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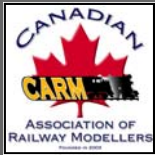


SPRING 2018 ISSUE #63

CHAIR GERALD HARPER TALKS ABOUT NEXT SUPERMEET ON PAGE 5



a quarterly publication of the "Canadian Association of Railway Modellers"



THE CANADIAN ASSOCIATION OF RAILWAY MODELLERS

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FRONT COVER PHOTO BY JOHN JOHNSTON: From Left to Right, Jordan Smith, Jason Shron, and Dan Garcia of Rapido Trains videotape the prototype N Scale CN Turbo on the editor's under construction N Scale Grand Trunk Southern Railway.

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observation platform john johnston: editor

RAPIDO VISITS THE GRAND TRUNK SOUTHERN

On Tuesday, March 14th, I had the wonderful opportunity to host Jason Shron and his staff from Rapido Trains. They were visiting the Grand Trunk Southern to shoot a video for the new N Scale Turbo Train. Jason had a 9 car CN version and a 5 car Amtrak version. These were prototypes and had been custom painted for display at various train shows.

It was certainly interesting watching Jason and the guys at work as they took take after take to get the shots they wanted. Given that these were prototypes and not part of the production run, it was also interesting to listen to them critique the few shortcomings that they were uncovering and making notes to have them corrected. Even though these were only prototypes, they looked good, sounded good, and ran well.



LETTERS TO THE EDITOR

I recently received an email from William Waithe in Toronto suggesting that I give some space to a Letters to the Editor column. Those of you who have been with us for a while might remember that I tried this 5 or 6 years ago with limited success. My approach now is to publish a letter if I receive it and if I consider it to contain information that is worth sharing and doesn't contain anything derogatory. It is my intent to continue this approach, but it is worth highlighting that if you have something to say, or something to share, I am always open to publishing your thoughts.

Interestingly, this month I received two letters/articles from members which more easily fit into the letter rather

than the article category. The first, chronicles the experience of Ian McIntosh and his wife staying in a railroad caboose, while the second from Doug Thorne concerned the Cranbrook History Centre and their railcar collection. Here they are.

The Rudy Caboose

By Ian McIntosh

For my 65th birthday my wife and I spent a couple days in Stratford, Woodstock and Ingersoll. We stayed in a bed and breakfast in Tavistock, near Stratford. I didn't know until we got there the B&B was in a refurbished caboose!



What started as a 1910 CNR wood caboose has been upgraded for comfort. It has electric lights and outlets, heating (without the coal stove) and air conditioning, and a mini fridge. There's a double bed and the two fold-down bench seats have much more comfortable mattresses. One closet is now a shower. There's still a desk, table and chairs. On the walls are a history of the caboose and interesting train photos. In early May we didn't bother with the heated pool. Model train enthusiasts will enjoy the mid-sized garden railway and many models in the sun room, where breakfast is served.



We had a good time staying a couple nights in a real caboose while exploring area antique and flea markets, museums, and restaurants like the Elm Hurst Inn and Quehl's, which has a room of railway photos.

More information: The Caboose Bed and Breakfast. Joan and Bob Rudy, 20 Holley Avenue, Tavistock, ON N0B 2R0 (519) 655-2691 Toll-Free: (888) 655-2691 Fax: (519) 655-2691. <http://www.rudyville.ca>



Cranbrook History Centre Heritage Railcar Building: by Doug Thorne



This photo taken on Feb. 15, 2017 shows the snow build up on the car roofs of the collection.

We have a complete 7 car CP "Trans-Canada Limited" on Track 1 (fully restored); a 4 car "Soo-Spokane Deluxe Limited" (3 cars restored); a 2 car "Pacific Express" (currently under restoration); as well as numerous Business and Interpretive cars, (partially restored) on Track 2; Track 3 has the business car British Columbia (fully restored), the Grand Pre (exterior painted in Royal Train colors, interior awaiting restoration), the Strathcona (restored), a 4 car Chinook Limited (partially restored) , and 3 other cars (awaiting restoration).

A new structure has been designed to accept walls and eventually will become fully enclosed, heated and air-conditioned. In an upcoming phase the south facing roof plates will have solar panels installed. Construction of the first phase covering 3 tracks is expected to commence immediately. Sprinklers will be added immediately after completion of each phase.

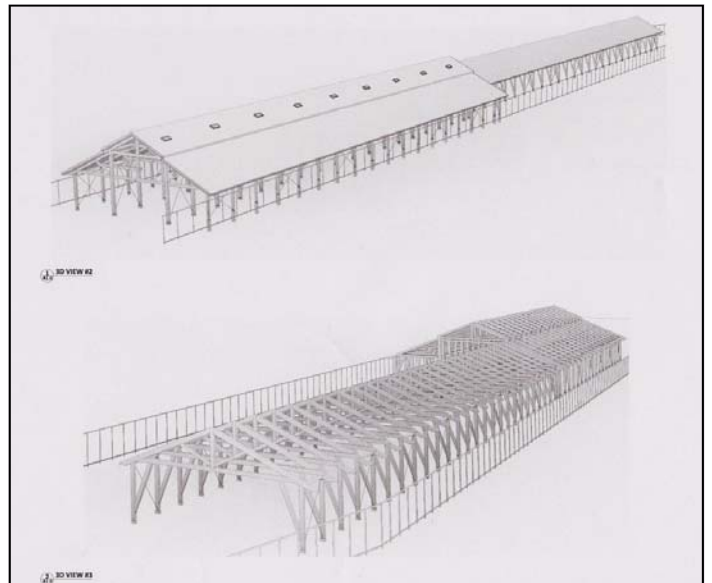
The College of the Rockies will be constructing a heavy timber Grand Entrance between the existing Museum Building and this new building in 2018.

Future construction will see Module 2 built (covering the rest of tracks 1 & 2), addition of solar panels; walls, windows and doors, interior and exterior displays.

The Cranbrook History Centre now contains much more than a fantastic coach collection with its displays, Paleontology exhibits, Royal Alexander Hall, gift shop, galleries, & Cranbrook Archives.

Donations gratefully accepted at 57 Van Horne Street South, Box 400, Cranbrook , B.C., V1C 1Y7 Canada. Attention T. Morgan

This contractors rendering shows our new proposed roof that will cover all the cars on Tracks 1, 2, and 3 cars on Track 3, the remainder of the cars on Track 3 are the 4 car Chinook Limited which are steel cars and will be maintained until cover can be extended. The other 3 cars on track 3 remain in work train condition and will be restored as soon as possible.



