, but for nearly a full second. This might not sound like much of an issue, but it makes precise control over the position of a servo’s arm problematic.

I dealt with that situation by programming two servo movement speeds into the microcontroller. When a button is pressed only once or for just a brief time the servo arm rotates only about 1 degree. If the button is held down for more than 2 seconds the arm begins to move more rapidly. This two-speed control allows the servo’s arm to be placed with good precision, certainly within a degree or two while allowing you to move the servo arm rapidly should that need arise.

A “proof of concept” unit was built and programmed as described above. It worked well, but several things were missing.

Needed: A Real User Interface

To make this a flexible and full-featured unit I felt that the end user had to be given the ability to fine tune the operation of the servo interface to meet his or her needs. Things like limits on how far the servo arm could move to the left or right and the speed which movements took place needed to be controlled.

Ideally this configuration would be done within the user interface on the REVOLUTION transmitter itself. Unfortunately, I had to design the interface so that it could interact with the REVOLUTION using only the functions and functionality that were currently installed in the REVOLUTION transmitter limiting me to the use of the six auxiliary input buttons.

I considered adding a few buttons and potentiometers to the servo interface board but hit on what I think is a more elegant, capable, and user-friendly solution. I had recently developed a plug-and-play auto-reversing controller for ARISTO-CRAFT’s new PCC trolley. All speed control and configuration on that unit was done with a basic hand held infrared TV remote control unit.

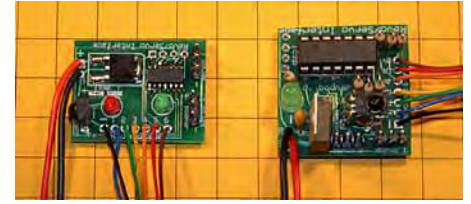


I decided to give that method of configuration a try on the servo interface. As you will see it worked out very well!

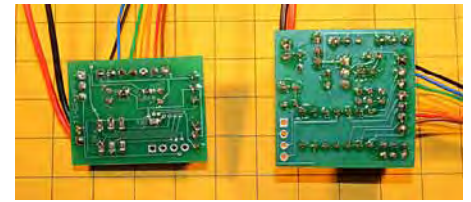
Hardware

The Servo Interface comes in two functionally identical but physically different styles. The first uses traditional “through hole” components. Through hole means that the leads on the devices on the board go into holes on the circuit board and are soldered to the board from the back. The other style uses “surface mount” devices. These components, as their name implies, are soldered directly to the top or

bottom surface of the circuit board. This allows a smaller board to be designed. In these photos, the surface mount unit is on the left and the through hole is on the right.



Note that the surface mount version has several components soldered to the back of the board.



The through hole version measures 1.25"×1.25"×0.875" high while the surface mount version is 1.25"×0.9375"×0.5".

Both of the boards contain a microcontroller, a voltage regulator, an infrared receiver, two LEDs and assorted resistors and capacitors. The key to keeping the component count down is the TV remote control that is used with the infrared receiver on the interface to control all settings, adjustments, and configuration.

The small red LED, which is directly behind and under the infrared receiver on the board, flashes whenever the TV remote control is used. It is there to let you know when the interface is “hearing” the TV remote. If you press a button in the TV remote and the red LED does not flash try moving the remote control unit closer to the interface board.

The green LED is used to give you feedback on commands that the interface receives and to let you know when it is ready to receive a command.

Connections

To connect the Servo Interface to the REVOLUTION receiver you need to solder the seven leads of the auxiliary wiring harness that is included with each receiver to the unit. The black wire goes to the

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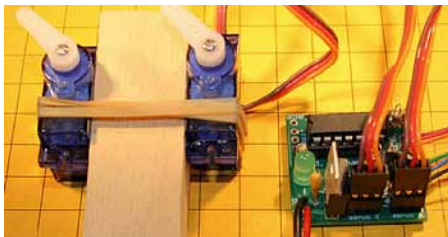
Servo Interface *(Continued)*

negative or common contact. It is labeled “-” as shown in this photo. The blue wire goes to the contact labeled “1”, green to “2”, yellow to, “3” and so on.



It is unnecessary to connect all six of the auxiliary control wires to the interface. If you are only planning on using one servo, as would be the case with the rudder control for the tug boat, you would only need to connect three of the wires plus the common lead. You could get away with only two wires if you only wanted to control left movement and right movement skipping the lead that immediately centers the servo. By using fewer of the control wires you could leave some to operate a sound unit, smoke control board, or other accessory.

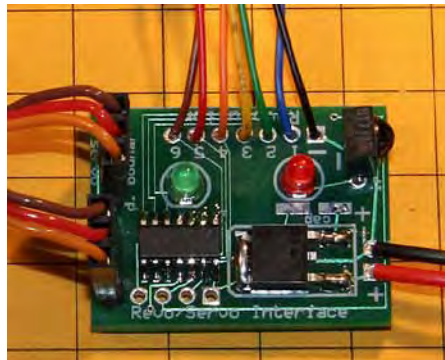
The board, interface cable for the REVOLUTION receiver and two micros servos are shown here. Note that the negative lead on the 3 wire servo cable goes to the left. With these servos that is the brown wire, on other servos the negative lead is black in color. There is a small minus sign next to the negative pin on the circuit board so that you can see where the black (or brown) wire goes.



The red and black wires that exit the board in the bottom left go to a source of DC power. This power connection can be to the same battery or other power source that is used by the REVOLUTION receiver. Both the revolution receiver and the servo interface will work with DC voltages between 8 and 24 volts. Lower voltages will allow the system to run

cooler. The REVOLUTION receiver is not polarity sensitive but the controller is. Just be sure to observe proper polarity, red to positive (+) and black to negative (-). If you are running from track power where the polarity can change, you will need to install a simple bridge rectifier to maintain consistent polarity to the servo board. (Bridge rectifiers are discussed in detail on my web page: <http://goo.gl/VnXD1>)

The surface mount version of the circuit is significantly smaller than the standard version and is the best choice if space is at a premium. The servos connect to the left, as shown. The REVOLUTION receiver connects to the contacts at the top, and power comes in from the two contacts on the right.



Software

Designing and fabricating the hardware for this interface was by far the simplest part of the project. Writing, revising and debugging the software took more time and effort! The code for the program spans 12 single spaced pages and all but fills the microcontroller’s memory space.

Each time the interface is turned on its green LED flashes out the version number of the software. For example, if the version of the software is 2.5 the LED will flash two times, pause briefly and then the LED will flash five times.

There are two separate sections of software in the controller. The first receives input from the REVOLUTION receiver via the auxiliary wires and moves the servos as they are configured. The second section interacts with the TV remote control and allows the user to change the characteristics and behavior of the servos.

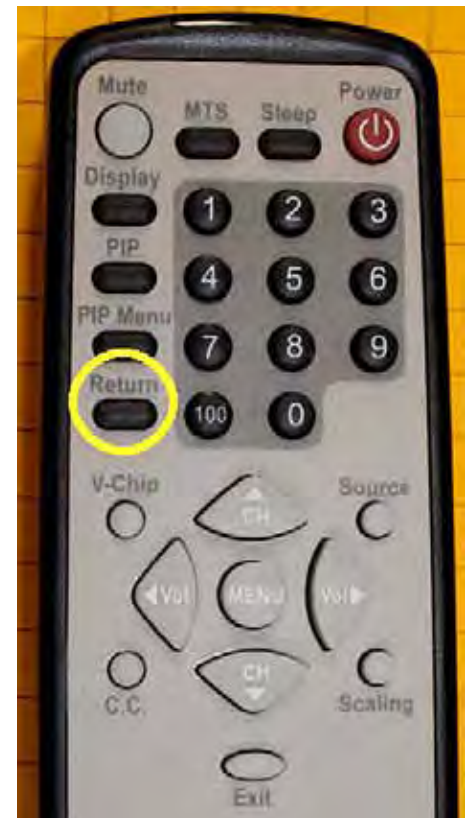
As delivered the servo controller does the following when buttons on the REVOLUTION transmitter are pressed:

Revolution Button	Default Action
1	Servo 1 moves counterclockwise. A brief button push moves just a little while holding the button moves faster
2	Servo 1 is moved to its center position
3	Servo 1 moves clockwise. A brief button push moves just a little while holding the button moves faster
4	Same as button 1 but for Servo 2
5	Same as button 2 but for Servo 2
6	Same as button 3 but for Servo 2

These behaviors can be changed by using the TV remote control.

Configuration with the TV Remote Control

The TV remote is used to modify the controller’s behavior. To enter the configuration mode put the REVOLUTION transmitter aside and point the TV remote at the interface and press the **Return** button. The green LED on the interface will stop flashing and the unit will await additional commands.



(Continued on next page.)

