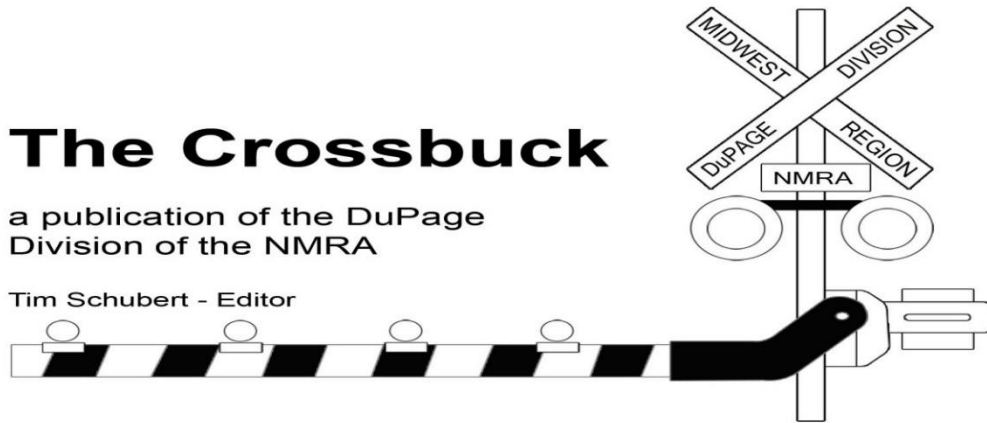


# The Crossbuck

a publication of the DuPage  
Division of the NMRA

Tim Schubert - Editor



## Winter-Spring 2023 Edition

### FROM THE SUPERINTENDENT'S DESK By Patrick Golden

It's been a terrific ride! Barring any unforeseen circumstances this will be my last Crossbuck column as Superintendent. Elections in March will provide the Division with a new Superintendent as well as a new Chief Clerk, being that both me and Chief Clerk Tim Schubert have reached our term limits.

After watching others function in the role of Superintendent since joining the NMRA and the DuPage Division in 2000, four years ago I thought I'd step up and volunteer to fill the position. I ran unopposed and was elected unanimously by those present at the March 2019 Division meeting. I've received nothing but enthusiastic support and encouragement since, and many members have approached me personally to let me know they believe I'm doing a good job. Thank you as it feels incredibly good to hear that.

Perhaps the one task that worried me the most was learning how to make thirty cups of coffee for a Division meeting and knowing when to plug in the coffee maker so the red light would be on and the coffee ready when the first of the members arrived. Mess that up and I could have been tossed but fortunately I never failed at that.

Not quite one year into my new position, the Covid pandemic hit, the world was upended and for several months we did not have in-person meetings and very little contact with each other. Eventually, with the help of Tim Schubert and a few others who are much more technically savvy than me, we began meeting via Zoom and that worked well and kept us all in the game and active in the hobby until we were allowed to meet in person again.

As Superintendent I've represented the Division at the Midwest Region Board of Directors' meetings held twice each year, at times by Zoom and at times in person. I've come to know Superintendents from other

Divisions as well as members of the Region Board, most notably Bob McGeever, the current president of the Region.

Acting in a leadership role within the Division not only entitles one to AP Certificates - Association Official for Superintendent and Association Volunteer for other positions - but it also gives a great sense of satisfaction knowing you play a role in keeping the Division on track, and as I said at the beginning of this column for me it's been a terrific ride.

For the most part our Division runs like a well-oiled machine. The policies and procedures in place serve us well and there's no real need for any wholesale change. The leadership simply steers the ship where it needs to go based on those policies and procedures.

So, as I close out my last column and take that leisurely ride into the sunset, and having expounded on the experiences I've had and the profound sense of achievement and satisfaction they have brought to me, I will once again strongly encourage our members to consider stepping forward to become part of the leadership team of the Division. It's nowhere near as difficult as you might think and extremely rewarding in the end.