JOHN JOHNSTON: EDITOR



CHAIRMAN'S REPORT

Your Executive has held several meetings during the winter and a topic that has been worked on extensively is more "SuperMeets" for our Association based on the formula used for the successful Montreal SuperMeet in August 2017. This type of an event has several advantages for members and organisers. It takes place over a weekend or long weekend and so does not require the participant to take vacation time. It doesn't require substantial travel for most attendees and it provides a full program of activities to keep every one busy as well as sufficient socialising to allow everyone to catch up with friends and colleagues. Finally it has a relatively low cost. It has advantages for the Executive in that it is relatively easy to organise and does not require a large number of people in the event area putting in a lot of preparatory work over a long lead time. We have explored several events for 2018 including southwestern Ontario, northern Ontario, the Muskoka region and central British Columbia. For one reason or another we have not been able to kickstart any of them for 2018, in part due to conflicting schedules with other events. The CARM Ottawa Chapter is part of a group organizing a "Capital Region Model Railway Tour" on Saturday October 20, 2018 and we are working to encourage members from beyond that Chapter area to attend and determining if we can combine it with a Sunday gathering of CARM members. You can get more information about the tours at www.capitaltrains.ca

We are working with the London and Southwestern Ontario Chapter members to bring you a SuperMeet in spring 2019 in conjunction with their layout tour. So add October 20, 2018 to your calendar and watch this space for more information in the next issue for details and dates for the Southwestern Ontario event.

Your Executive has also addressed the membership topic and while we have been gaining e- members

we have a serious backlog of unpaid members who have opted for the full paying membership which includes the mailed out versions of **The Canadian** and the calendar. Everyone in that category should have received a message from the Membership system by the time you receive this issue of **The Canadian** reminding you that you need to pay to continue to receive the mailings and if not we will have to cancel any more mail outs to you. The one year free membership was just that, for one year, the year 2017.

My brother, who has an On2 narrow gauge modular layout depicting the Maine narrow gauge two footers, was invited to display it at the Amherst Show in Massachusetts at the end of January 2018 so he and I made the trip there and had a great time meeting an enthusiastic bunch of interested modelers as well as having time to absorb the massive amount of displays at this show. One of the biggest, if not the biggest show in North America, attendance was over 17,000 on the two days. While this was down from 22,000 – 24,000 in years gone by it was still an impressive show with every major manufacturer there displaying their new products and discussing their plans and aspirations. I was interested to observe how many manufacturers are working on, or have developed and are offering integrated sets of lights and control systems. These systems range from controllable lights for buildings, streets and yards to signalling systems which may be integrated with switches and controls. I'll utilise LEDs for the lights which keeps the voltage, current and heat issues minimal. So if you are interested in installing such a system you may want to think twice about designing and building your own system just to find that an off the shelf system becomes available the day you finally switch on your personal system.

Gerald Harper, Chair, CARM

PUBLICATION SCHEDULE FOR *THE CANADIAN*

The Canadian is published four times per year. Submission by authors or Chapters should be submitted by the following dates.

Spring Issue: February 1

Summer Issue: May 1

Fall Issue: August 1

Winter Issue: November 1

TORONTO CHAPTER:

Steve Bourdon's CNR Goderich Subdivision Layout Tour: In November, Toronto CARM members visited Steve Bourdon's HO layout. Steve's layout has some wonderful moments of humour on his well detailed layout so you need to look carefully during your visit.



Photo by James Razor – Engine yard in Stratford

He describes his layout as an "HO scale model railway based on the CN Goderich Subdivision in the 80's-90's. The point-to-point layout is powered by a Lenz DCC system. Trackwork and scenery are essentially complete, except for some little details which are added when time allows. The main focus these days is prototype operations.

Way freights normally head west out of Stratford Yard and service Sebringville, Mitchell, Seaforth and Clinton Junction before drifting into Goderich. As well as way freights, morning and afternoon locals serve the various industries at Stratford and Goderich, including the grain elevators and the Sifto Salt mine at Goderich Harbour. Occasionally, a CN freight train will travel from the Exeter Subdivision (staging) onto the Goderich Sub and terminate at Stratford. As well, a CSX freight does an interchange transfer run from St. Thomas (staging) to the Goderich Sub at Mitchell. Unlike the real Goderich Sub, this HO version offers regular VIA

passenger service. In this case a custom RDC-3.

Operations are constantly in the development stage as new industries replace outmoded ones. We are currently using switch lists generated by JMRI Panel Pro software. One person can operate the layout, but we prefer to use our regular operating crews.

Steve provided this layout summary.

Richard Morrison's Layout Tour: In early December CARM Toronto members visited Richard Morrison's Union Pacific HO layout and he had an idea on his layout that I really liked and I just had to show it here! Richard, like many of us, has projects in mind to finish "some day" and for some of those items that are buildings, he places a black & white picture of it on his layout. I really liked this idea of "Coming soon!"



Photo by James Razor

CARM Toronto Lecture Series – January 2018: In January, CARM Chapter Members were treated to a double presentation by two of its members. After a brief meeting at the beginning, Ian McIntosh presented an illustrated talk entitled "Montreal Meet Layouts" based on the August [CARM Super Meet](#) and Gerald Harper presented an illustrated talk on the 37th National Narrow Gauge Convention which was held in Denver Colorado in August.

NATIONAL CAPITAL CHAPTER - Layout Tour Report from Dave Venables

The first annual Capital Region Model Railway Tour (CRMRT), held on Saturday, October 21, 2017, was certainly considered a success. Some 134 adult visitors and 41 children came from as far afield as Lac St-Jean, Montreal, Eastern Ontario and South-Western Ontario. Seventeen home layouts, scattered as far west as Renfrew, Orleans in the east, Gatineau to the north and South Ottawa, were open for the self-guided tour as were five other layouts at the St. Anthony's registration centre and the Gatineau Model Railway Club. The tour was planned and organised by the CRMRT Association, comprising members of CARM and several other Ottawa model groups, and was financially supported by CARM, OVAR, and SLD, primarily to cover promotion and printing costs.

Once registered, a tour guide, broken down into five geographical areas, was provided with a description of the layouts to be visited and their addresses. Maps of the layout locations were available to allow visitors to plan their journey and the five layouts at the registration centre provided visitors with an initial feel of what they might see on their tour. Feedback from visitors was very positive, indicating that the home layouts were superb and the owners and their assistants were very welcoming.

To get an idea of how the hosts felt about the experience they were asked to respond to a number of questions while the event was still fresh in their mind. The objective was to get their immediate feedback about their experience with, and reactions of, the visitors to their layout which might help the organisers make improvements for the 2018 tour. In addition to providing responses to the specific questions, every host provided some commentary on how they felt about the event. Overall, they were very positive. Most indicated that they found that their visitors (both adults and children) were well behaved, very respectful, interested in what they saw, and were eager to learn.