Servo Interface *(Continued)*

TV Remote Button	What the Button Does				
1	Servo 1, set maximum counterclockwise position—use <Vol and Vol> to move the servo left and right—when it is in the desired position press MENU .				
2	Servo 1, set center position—use <Vol and Vol> to move the servo left and right — when it is in the desired position press MENU .				
3	Servo 1, set maximum clockwise position—use <Vol and Vol> to move the servo left and right—when it is in the desired position press MENU .				
4	Servo 2, set maximum counterclockwise position—use <Vol and Vol> to move the servo left and right—when it is in the desired position press MENU .				
5	Servo 2, set center position—use <Vol and Vol> to move the servo left and right — when it is in the desired position press MENU .				
6	Servo 2, set maximum clockwise position—use <Vol and Vol> to move the servo left and right—when it is in the desired position press MENU .				
7	Alters behavior of Servo 1—After pressing button 7 you can use these commands: <table border="1"> <tr> <td>Key 0</td> <td>Button 1 on REVOLUTION moves servo counterclockwise in small increments, button 2 on REVOLUTION moves servo to center, and button 3 on the REVOLUTION moves the servo clockwise in small increments (default behavior).</td> </tr> <tr> <td>Keys 1->9</td> <td>Buttons 1 and 3 on REVOLUTION causes fast move of servo to set position, and button 2 on REVOLUTION moves servo to center. Selecting 1 moves the servo to the set position most rapidly, while selecting 9 moves it very slowly. Buttons 2->8 give proportionately higher or lower speeds of movement.</td> </tr> </table>	Key 0	Button 1 on REVOLUTION moves servo counterclockwise in small increments, button 2 on REVOLUTION moves servo to center, and button 3 on the REVOLUTION moves the servo clockwise in small increments (default behavior).	Keys 1->9	Buttons 1 and 3 on REVOLUTION causes fast move of servo to set position, and button 2 on REVOLUTION moves servo to center. Selecting 1 moves the servo to the set position most rapidly, while selecting 9 moves it very slowly. Buttons 2->8 give proportionately higher or lower speeds of movement.
	Key 0	Button 1 on REVOLUTION moves servo counterclockwise in small increments, button 2 on REVOLUTION moves servo to center, and button 3 on the REVOLUTION moves the servo clockwise in small increments (default behavior).			
Keys 1->9	Buttons 1 and 3 on REVOLUTION causes fast move of servo to set position, and button 2 on REVOLUTION moves servo to center. Selecting 1 moves the servo to the set position most rapidly, while selecting 9 moves it very slowly. Buttons 2->8 give proportionately higher or lower speeds of movement.				
8	Alter behavior of Servo 2: <table border="1"> <tr> <td>Key 0</td> <td>Button 1 on REVOLUTION moves servo counterclockwise in small increments. Button 2 on REVOLUTION moves servo to center,. Button 3 on the REVOLUTION moves the servo clockwise in small increments (default behavior).</td> </tr> <tr> <td>Keys 1->9</td> <td>Buttons 1 and 3 on REVOLUTION cause fast move of servo to set position, and button 2 on REVOLUTION moves servo to center. Selecting 1 moves the servo to the set position most rapidly, while selecting 9 moves it very slowly. Buttons 2->8 give proportionately higher or lower speeds of movement.</td> </tr> </table>	Key 0	Button 1 on REVOLUTION moves servo counterclockwise in small increments. Button 2 on REVOLUTION moves servo to center,. Button 3 on the REVOLUTION moves the servo clockwise in small increments (default behavior).	Keys 1->9	Buttons 1 and 3 on REVOLUTION cause fast move of servo to set position, and button 2 on REVOLUTION moves servo to center. Selecting 1 moves the servo to the set position most rapidly, while selecting 9 moves it very slowly. Buttons 2->8 give proportionately higher or lower speeds of movement.
	Key 0	Button 1 on REVOLUTION moves servo counterclockwise in small increments. Button 2 on REVOLUTION moves servo to center,. Button 3 on the REVOLUTION moves the servo clockwise in small increments (default behavior).			
Keys 1->9	Buttons 1 and 3 on REVOLUTION cause fast move of servo to set position, and button 2 on REVOLUTION moves servo to center. Selecting 1 moves the servo to the set position most rapidly, while selecting 9 moves it very slowly. Buttons 2->8 give proportionately higher or lower speeds of movement.				
Note: Wait for fast LED blink before hitting key 0->9					
9	Time before fast move on Servo 1 — Enter 0-9 with 0= no fast move, 1=immediate fast move, 9 long delay before fast move. Note: Press 9 briefly and wait for fast LED blink before hitting 0->9; holding 9 for more than ½ second will enter 9 as the value.				
0	Time before fast move on Servo 2—Enter 0-9 with 0= no fast move, 1=immediate fast move, 9 long delay before fast move. Note: Press 0 briefly and wait for fast LED blink before hitting 0->9; holding 0 for more than ½ second will enter 0 as the value.				

Once you are in the configuration mode, the variables in the table can be changed with the keys shown.

Press the **Power** button on the TV remote control to complete configuration. The green LED will flash out the software version and the unit will return to operating from the REVOLUTION remote control. All settings will be retained after power is turned off.

Advanced Configuration—One Button Operation

The system can be set to activate a servo from only one button on the REVOLUTION transmitter so

that it rotates from its clockwise (or counterclockwise) limit to the counterclockwise (or clockwise) limit pauses for a moment and returns to the clockwise (or counterclockwise) limit. The limits can be set as shown above and the speed of motion and pause time between the two movements can be modified as shown here. This type of behavior would be used, for example, if a servo were operating an animation like the movement of the spout on a water tank. Pushing a single button would lower the spout, pause for a few seconds then return it to its upright position.

TV Remote Button	Single button cycles servo from full counterclockwise limit to full clockwise limit or visa versa.
1	Servo 1—Same as basic configuration to set limit with <Vol and Vol>—after setting limit press a single button (from 1->9) to activate 1 button sweep—the number used is the pause between clockwise & counterclockwise in ½ second increments. Press MENU when done.
3	Servo 1—Same as above but ccw to cw movement
4	Servo 2—Same as above cw to ccw
6	Servo 2—Same as above ccw to cw
9	Rate of movement for servo 1—1=very slow, 9=very fast. Press MENU when done.
0	Rate of movement for servo 2—1=very slow, 9= very fast. Press MENU when done.

Press the **Power** button on the TV remote control to complete configuration.

Full Factory Reset

To return the system to the settings that were initially programmed into it at production follow this procedure:

Press the **Return** button on the TV remote and wait for the green LED to stop flashing. Press the **V-Chip** button—the LED will flash rapidly. Press the **Exit** button to fully reset—press the **Power** button to abort reset.

Other Vehicles and Accessories

While the interface was designed with live steam and boat rudder control in mind there are a host of other uses for servos on our garden railroads. Because a servo's arm (also called a horn) can rotate 180 degrees with a good bit of torque, they are ideally suited to control animated vignettes.

WATER TANK—I have animated the spout on several water tanks. It is a simple matter to hide a servo in the tank and run linkage out to the spout so that it lowers and raises with the movement of the servo. There is a video of this animation at the link at the end of this article.

(Continued on next page.)

Servo Interface *(Continued)*

ELEPHANT TRUNK – A more difficult animation was done for Pittsburgh Children’s Hospital. It involved mounting a micro servo in a Playmobil elephant. Details on the installation are on my web page at: <http://goo.gl/zol38>

PRAIRIE DOGS – A group of prairie dogs were animated to pop out of and back into their holes for a layout that was built for Pittsburgh’s Phipps Conservatory. Details are here: <http://goo.gl/KwFYN>

OUTHOUSE, GARAGE & OTHER DOORS – The link above also details how an outhouse door was animated with a servo. It is possible to use servos to animate nearly any type of door or gate.

RAILROAD CROSSING GATES – Micro servos are ideal for building animated crossing gates. They have sufficient torque to lift and lower the arms and can be made to move very slowly. Many commercial units use servos for this purpose.

SWITCH POINTS – If you want to switch points on your turnouts that move really, really slowly you can connect them to servos. This is exactly what I do with the automated switch back line on my HO module. Details are here: <http://goo.gl/aQ9rN>

SPOTLIGHT MOVEMENT – With some reprogramming of the

servo controller it can be modified so that it “pans” a searchlight back & forth across an area. I recently experimented with such an animation: <http://goo.gl/sYz64>

TREE FALLING – A very realistic animation of a tree being chopped down was done for a recent outdoor community layout.



Here is the servo connection to the hinged tree trunk. Note the spring that helps to supply power to put the tree back into a vertical position.



Some photos of the layout and a video of the tree animation are here: <http://goo.gl/ztLgZ>

And Many, Many More!

Servos are so versatile that there is no end to the things that they and the REVOLUTION can animate. How about playground equipment, circus swings, a flag going up and down, more animal movements? How about some animated circus animals in moving box cars? The list is endless.

