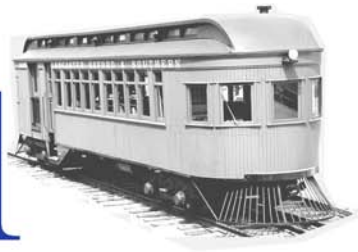
The Local



A PUBLICATION OF THE MID-EASTERN REGION OF THE NMRA

Volume 71 August - September - October 2016 Number 5

Special Issue - Ballot and Survey Enclosed

Kenneth Montero, MER Director

This issue of The Local is being sent to all members of the Mid-Eastern Region of the National Model Railroad Association (MER) and other subscribers to The Local as shown in the MER records. The envelope also contains:

1. Your ballot for the election of officers and directors of MER and voting on by-law amendments (sent only to members eligible to vote).

2. Your questionnaire and survey form both to update your membership information and to seek your input as to several matters being considered by the Board of Directors (BOD) of MER, and

3 A pre-addressed envelope (for MER members eligible to vote) for you to send the ballot and questionnaire & survey form back to MER.

This article explains why MER is doing so for this issue of The Local. Bear with me – a lot of things are covered in this article.

The BOD decided to combine several mailings as explained below into one mailing, as no one likes to be bombarded with multiple mailings from the same entity. Let's first discuss the election.

Ballot

MER is required to send a ballot to all members eligible to vote for each election. Inside this issue on pages 8 and 9 is a statement by each candidate for office, together with a picture of each candidate, and the text of each proposed by-law amendment. The ballot is on a separate sheet – there is no need to try to tear out the ballot from this issue of The Local or separate it from a description of the candidates. For members eligible to vote, this is your opportunity to participate in selecting MER's officers and deciding MER's governing provisions.

Return Envelope

In the past, MER sent a ballot by a separate mailing, asking members eligible to vote to tri-fold the ballot, tape it shut, and mail it to the Ballot Committee. This approach, while avoiding an expense for envelopes for MER, was not entirely satisfactory for some MER members. For this election, the BOD decided to provide a pre-addressed return envelope to encourage participation by members eligible to vote in the election process. This also permits us to send a questionnaire and survey form to you and provide a convenient way for you to return it to MER, so you only have to make one mailing back to MER.

Questionnaire & Survey

Whether or not you participate in voting, please complete and return the questionnaire & survey form (called hereafter the survey form). MER is trying to improve the accuracy of its information about all of its members, and also get input from its members about several matters. The form has three parts described below.

A. MER Records and Your Personal Information

The top part of this survey form has been prepared from MER's records with your name, postal address, preferred email address, and status regarding your subscription (if any) to The Local.

MER is trying to update its records via this form – please make any corrections on this form so that MER has your correct contact information. This is especially true for your preferred email address for future contact by MER, as email is increasingly used for communication due to its speed, convenience, and cost compared to postal service mailings. Correct contact information is essential for MER to meet its required distribution of notice of the annual meeting and election ballots.

In asking for your postal service address and preferred email address, please note that MER takes steps to insure the privacy of your information. MER data is used to update your information in the NMRA database

Continued on page 4

The Local

Official Publication of the Mid-Eastern Region, NMRA - A Tax-Exempt Organization

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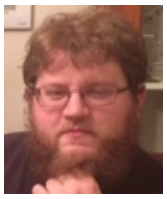

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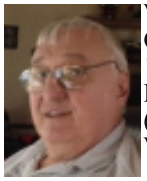

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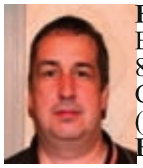

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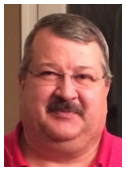

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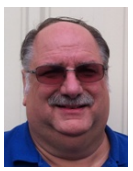

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From The Business Car

By P. J. Mattson, MMR, MER President

In this issue you will find the resumes of the people running for the Officer positions and the ballot. You will also find information regarding four changes to the MER By-laws that need approval, and these are also on this year's ballot. Also, there should be a self-addressed envelope provided for you to mail in the ballot. We are sending this copy of The Local out to all the members of the MER just like we would the ballot. Hopefully some of the members that do not receive The LOCAL via mail or e-mail will start to appreciate what they see and consider receiving the MER newsletter. Remember, The Local is FREE via to download from the link that is sent out to all electronic subscribers.

Also in this issue is a questionnaire. Please find time to fill it out and send it in with your ballot. We hope this will help us serve your wishes better.

This year's Convention will be in Durham, NC. It's named "Tracks to the Triangle". We hope to see you there. Bring your best models for the contest. This year's Presidents Award will be for a Diesel Engine. I hope to see many of them in the contest. Till next time stay on the right track.

Keeping in Touch...

By Bob Price, MER Business Manager

It's Election time again. We only have a handful of members running for the various positions. It is great to see these members stepping up and running for office. This year, the ballot and a survey are included with the latest issue of The Local. More about that can be found elsewhere in this issue. As always, the election results will be posted on the MER web site, the MER Yahoo group, the next issue of the Local and at the Annual Business meeting as per the MER By-Laws. Good luck to everyone that is running.

In June the MER Board of Directors held a meeting in Clinton Maryland, down the road from Andrews AFB. Treasurer Buckingham arranged the location and it exceeded our needs. The Board covered a lot of topics and material, yet still managed to get us out of there on time. Kudos to them all for their early preparation work prior to the meeting to help keep it moving.

Finally, another plug for the upcoming MER convention. I know I will be there (I have to be there for the various Board and Member meetings as well as for the Business Manager's Reunion Party). I look forward to seeing you there too.