And I'm not really riding off into the sunset as I am still the coordinator of the annual All American Railroad Show and the March 2023 show will mark my 20th year at the helm of that endeavor.

Thank you all for the terrific ride and Happy Railroading!

## MEETING LOCATION FOR 2022-23

The Division meetings will be held at:

***St. Paul's United Church of Christ  
5729 Dunham Road  
Downers Grove, IL 60516***

The church is at the intersection of Dunham and Jefferson. There is plenty of parking and it is ADA accessible. Nearest major intersections: North – 55<sup>th</sup> Street/Maple & Dunham, South – 63<sup>rd</sup> Street & Dunham

## Division Officers For 2022-2023

Superintendent – Patrick Golden - Expires 5/31/23  
Asst. Super. – Perry Sugerman - Expires 5/31/24  
Chief Clerk – Tim Schubert - Expires 5/31/23  
Paymaster – Alex Schneider - Expires 5/31/24

### **Trainmasters** (All terms expire 5/31/23)

Tim Schubert - *Crossbuck Editor*  
Patrick Golden - *All American Railroad Show*  
Ron Scharping - *Membership Chairman*  
Rob Schiavone - *Achievement Program*  
Charlie Lewis - *Contest Chairman*  
Dave Koch – *Social Media*  
Dave Angus – *Name Tags*  
Open – *Division Outreach*  
Alan Busic – *Division Outreach*  
Fred Henize – *At Large Trainmaster*  
Open – *At Large Trainmaster*

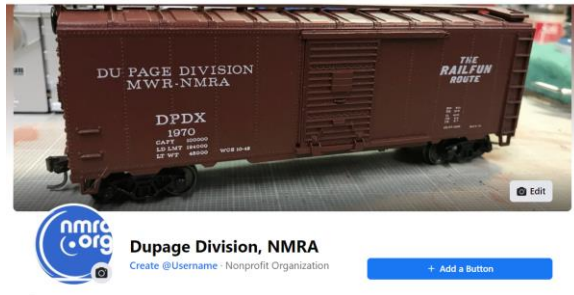
Contact Information is available on the Division website. Website: [www.mwr-nmra.org/dupage](http://www.mwr-nmra.org/dupage)

### **Division Address:**

*DuPage Division – MWR – NMRA  
1278 Oxford Lane  
Wheaton, IL 60189*

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## Like us on Facebook!



If you are on Facebook, find us at DuPage Division, NMRA. We are looking to grow our presence in this area and use it to promote our annual show. We also have a Division members only closed group as well. Our hobby is not dying, it has just moved to the digital world like many other things.

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### WELCOME TO OUR NEWEST MEMBERS

- Michael Fagel – Sugar Grove
- Jeff Geisler – Palos Hills
- Robert Hansen – New Lenox
- David Miecznikowski – South Holland
- Akash Sheth – Oak Brook
- James Stover - Wheaton

Welcome to the NMRA and the DuPage Division – we hope to see you at a meeting!

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### Short Blasts

Some upcoming model railroading events for your calendar:

**Fri & Sun – Elmhurst Model Railroad Club Open House** - 111 E. 1<sup>st</sup> St. Elmhurst, IL Friday – 7-10pm, Sun – 1-4pm *Come out and support some of our Division members*

**Weds & Fri – Prairie Scale Model Railroaders** - 3 E. Ash St Lombard, IL 7:30-9:30pm *Come out and support some of our Division members*

**Feb 18 – Train Fair & Farm Toy Show** – Bureau County Fairgrounds, Princeton, IL 9am to 3pm, Admission \$5, 10 & under free

**Feb 19 – Peoria & Pekin Train Fair** – Illinois Central College, East Peoria, IL 10am to 3pm, Admission \$3 under 12 free

**Feb 26 – Michigan City Swap Meet** – LaPorte County Fairgrounds, LaPorte, IN 9:30am to 2pm (CST), Admission \$5, 6-12 \$1, under 5 are free

**Mar 4 – Model Railroad Garage Sale** – Dubuque County Fairgrounds, Dubuque, IA 9am to 2pm, Admission \$3

**Mar 12 – Springfield Railroad Society Train Fair** – State Fairgrounds – Orr Building 10am to 4pm, Admission \$5, under 11 free

**Apr 23 – Greater Rockford Military & Train Show** – Forest Hills Lodge Banquet, Loves Park, IL 8am to 2pm, Admission \$6, 14 and under free.