For more information about the servo interface, or if you have ideas for other servo behavior settings or have a need for custom programming of the servo controller, please contact me (Dave Bodnar) at:

info@trainelectronics.com

Video

This video serves as an introduction to the interface and how it operates. If you have questions, please contact me at:

info@trainelectronics.com

<http://goo.gl/B7BUr>

This video shows two additional features – doing a factory reset and controlling the motion of a servo from only one button:

<http://goo.gl/pUIFI> ♦



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Les Trains de Daliplumes, Villiers sur Morin, 00 33 950 87 87 10

GERMANY

All American Trains, Kaarst, Ger 49-2131-769640
Fertig Modellbahnen, Moerlenbach, Ger 49-6209-4265
Gartenmodelleisenbahn und Mehr, Eschborn, Ger 49-6173-966230
Modellbaushop Drexler, Gross-Rohrheim, 49-6245-997852
ModelleisenbahnCenterSchuler, Stuttgart, 49-711-608375
Sammler-Service Scheyern, Ger 49-8441-22-44
Semaphore Trains, Weil am Rhein, Germany, 49 7621 577317

JAPAN

Train Depot, Tokyo, Japan 813-3718-8916

SWITZERLAND

Bigtrains&more Ltd, Sissach, Switzerland, 61 971 6615

UNITED KINGDOM / ENGLAND

Garden Railway Centres, Cheltenham, England 44-1242-519770
Garden Railway Specialties, Buckinghamshire, England, +44 (0)1844345158
Glendale Junction, Deeping St. James, England, 01778 343183
Hobbybahn Stapeton, England. 0044-01455-847379
Kernow Model Rail Centre, Camborne/Kambroon, UK, 01209 714099
Kent Garden Railways, St. Mary Cray, England, 44 1689 891668
Martin's Models, Kington, England, 44-1544-230777
OnTracks.co.uk, Pontrilas, England, +44 (0) 8700 111 131
Scottish Garden Railway, Stirling, Scotland, 01786-464193
Spot-On Models & Games, Swindon Wilts, UK 01793 617302
Totally Trains, Herefordshire, England 44-1989-567577



New Arrival List • July–August 2011

Item	Description	List (\$US)
NEW ARRIVALS on or about 8-25-11		
__ART30380	Switch Wide Manual Left . . .	86.00
__ART29111B	Metal Wheel Set Bulk	335.00
__ART11000	Brass Straight Track 12"	122.00
__ART11003B	Track Ties Straight Euro	83.00
__ART11031	Bumper Lit	13.00
__ART11003B	Track Ties Euro Curved	83.00
__ART11200	Switch Manual Right	53.00
__ART11910	Socket Head Track Screws	7.00
__ART11930B	Rail Clamp Brass Bulk	132.00
__ART30033B	Track Ties Straight USA	83.00
__ART30300	Switch Manual Right USA	83.00
__ART30350	Switch Manual Left USA	53.00
__ART30370	Switch Wide Manual Right	53.00
__ART20370	SS Switch Manual Right	99.00
__ART20380	SS Switch Manual Left	99.00
__ART20100	SS Curved 4' Diameter	164.00
__ART20110	SS Curved 5' Diameter	212.00
__ART20115	SS Curved 8' Diameter	223.00
__ART20120	SS Curved 10' Diameter	403.00
__ART29111D	Metal Wheels Bulk D Cut	38.00
__ART12105	Rail 8' Tube	230.00
__ART12180	Alum Curved Track 8' Diam.	100.00
__ART12101	Alum Straight Track 12"	48.00
NEW ARRIVALS on or about 7-10-11		
__ART21605	Mallet C&O	920.00
__ART7206	Built Up Church	173.00
__ART20600	Consolidation Undec	891.00
__ART20601	Consolidation B&O	891.00
__ART20602	Consolidation W. Maryland	891.00
__ART20603	Consolidation ATSF	891.00
__ART20604	Consolidation UP	891.00
__ART20608	Consolidation NYC	891.00
__ART20609	Consolidation USATC	891.00
NEW ARRIVALS on or about 6-6-11		
__ART21601	Mallet PRR	920.00
__ART21602	Mallet ATSF	920.00
__ART21603	Mallet UP	920.00
__ART21604	Mallet D&RGW	920.00
__ART21605	Mallet C&O	920.00
__ART21607	Mallet N&W	920.00
__ART21608	Mallet B&O	920.00
NEW ARRIVALS as of 5-28-11		
__ART21401	Pacific PRR	725.00
__ART21402b	Pacific B&O Blue	725.00

Item	Description	List (\$US)
__ART21405	Pacific Southern Railway	725.00
__ART21407	Pacific NYC	725.00
__ART21408	Pacific Union Pacific	725.00
__ART21408	Pacific D&RGW	725.00
__ART21409	Pacific So.Pacific	725.00
__ART214114	Pacific Sante Fe	725.00
__RMT99417	Seated Figure Set (48)	49.95
__ART99418	Standing Figure Set (48)	49.95
<i>Above Perfect for PCC Interior</i>		
NEW ARRIVALS as of 2-25-11		
__ART29311	Smoke Unit SD-45	58.00
__ART7103	Water Tower Built Up	173.00
__ART7200	Freight Depot Bu	84.00
__ART22202	RS-3 Diesel Union Pacific	397.00
__ART22203	RS-3 Diesel Sante Fe Zebra	397.00
__ART22205	RS-3 Diesel D&RGW	397.00
__ART22206	RS-3 Diesel Rock Is. Rocket	397.00
__ART22211	RS-3 Diesel PRR	397.00
__ART22213	RS-3 Diesel B&O	397.00
__ART22208	RS-3 Diesel Can. Pacific	397.00
__ART22245	RS-3 Diesel New Haven	397.00
__ART2240	RS-3 Diesel Nickle Plate Rd.	48.00
NEW ARRIVALS as of 1-25-11		
__ART12190	Aluminum Track 72" Flex	234.00
__ART11921	Dual Rail Bender	225.00
__ART11005	Brass Rail 8'	364.00
__ART11060	Brass Straight 24"	212.00
__ART11070	Brass Straight 36" Straight	318.00
__ART11099	Brass Straight 5'	559.00
__ART11100	Brass Straight 12"	106.00
__ART11297	Manual Switch Machine	10.00
__ART11300	30 Degree Crossing	46.00
__ART11350	Re-Railer 12" Straight	23.00
__ART11351	Re-Railer With Diodes	23.00
__ART11510	Brass Euro Curved Track 6.5	194.00
__ART11801	Brass Euro Curved Trk 11.5	341.00
__ART11900	Brass Rail Joiners	9.00
__ART11900b	Brass Rail Joiners Bulk (50)	24.00
__ART11901b	Plastic Rail Joiners Blk (25)	30.00
__ART11910	Socket Head Track Screws	6.00
__ART11930	Brass Rail Clamps (10)	14.00
__ART11930b	Brass Rail Clamps Blk (100)	115.00
__ART30060	USA Brass Straight 60"	212.00
__ART30101	USA Brass Curved 1/2 6"	56.00
__ART30103b	USA Track Ties Curved	72.00



New Arrivals • July-August 2011 (page 2 of 2)

Item	Description.....	List (\$US)
__ART30112	USA Curved Track 6.5'	194.00
__ART30116	USA Curved Track 9'	267.00
__ART30121	USA Curved Track 11.5'	341.00
__ART30122	USA Curved Track 12.5'	368.00
__ART30125	USA Curved Track 20'	592.00
__ART30195	USA Straight Track 5'	559.00
__ART30115	USA Curved Track 8' (16).. . . .	237.00
__ART30120	USA Curved Track 10"	293.00
__ART30370	USA Switch Remote Right	75.00
__ART30380	USA Switch Manual Left.	75.00
NEW ARRIVALS as of 2-5-11		
__ART41801e	2-Bay Coal Hopper PRR	80.00
__ART41801f	2-Bay Coal Hopper PRR	80.00
__ART41802e	2-Bay Coal Hopper ATSF.	80.00
__ART41802f	2-Bay Coal Hopper ATSF.	80.00
__ART41803e	2-Bay Coal Hopper UP	80.00
__ART41803f	2-Bay Coal Hopper UP	80.00
__ART41804e	2-Bay Coal Hopper D&RGW	80.00
__ART41804f	2-Bay Coal Hopper D&RGW	80.00
__ART41805e	2-Bay Coal Hopper SR	80.00
__ART41805f	2-Bay Coal Hopper SR	80.00
__ART41806e	2-Bay Coal Hopper N&W.	80.00
__ART41806f	2-Bay Coal Hopper N&W.	80.00
__ART41807e	2-Bay Coal Hopper B&O	80.00
__ART41807f	2-Bay Coal Hopper B&O	80.00
__ART41808e	2-Bay Coal Hopper GN	80.00
__ART41808f	2-Bay Coal Hopper GN	80.00
__ART50015p	Evans Box Car Railbox	96.00
__ART50017p	Evans Box Car Golden West	96.00
__ART50023p	Evans Box Car Weyerhouser	96.00
__ART50024p	Evans Box Car GTW	96.00
__ART50028p	Evans Box Car BNSF Circle	96.00
__ART50029p	Evans Box Car PRR Cushion	96.00
__ART50030p	Evans Box Car SP Hydro	96.00
__ART50003p	Evans Box Car CSX.	96.00
__ART50001p	Evans Box Car Purina	96.00
__ART22727	Eggliner Snowflake.	109.00