As always Keep in Touch with any questions or changes in your subscriptions or addresses. A current address on file saves the MER some money.

Board of Directors Meeting

The Board of Directors of the MER-NMRA will meet at 7:00 pm on Thursday, October 20, during the Tracks to the Triangle 2016 convention. Board meetings are open to all MER-NMRA members. The room will be posted at the convention information desk.

Annual Membership Meeting

The annual meeting of the membership of the MER-NMRA will convene at 10:00 am on Sunday, October 23, during the Tracks to the Triangle 2016 convention. All MER-NMRA members are strongly urged to attend. The room will be posted at the convention information desk.

Special Convention Issue

There will be a special edition of the eLocal featuring photos of layouts that will be open during Tracks to the Triangle. Even if you don't plan to attend the convention there are photos of some really nice layouts.

In This Issue

Pages over 16 are in the electronic eLocal - Editor
http://mer-nmra.com/MEReLocalsCurrent.html

Continued from page 1
(from which MER data is extracted). When MER receives back your information, the MER's general principles for privacy guidelines are as follows:

"The MER BOD must authorize distribution of MER personal information, either for an ongoing management purpose, or in response to a special request. Similarly, the appropriate Division Superintendent must approve such distributions of Division-level information. They will be guided by the following general principles. Personal information will **not** be distributed in the following cases:

a. To any individual or business for commercial purposes.

b. To any individual not in a leadership role within the NMRA, the MER, or an MER Division (exceptions must be specifically approved by the MER BOD [for Regional information] or the Division Superintendent [for information relating to that Division's membership].

c. For any purpose other than NMRA, MER, or MER Division business."

(The emphasis is in the text of this policy statement.)

B. The Local and You

The Local is MER's primary vehicle for communicating with its members, so a lot of emphasis is placed upon making it available to the MER members.

Regarding the status of your subscription (if any) to The Local, our records are complete only as to members who receive the print version of The Local. While some members subscribe to the electronic version of The Local, we believe that many more members just go to the MER website and download the latest issue but are not subscribers. We do know that we have a lot of members for whom our records show that the member has no subscription of any type. We also know that there are some members who don't receive either the print or electronic version of The Local, sometimes by choice – just as some members prefer not to subscribe to the NMRA magazine. Your subscription status, as shown in MER's records, is shown on the survey form.

MER believes that there may be some confusion as to what type of subscriptions are offered by MER because the NMRA website only lists the print version as a subscription option. Consequently, MER decided to combine :

a. Notification to you of what MER's records show regarding your subscription status, and

b. An opportunity for you to decide which, if any, type of subscription you would want in the future.

MER now offers two types of subscriptions:

Electronic version – FREE to MER members – All that you would have to do is ask the Business Manager to put you on the list of MER members who want this free version. To make it easy for you to subscribe to the electronic version:

1. Review (and revise if needed) your preferred email address on the survey form,
2. Check the appropriate box on the survey form,
3. Return the survey form in the enclosed envelope.

Once your subscription is recorded in MER's records (along with a valid email address), you will be notified by email when each issue is ready, and it will contain a link to click to go to the latest issue for viewing or downloading - MER does not clutter your email mailbox with a copy of each issue.

Print version – currently $9.00/year – if you want this version and don't already have a print version subscription, you can be subscribe by:

1. Review (and revising as needed) your postal mail address on the survey form,
2. Check the appropriate box on the bottom of the survey form,
3. Attach to the survey form your check or money order for $9.00 made payable to Mid-Eastern Region NMRA
4. Return the survey form with check or money order attached in the enclosed envelope.

Each issue normally is mailed at a bulk rate (not first class) without an envelope or wrapper to keep low the cost of production.

Comparison – So that you can compare versions offered by MER, we are sending each member a print version of The Local and, for the electronic version, you can got to this website address to access the electronic version: http://mer-nmra.com/MEReLocalsCurrent.html

Here are some things to consider:

• *Cost to you* - Electronic version is provided at no additional charge to MER members – a real money-saver. The print version is $9.00/year, subject to increase when costs of production rise.

• *Content* - Electronic version will have color photos and graphics, while the print version is only in black & white. Electronic version can contain more pages than the 16-page limit that applies to the printed version.

• *Renewal* – Electronic version subscription needs no periodic renewal – just sign up once. Print version requires your periodic action and your payment for renewal.

• *Timeliness* - Electronic version will be available for downloading before the U.S. Postal Service can deliver the print version, and postal delivery usually is slower than first class mail.

• *Condition on arrival* - Electronic version is complete, while paper version can get mangled in the postal mail service.

• *Back issues* – Electronic versions available on website back to 1996 at no charge. There is no consistent stock of back issues for print versions.

MER strongly encourages its members to become electronic version subscribers because the electronic version provides a much better product and value for the members, saves members money, and saves MER staff (all volunteers) time and effort in dealing with print subscriptions.

Below the information about your current subscription status is a series of check boxes if you wish to change the type of subscription that you have.

a. If you want to become an electronic version subscriber, check the box for that change and send the survey form in the enclosed envelope. The change will be done through this survey form.

b. If you are a print version subscriber and wish to become an electronic version subscriber, check the box for that change and send the survey form. The change will be done through this survey form. MER will continue to also send the print version until your print version subscription expires (MER is unable to provide a refund for any unused print subscription).

c. If you want to become a print version subscriber, check the box for that change, attach your check or money order for $9.00 made payable to Mid-Eastern Region NMRA, attach it to the survey form, and send the survey form in the enclosed envelope. (Do not send cash.) The change will be done through this survey form.

d. If you are a MER Life Member (an option no longer open to new members) and want to switch from a print version subscription to an electronic version, check the box for that change and send the survey form. The change will be done through this survey form. MER will activate your electronic version subscription and discontinue your print version subscription (MER is unable to provide a refund for any unused print subscription).

e. If you want to discontinue your subscription, check the box for that change. MER will make no further effort to inquire about your subscription status unless and until you ask for a change.