*Keep your eye on our Facebook page as we will promote any upcoming model railroading or prototype events as we are notified.*

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### BECOME A MASTER MODEL RAILROADER!

Get credit for the work you have done! See Rob Schiavone at one of our meetings to get guidance on the Achievement Program for the NMRA. You may be surprised that some of your work or volunteering counts towards this program. See details at <https://www.nmra.org/education/achievement-program>

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## DuPage Division 2022-23 Calendar of Events

Month	Presentation	Contest
<b>September 11, 2022</b>	<i>Building the Mainline Bridge by Patrick Golden</i>	Refrigerator Cars
<b>October 2, 2022</b>	<i>Alternatives to Duck Unders by Perry Sugerman</i>	Maintenance Of Way Equipment
<b>November 6, 2022</b>	<i>Tales of an Old Railroader by Fred Henize</i>	Head End Passenger Equipment
<b>December 4, 2022</b>	<i>Annual Holiday Luncheon</i>	All Categories Photo Contest
<b>January 8, 2023</b>	<i>Adding a Prototypically Representative Industry/ Wood Scratch-Building Tips by Jim Huebler</i>	Open Loads
<b>February 5, 2023</b>	<i>Build a small-scale model of your model railroad track plan by Dave Lull</i>	Freight and Passenger Stations
<b>March 5, 2023</b>	<i>Train Communications in the 1940's by Robert S. Hanmer</i>	Annual All NRMA Categories Contest
<b>March XX, 2023</b>	<b>All American Railroad Show – 40<sup>th</sup> Annual</b> at Lyons Township High School in LaGrange, IL	9am to 5pm Admission \$5
<b>April 2, 2023</b>	<b>Layout Tours</b>	No Contest
<b>May 7, 2023</b>	TBA	Switching Locomotives
<b>June XX, 2023</b>	<b>Division Outing</b>	<i>Let us know some things you want to see or places you may want to go.</i>
<b>August 20-26, 2023</b>	<b>National Convention</b> Grapevine, TX (DFW area)	National Contests

# Stall Motor Switch Machines

## by Perry Sugerman

### History

In the mid-1960's I was in college at Illinois Institute of Technology. There was a model railroading club that had a layout in the attic of Main Building, an old brick 5-story building with offices and classrooms. The attic was on the 6<sup>th</sup> floor and occupied about 40% of the floor space. An anecdote claimed that the club had been in the building's south attic, but a fire rendered that attic unusable. The club moved to the north attic. It was a very large layout modeling part of downtown Chicago. The club acquired a prototype mechanical interlocking machine from a closing (11<sup>th</sup> street?) tower and it was transported to the club and moved up to the attic using manpower.

This machine was used to control the Chicago downtown passenger and freight yard signals and switched. During their initial testing of the interlocking machine the club ran into a serious problem, "The twin-coil switch machines operated so quickly that the interlocking machine's selected route would be protected against itself. The gravity operated dogs of the interlocking machine were too slow. The club needed a way to slow down the switches.

The club created a slow-motion switch machine from a 24-volt, A. C., 5 rph timing motor. It was surplus provided by Olson Electronics for a small price. It was necessary to open the case by unsoldering the bottom plate, The club used a torch, very quickly, to avoid damage to one needed plastic gear in the case.

The last two members of the gear train were removed, while the third was modified to have a pinion, a piece of brass tubing over a 00-90 screw. Slots were filed into the case so a brass rod (flat) would be able to slide across it. Two strong pieces of spring wire were attached to the flat bass and the case bottom reattached. When the motor ran the brass rod would move, smoothly and slowly, back and forth, like a connecting rod for a steam locomotive.