Item	Description.....	List (\$US)
NEW ARRIVALS as of 1-5-11		
__ART29300	Smoke Unit	24.00
__ART29353	Universal Assembly FA-1.	9.00
__ART29132b	Inner Gear Box w/o Wheels	40.00
__ART29354	Axle w/Gear FA-1	6.00
__ART22714	Eggliner Honey Bee	109.00
__ART29198	Knuckle CoUPler (50)	480.00
__ART46950	Track Cleaning Car Aristo	84.00
__ART46951	Track Cleaning Car PRR	84.00
__ART46953	Track Cleaning Car UP	84.00
__ART46954	Track Cleaining Car ATSF	84.00
__ART22727	Eggliner Snowflake.	109.00
__ART29138	SS Wheels for 3 Axle Trucks 6	66.00
__ART29139	SS Wheels for 2 Axle Trk. 4)	48.00
<i>(Club Cars for 2010 - All)</i>		
__ART22715	Eggliner Monarch Butterfly	109.00
__ART22726	Eggliner Christmas Wreath	109.00
__ART7103	Water Tower B.U.	150.00
__ART23302	PCC Trolley Brooklyn	287.00
__ART23303	PCC Trolley Mbta	287.00
__ART23304	PCC Trolley Philly Traction	287.00
__ART23305	PCC Trolley San Francisco.	287.00
__ART23306	PCC Trolley Los Angeles	287.00
__ART23307	PCC Trolley Toronto	287.00
__ART23308	PCC Trolley USA Philly	287.00
__ART23309	PCC Trolley Baltimore.	287.00
__ART23342	PCC Trolley Pittsburgh	287.00
__ART2300	PCC Trolley Undec	287.00
<i>(Green Hornet Exclusive)</i>		
__ART41001	40' Gondola Soo Line	76.00
__ART41008	40' Gondola PRR.	76.00
__ART41012	40' Gondola SR.	76.00
__ART41015	40' Gondola B&O.	76.00
__ART41110	40' Cov.Gondola UP.	82.00
__ART41112	40' Con.Gondola D&RGW	82.00
__ART7109	Watch Tower BU.	108.00
__ART11298	Slow Motion Switch Machine	20.00



Parts List • July–August 2011

Item	Description)
PACIFIC PARTS	
P21400-137	Rh Rear Cross Head Support
P21400-04	Boiler Hand Rail
P21400-11	Steam Dome
P21400-137	Sand Dome
P21400-129	Crosshead Mount
P21400-130	Piston Rod
P21400-138	L.H. Crosshead Mount
P21400-139	R.H. Cross Head Arm
P21400-140	L H Cross Head Arm
P21400-17	Rh Car Entrance Door
P21400-183	Fly Wheel
P21400-54	Draw Bar
P21400-136	Short&Long Arm Screw
P21400-141	Cross Head Screws
P21400-31	Pilot Mount Retaining Screw
P21400-50	Brake Retaining Screw
P21400-51	Rh Brake Retaining Screw
P21400-55	Lh Rear Brake
P21400-56	Draw Bar Washer
P21400-57	Drawbar Spring
P21400-65	Forward Piping
P21400-71	Lh Piping
P21400-81	Pony Truck Wheels
P21400-96	Spring
P29132-168	Worm
P29132-169	Helical Gear
P21400-68	Air Pump Retaining
P21400-02	Boiler Shell
P21400-03	Cab
P21400-47	Motor
P21400-164	Front&Rear Driver Wheels
P21400-165	Center Drive Wheels
P21400-09	Handrail Stanchions
P21400-106	Marker Light Bulbs
P21400-107	Head Light
P21400-114	Smoke Pipe Retainer
P21400-115	Smoke Stack
P21400-12	Whistle
P21400-133	Cross Head Upper Side
P21400-134	Short Arm
P21400-135	Long Arm
P21400-142	Cross Head Forward Mount
P21400-151	Rh Reverse Cam
P21400-152	Lh Reverse Cam
P21400-163L	Lh Brake Shoe
P21400-93	Pilot Pivot
P21400-103	Smoke Box Door
P21400-104	Marker Lights
P21400-14	Bell Harp
P21400-144	Main Eccentric Crank
P21400-148	Rh Reverse Mount
P21400-149	Lh Reverse Mount
P21400-15	Bell Harp
P21400-22Q	Cow Catcher

Item	Description)
MALLET PARTS	
P21600-12	Smoke Box Door
P21600-101	Drive Box Pivot
P21600-102	Bolster
P21600-103	Bolster
P21600-35	Safety Valve
P21600-39	Cab Vent
P21600-63	Cab Lower Support
P21600-64	Rear Step
P21600-71	Rh Rear Piping
P21600-166	Pilot Mallet
P21600-	Motor W/ Hex
P21600-112	Drive Axle Flywheel
P21600-37	Generator
P21600-38	Lubricator Dry Pipe
P21600-119	Screw
P21600-120	Short Main Drive Rod Lh
P21600-121	Short Main Drive Rod Rod Rh
P21600-43	Hand Rail Stanchion
P21600-23	Hand Rail Lh
P21600-14	Bell Harp
P21600-26	Front Steam Pipes Rh
P21600-31	Front Steam Pipes Rh S Lh
P21600-33	Whistle
P21600-36	Steam Valve Aux
P21600-72	Distributor Valve Rh
P21600-04	Forward Grab Iron Lh
P21600-05	Forward Grab Iron Rn On Lh
P21600-09	Rear Grab Iron Rh
P21600-10	Rear Grab Iron Lh
P21600-13	Light Bulb
P21600-20	Short Hand Rail Stanchion
P21600-21	Long Hand Rail Stanchion
P21600-22	Hand Rail Right Hand
P21600-13	Bell
P21600-110	Front & Rear Wheels
P21600-152	Front Railing
P21850-28	5 Watt 8 Ohm Speaker
P21600-155	Headlight
P21600-07	Cab Window Rear
P21600-08	Cab Sliding Window
P21600-117	Long Main Drive Rod Lh
P21600-118	Long Main Drive Rod Rh
P21600-126	Main Eccentric Crank
P21600-15	Number Board Lh
P21600-156	Headlight Lens
P21600-166	Number Board Rh
P21600-22	Marker Light Assembly Rh
P21600-23	Marker Light Assembly Lh

Item	Description)
CONSOLIDATION PARTS	
P20601-12	R.Cylinder Exhaust
P20601-15	Smoke Box Front
P20601-17	Top Door Hinge
P20601-25	Lh Front Step
P20601-29	Rh Shaft Lever
P20601-33	R.Steam Pipe
P20601-37	Rh Air Tank
P20601-47	Headlight Lens
P20601-51	Rh Cab Window
P20601-53	Marker Light Lens
P20601-65	Cab Support
P20601-69	Rear Steam Pipe
P20601-79	L.Piston Rod
P20601-89	Head Light
P20601-04	Rear Cylinder
P20601-06	Cylinder Exhaust
P20601-08	Cylinder Support
P20601-16	Smoke Box Door
P20601-18	Bottom Door Hinge
P20601-22	Headlight Platform
P20601-24	Cylinder Support
P20601-26	Rh Front Step
P20601-48	Headlight Side Lens
P20601-62	Radius Rod
P20601-66	Draw Bar Mount
P20601-68	Sun Shade
P20601-80	Piston Rod
P20601-82	Generator
P20601-84	Marker Light
P20601-90	Pilot Truck Mount
P20601-91	Pilot Truck Retainer
P20601-101	Chassis Ornament
P20601-111	Stanchion
P20601-92	Pilot
P20601-146	Fly Wheel
P20601-64	Pilot Support
P20601-96	Marker Light Screw
P20601-22	Tender Wheel B
P20601-05	Coal Load
P20601-01	Sunbeam Headlight
P20601-02	Number Plate Glass
P20601-07	Sunbeam Rear Light
P20601-12	Tender Ladder
P20601-10	Tender Step L
P20601-111	Tender Step R
VANDERBILT TENDER	
P21850-06	Front Deck And Steps
P21850-11	Rear Ladder
P21850-14	Lamp Housing
P21850-15	Light Lens Van.Tender
P21850-17	Short Platform
P21850-18	Waterfill Hatch
P21850-19	Long Platform



On-Hand List • July 1, 2011 (page 1 of 6)