Exception: If MER records show that you do not have a subscription to any version of The Local and you do not want to subscribe to any version, please check the box that reads, "I do not wish to receive The Local." By doing so, MER will make no further effort to inquire about your subscription status unless and until you ask for a change.

C. Survey Questions

At the bottom of the survey form are two questions about how MER conducts its business. We need your input.

First Question: MER included a pre-addressed envelope for your use in returning your ballot and the survey form. MER has not done so in recent years, if ever, for mailing ballots. Obviously, this is an extra cost for MER, and the question is "Is it worth the cost?" Your response will provide guidance as to whether MER should provide a pre-addressed envelope in future years.

Second Question: MER is exploring the use of electronic voting for those willing to vote by email or similar electronic means. Southeastern Region is trying out an electronic voting process. Electronic voting would save members postage money and be more convenient than postal mailing, and it would save fellow MER members on the Ballot Committee (all volunteers) a lot of time in counting ballots.

At the 2015 annual meeting, there was overwhelming support from those in attendance for the electronic voting option. Since many MER members were not at that meeting, this question is being asked through this survey. Again, your response would provide guidance as to whether BOD should proceed with exploring this option.

Notes:

Having accurate email addresses is important in electronic voting, so please be sure that MER has a good email address for you in the upper part of this survey form.

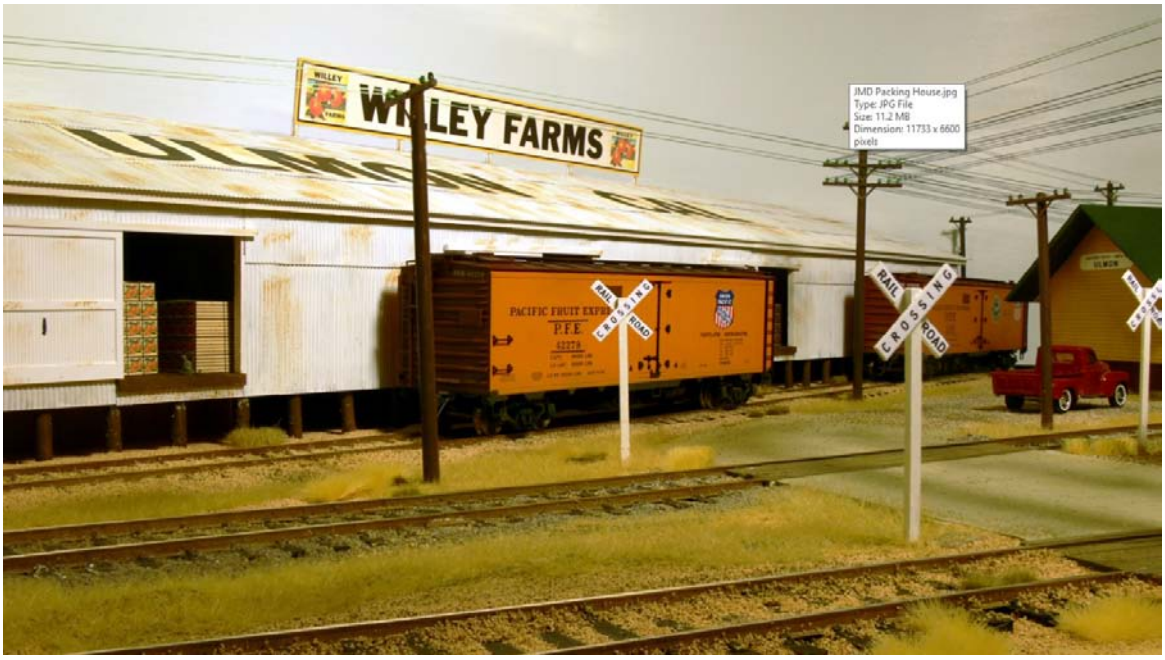
Electronic voting does not eliminate paper ballots for members who do not have email access or prefer to have a paper ballot.

Additional Input

There is blank space on the back of the survey form for your input as to ideas that the BOD should explore. "No one has a monopoly on knowledge and good ideas" is an axiom with which the BOD strongly agrees. There is no way that members of the BOD can personally contact each member for such input. Therefore, the BOD requests that you share with us through this survey form your thoughts and ideas of things that the BOD should explore to improve MER. Feel free to attach more pages to your survey if the back of the form does not provide sufficient space for what you have to say. Your ideas will be shared with the entire BOD.

Dan and Michelle Fisher's Layout at Tracks to the Triangle

Photos from Jerry Davis' O Scale Layout, Open at Tracks to the Triangle



For more photos of convention layouts get the special convention issue at:
http://mer-nmra.com/MEReLocalsCurrent.html

2016 Elections and Changes to the By-Laws

This year we elect the four Officers to the Board of Directors for the Mid-Eastern Region. Below you will find information regarding all of the candidates for the positions of President, Vice-President, Treasurer, and Secretary.