A key comment for the future, which was both explicit and implied by other comments, was that having enough helpers is essential. As a host I was very fortunate to have two of my regular crew as helpers at all times with three at the peak which gave us time to have a quick lunch. Another was that helpers might need to attend a familiarization session a few days before the tour if they are not familiar with the layout.

Several hosts fielded questions about the materials they used for scenery, benchwork, roadbed, and sub-roadbed and one said that he was glad that he had some small samples of each handy to show. A couple mentioned that having some areas of the layout with no or minimal scenery gave visitors a better understanding of how it is built, and what is involved.

The following samples give a good indication of how the hosts felt about the experience:

I want to thank the committee for a great day. Both volunteers and visitors had nothing but positive comments about the tour and how it was organized.
It was great fun with a steady stream of visitors throughout day.
The number of visitors was amazing and comforting about the future of Model Railroading.
It was the best Model Railroading Promotional Event in years.
Lots of fun! All around a great day and a most rewarding experience.
An excellent day - congratulations are certainly due to all the organizers and volunteers.
Looking forward to the next edition.

The quantitative information from the hosts provided the number of visitors to their layouts while the registration information showed how far visitors travelled to come for the tour. Combining the two sets of information shed light on the amount of travelling visitors were prepared to undertake during the tour.

Visitors	Up to 25	26-50	Over 50
Number of hosts	6	6	4

Distance travelled	0-25kms	25-50kms	50-100kms	100-150kms	150-250kms	Over 250kms
Visitors	77	35	7	5	9	2

Layouts visited	0	1	2	3	4	5	6	7	8
Number who visited	11	27	19	20	23	16	14	3	2

(The 11 who visited none of the hosted layouts were satisfied with those they saw at the registration location.)

Overall, these are useful and encouraging insights, comments and statistics for future layout hosts and helpers.

THE ANYOX MINE RAILWAY: PART 2

COMING TOGETHER OF IDEAS AND PRACTICALITY

ARTICLE AND PHOTOS BY GERALD HARPER

In Part 1 of this series of articles I ended by saying “By the time of the next article I hope to have a completed coastline, staging yard where copper ingots will be stacked and the commercial district of the town along the railroad tracks prior to the line crossing a trestle across an estuary and maybe even a powered up piece of track so I can test out my steeple cab!” Well I achieved about half of those goals. I got the coastline worked on, made some copper ingots but not a yard full, got the town under construction, powered up and ran a test train but did not get my steeple cab built. So lets have a look at some of those items where progress got made and also discuss a few things which happened that had not been on the list.

I had made a rough inventory of the buildings I needed in the town to make it into a microcosm of the real thing. I needed, a mine office, a company store, a hospital and hotel. These would form the core of the commercial district. I am debating whether to add a bar/pub as this is a Company town in the 1920s and may well have been dry, but maybe not. The residential district would be workers houses and one or two slightly larger houses to accommodate the mine manager and smelter superintendent. When I drew up quick plans for each building I realised there was only room for four buildings on each module so those listed above would be all I could accommodate. I scratch built a company store and a mine office. Then I made a trip to the Amherst Show in West Springfield, MA., and was able to search the stocks of several parts makers like Tichy and Crow River Products. They allowed me to stock up on O scale chimneys, doors, fire escapes, windows and other building trimmings which were needed to complete the buildings already under construction. Then I had two strokes of luck. First I found a dealer selling ready made basic workers cottages at a reasonable price and a company selling O scale boat kits. I acquired two workers house's and a manager's house so have eliminated a very large amount of the scratch building I would otherwise have had to do. The major scratch building project now in the structures is the hospital. In the shipping area I acquired a tug, barge and coastal steamer, all of which I needed to service the dock area and haul in the many different supplies and take out the copper ingots. When the tug isn't docking the coastal steamer it is kept busy towing barges of very high grade silver ore from the Dolly Varden Mine across the sound and barges of logs from the various logging operations

up and down the sound. The boat kits were made by a company called Deerfield Laser and all are appropriate for the 1920s period. After building the tug boat I can say that I am very happy with their products.



PHOTO ABOVE: The tug at the Anyox dock waiting its next assignment. Note the partially painted backdrop. The surface of the dock still needs some timber decking, some edging and a few bollards.

Then there was a hiatus in construction while a whole lot of furniture got moved, after which I was able to erect all three modules in a row and install the backdrops on each one, which had been pre-painted with a pale sky blue latex paint over primer. With the backdrops in place and the approximate locations for the foreground buildings known I was able to consider what should be on the backdrops. After scouring the web for commercial backdrops I failed to find anything appropriate and determined I would have to resort to my best efforts hand painting, based on an assortment of photographs which gave me a sense of what I needed. I have two types of photographs, the older and younger. The older are ones I have found on the web of the historic appearance of the Anyox site and they are all black and white. Then I have my own photos in colour from my various travels in that part of the world. The latter were critical to attempting to develop a backdrop environment. While the black and white photo-

graphs, for example, showed me the basic style of the workers houses (which my acquired models fitted with) they only showed white window frames and everything else either black or some dark colour. I assumed that most of the buildings were wood, being the locally available material so I assumed that their colour would be either weathered plain wood or stained wood so that everything would have been various shades of brown. Only the hotel displays some brick in its construction which probably reflects the fire hazard problem with such public buildings. If history could be rolled back there was probably an earlier hotel that was wood and burned down so this brick structure is the replacement after Anyox became a regular destination for several of the coastal steamers which would have had to bring in the bricks.



PHOTO ABOVE: Some of the structures in the commercial part of the town. In the foreground is the roofed over platform where the workers wait for the trains to take them to the mine or smelter for their work shift. The heavy rain experienced in coastal British Columbia makes roofs necessary but the rusty state of the corrugated iron suggests that black tar paper may be a cheaper way of maintaining dry interiors. The hotel is the imposing brick building with the verandah. A worker's cottage is on the left.

While this work was going on, progressing the modules in fits and starts, I was also working on the long, curved, trestle which I knew was going to dominate the fourth module. The trestle crosses an estuary of the river so is long rather than deep. Consequently each of the trestle bents is the same length and I was able to cut out a template from a 2 x 4 inch block of lumber and assemble one trestle bent per evening, leaving it clamped overnight. Once removed from the jig it was sanded to remove excess glue and then dunked in my stain bath for 24 hours to give it the appropriate weathered look. I needed a total of 14 bents and then I had to glue them one by one upside down on to a set of five sills that were curved in a 36 – 38 inch radius (36 inch on the inside and 38 inch on the outside). Finally I glued bridge ties across the sills and the trestle is now ready to mount on module #4 once it is



PHOTO ABOVE: the jig I made with trestle parts clamped and gluing. Note the stack of completed bents in the back left.



PHOTO ABOVE: The trestle sills being clamped and glued, with the radius controlled by a radius curve template.

assembled and levelled to match the other modules.