Item	Description	List (\$US)	Item	Description	List (\$US)
ART 11001	Euro Track 1/2 Straight (12)	64.00	ART 12303w	Grid Inside Corner White	10.00
ART 11005	Flex Rail Brass 8' (12)	419.00	ART 12304	Wall Bracket 15 Black	10.00
ART 11060	24" Straight Track(12Pcs)	244.00	ART 12305	Grid S Hook for Door Area	1.00
ART 11070	36" Straight Track(12Pcs)	366.00	ART 12306	Grid Suspension Hook 10	2.00
ART 11091	Reversing Unit/Softstart Only	81.00	ART 12307	Grid Suspension Hook 20	3.00
ART 11095	Euro Straight 6' w/Clamps 6 Pcs	293.00	ART 12310	Suspension Bar 16 Black	12.00
ART 11098	60" Straight Track (6)	339.00	ART 12312	Grid Bracket for Tower 15	7.00
ART 11099	60" Straight Track (12Pcs)	643.00	ART 12316	Ceiling Grid Clip	3.00
ART 11100	Curve Track 4' Diam (12Pcs)	122.00	ART 12401	Track Support Flower Tub (6)	9.00
ART 11101	Euro Track Curve 1/2	64.00	ART 20031	USA Str. Track 1/2 S.S.	85.00
ART 11103	Euro Track Ties Curved	2.00	ART 20035	Stainless Steel Rail 8' 12 Pc	551.00
ART 11145	31" Diam Track (4) for Barrel	120.00	ART 20060	SS Str. Track 2'	329.00
ART 11200	Switch-Manual Right	53.00	ART 2008club	Club Fee for 2008	25.00
ART 11205	Switch-Remote Right	67.00	ART 20100	SS Curve Track 4'	164.00
ART 11210	Switch-Manual Left	53.00	ART 20117	SS Curve Track 9'	358.00
ART 11215	Switch-Remote Left	67.00	ART 20120	SS Curve Track 10'	403.00
ART 11297	Manual Switch Machine	12.00	ART 20121	SS Curve Track 11.5'	458.00
ART 11298	Switch Machine Rem Slow Motion	23.00	ART 20124	SS Curve 15' Diam	593.00
ART 11300	30 Degree Crossing	53.00	ART 20125	SS Curve Track 20' Diam	820.00
ART 11350	Rerailer 12 Straight	26.00	ART 20199	SS Rail Joiners (12)	10.00
ART 11351	Re-Railer w/ Gap & Diodes	26.00	ART 20330	SS #6 Switch Right	242.00
ART 11550	Euro Curve Track 6.5' Brass	223.00	ART 20335	SS #6 Parallel Adaptor	53.00
ART 11700	Curve Track 9' Diameter Brass	307.00	ART 20340	SS #6 Switch Left	242.00
ART 11800	Euro Curve Track 10' Brass	337.00	ART 20345	SS #6 Wye Switch SS	159.00
ART 11801	Euro Curve 11.5' Brass	392.00	ART 20350	SS Re-Railer	29.00
ART 11804	Euro Curve Track 15' Brass	508.00	ART 20375	Siding for 10' Diam. Switch	33.00
ART 11805	Euro Curved Track 16.5' Brass	551.00	ART 20380	SS Switch Wide Manual Left USA	99.00
ART 11820	Euro Curve Track 20' Brass	681.00	ART 20400	SSS Crossing 19.5	79.00
ART 11900	Rail Joiners (12 Pack) Brass	10.00	ART 20405	SS Crossing 30 Degree	52.00
ART 11900b	Track Rail Joiners (50)	28.00	ART 20410	SS Crossing 90 Degree	60.00
ART 11901	Rail Joiners (4 Pack) Plastic	7.00	ART 20600	2-8-0 Consolidation Undec	891.00
ART 11901b	Rail Joiners (25Pack) Plastic	35.00	ART 20601	2-8-0 Consolidation B&O	891.00
ART 11902	Tap & Drill Set 2MM for Track	12.00	ART 20602	2-8-0 Consolidation Wm	891.00
ART 11903	Waterproof Micro Switch (2)	12.00	ART 20603	2-8-0 Consolidation ATSF	891.00
ART 11905	Stationary Rollers (4 Pack)	58.00	ART 20604	2-8-0 Consolidation Up	891.00
ART 11906	Track Gauge W/ Level	13.00	ART 20608	2-8-0 Consolidation NYC	891.00
ART 11910	Socket Head Track Screw	7.00	ART 20609	2-8-0 Consolidation USATC	891.00
ART 11911	Rail To Tie Screws (50)	8.00	ART 21001c	Rogers PRR w/Caboose	376.00
ART 11921	Dual Rail Bender	259.00	ART 21002c	Rogers Drwg w/Caboose	376.00
ART 11930	Rail Clamp Brass (10Pcs)	16.00	ART 21004c	Rogers ATSF w/Caboose	376.00
ART 11940	Rail Clamp (10) Silver Pltd	21.00	ART 21102c	Rogers GN w/Caboose	376.00
ART 11940b	Rail Clamp SS Plated Bulk(100)	159.00	ART 21104c	Rogers ATSF + Caboose	327.00
ART 11950	Wire W/Lug for Joiners (10)	16.00	ART 21311c	0-4-0 Switcher B&O w/Caboose	281.00
ART 12111	Aluminum Track 4' Curve	48.00	ART 21327c	0-4-0 Switcher D&RGW w/Caboose	281.00
ART 12160	Aluminum Crossing 19.5 Degree	35.00	ART 21405	Pacific Sr/So.Railway	725.00
ART 12161	Aluminum Crossing 30 Degree	35.00	ART 21407	Pacific N.Y.C.	725.00
ART 12162	Aluminum Crossing 90 Degree	35.00	ART 21408	Pacific UP/Union Pacific	725.00
ART 12181	Aluminum Track 10' Curved	144.00	ART 21409	Pacific DRGW/Rio Grande	725.00
ART 12202	Roadbed - 5' Curved	46.00	ART 21410	Pacific SP/Southern Pacific	725.00
ART 12203	Roadbed - 8' Curved	20.00	ART 21411	Pacific ATSF/Santa Fe	725.00
ART 12204	Roadbed - 10' Curved	20.00	ART 21601	Mallet PRR Vanderbilt Ten.	920.00
ART 12301b	Grid Shelf 15 X 24 Black	18.00	ART 21602	Mallet ATSF Vanderbilt Ten.	920.00
ART 12302b	Grid 1/4 Round Curve Black	12.00	ART 21603	Mallet UP Vanderbilt Ten.	920.00



Item	Description	List (\$US)
ART21604	Mallet D&RGW Vanderbilt Ten. B	920.00
ART21605	Mallet C & O Vanderbilt Ten.	920.00
ART21607	Mallet N & W Vanderbilt Ten.	920.00
ART21875	Usra Tender - Undec.	275.00
ART21900	Slope.Tender Undec.(Blk)	138.00
ART22202	RS-3 Up/Union Pacific.	397.00
ART22203	RS-3 ATSF/Santa Fe Zebra	397.00
ART22205	RS-3 Drgw/Rio Grande	397.00
ART22206	RS-3 Rock Island Rocket.	397.00
ART22208	RS-3 Cp/Canadian Pacific	397.00
ART22209	RS-3 So.Railway Grn/Wht	397.00
ART22211	RS-3 PRR/Pennsylvania-Grn.	397.00
ART22213	RS-3 B&O/Baltimore & Ohio	397.00
ART22240	RS-3 Diesel Nickel Plate Rd.	397.00
ART22245	RS-3 New Haven	397.00
ART22405	SD-45 Diesel - Union Pacific	552.00
ART22406	SD-45 Diesel - Erie Lackawana	552.00
ART22409	SD-45 Diesel - PRR.	552.00
ART22501c	Lil'critter PRR W/Cab	200.00
ART22606c	Cen.Cab Ind.Sw. D&RGW w/cab	297.00
ART22702	Egg Liner - Union Pacific	125.00
ART22703	Egg Liner - Atlantic Coast Lin	125.00
ART22707	Egg Liner - Lady Bug	125.00
ART22708c	Egg Liner - Easter Egg	125.00
ART22711	Egg Liner - ATSF Warbonnet	125.00
ART22714	Egg Liner - Honey Bee	125.00
ART22715	Egg Liner - Monarch Butterfly	125.00
ART22726	Egg Liner - Christmas Wreath	125.00
ART22727	Egg Liner - Snowflake	125.00
ART22798	Egg Liner Annual 2010.	125.00
ART22851	RDC 3 Great Northern	397.00
ART22853	RDC 3 B & M.	397.00
ART22854	RDC 3 C&NW.	397.00
ART22856	RDC 3 NYC	397.00
ART22858	RDC 3 LIRR	397.00
ART22859	RDC 3 New Haven	397.00
ART22861	RDC 3 Penn-Rdg-Seashore	397.00
ART23004	Dash 9 Up	580.00
ART23600	E-8 Undec.	480.00
ART23602	E-8 SP.	552.00
ART23603	E-8 Union Pacific	552.00
ART23614	E-8 Diesel El	552.00
ART23615	E-8 Diesel Erie	552.00
ART29098	Frt.Truck w/Metal Wheels & Bb	76.00
ART29099	Modern Freight Trucks w/Pl Whl	30.00
ART29101	Truck-Freight Plastic Wheels	32.00
ART29102	Truck-Caboose Metal Wheels	67.00
ART29104	Plastic Wheels (2 Wheel Sets)	13.00
ART29105	Rogers Loco Metal Sml.Whl.Set	21.00
ART29106a	Rogers Front Drive Wheels	28.00
ART29106b	Rogers Back Drive Wheels	28.00
ART29107	Truck-Psgr(Wood) Metal Wheels	67.00
ART29108	Truck-Long Tender (Pair)	67.00
ART29109	Truck-Hwt.Psgr.(Pair)	67.00