Statements of Candidacy

Candidate for **President – P. J. Mattson -** I have been a Life member of the NMRA and MER (NMRA L-5286 MER L-284) since 1985. I now serve as the MER President and Convention Treasurer for the MER. I started being a Convention Registrar for the Markers '89 regional convention in Cherry Hill, NJ. I then served as the Registrar for the Valley Forge Express National Convention in 1993. I have done a multitude of Regional Conventions and served as the Tour Desk coordinator for the recent Independence Junction National Convention in 2006. I am also the Car Project distributor for the MER. I have served as an MER Director for 3 years and then I became Vice-President. I now have served as President for 2 years. I am married with 3 children and 7 Grandchildren and 2 Great-Grandchildren. I am a retired Emergency responder for the DuPont Corporation. I served in the Army in Vietnam in 1969 and 1970. I also am a Volunteer Firemen where I served for 13 years as Chief and was also President of the Relief Association. Now my Grandchildren, Great Grand-children and trains are my passion and fill most of my time.

Candidate for **Vice-President – Kurt Thompson -** I am seeking the Vice Presidency. The Vice President serves as the champion of the Divisions and their voice to the MER Board of Directors. I joined the NMRA in 1987 and became a Life Member in 1994. I have earned six Achievement Programs certificates and am working my way toward Master Model Railroader. I was successful in leading the rebirth of the NMRA in the Baltimore area. Between 2008 and 2013, I was the first Superintendent of the Chesapeake Division serving from the start up. My last project as Superintendent was the co-chair of the highly successful 2013 C&P Jct convention. I have shared my love and interest in modeling railroading through many articles. I have been published in the NMRA magazine several times, the Keystone newsletter of the Division 2 MCR (Pittsburgh Div.) and "The Relay" (Chesapeake Division's newsletter). As Vice President, I will work as hard for all the Divisions as I worked as Superintendent of the Chesapeake Division. As the Superintendent of a start up Division, I have a unique perspective on gathering consensus and motivating people to move forward together. I look forward to serving you as the next Vice President of the MER.

Candidate for **Vice-President – Gary Brown** - I have been a model railroader for over 50 years, modeling first in O gauge (the old standby, Lionel) and then HO after I married. I am working towards Master Model Railroader, having completed Golden Spike, Chief Dispatcher, and Volunteer. Currently I am working on the Structures, Cars, Scenery, Civil, and Electrical Achievements. I am fully retired, although I am working 3 days a week at Busch Gardens, Williamsburg as a Locomotive Engineer and Fireman on their 3 foot gauge 4-4-0 steam locomotives. I don't consider it a real job, more like a dream come true. I have served on the Tidewater Division Board of Directors for fourteen years, including four years as Superintendent, and four years as Assistant Superintendent. I also served as the coordinator for the 2012 MER convention, "Milepost 40". I am currently the Chairman of the Advisory Board for the City of Virginia Beach's Disabled Adult Day program, and am entering my fourth year as President of the Oceana-Lynnhaven-Golden Lions club. One of the responsibilities of the MER Vice President is to represent the Divisions at MER Board meetings. In order to fulfil this responsibility, if elected, I will commit to attending a regular meeting of each Division in the MER at least once each year. I have the time, interest, and experience to serve as Vice President of the MER, and ask for your support and vote.

Candidate for **Treasurer – Brian Kampschroer** - As a member of MER for 39 years and a former MER and NMRA Board member (NMRA #L04001, MER #L00074), I know it is important to regularly bring in fresh people and ideas to any Board. You will find my past experiences provide a unique set of qualifications which are valuable to the MER:
Assistant Treasurer, MER: 11 years; Treasurer or co-chair of 5 MER conventions, all with substantial surpluses. Assistant Treasurer, Washington, D.C. NMRA National Convention; Treasurer of the most successful ever NMRA National Convention, Valley Forge Express. Director, MER: 4 years; Founder, Susquehanna Division, MER. Executive Convention Chairman, MER: 7 years; Eastern Vice President, NMRA: 4 years. Finance Committee Chair, NMRA: 12 years; Director of Meetings, Conventions and Trade Shows, NMRA: 9 years. Certified Meeting Professional.
Rules are meant to be practical guidelines and can be modified or at least bent occasionally to suit specific needs. While there is a very low limit as to how much a Treasurer may bend the rules, there is no limit to the search for solutions. If elected, I promise to be receptive to new and innovative ideas and concepts, no matter their sources and regardless of how unconventional, to work with the board and the members to enable them to reach their goals while maintaining and perhaps improving the solid fiscal standing of the Mid-Eastern Region. I ask for and appreciate your support.

Candidate for **Secretary – Ken Nesper** -- My name is Ken Nesper and I am a candidate for reelection to the office of MER Secretary. During my first term, in addition to officially documenting the meetings of the board and maintaining the MER Executive handbook, I sought to keep the membership informed about board activities by publishing meeting summaries in The Local. I hope that you found the summaries useful. I am well-versed in the responsibilities of being the Secretary on the Board of Directors in a volunteer organization. I served four 2-year terms as secretary of the League of Women Voters of DC (yes, there are male members of the League). I also served as Secretary of the Administrative Board of my church. Within the MER, I was Chairman of the Audit Committee between 2003 and 2014, a member of the Budget Committee between 2001 and 2012, and served as Chairman of the Budget Committee between 2012 and 2014. (In the MER, an officer cannot serve as a Committee Chair.) In addition to being a life member of the NMRA and MER, I am a member of the B&O Railroad Historical Society, the National Railway Historical Society, O Scale Kings, Potomac Division, and the Operations SIG. I model an operations-oriented urban industrial railroad loosely based on the B&O's Alexandria Subdivision in O scale. My wife and I reside in the Brookland neighborhood of NE DC.