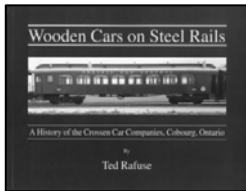
With the first three modules connected together I also completed the Buss wiring underneath each module and connected it by drop feeders from all the tracks, at least twice on each module. Then I hooked up a DCC power system, turned it on and my only steam engine ran back and forth the length of the three modules. The steeple cab locomotive unfortunately has made no progress because I am still waiting for the ordered wheel motors to install in it. A dealer at Amherst was able to provide me with a DCC card with appropriate sounding electric locomotive sound system; so I am keen to get it installed once the wheels and motors arrive and try it out. For

those of you who may attend the Schomberg Narrow Gauge Show on April 21st, 2018, I am hoping to have it with me there, hopefully in a setting where I can operate it.

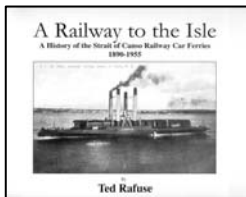
There are now a large number of half finished pieces of work which all need to be completed before moving on to the next stages of the overall construction. The backdrop painting needs to be finished before any foreground features get permanently installed. The foreground structures need to be finished, placed and then put into a vegetated setting. The intention is to be able to transport the structures separately in a box while the modules, minus any height extensions, will be able to stack in a rack without taking up too much space. Module four needs to be completed, trestle installed, track laid, river banks scened and backdrop installed. This piece of backdrop will include a hole and a tunnel portal so that the track can disappear "offstage" into a hidden fiddle yard from where trains can be turned and/or rerouted from the dock line to the smelter line. The smelter line will go off in an-

other direction to a pair of additional modules, but they are not part of the current completion plan.

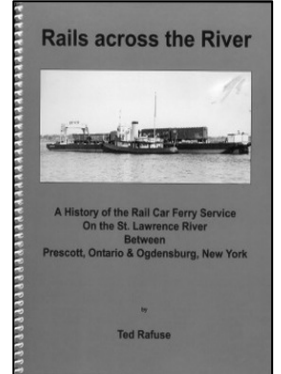
Some of my buildings have lighting installed in them and I am debating whether to install lights in all the buildings so that I can have a "night scene". I am also still considering what types of switch stands to install. Under module electric throws such as tortoise motors won't fit because of the lack of space under the module when the legs are folded down. They also require more wiring between modules which I am trying to keep to a minimum given the portable objective of the layout. I have not come across any appropriate looking O scale switch stands to mount right beside the switches so am collecting various pictures of Harp style and other switch stands to determine if I could manufacture some by scratch building out of brass. By the time you read Part 3 I may have made a decision and constructed at least a prototype of the intended switches.



Wooden Cars on Steel Rails chronicles the Crossen Car Manufacturing Co, Canada's largest independent builder of wooden rail cars 1866-2016.



A Railway to the Isle outlines the rail car ferry service between Cape Breton Island and Nova Scotia 1890-1955.



A History of the Rail Car Ferry Service on the St. Lawrence River Between Prescott, Ontario and Ogdensburg, New York, 1858-1970.

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MODEL RAILWAY ANIMATION

PART 3: MOTION USING SERVOS AND MOTORS

Text & Images by David King

Welcome to the next instalment of this series as we build on what we learned in the previous lessons and now we will add some motion features. This time we will have a look at controlling both a servo and a small DC motor. Both of these items are included in all of the 3 kits that I outlined in the original article so you should have all of the physical parts needed to complete the projects in this article.

The Servo

All of the servos from Adafruit, Arduino and SparkFun are similar in appearance and they all function exactly the same.

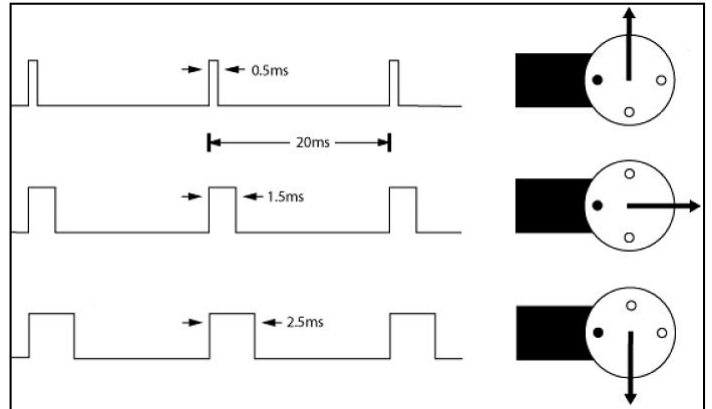


Each servo has 3 wires connected from the servo to 3-pin female connector. The red wire is connected to the +5 volts from the UNO, the black or brown wire is connected to a ground pin on the UNO, and the white or orange wire is going to be connected to one of the digital I/O pins on the UNO.

These servos can be connected directly to our Arduino Uno but larger servos should only be connected by using a servo driver board between the servo and the Uno due to the larger current requirements of the larger servos.

How a Servo Functions

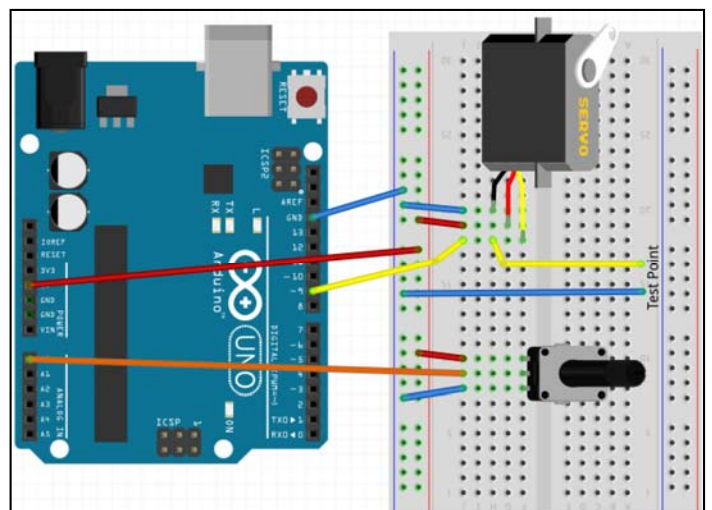
There are 2 basic types of servos that can be used with our UNO and these are a continuous servo, meaning that it can rotate continuously in both a clockwise and counter clockwise rotation, and a 180 degree servo, meaning that it only rotates about 180 degrees. We have the servo that is limited to the 180 degrees of rotation, which allows us a great deal of options.