The motor could be connected to switch machine linkage and move the points slowly back and forth. The points seemed to glide like the prototype. The motor was connected to a thin rectangular circuit board that had 2 microswitches that would be tripped at the far ends of the travel. Power was applied to the motor through these switches and a control switch so the motor would stop when the microswitch selected by the control switch engaged. Now the device was a switch machine with these interesting properties:

1. the points glided very slowly;
2. if the motor tried to move the points past the stock rail of the switch, it would stall unlike previous attempts with DC motors that moved the sock rail!
3. The power was off when the point was in position and was held there by gears; and
4. If the point rail moved away from the stock rail the power would come back on to re-position the point.

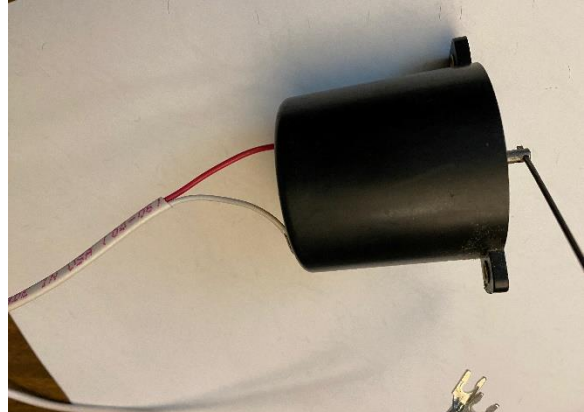
I was so impressed by this arrangement, that I purchase several dozen motors from Olson Electronics. I still have most of them.

Along came Bob Brush. Bob was part of the Elmhurst Model Railroading Club and he was hawking [Hankscraft](#) Display Motors as a switch machine. The motors were slow, 1 to 4 RPM and drew very little current. When the motor was stopped by something, it stalled and drew less than 15 milliamps. They came as 12-volt DC motors and a 1-amp supply could handle over 60 stall motors.

The power was on all the time. Those of us who were using twin coil machines considered this to be a problem, even though it is not the fire hazard of twin coil machines with power stuck on. In the mid-1960's I was willing to wait until I could figure out how to get route control on these machines. Technology (the Space Program) came to the rescue. By the end of the 1970's integrated circuits were available at very low cost. A diode- matrix arrangement could be run integrated circuit switch machine drivers made out of memory chips and op-amps. I was convinced.

In 1979 I re-established contact with Steve Karas (Fox Valley Division again). I would visit the Central of Wisconsin for work sessions on Saturday. The first chore was installing Hankscraft Motor switch machines on the hundred or so hand laid switches. Steve had built the CoW during the last year. Now control systems were the main impediment to operation.

We spent that evening installing two switch machines. We were learning how to do the Bob Brush method. I figured we would be at least 10 weeks installing switch machines but the next week, Steve had already finished installation of 100 switch machines.



*Figure 1 Hankscraft Display Motor with piano wire and power wires attached.*

It was time for a Fox Valley Division hosted NMRA Regional convention, and I was in charge of the company store. Some of the products offered were Hankscraft motors for switch machines. Several of the Rail Group Chicago modelers made a bulk purchase (1000 motors) and after the motors were divided and installed quite a few were left. I sold all of them.

The Bob Brush installation method bothered me. It was complicated and required expensive parts. In previous years I had become friendly with John Tesch, another Fox Valley member. John, a dedicated model railroader, was building and operating in N-scale and had an interest in making throttles that would improve the performance (especially slow speed performance) of DC powered model locomotives.

John got interested in switch machines creating a device he called, "The Motovator." The Motovator used [Plastruct](#) parts, a 4-40 screw and a very cheap (\$.33) toy motor. It operated in much the same way as the Illinois Tech switch machine except that the motors were DC. The motor turned the 4-44 screw so that a square tube would move within a larger square tube.



The back and forth was caused by using a toggle switch to change the direction of the motor.

Not counting the toggle switch, a Motovator cost about \$1.00.