Item	Description	List (\$US)
ART29110	Truck-Hwt.Psgr.6 Metal Wheels	85.00
ART29111d	Mtl Whls - Blk 4 Axle w/o Hub	38.00
ART29111s	Metal Wheels Silver 4 -Axle	38.00
ART29113	Springs-Passenger Truck	9.00
ART29114	Springs-Diesel Truck.	9.00
ART29115	Truck-Slope Tender (Pair)	67.00
ART29117	Truck-Psgr. Strmln	94.00
ART29118p	Diesel Bushing (Previous)	13.00
ART29119s	Springs Streamline Silver	10.00
ART29123b	Ball Bearing Wheels 2 Axles Bl	71.00
ART29130	Metal Wheel Replacement.	20.00
ART29131	Metal Diesel Wheel W/Tire	21.00
ART29132b	Inner Gear Box w/o Wheels.	17.00
ART29134	Commonwealth 6 Axle Truck Pr.	110.00
ART29138	SS Wheels for 3-Axle Trucks(4)	76.00
ART29139	SS Wheels for 2-Axle Trucks(4)	55.00
ART29140	Ball Bearings for Modern Frt.	23.00
ART29196	Coupler-Knuckle (1 Pair) E-8	16.00
ART29197	Coupler-Knuckle (1 Pair)Dash 9	14.00
ART29198	Knuckle Coupler (50 Pr.S)	552.00
ART29199	Knuckle Coupler (6Pr.)	74.00
ART29200	Coupler-Knuckle (1 Pair)	16.00
ART29201	Coupler RS-3/Lil' Critter	20.00
ART29202	Hook & Loop Coupler 1 Pair.	7.00
ART29203	Hook & Loop Coupler 6 Pr.	35.00
ART29205	Coupler- Knuckle (Pr) SD-45	16.00
ART29206	Knuckle Coupler Fa (2) New	17.00
ART29300	Smoke Stack (Operating)	28.00
ART29301	Smoke Stack (Opg) Stv/Psg.Cab.	32.00
ART29302	Smoke Stack (Opg) Rogers Loco	28.00
ART29304	Smoke Stack (Opg) Psgr. Wood.	28.00
ART29306	Smoke Unit-Steam Loco 0-4-0	32.00
ART29309	Smoke Unit-Loco RS-3	32.00
ART29311	Smoke Unit SD-45	67.00
ART29313	Smoke Unit Parts.	10.00
ART29350	Gp-40 Motor Block.	86.00
ART29351	Power Trk Ge U25-B/FA/FB/RS.	85.00
ART29351b	Motor Block for Repair Dept	74.00
ART29352	Universal for Pacific 6 Pack.	28.00
ART29353	Universal Assembly for FA-1.	10.00
ART29354	Axle W/ Gear for FA-1	7.00
ART29358	Motor Block-Railbus W/A-Frame.	102.00
ART29360	Motor for 0-4-0	26.00
ART29363	Pacific Gear Box w/Whls.	185.00
ART29400	Gear Box & Motor 2-4-2 Rogers	47.00
ART29402	Brush & Spring Set W/Holder 4.	13.00
ART29403	Assorted Screw Set	10.00
ART29404	Rubber Tires 2-4-2 Rogers	10.00
ART29405	Rubber Tires - Diesel	7.00
ART29406	Brush, Spring & Bushing (8) Diesel	13.00
ART29411	Ball Bearing Set (10) for Std.	23.00
ART29501	Marker Lights 2-4-2 Rogers.	9.00
ART29502	Bulb/Long Cab./Sierra (10 Pc)	20.00
ART29503	Bulb & Socket Set w/Wire.	13.00



On-Hand List • May 1, 2011 (page 3 of 6)

Item	Description	List (\$US)
ART 29507	Bulb/Hvywt/Strmline(2Pc)	9.00
ART 29508	RS-3 Marker Lights (Pr)	13.00
ART 29511	Plug for Power To Tender	13.00
ART 29512	Ditch Lights (2)	20.00
ART 29515	Weights for The SD-45	48.00
ART 29517	E-8 Weights 3 + Screws	30.00
ART 29518	Wires w/Female Plug L+230Mm	2.00
ART 29519	Plug Male L=200Mm	2.00
ART 29600	Track To Pack.Conn.Wire	7.00
ART 29603	Aristo-Lube Oil 1.125 Oz.	6.00
ART 29605	10 Amp Fuse for Train Eng.	7.00
ART 29607	Mu Cable	10.00
ART 29608	Wires With Plugs for Sound Ins.	7.00
ART 29700	Chair Kit-L(6Pcs)Long Caboose	13.00
ART 29703	Double Chair Set (4)	10.00
ART 29704	New Roof Walk for Frt Car	13.00
ART 29706	Lowered Floor for Rolling Stok	20.00
ART 29708	Long Caboose Roof Walk/New	20.00
ART 30100	USA Curve Track 4'(12 Circle)	122.00
ART 30101	USA Curve Track 1/2 Section	64.00
ART 30103	Track Ties Curved - USA	2.00
ART 30112	USA Curve 6.5 Diam	223.00
ART 30116	USA Curve Track 9'	307.00
ART 30121	USA Curve 11.5'	392.00
ART 30122	USA Curve 12.5'	423.00
ART 30125	USA Curve 20' Diam	681.00
ART 30130	USA Curve 16.5' Diam	541.00
ART 30195	USA Str. Track 5' (12)	643.00
ART 30310	USA Switch Remote Right	67.00
ART 30335	#6 Parallel Adaptor	45.00
ART 30345	#6 Wye Switch Brass Us.	139.00
ART 30360	USA Switch Remote Left	67.00
ART 30370	Switch Wide Manual Right	86.00
ART 30400	Crossing 19.5	79.00
ART 30410	Crossing 90 Degree	53.00
ART 31001	Sierra Coach Pennsylvania	176.00
ART 31001-3	Sierra Set - PRR	527.00
ART 31002	Sierra Coach B&O Balt&Ohio	176.00
ART 31004	Sierra Coach Drgw/Yellow	176.00
ART 31005	Sierra Coach ATSF/Santa Fe	176.00
ART 31005-3	Sierra Set - ATSF	527.00
ART 31009	Sierra Coach Wpy/White Pass	176.00
ART 31009-3	Sierra Set- White Pass	527.00
ART 31011	Sierra Coach D&RGW Green	176.00
ART 31305	Std.Hvy.Wht.Coach So. Crescent	291.00
ART 31308	Std.Hvy.Wht.Coach Up/Union Pac	291.00
ART 31310	Std.Hvy.Wht.Coach So.Pac.Day	291.00
ART 31651	Std.Hvy.Wht Baggage PRR	335.00
ART 31659	Std.Hvy.Wht Baggage D&RGW	291.00
ART 31660	Std.Hvy.Wht Baggage SP Daylt.	291.00
ART 31711	Std.Hvy.Wht.Combine ATSF	210.00
ART 31732	Std.Hvy.Wht.Combine NAPA	210.00
ART 31801	Std.Hvy.Wht.Pullman PRR	335.00
ART 31802	Std.Hvy.Wht.Pullman B&O	291.00

Item	Description	List (\$US)
ART 31805	Std.Hvy.Wht.Pullman So. Crescent	291.00
ART 31808	Std.Hvy.Wht.Pullman Up	291.00
ART 31810	Std.Hvy.Wht.Pullman Sp	291.00
ART 31817	Std.Hvy.Wht Pullman C&NW	291.00
ART 31832	Std.Hvy.Wht.Pullman Napa	291.00
ART 31905	Std.Hvy.Wht. Set So. Crescent	1,160.00
ART 31908	Std.Hvy.Wht. Set Up	1,160.00
ART 31910	Std.Hvy.Wht. Set SP Daylight	1,160.00
ART 31932	Std.Hvy.Wht. Set Napa Valley	1,160.00
ART 40001	Gondola 20' - PRR	53.00
ART 40002	Gondola 20' - A.T.S.F.	53.00
ART 40005	Gondola 20' - B & O	53.00
ART 40101	20' Tank Car - PRR	53.00
ART 40103	20' Tank Car - Up	53.00
ART 40105	20' Tank Car - B&O	53.00
ART 40201	20' Flat Car - PRR	53.00
ART 40205	20' Flat Car - B&O	53.00
ART 40225	20' Flat Car - Christmas	53.00
ART 40301	20' Box Car - PRR	53.00
ART 40305	20' Box Car - B&O	53.00
ART 40311	20' Box Car - D&RGW	53.00
ART 40325	20' Box Car - Christmas	53.00
ART 41001	Gondola Soo/Colormark	87.00
ART 41008	Gondola PRR/Pennsylvania	87.00
ART 41012	Gondola Sr/Southern Railway	87.00
ART 41015	Gondola Baltimore & Ohio	87.00
ART 41026	Gondola Wisconsin Cen.	87.00
ART 41027	Gondola Norfolk So.	87.00
ART 41028	Gondola CSX(B&O)	87.00
ART 41029	Gondola Conrail Quaulity	87.00
ART 41030	Gondola Erie Lackawanna	87.00
ART 41102	Cov.Gondola New York Central	94.00
ART 41103	Cov.Gondola Pitt/Lake Erie	94.00
ART 41109	Cov.Gondola ATSF	94.00
ART 41110	Cov.Gondola Up	94.00
ART 41112	Cov.Gondola Denver Rio Grande	94.00
ART 41201	Cov.Hopper Nickel Plate Road	114.00
ART 41207	Cov.Hopper Boraxo	114.00
ART 41208	Cov.Hopper Union Pacific	114.00
ART 41210	Cov.Hopper Farm.Co-Op (Pink)	114.00
ART 41211	Cov.Hopper Rio Grande	114.00
ART 41215	Cov.Hopper PRR/Pennsylvania	114.00
ART 41216	Cov.Hopper RDG/Reading	114.00
ART 41218	Cov.Hopper Burlington No.	114.00
ART 41220	Cov.Hopper C&NW	114.00
ART 41224	Cov.Hopper ATSF Sm. Herald Brn	114.00
ART 41225	Cov.Hopper L&Ne Fried Egg	114.00
ART 41228	Cov.Hopper Wabash w/Flag	114.00
ART 41229	Cov.Hopper New Haven Brown	114.00
ART 41230	Cov.Hopper Frisco Black	114.00
ART 41304	S.Dome-Tank Union Oil	94.00
ART 41308	S.Dome-Tank Up/Union Pacific	94.00
ART 41335	S.Dome-Tank Gatx	94.00
ART 41336	S.Dome-Tank Ultx	94.00