In order for us to get the angle of movement we require for the servo we will need to send it a signal that is a short duration pulse. This pulse will be a +5 volt signal with a time ON ranging from about 500 microseconds (0.5 milliseconds) to 2500 microseconds (2.5 milliseconds) out of a pulse that only lasts for 20000 microseconds (20 milliseconds). A short ON pulse of about 1500 microseconds (1.5 milliseconds) will position the servo at about the middle position. This pulse is repeated continuous on the output pin of the UNO.

Wiring Up a Servo

Wiring up the servo is simple and to allow us to control the movement of the servo we will also add a potentiometer to our wiring. The image of the Arduino Uno will show you how to connect the servo, potentiometer and Uno together. You can leave the Test Point wires off for our needs.



Creating a Sketch called Sweep

A simple first sketch to create using the servo is one that will allow the arm of the servo to move 180 degrees in one direction and then move in the opposite direction for the full 180 degrees. This sweeping motion should continue until you disconnect the power to Uno.

For this sketch we will need to add an extra file, referred to as a library file, that contains all of the basic code needed to operate the servo. The file is called Servo.h and the code that will need to be entered in your sketch is as follows;

```
// include any associated files in this location
#include <Servo.h>
```

Based on our previous sketches during this series of articles we can use a blank sketch or one of our previous sketches. Doing this will save you time as we have the basic layout of the code and we can add and remove any coding required while retaining our basic programming structure.

Using the library reduces the amount of code that would be required to control and operate the servo but we do need to know what key words or instructions are included in this library. To avoid looking through the library file I will show you each of the key words and instructions that are available to us.

```
Servo myservo;           //The name of the servo
attach()                 //Connect the servo to a pin
write()                  //Set the position of the servo using degrees
writeMicroseconds()     //Set the position of the servo using microseconds
read()                   //Read back the position of the servo in degrees
readMicroseconds()     //Read back the position of the servo in microseconds
attached()               //Check to see if a servo is connected
detach()                 //Disconnect the servo from the pin
```

In the declarations area of the sketch you will need to identify your servo by naming it. To do this use the following code but you can replace myservo with a name of your choosing.

```
// declare any variables needed in you file here
Servo myservo;
```

The next instructions we should look at are the three functions that are used to connect, disconnect and check the status of the servo connection. The first and most important function is attach(). This function is normally placed inside of the void setup() section of the code so that it is executed prior to running the main part of your sketch, void loop(). The code needed to attach the servo is simple and requires 3 elements. These elements are the name of the servo, the function attach(), and the pin number inside of the brackets. Here is the code.

```
void setup() {
  // put your setup code here, to run once:
  myservo.attach(9);
}
```

You can also use the detach() to disconnect the servo

from the Uno at any time while running your sketch if needed. As well you can use the attached() at any time while running the sketch to make sure that the servo is attached to a pin. Checking the status of the servo is only required if you attach() and detach() the servo while running the sketch.

The balance of the functions are used to set the position of the servo arm or to read back the current position of the servo arm. You may have noticed that there are 2 write functions and 2 read functions. The reason for this is that one pair of functions, write() and read(), uses degrees with a range of 0 to 180 while the other 2 functions use microseconds to set the position with 1500 set the servo arm to the middle position and a range of 500 to 2500. Caution should be used when setting the range in microseconds as you approach the extremes of the range as the servo will have physical stops installed in the servo to prevent over travel and damage can occur to the internal gears.

Here is a chart that works well with most servos and the lower and upper limits for using microseconds are shown.

Instruction	Minimum	Midpoint	Maximum
write()	0 degrees	90 degrees	180 degrees
writeMicroseconds() ()	544	1500	2400

Here is the completed code to allow the servo sweep from 0 degrees to 180 degrees and back again to 0. This sketch will continuously run until you power down the Uno.

```
// Sweep.ino by David King
// This is a basic test sketch to operate a servo from 0 to 180 degrees
// of movement and back to 0. It operates continuously.

// include any associated files in this location
#include <Servo.h>

// declare any variables needed in you file here
Servo myservo;           // The name of my servo
int pos = 0;             // The initial starting position for the servo

void setup() {
  // put your setup code here, to run once:
  myservo.attach(9);     // Connect the servo to the Uno
}

void loop() {
  // Use this for function to increase the position of the servo
  for(pos = 0; pos < 180; pos += 1) {
    myservo.write(pos);
    delay(15);           // Adjust this delay to speed up or slowdown the movement
  }

  // Use this for function to decrease the position of the servo
  for(pos = 180; pos >= 1; pos -= 1) {
    myservo.write(pos);
    delay(15);           // Adjust this delay to speed up or slowdown the movement
  }
}
```

A Sketch Called Knob

Now we can write a sketch that will allow us to position the servo arm in a desired position and move it any time by turning a potentiometer. In this sketch you should see that we read the setting of the potentiometer and use the `map()` to change the value of this reading from the 0 to 1023 value that has been read to a value from 0 to 180 in degrees. Once this has been completed we write that degree value to the servo so that it moves to the desired position.

```
// Knob.ino by David King
// This is a basic test sketch to operate a servo from 0 to 180 degrees
// using a pot to control the position.

// include any associated files in this location
#include <Servo.h>

// declare any variables needed in you file here
Servo myservo; // Name the servo
int potPin = A0; // Assign the pin for the potentiometer
int potPosition; // Create a variable for the position

void setup() {
  // put your setup code here, to run once:
  myservo.attach(9); // Connect the servo to the Uno
}

void loop() {
  potPosition = analogRead(potPin); // Read the pot value
  potPosition = map(potPosition, 0, 1023, 0, 180); // Convert pot value to degrees
  myservo.write(potPosition); // Write the value to the servo
  delay(15);
}
```

A Small DC Motor

Small DC motors are commonly in use on our model train layouts as most model trains use small DC motors to propel our trains around the tracks and it doesn't matter if you use conventional controller packs or one of the many digital, DCC, systems. Motors can also be used to operate any number of additional items such as turntables and other animated movements around the layout.

Each of the kits include a small DC motor that we will use with the sketches we write. There are also extra components that have been included in the kits that will also be needed.