Changes to the By-laws that the Board of Directors has approved for placement on the Ballot:

Article II Membership, Fees, and Publication
Section 3. Subscriptions and Fees

F. ~~In the absence of dues per se, a~~ Each MER member shall be entitled to a subscription to **The Local**, which a member may decline to receive, ~~may be obtained at a cost to be determined by the Board.~~ Any NMRA member may subscribe to **The Local**. The Board of Directors shall determine the form of, and subscription rates for, **The Local**.

Rationale
This amendment reflects that we are removed from the time when region membership included a subscription to The Local. It recognizes that some members do not wish to receive The Local in print or electronic format. And, it restates that existing practice that the subscription rates are set by the MER Board of Directors.

Article IV Elections, Eligibility, Nominations and Ballots (6/05)
Section 3. Nominations

C. Balloting shall be by mail or any reasonable electronic means as approved by the Board of Directors. The ballot will be designed to deter fraudulent duplication . (3/01)

Rationale
Due to technical advancements in communication, the laws in most states have been modified to permit election of officers and directors and adoption of by-law amendments using secure electronic technologies. To take advantage of such changes under Maryland statute, the by-laws need to be revised.

Article IV Elections, Eligibility, Nominations and Ballots (6/05)
Section 3. Nominations

H (New). The deadlines and schedules for nominations and balloting shall be as stated in the Policies of the Mid-Eastern Region, NMRA, Inc., and shall be published in the first edition of **The Local** that is published each year for that year's election.

Rationale: Nowhere in the By-laws are there provisions as to publicizing the election deadlines. They are needed to have an effective nominations and election process.

Article VI Board of Directors
Section 3.

There shall be at least two (2) meetings per year of the Board of Directors of the Region. These meetings shall be held at such time and place as directed by the President. Upon petition of any three (3) members of the Board of Directors, additional meetings of the Board may be called as necessary, or to fix the date and time of a meeting in the event the President fails to do so. (11/97) Attendance and participation via teleconference, and/or any reasonable means approved by the Board of Directors, shall be permitted.

Rationale
Due to technical advancements in communication, the laws in most states have been modified to permit participation in meetings by boards of directors without physically being present in the same room. To take advantage of such changes under Maryland statute, the by-laws need to be revised.

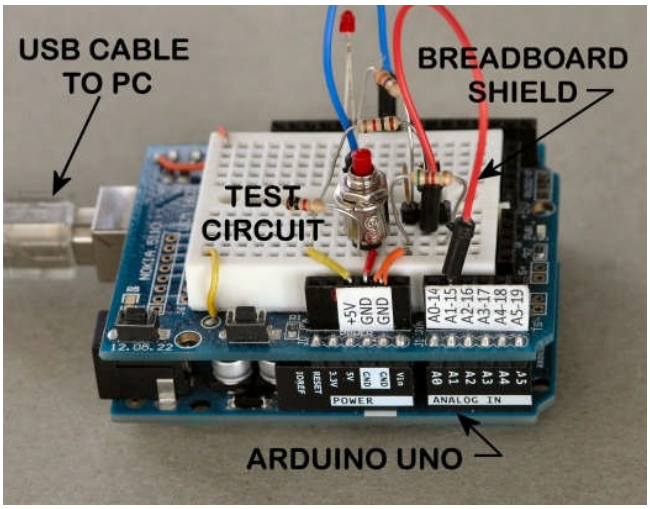
Model Fusees

A micro-controlled model railroad project

By Fred Miller, MMR

In the days before train radio communications, fusees (fyu-'zE), or railroad flares were used to keep trains apart on un-signaled lines. Railroad fusees were timed to burn for ten minutes and were dropped behind a train to ensure a safe spacing. If a following train encountered a burning fusee it was not to pass until the fusee burned out. Fusees are frequently used in modern railroading to protect difficult road crossing locations particularly around dense industrial switching situations not otherwise signaled with lights or gates. A reasonable representation of a fusee can be modeled using a bright miniature red LED with controls to provide a flare-like flickering. Logic Rail Technologies™ offers a product they call Fusee Pro for $28.95 and Bakatronics LLC has a fiber optics based fusee for $24.99.

A similar device can be constructed by the modeler who would like to experiment with current day electronic circuits. This is a simple job for micro-controllers such as the popular Arduino series. The project described in this article was built for around $5; a good price to sprinkle many such fusees around a layout. The micro-controller program (or "sketch" as it's called in the Arduino world) can be set to control a variety of random flashes. The author's project has a sketch to run a bright ON/OFF flicker for a brief "ignition" time, then a 1, 5 or 10 minute selectable "burn" time with random flickering, followed by a brief time with going off flickering representing the fusee sputtering out.



All of the author's Arduino micro-controller projects begin by developing the program sketches and preliminary electronic circuit on an Arduino UNO with a plugged in Breadboard "shield." This starting point "workbench" facilitates easy changes in software and the controlled circuitry. The "sketch" is developed using the free Arduino development system (IDE) running on a PC. The software is written, compiled, and then downloaded to the UNO for testing using the provided simple menu controls and a USB cable to the UNO.

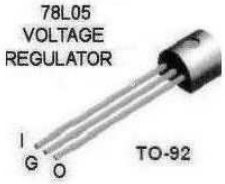
Rather than use the larger Arduino UNO for the completed project, the author generally moves the software to smaller micro-controller chips. In this case an inexpensive 8-pin chip called an ATTINY85 was used.