On-Hand List • May 1, 2011 (page 4 of 6)

Item	Description	List (\$US)
ART 41337	S.Dome-Tank General Molasses	94.00
ART 41338	S.Dome-Tank Stauffer Chem.	94.00
ART 41339	S.Dome-Tank Corn Industrial	94.00
ART 41401p	Coal Hopper Chessie W/Plasti	113.00
ART 41402p	Coal Hopper N&W	113.00
ART 41404p	Coal Hopper D&RGW	113.00
ART 41406p	Coal Hopper UP w/Plastic Whl.	113.00
ART 41407p	Coal Hopper Norfolk So.	113.00
ART 41408p	Coal Hopper Burlington No.	113.00
ART 41409p	Coal Hopper Conrail	113.00
ART 41610	3 Dome-Tank Oilzum.	75.00
ART 41611	3 Dome-Tank Marvel Oil	86.00
ART 41617	3 Dome-Tank Pitts.Plate Glass	75.00
ART 41800ra	2 Bay Coal Hopper Undec Red	92.00
ART 41801e	2 Bay Coal Hopper PRR	92.00
ART 41801f	2 Bay Coal Hopper PRR	92.00
ART 41802b	2 Bay Coal Hopper ATSF	92.00
ART 41802c	2 Bay Coal Hopper ATSF	92.00
ART 41802d	2 Bay Coal Hopper ATSF	92.00
ART 41802e	2 Bay Coal Hopper ATSF	92.00
ART 41802f	2 Bay Coal Hopper ATSF	92.00
ART 41803e	2 Bay Coal Hopper Up	92.00
ART 41803f	2 Bay Coal Hopper Up	92.00
ART 41804e	2 Bay Coal Hopper D&RGW	92.00
ART 41804f	2 Bay Coal Hopper D&RGW	92.00
ART 41808e	2 Bay Coal Hopper GN	92.00
ART 41808f	2 Bay Coal Hopper GN	92.00
ART 41809a	2 Bay Coal Hopper B & M	92.00
ART 41809b	2 Bay Coal Hopper B & M	92.00
ART 41809c	2 Bay Coal Hopper B & M	92.00
ART 41809d	2 Bay Coal Hopper B & M	92.00
ART 41811c	2 Bay Coal Hopper C & NW	92.00
ART 41811d	2 Bay Coal Hopper C & NW	92.00
ART 41812a	2 Bay Coal Hopper NYC	92.00
ART 41812b	2 Bay Coal Hopper NYC	92.00
ART 41812c	2 Bay Coal Hopper NYC	92.00
ART 41812d	2 Bay Coal Hopper NYC	92.00
ART 41817a	2 Bay Coal Hopper D & H	92.00
ART 41817b	2 Bay Coal Hopper D & H	92.00
ART 41817c	2 Bay Coal Hopper D & H	92.00
ART 41817d	2 Bay Coal Hopper D & H	92.00
ART 41878x-A	2 Bay Coal Hop. L&N #60899	80.00
ART 41878x-B	2 Bay Coal Hop L&N#60894	80.00
ART 41878x-C	2 Bay Coal Hop L&N #60886	80.00
ART 41878x-D	2 Bay Coal Hop L&N #60792	80.00
ART 41879x-A	2 Bay Coal Hop C&O #123690	80.00
ART 41879x-B	2 Bay Coal Hop C&O #123456	80.00
ART 41879x-C	2 Bay Coal Hop C&O #123599	80.00
ART 41879x-D	2 Bay Coal Hop C&O #123585	80.00
ART 42131	Caboose Long Acl	132.00
ART 42200	Bobber Caboose Undec (Red)	53.00
ART 42208	Bobber Caboose Up/Union Pac.	53.00
ART 42210	Bobber Caboose Drwg/Rio Grand	53.00
ART 42211	Bobber Caboose ATSF/Santa Fe	53.00

Item	Description	List (\$US)
ART 45101	40' Dbl.Door Boxcar ATSF	104.00
ART 45102	40' Dbl.Door Boxcar Up	104.00
ART 45103	40' Dbl.Door Boxcar Cotton Blt.	104.00
ART 45105	40' Dbl.Door Boxcar NYC	104.00
ART 45106	40' Dbl.Door Boxcar PRR	104.00
ART 45107	40' Dbl.Door Boxcar C&NW	104.00
ART 45108	40' Dbl.Door Boxcar GN	104.00
ART 45112	40' Dbl.Door Boxcar Milw.	104.00
ART 45113	40' Dbl.Door Boxcar So.Pac.	104.00
ART 45114	40' Dbl.Door Boxcar Cb & Q	104.00
ART 45200	40' Plug Door Box Car Undec	104.00
ART 45201	40' Plug Door Box Car Nh.	104.00
ART 45202	40' Plug Door Box Car Fge	104.00
ART 45203	40' Plug Door Box Car Dt&C	104.00
ART 45205	40' Plug Door Box Car CNj	104.00
ART 45208	40' Plug Door Box Car PRR	104.00
ART 45298a	40' Plug Dr Box Car Club75 Red	50.00
ART 45298b	40' Plug Dr Box Car Club75 Blu.	50.00
ART 45298c	40' Plug Dr Box Car Club75 Grn	50.00
ART 45298d	40' Plug Dr Box Car Club75 Sil	50.00
ART 46000	Box Car(Steel)Ptd W/Data	104.00
ART 46003	Box Car(Steel)ATSF/Santa Fe	104.00
ART 46004	Box Car(Steel)PRR/Penna.	104.00
ART 46008	Box Car(Steel)B&O/Sentinel	104.00
ART 46010	Box Car(Steel)Up/Union Pac.	104.00
ART 46066	Box Car (Steel)Erie	90.00
ART 46069	Box Car (Steel)Soo Line	104.00
ART 46071	Box Car (Steel)Chessie Cat	104.00
ART 46103	Stock Car Up/Union Pacific	104.00
ART 46106	Stock Car ATSF/Santa Fe	104.00
ART 46108	Stock Car GN/Great Northern	104.00
ART 46111	Stock Car M-K-T/Katy	104.00
ART 46117	Stock Car B&O/Baltimore&Ohio	104.00
ART 46202	Reefer Schlitz Beer	90.00
ART 46305t	Flat Car-Stake PRR (2)	123.00
ART 46308t	Flat Car-Stake B&O (2)	123.00
ART 46309t	Flat Car-Stake D&RGW (2)	123.00
ART 46313t	Flat Car-Stake UP (2)	123.00
ART 46320t	Flat Car-Stake ATSF (2)	123.00
ART 46701	Snow Plow - D&RGW	193.00
ART 46702	Snow Plow - C & S	193.00
ART 46703	Snow Plow - CNW	193.00
ART 46706	Snow Plow - PRR	193.00
ART 46707	Snow Plow - NYC	193.00
ART 46709	Snow Plow - CN	193.00
ART 46950	Track Cleaning Car - Aristo	97.00
ART 46951	Track Cleaning Car - PRR	97.00
ART 46952	Track Cleaning Car - B & O	97.00
ART 46953	Track Cleaning Car - Up	97.00
ART 46954	Track Cleaning Car - ATSF	97.00
ART 46955	Track Cleaning Car - SR	97.00
ART 50001p	53' Evans Box Car Purina	110.00
ART 50003p	53' Evans Box Cars CSX	110.00
ART 50015p	53' Evans Box Car - Railbox	110.00



Item	Description	List (\$US)
ART50017p	53' Evans Box Car Golden West	110.00
ART50023p	53' Evans Box Car Weyerhouser	110.00
ART50024p	53' Evans Box Car GTW	110.00
ART50028p	53' Evans Box Car BNSF Circle	110.00
ART50029p	53' Evans Box Car PRR Cushion	110.00
ART50030p	53' Evans Box Car SP Hydro	110.00
ART60001	Seated Train Engineer	10.00
ART60002	Train Conductor	10.00
ART60003	Train Brakeman	10.00
ART60004	Man In Suit	10.00
ART60005	Woman With Hat	10.00
ART60006	Man With Satchel	10.00
ART60007	Man In Shirt	10.00
ART60008	Porter In White Jacket	10.00
ART60009	Dining Car Waiter	10.00
ART60010	Soldier W/Duffle Bag	14.00
ART60011	Woman Conductor	10.00
ART60012	Seated Passenger Male w/Stick	14.00
ART60013	Seated Passenger Female	10.00
ART60015	Station Master	10.00
ART60017	Shepherd W/Cape And Dog	10.00
ART60018	Conductor With Lantern	10.00
ART60019	Seated Man W/Cigar	10.00
ART60020	Seated Child/Girl	10.00
ART60025	Seated Santa Engineer	10.00
ART60027	Hobo W/Pole And Bag	14.00
ART60028	Hobo Seated On Tree Stump	14.00
ART60029	Hobo - Fat King of The Road	14.00
ART60030	USA Fireman	10.00
ART60031	Policeman	10.00
ART60032	State Trooper	10.00
ART60034	Texas Ranger	10.00
ART60035	Farmer In Coveralls	10.00
ART60036	Lumberjack	10.00
ART60037	West Point Cadet-Male	10.00
ART60039	Us Army Marine - Male	10.00
ART60040	Us Army Soldier-Female	10.00
ART60041	Us Navy Sailor-Male	10.00
ART60042	Woman With Baby	10.00
ART60043	Bride	10.00
ART60044	Groom	10.00
ART60045	Clown #1	10.00
ART60046	Clown #2	10.00
ART60047	Clown #3	14.00
ART60048	Clown #4	14.00
ART60049	Clown #5	14.00
ART60050	Ice Skater-Male	14.00
ART60051	Ice Skater-Female	14.00
ART60052	Ice Skater Man W/Scarf	14.00
ART60054	Ice Skater-Female W/Scarf	14.00
ART60055	Ice Skater-Male Racer	14.00
ART60056	Hobo Catching Goose	10.00
ART60057	Hobo Fat Queen of The Road	13.00
ART60058	Hobo W/Pole Reclining	14.00