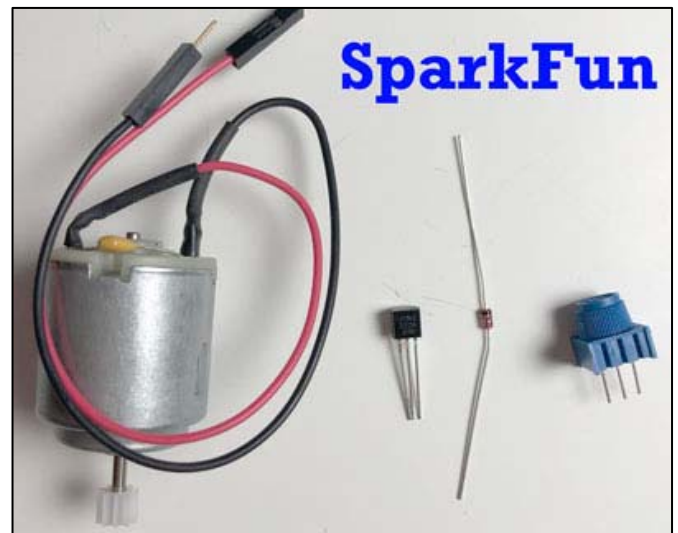
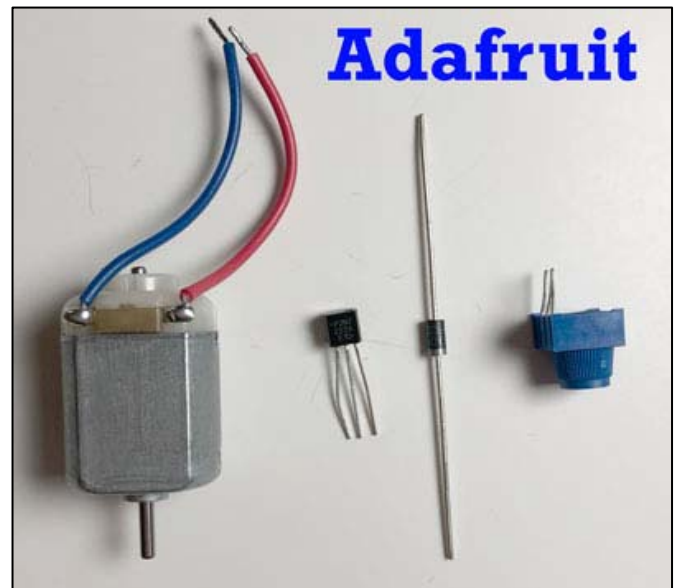
Running the Motor at Various Speeds

One of the first functions that we may wish to do with the motor is something as simple as being able to vary the speed of the motor on. You could set the speed of the motor within the sketch but we will a potentiometer as an input so we can control the speed of the motor in real time. To do this we will need a few items from our kits as noted below and shown in the images.

- | | |
|-------------------------|----------------------------|
| (1) DC Motor | (1) Diode |
| (1) 10kΩ Potentiometer | (1) 9 Volt Battery |
| (1) Battery Clip | (?) Various Jumpers |
| (1) Transistor / Mosfet | (1) 330 to 2.2kΩ Resistor* |

*(for use with the transistor only)

The parts vary from one kit to another but this project can be completed with any of these kits. The kit from Arduino



uses a Mosfet for the transistor where the other kits use a P2N2222A transistor.

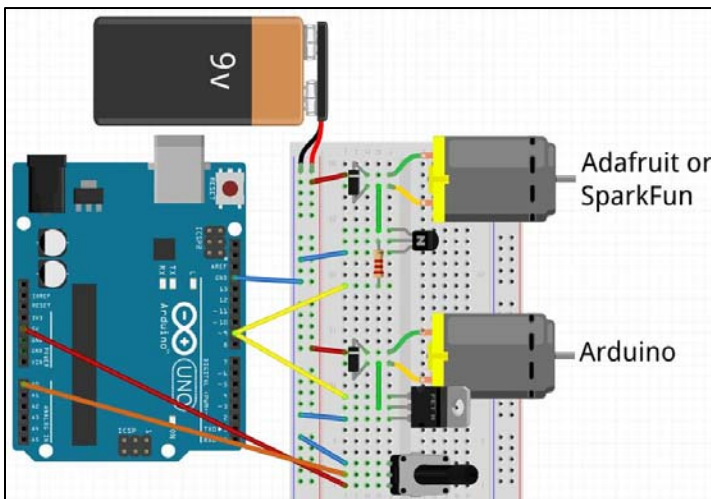
When we want to connect a small DC motor to the microprocessor by using one of the digital output pins we have a small problem to overcome. The current

draw of the motor would damage the output pin as the motor draws more current than the 40 milliamps that can be supplied by the pin.

Another issue is that anytime a magnetic field is energized by applying the required voltage energy is stored in the copper windings of the motor or coil. When the applied voltage is turned off the energy in the copper winding is discharged. This energy is discharged in the opposite polarity to which it was supplied. Also, the voltage at which this discharge occurs can be as high as 3.5 times the original applied voltage. For this project, we will be applying 9 volts to the motor so the discharge can reach a voltage as much as 31.5 volts. This higher voltage can cause a lot of damage to the microprocessor. For these reasons, we will isolate the motor from the microprocessor by using a transistor or Mosfet.

To protect the transistor or Mosfet from this higher discharged voltage we will add a diode to the motor leads that is connected opposite to the normal voltage that is applied to operate the motor but in the correct direction to allow the discharged energy to dissipate through the motor itself.

Here is the wiring for the small DC motor and a potentiometer for any of the kits. The wiring shown in this image includes a version for the Adafruit and SparkFun kits using the P2N2222A transistor. The resistor for the Adafruit kit can be a 560Ω resistor and the SparkFun kit can use a 330Ω resistor. Slightly larger valued resistors could also be used. The wiring version for the Arduino kit doesn't require a resistor as this circuit uses a N-type Mosfet which works very similar to the transistor but not exactly the same. If you wish to know more about Mosfet components you can search out how they work using Google or another web browser search engine. In the following diagram I have connected Pin 9 from the Uno to transistor or Mosfet. I used Pin 9 since this is a pin that can be used as a pulse wave modulation, PWM, pin.



The last piece we need to cover is the Sketch needed to operate the motor. In this sketch I'm keeping the coding very simple since I just want to be able to control the speed of the motor. The coding in the sketch is identical for all 3 of the kits even though the parts used for the circuit vary.

```
// DC_Motor_w_Pot.io by David King
// This sketch is used for the most basic of speed controls for a DC motor

// declare any variables needed in you file here

int transPin = 9; // This pin is connected to the transistor/mosfet
int potPin = A0; // This pin is connected to the potentiometer

int motorSpeed = 0; // This is the speed of the motor on output pin
int motorSpeedRaw = 0; // This is the raw value from the potentiometer

void setup() {
  // put your setup code here, to run once:
  pinMode(transPin, OUTPUT); // Set the pin for the transistor
  analogWrite(transPin, 0); // Set the starting speed to 0
  Serial.begin(9600); // Enable the serial monitor
}

void loop() {
  motorSpeedRaw = analogRead(potPin); // Read the potentiometer
  motorSpeed = map(motorSpeedRaw, 0, 1023, 0, 255); // Scale reading for output

  analogWrite(transPin, motorSpeed); // Set the speed of the motor
  Serial.println(motorSpeed); // Use to display motor speed setting
}
```

As part of this sketch I have include the code required to allow us to use the serial monitor so that we can see what value we a using to drive the motor. When you run this sketch you will find that you need to increase the motor value up fairly high to get the motor turning and once the motor is turning you can reduce the motor value very low and this will slow down the motor greatly. This operation method is required because these DC motors supplied with the kits a of vary low quality. If you want to so better control connect the motor leads from the breadboard to a length of rail track. Place a N-scale or small HO-scale locomotive on the rails and you can control the speed of the locomotive. Be sure to test the circuit first with the kit DC motor before trying to run a locomotive and be sure to have the 9 volt battery connected.