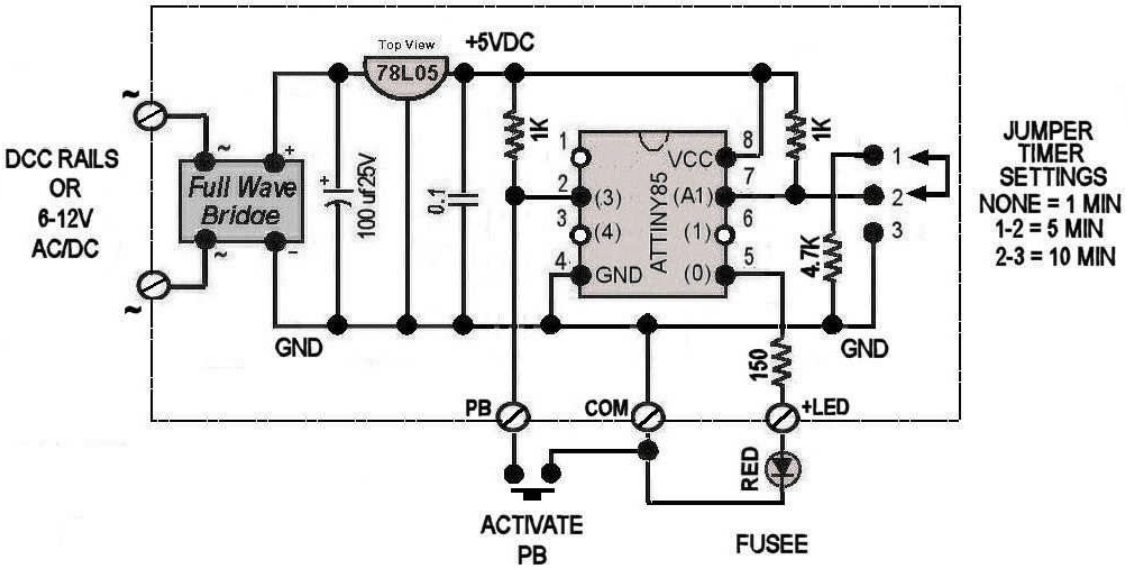
The Arduino IDE can be used to program the ATTINY85. A stand-alone circuit board then is designed and assembled to house the microcontroller chip and parts.

The simulated fusee is constructed using a small (1.8mm) LED with very fine wire attached to the (shortened) LED leads and then covered with shrink tubing. The assembled demonstration fusee is shown in the photo with a pushbutton switch on the fascia mounted panel which activates the fusee operation. Setting the onboard jumper to one of three positions selects the 1, 5 or 10 minute operation. The developed circuit is shown below along with the parts list for the project. The software and programming advice is available from the author just for the asking.

FUSEE CONTROL CIRCUIT

F. MILLER 9/2015





PART PRICE AND SOURCE					
QTY	DESCRIPTION	PRICE	EXT $	SOURCE	PART NO.
1	FULL WAVE BRIDGE	$ 0.29	$ 0.29	JAMECO	10300
1	100 MFD 25V ELECTROLYTIC CAP	$ 0.12	$ 0.12	JAMECO	93761
1	0.1MFD 50V DISK CAP	$ 0.15	$ 0.15	JAMECO	2146302 *
1	78L05 5V REGULATOR	$ 0.25	$ 0.25	JAMECO	51182 *
4	VARIOUS 1/4 W OHM RESISTOR	$ 0.09	$ 0.36	JAMECO	VARIOUS
1	ATTINY85	$ 1.45	$ 1.45	MOUSER	556-ATTINY85-20PU
1	8 PIN IC SOCKET	$ 0.12	$ 0.12	JAMECO	526299
1	1.8 MM ROUND TOP RED LED	$ 0.18	$ 0.18	LIGHTHOUSE LEDS	1.8MMROUNDTOPLEDRED
1	2-POSITION TERMINAL BLOCK	$ 0.35	$ 0.35	JAMECO	2094506
1	3-POSITION TERMINAL BLOCK	$ 0.45	$ 0.45	JAMECO	2094514
1	3-POSTION MALE HEADER	$ 0.35	$ 0.35	JAMECO	421489
1	2-POS SHORTING JUMPER	$ 0.15	$ 0.15	JAMECO	112432
1	SPST MOM ON PUSH BUTTON	$ 0.85	$ 0.85	JAMECO	26623
-	PERF BOARD, MISC HARDWARE	-	-	RADIO SHACK	-
		TOTAL:	$ 5.07		* MIN QTY OF 10

For those modelers interested in building this fusee control board, but not into learning the Arduino world of micro-controllers (shame, shame!), the author could make pre-programmed chips available at a cost plus shipping basis. Wiring the control board, however, is left to the modeler.

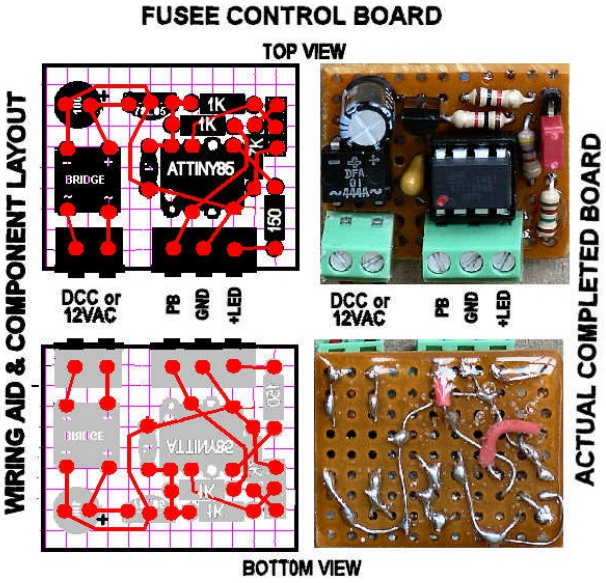
The parts can be acquired from:

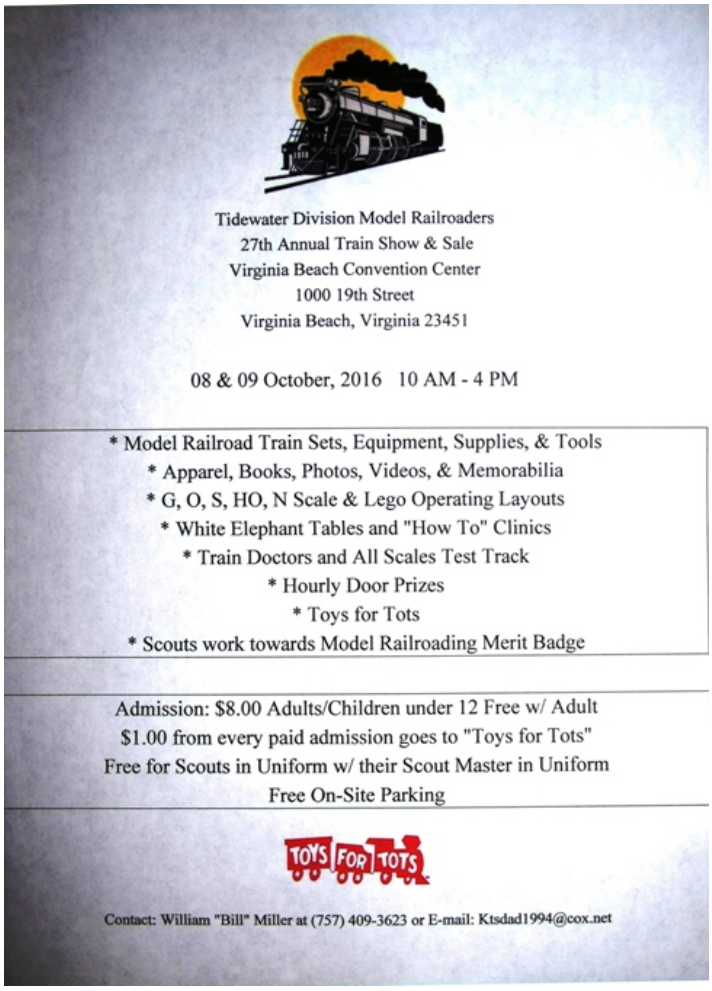
Jameco.com
Mouser.com
Lighthouseleds.com
Radioshack.com

The author recently conducted a "make-n-take" clinic which used a printed circuit board making the assembly a lot easier. Some of these boards are still available. The software sketch and/or an ATTiny85 chip with the software already loaded are available.

Contact the author at:
tractionfan@aol.com

Code for the sketch is included in the eLocal. Ed





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Tehachapi Loop on Jerry Davis' layout, open at Tracks to the Triangle

Tracks to the Triangle Clinic Schedule

NOTE: This schedule is current as of the publication date.

Time Slot	Salon B - Red Zone	Salon C - Blue Zone	Salon D - Green Zone
Thursday Evening 7:15 -8:15	Layout Planning and Design by Andrew Dodge, MMR	**7:30 MER Board of Directors Meeting**	Matching the prototype with resin cars by Vic Bitleris
Thursday Evening 8:30 - 9:30	Evolution of an Operating Scheme by Bob Weinheimer, MMR	**MER Board of Directors Meeting**	Modeling Lehigh Valley and other Coal Cars by Chuck Davis, MMR
Thursday Evening 9:45 - 10:45	Modeling B &O Rolling Stock in the Steam Era by Bill Hanley	Contest Evaluation Training Clinic by Martin Brechbiel	Foam Scenery and Static Grass - Modeling for Motion by Will Seehorn
Friday Morning 8:00 - 9:00	Building Resin Car Models by Craig Zeni	Signals and Detection by Marshall Abrams	Introduction to Model Railroad Operations by Steve Benezra
Friday Morning 9:15 - 10:15	Modeling to Prototype Standards and Operating Procedures by Andrew Dodge, MMR	Jersey Central's Ashley Operations & Modeling Applications by Chuck Davis, MMR	Early Reading auto cars by Dick Foley