Item	Description	List (\$US)
ART60059	U.S. Airforce Officer w/Bag	14.00
ART60060	Male Sportsman w/Golf Clubs	14.00
ART60061	Male Sportsman W/Tennis	10.00
ART60062	Female w/Tennis Dress	10.00
ART60063	Female w/Baby	14.00
ART60065	Seated Male Asleep	10.00
ART60066	Seated Female Sewing	10.00
ART60067	Seated Female w/Baby	14.00
ART60068	Track Worker w/Pick	14.00
ART60069	Track Worker w/Sledge Hammer	14.00
ART60070	Worker w/Wheel Barrel	14.00
ART60071	Photographer W/Camera	14.00
ART60073	Cowboy w/Saddle	14.00
ART60075	Man Fishing	14.00
ART60076	Workman w/ Jack Hammer	14.00
ART60077	Workman for Compressor	14.00
ART60077b	Compressor	14.00
ART60078	Man Shoveling	10.00
ART60079	Man Sweeping	10.00
ART60080	Woman Worker w/Wrench	10.00
ART60081	Woman Worker w/Shovel	10.00
ART60082	Figure - Seated - Selma	10.00
ART60083	Figure - Seated - Student	10.00
ART60084	Figure - Seated Eating	10.00
ART60085	Figure - Seated - Young Woman	10.00
ART60086	Figure - Seated Child w/Rr	10.00
ART60088	Figure - Seated W/Binoculars	10.00
ART60089	Figure - Seated - Linda	10.00
ART60090	Figure - Seated - Shirley	10.00
ART60091	Figure - Seated - Terry	10.00
ART60092	Figure-Seated-Maryann w/Hat	10.00
ART60094	Figure - Seated - Kathryn	10.00
ART60197	Turntable for Figures	28.00
ART60301	Teddy Bear Jointed 8"	8.00
ART60405	Scrap Load for Gondola	25.00
ART62005	Military Travelers Set	53.00
ART62009	Sporting People Set	47.00
ART62010	Public Safety Uniformed Set	47.00
ART62011	Construction Workers Set	47.00
ART7100	Victorian Station Built-Up	185.00
ART7101	Covered Bridge	85.00
ART7103	Water Tower	173.00
ART7104	Over & Under Trestle Set	54.00
ART7105	Covered Waiting Platform	69.00
ART7107	Victorian Barn	201.00
ART7109	Watch Towerw/Oper.Lt & Smoke	124.00
ART7114	Transmission Towers (Pair)	55.00
ART7200	The Passenger Depot - Built-Up	97.00
ART7201	The Freight Depot - Built-Up	97.00
ART7202	The Crossing Shanty - Built-Up	62.00
ART7203a	Farm House / White W.Grn Trim	117.00
ART7206	Church	173.00
ART7210b	Tract House Built UP Green	192.00
ART7401	Foam Portal	28.00



Item	Description	List (\$US)
ART 7402	Double Portal	55.00
ART 7403	Wings for Foam Portals	104.00
ART 7404	Foam Viaduct	90.00
ART 7405	Foam Viaduct Piers (2)	55.00
ART 84196	Live Steam Butane Filler Val	30.00
ART 84198	CD Video of Live Steam	9.00
ART 84199	Steam Oil 1 Qt.	18.00
ART 89103	Caboose Truck w/Metal Wheels	58.00
ART 90010	How Model Trains Are Made DVD	20.00
CRE 0001	Grain of Wheat 12V Clear	59.00
CRE 0005	Grain of Wheat 4 Asst Colors	59.00
CRE 00072	Micro Switch	2.00
CRE 00073	Micro Switch W/Lever 10Pcs	16.00
CRE 0011	Grain of Rice 10Ea. Crga (40)	59.00
CRE 29429	Track Magnet (6)	5.00
CRE 29431	Reed Switches (2)	8.00
CRE 29435	Dallee Dig. Sound E-8	120.00
CRE 29436	Dallee Dig. Sound Rdc	120.00
CRE 29437	Dallee Dig. Sound C-16	120.00
CRE 29438	Dallee Dig. Sound RS-3	120.00
CRE 29439	Dallee Dig. Sound FA-1	120.00
CRE 29441	Dallee Dig. Sound Pacific	120.00
CRE 29445	Dallee Dig. Sound SD-45	120.00
CRE 29448	Dallee Dig. Sound Sm. Steamer	120.00
CRE 29450	Dallee Dig. Sound Gp-40	120.00
CRE 29601	CREST Smoke Fluid 4 OZ.	6.00
CRE 29603	CREST Lube - Oil 1.125 Oz.	7.00
CRE 29606	Conductive Grease 4 Oz.	17.00
CRE 29608	Te Output Glass Fuse (5)	5.00
CRE 55001	Train Engineer Receiver	53.00
CRE 55002	H.O. Train Eng Rx 6 Pack	210.00
CRE 55004	Receiver 2 Pack	95.00
CRE 55005	Antenna - Metal Telescoping	8.00
CRE 55400	Power Pack 1.8 Amp W/Chip	81.00
CRE 55401	Controller	97.00
CRE 55452	Track To Pack Connector Heavy	10.00
CRE 55466	Jewel 5 Amp Regulated Supply	133.00
CRE 55467	15 Amp Controller Only	201.00

Item	Description	List (\$US)
CRE 55468	Everest Power Supply 15A 24V	242.00
CRE 55470	D.C. Train Engineer Set	276.00
CRE 55474	DC/RC Wireless Access Switch	102.00
CRE 55475	DC/RC 5 Switch Rx	110.00
CRE 55491	On Board Train Eng. 75	209.00
CRE 55492	Onboard Rx Plus Tx	393.00
CRE 55493	Gel Cell Battery 6V 3.2 Amp X3	64.00
CRE 55494	Charger for Gel Cells	113.00
CRE 55497	Battery Car R/C W/O Battery	180.00
CRE 55498	On-Board Cooling Fan	30.00
CRE 55499	Fan for 55471 above 5 Amps	30.00
CRE 55601	Auto Cutoff for Gell Battery	21.00
CRE 55602	Wire Harness for Battery Set	14.00
CRE 55610	Li-On Battery 2 Amp 21.5V	138.00
CRE 55611	Y Plug for Battery Parallel	9.00
CRE 55612	Battery Box 6 AA for Rem.Sw.	9.00
CRE 55613	Y Plug for Battery Series	9.00
CRE 55620r	Li-On Bat. Charger w/Auto Cut.	60.00
CRE 55621	Adaptor Plug for Li-On Bat Chg	5.00
CRE 55622	Plug Adaptor for 55620 for Eur	5.00
CRE 55650	Battery Nmh 12V 28 M.A.	89.00
CRE 55651	Battery Nic_d 12V 1500 M.A.	43.00
CRE 55660	Charger for Nicad&Nmh	40.00
CRE 55663	Battery Chgr. for 55653 Auto	40.00
CRE 57002	Train Eng. 2.4 Ghz Rx	133.00
CRE 57003	Train Eng 2.4 Ghz Rx (6Pk)	661.00
CRE 57005	Train Eng 2.4 Ghz Base/ Super	230.00
CRE 57005b	Train Eng 2.4 Base/Super Rx 6	1,150.00
CRE 57072	G Smoke Board 6 Pack	115.00
CRE 57074	RCC Remote Switch Device	133.00
CRE 57074b	RCC Remote Switch Device (6)	661.00
CRE 57076	Capacitor Board for G	29.00
CRE 57078	Non Plug N' Play Board Ac	35.00
CRE 57079	Bridge Rectifier Board	6.00
CRE 57088	6 Pin Accessory Plug	7.00
CRE 57089	Ext. Button Cord	7.00
CRE 57090	Train Eng. Pwc to Linear	29.00

Answers to **Mallet** questions from page 6:

- (1)** UP Big Boy **(2)** DM&IR Yellowstone **(3)** UP Big Boy **(4)** UP Big Boy **(5)** C&O H8 Allegheny **(6)** Counting all old dogs Virginian Triplex, 2-8-8-4 **(7)** NW Y6b **(8)** UP Challenger **(9)** NW surplus Y3s wondered around because of WWII. **(10)** Virginian Triplex, 2-8-8-4 **(11)** PRR Q1, Q2, S1 & T1 **(12)** UP FEF Four-Eight-Four