Conclusion

As we have seen from this article it is possible to make items move using a servo or small DC motor but the samples I have shown are limited. If you what to learn more and try more controls for a small DC motor such as starting and stopping as well as being able to reverse the direction of the motor be sure to go to CARM website in the member section and check out the expanded article.

The next instalment of this series will involve displaying information on a LCD screen. The LCD screen was included in the Arduino and SparkFun kits and Adafruit sells the 16x2 LCD display as a separate item.

This is a project that you can start at any time even if you have not viewed the previous article from this series. The previous articles are available in the preceding issues (#59, #60 and #61) of *The Canadian*, so enjoy!

Kitbashing a Two-Stall Rectangular Engine House from a Walthers Cornerstone Three-Stall Kit

By Richard Morrison

I have just finished a two-stall engine house near the front of the layout. The front wall and roof lift off as one piece to reveal the detailed interior.



My original plan was to scratchbuild a wood engine house. I bought the necessary clapboard siding and reinforcing pieces, then checked Google, together with Edward Forbes Bush's *Engine Houses and Turntables on Canadian Railways*, and saw that wooden engine houses were relatively rare, being flammable and all. Then I found an unbuilt Walthers Cornerstone three-stall Modern Roundhouse kit still in its original box under the layout. The walls and windows would stay the same, and it would be a relatively simple matter to cut the plastic floor and roof sections from wedge-shaped to rectangular. The most difficult part was making the lift-off wall/roof combination, which had to be sturdy to withstand repeated removal, and had to fit within a fairly fine tolerance.

Had the engine house been part of the layout's original plan, it would have been built on a base and simply set down on the layout. In this case, because it would have two inspection pits beneath its tracks, I cut the trenches for the pits in the Homasote "ground", then glued down the floor of the engine house directly to the Homasote. That meant the rest of the structure would have to be fitted around the floor. The "ground" was not quite flat, and since the tracks are not exactly parallel to the front of the layout, the footprint for the structure was not quite square. I got plenty of exercise carrying the scale rule, X-Acto knife, Dremel Moto-Tool and pieces of floors, walls and roofs between the layout and the workbench, measuring, cutting, gluing, remeasuring and recutting. It was fun, though.

Floor

Using a sharp knife and narrow chisel, I excavated two trenches in the Homasote to accommodate the locomotive pits. I dropped in the plastic pits, then cut, filed and sanded the pie-shaped floor to make it rectangular. I scribed, snapped and sanded square the two halves of the floor, then joined them with Tamiya Extra-Thin cement and in some parts, with CA. The floor halves were not quite square, so I used modeling putty to fill the gaps, then painted them with Woodland Scenics Top Coat Concrete ST1454. Once the paint was dry, I sanded it to represent scrapes and stains. When I pushed on the pit rails to hold them down while gluing them to the floor, I accidentally cracked the modeling putty, resulting in long cracks down the floor. I left the cracks, ostensibly caused by the weight of locomotives. As a final step, I brushed floor with Grimy Black, one of 12 powdered colors in a box of Doc O'Brien's Weathering Powders from Micro-Mark (US\$14.95). I highly recommend this economical boxed set, which I've used on many structures.

Roofs

I reinforced the kit's front wall and roof halves with scrap plastic so the wall-roof combination could withstand repeated removal and re-installation. The roof halves were cut from pie shapes into rectangles and glued together with scrap plastic underneath.

Interior Walls

The interiors of the plastic rear and end walls were covered in a layer of thin shirt cardboard, with holes for the windows cut out. I looked up "vintage brick walls" on Google Images, printed them out (no copyright was mentioned) and cut and glued the resulting brick paper to the cardboard.





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PHOTO OF INTERIOR



SW1200RS Models – A Changing of the Guard

By Peter Mumby: Photos by George Dutka and Peter Mumby.



Overall view of Peter Mumby's SW1200 collection. George Dutka photo

The SW1200RS is "the iconic Canadian small road switcher of the late 1950s produced by General Motors Diesel." Essentially a GMD road variation on an EMD yard switcher theme, these units were based on a standard SW1200 design. To accommodate higher speed requirements, 62:15 gearing allowed for 65 mph on the road, and flexicoil trucks were provided. The 500-gallon yard switcher fuel tank was replaced with a 775-gallon version, and multiple unit connections were included. A large headlight/number board fixture was designed to fit on one or both ends of the body, depending on the owner's specifications. Built to replace the smaller steam locomotives that frequented Canada's many lightly-built branch lines, the SW1200RS made its presence felt from coast to coast.

The first such unit was built for Canadian National, and rolled off the erecting shop floor in London, Ontario in September of 1955. Between then and 1960, CNR took delivery of 192 similar units. Most were numbered in the 1200s or 1300s. They received the class designation of GR-12, as compared to GY-12 for comparable SW1200 yard switchers. Early deliveries featured hood-mounted handrails, later replaced with a safer frame-mounted design. Locomotives of this class were also later retrofitted with a pair of distinctive spark arrestors. After a long and successful working life, some units became candidates for rebuilding in the late 1980s; those with replacement prime movers were renumbered into the 7300-7317 group. Others went in to the 7100-7107 "Sweep" programme, or were renumbered as hump units.

Comparable Canadian Pacific units 8100-8171 were constructed between 1958 and 1960. The major cosmetic difference between this group and their CN counterparts was that the CP "branch line units" lacked the large number board fixture on the cab end. In the 1981-1985 era, a number of units were upgraded with newer engine components, and renumbered into the 1200 number series. A small group of the 8100s were rebuilt as slugs or control units and numbered in the 1000 and 1100 series. As on CN, most of the original SW200RS locomotives have now been retired. Many found their way onto the used market and continue to work today for private operators.

Back in June 2017 George Dutka and I attended the Rapido Trains annual open house. Rapido announced the imminent release of a group of SW1200RS models. It sounds as if this is going to become a very popular release, with orders exceeding Rapido's expectations. But what about modellers who desired a version of this locomotive twenty or thirty years ago? Were alternatives available, or did HO fans simply do without? Limited run brass models have been available, but for most of us, an SW1200RS was a detail, paint and decal project. The likely starting point was an Athearn blue box SW7 (Hobbytown also produced a suitable mechanism). Kit K-21, an SW-1200 RS Conversion Kit, was made available by Juneco Scale Models. (The wife of the founder of this product line was named "June," so when pronouncing the company name, think "June Co.")