To achieve similar results for the linkage of a Hanksraft Motor, I chose a 1 3/4" pipe strap (\$.11 each in 1979) to hold the motor and number 50 piano wire to connect the motor shaft to the middle of the switch tie for moving the points.

Instead of mounting the motor with the drive axle perpendicular to the layout, I mounted it with the drive shaft parallel to the center line of the straight track through the switch. An appropriate hole was drilled through the shaft and a length of piano wire about an inch longer than the distance from the installed motor through the layout to the switch tie had one end flattened (a hammer). The wire was pulled through the motor shaft and a hard pull with a pliers resulted in the wire at right angles to the shaft. We subsequently added glue to the joint.

Take this assembly under the layout and run the wire through a hole drilled through the sub-roadbed, and roadbed, through a hole in the point moving tie that moved the points. The extra inch could be grabbed with a hemostat allowing a one-person installation team.

Once the motor was approximately centered under the switch, the pipe strap was screwed into the bottom of the sub roadbed. The motor is self-adjusting if you get close.

I think this is one of my lasting contributions to the hobby. Vendors still supply Hanksraft motors with a pipe strap and

piano wire to use a switch machine. All the parts cost a lot more today.

### Motor Control

In the IIT days I told Bob Brush that I would switch to stall motors (Hanksraft) when I could drive them with reasonable route selection circuits. Previously, we used diode matrices to perform route control with twin coil switch machines. Below is a sample for

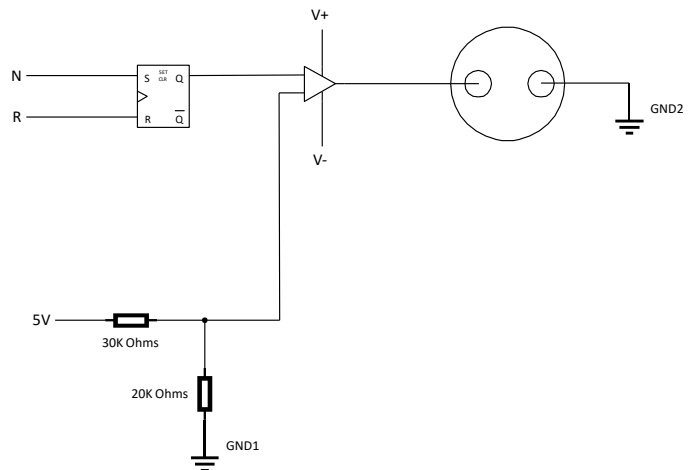


Figure 2 - Switch Motor Driver

stall-motors.

Figure 2 shows how the stall motor is connected electrically. The motor is connected to ground on one side and to the output of an op-amp on the other. For single installations an LM741 op-amp can be used but if many switches are to be run, the LM324 Quad op-amp reduces the cost. V+ and V- are supplied by a 1-amp power supply, + and - 12 volts. It is grounded to the same ground as the motor. This power supply will support over 60 stall-motors. The motors draw their maximum current of 15 milliamps when stalled.

A 5-volt supply is needed for logic. The diagram shows a Set/Reset Flip-Flop as the memory for the position of the switch. When Q is higher than reference voltage, the op-

amp connects V+ to the motor; otherwise, the op-amp supplies V- current to the motor, making it turn in the other direction.

The reference voltage is a low current 2-volt reference. If using TTL-logic chips, the combination of the flip-flop and the op-amp will act as a switch for the motor. If using some other memory, like CMOS, the reference voltage may need to be adjusted. Just change the values of the resistors until things work.

Instead of the flip-flop, memory chips can be used. An example is the 74LS373 Tri-state octal latch. This provides memory for 8 switch machine drivers with 1 chip. Some extra wires may be needed, because of its tri-state. The LS versions of these chips are more expensive today than AL versions.

Now that we have a way to control switch motor that can be wired to other logic circuitry, it is time for an example of the diode matrix.

First let's look at the track arrangement in Figure 3. One track goes to 5 tracks. There are 4 switches (motors) to be controlled.