The Juneco K-21 kit contained an excellent set of instructions with lots of prototype data. One plastic bag contained the four flexicoil side frames, with the other parts in a second bag. Also shown is the fuel tank modification as a separate part. I had none of these kits left in my inventory, but my friend Gord kindly loaned me one of his kits for photographic purposes. Peter Mumby photo

At this time, Juneco was producing wood kits for CN and CP cabooses in HO, along with a few other pieces of rolling stock. At least one structure kit was offered, as well as an O scale car kit. The main portion of the Juneco line, however, was made up of a large number of metal detail parts. The K-21 kit included soft metal castings for the number boards, class lights, MU components, spark arrestors, and road switcher pilot, as well as Athearn handrail stanchions and wire for handrails. Suggested optional extras were the C-53 CN winter hatch, and the B-10 chain for walkover protection. For some reason, the fuel tank modification (C-54 or C-55) was not included in the kit, although this was an essential detail for either the CN or CP version of the locomotive.

Many of the Juneco detail parts are still available today,

Here we have a comparison of the cab ends of the CN and CP variations of the locomotive. George Dutka photo



This photo illustrates a few of the individual metal Juneco castings. Peter Mumby photo

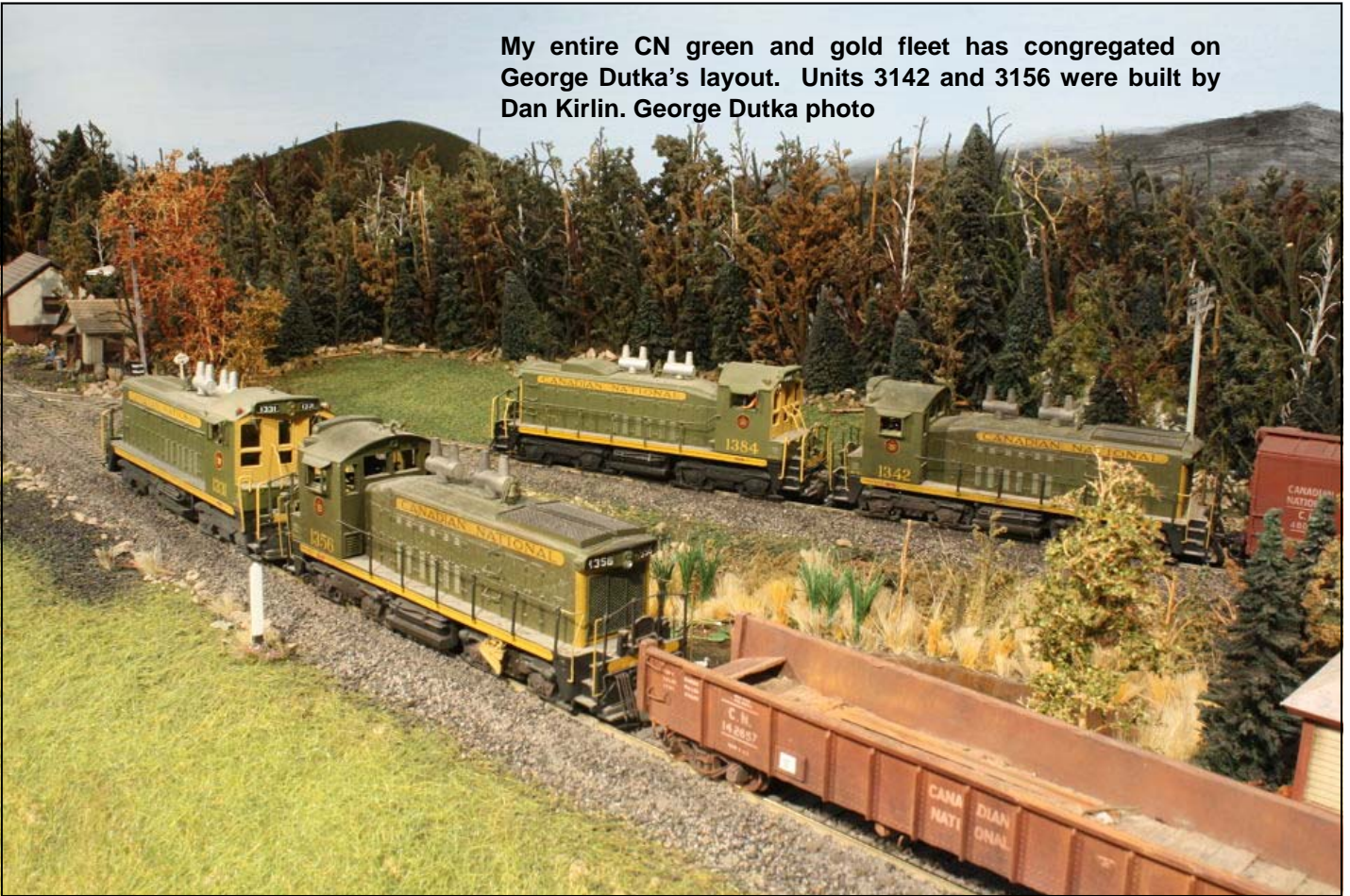
although K-21 and the rest of the kits have disappeared from the catalogue. The only SW1200RS-specific parts I could locate on the Inter-Hobbies Distributors site were the C-53 CN winter hatch, the C-54 fuel tank modification, and the C-90 SW-1200 RS number boards. Building an SW1200RS model, especially of the CP variety, would still be possible today, albeit a bit of a challenge. Keep your eyes open for a K-21 kit at the train shows, and your task will be greatly simplified!

When George and I returned from the Rapido open house, I got to thinking about the SW1200RS models in my collection, all built using Juneco and Athearn parts. After brushing off the cobwebs, I determined that I had built four myself, and acquired six more from other sources. I also located one additional shell which has yet to be completed. Once the Rapido models arrive, will I still be satisfied with these relics from the hobby's past? For now, they'll go back on the display shelves, but we'll see what the future brings!

Check out the front end of the two road's units. George Dutka photo



My entire CN green and gold fleet has congregated on George Dutka's layout. Units 3142 and 3156 were built by Dan Kirlin. George Dutka photo



This pair of CPR Branch Line Units is headed out over the White River on George Dutka's layout. The prototype 8160 was one of the "pups" that replaced steeple-cab electrics working out of Preston, Ontario on CP's former Electric Lines. George Dutka photo



PETER MUMBY'S CP SW1200RS

Photo by George Dutka



INTERIOR OF KITBASHED 2 STALL ROUNDHOUSE

Photo by Richard Morrison