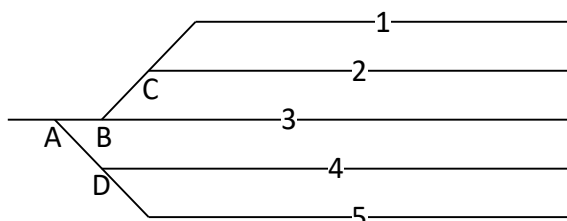


Figure 3 Track Diagram

The route settings for the switch motors are described in the manipulation chart, Fig. 4. The manipulation chart has a column for each switch and a row for each route. Starting at the left of switch A and heading to the right, track 1 is reached if Switch A is Normal, Switch B is Reversed and Switch C

is Normal. We write these conditions in row 1 of the manipulation chart under the corresponding switch. Note there is no information on switch D because we get to track 1 without traversing that switch.

After the manipulation chart is complete the diode matrix can be constructed.

Track	Switch A	Switch B	Switch C	Switch D
1	Normal	Reverse	Normal	
2	Normal	Reverse	Reverse	
3	Normal	Normal		
4	Reverse			Reverse
5	Reverse			Normal

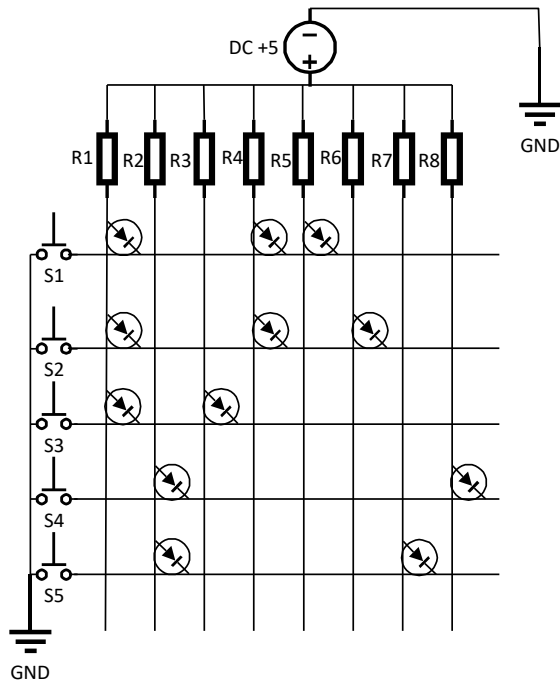
The lines in the diode matrix, Fig. 5, represent wires. I assemble the wires on perforated prototype circuit board. The vertical wires on one side of the board, are connect to the logic power supply through 2.2 K Ohm resisotrs (R1-R8). The other ends are connected to the flip-flop for its corresponding switch motor. AN goes to the Set pin of flip-flop A while AR connects to the Reset pin of flip-flop A.

The horizontal lines are connect to logic ground through the momentary push buttons, and live on the other side of the board, insulated from the vertical wires. For each item in the manipulation chart a diode is connected from the horizontal wire representing the route to the vertical wire representing the desired position of the



switch.

Figure 5 Diode Matrix



When a button is pushed, its horizontal wire is grounded and the diodes connections cause the vertical wires to be grounded, too. In the example matrix, pushing button one will cause AN, BR and CN to be grounded. The flip-flops remembering A, B and C will be set Q-Hgh, Q-Low, Q-High causing the switch motors to rotate in the correct direction for the route to track 1. Note that nothing happened to switch D, it just stays the way it was before the button was pushed.

### Photos from the Elmhurst Model Railroad Club



***The Crossbuck***

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c/o Tim Schubert  
1278 Oxford Lane  
Wheaton, IL 60189

**This is your notification of the February 5,  
2023 meeting**

***The Crossbuck*** is the official publication of the DuPage Division of the National Model Railroad Association. Subscription is free to all NMRA members that reside within the boundaries of the DuPage Division. The DuPage Division does not offer any liability from the information contained within this publication.