Friday Morning 10:30 - 11:30	Late Seaboard System/early CSX 1983-1987 in Eastern NC by Craig Zeni	Computer techniques to generate backdrops by Marshall Abrams	The Southern Railway by Fenton Wells
Friday Afternoon 1:00 - 2:00	Give 'Em a Brake by Vic Bitleris	Thirty Five years of Tips and Tricks by Brian Sheron, MMR	Pulp wood cars by Fenton Wells
Friday Afternoon 2:15 - 3:15	Speed Ballasting; Great Trackwork in Less Time by Neal Anderson	Switch List Generation by Marshall Abrams	Pullman Cars by John Sokash
Friday Afternoon 3:30 - 4:30	CSX by Bruce Faulkner	Backdrops: Achieving depth through forced perspective and 3-D effect methods by Brian Sheron, MMR	WEATHERING: Striving for Realism by Bill Davis
Friday Afternoon 4:45 - 5:45	NMRA Achievement Program by Charlie Flichman	Expanding the Long Island Railroad by Brian Sheron, MMR	Boston & Maine: The Boston Terminal Facilities by Tom E Thompson
Friday Evening 7:00 - 8:00	July 1944, Military History in a Great Layout by Ted Fort	NMRA Standard for Layout Command Control (LCC) by Dick Bronson	Pennsy Motive Power by John Sokash
Friday Evening 8:15 - 9:15	CAM Design Software for Rapid Prototyping and Manufacturing by Rick Uskert	Boston & Maine: Passenger Cars and Famous Trains in the 1950s by Tom E Thompson	Foam Board Layout Construction by John Burchnall
Friday Evening 9:30 - 10:30	Light, Sound & Motion Animation for Model Railroads by Fred Miller, MMR	Introduction to Signaling Your Layout Using JMRI by Dick Bronson	Scenery I by Lou Sassi
Saturday Morning 8:00 - 9:00	Using Microcontrollers in Model Railroading by Fred Miller, MMR	Durham & Southern by Dr. Cary Poole	Proto 1:1 Design of Real Railroad Projects by Danial Fisher
Saturday Morning 9:15 - 10:15	Multi-purpose Animation Decoder by Fred Miller, MMR	Engineering Secrets of the Eastern Loggers Group by John Burchnall	Ships and Boats for the HO Waterfront by Mat Thompson
Saturday Morning 10:30 - 11:30	Design for Rapid Prototyping and Manufacturing - Materials, Methods, Costs by Rick Uskert	Scenery II by Lou Sassi	Vehicle Prototype Modeling by Ted Fort
Sat. Afternoon 12:30 - 1:30	The History of Railroading in Western North Carolina by Dr. Cary Poole	Laser Cutting Technology by Jeff Grove	Military Railroads by Bernie Kempinski
Sat. Afternoon 1:45 - 2:45	Latest Advancements in DCC by John Wallis	Craftsman Kit Development from the Prototype by Jeff Grove	Layout Designs update by Bernie Kempinski
Sat. Afternoon 3:00 - 4:00	Speed Matching Locos with DCC by John Wallis	Edwards Motorcar Company by Dr. Cary Poole	"Last Train Ride" Military Mortuary Trains by Jim Murrie
Sunday Morning 8:30 - 9:30	Rollins Pass on the Denver & Salt Lake by John Sokash	**10:00 General Business Meeting**	Repowering classic brass locomotives by Danial Fisher

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Friday Breakfast	402	$16		
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Convention Polo Shirt – 2XL,3XL,4XL Quan Size // Quan Size	905-907	$20		
Call Boards / Ops – Expanded Call Board Info Available on Website	----------	----------	----	----------
PCRR L&D Div. (N) Michael Pennie Friday (leave7am) 8:30am-12pm **Max # 7**	801	$5		
BR&WM RR (HO) Chuck Batherson Friday 1pm – 4:30pm,(ret .by 6pm) **Max # 7**	802	$5		
801+ 802 above can be a full day call board trip if registered for both, 7a-6p	---------	----------	----	----------
D&RGW (HO) Rob Westdyke Thursday 1pm-5pm **SOLD OUT**	803	Sold out	----	----------
ACL (N) Dave Koss Thursday 7pm-10pm **Max # 5**	804	$5		
Clinch. Sou. (HO) Steve Benezra Friday 7pm-10pm **Max # 10**	805	$5		
Clinch. Sou. (HO) Steve Benezra Sunday 10am-2pm **Max # 10**	806	$5		
LV NYC (HO) Jamie Jordan Saturday 1m-4pm **Max # 15**	807	$5		
Mo. Pac. (HO) Bobby Woodell Saturday 9am-12pm **Max # 5**	808	$5		
PRR (HO) Dick Buchan Friday 7pm-10pm **Max # 5**	809	$5		
Prototype Tours – More Info on Website				
New Hope Valley RR – Engineer, Diesel – Friday 9am – 12pm **Max # 4**	201	$125		
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New Hope Valley RR – Caboose Ride – Friday 9am – 12pm **Max # 30**	203	$9		
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Pullman Sleeper Under Restoration Tour – Saturday - 10am **Max # 12**	205	$5		
Pullman Sleeper Under Restoration Tour – Saturday –11am **Max # 12**	206	$5		
Made in the MER Tours – More Info on Website				
Tichy Train Group Factory Tour Friday 9:30am - 11am **Max # 30**	701	$5		
Tichy Train Group Factory Tour Saturday 9:30am - 11am **Max # 30**	702	$5		
Non Rail Activities – More Info on Website				
North Carolina Museum of Art – Saturday 10am – 2pm	501	$5		
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Black Poly Fiber Forest

by Mike Garber

This is a reprint of an older article published in Crossties. It caught my eye because after making about 1000 'trees' I still need about 10,000 more. Read on for an updated version. - Editor

My freelanced HO scale Virginia Southern Railway is set in the mountainous Appalachian region of southwest Virginia and southern West Virginia. Therefore much of the railroad clings onto or winds its way through heavily forested mountain slopes. With a sizeable amount of forested mountain scenery needed, a method had to be found to easily and affordably create a vast amount of "representative" forested mountainside without having to make millions and millions of individual trees. So my good friend, Howard Heltman, who models the Western Maryland in West Virginia, and I came up with a way to use poly fiber fill and a few "standard" hobby scenery materials to create the look we wanted.

The materials used to create the forested mountainside are black poly fiber fill, Woodland Scenics dark and light green course turf and burnt grass fine turf, and Elmer's Spray Adhesive and white glue. The secret ingredient in this short list of materials is the "black" poly fiber fill.

The 16-ounce bag of black poly fiber fill, about the size of a pillow, was sold under the name of Freaky Fluff by the Union Wadding Co. of Pawtucket, RI and cost under $10 a bag when it was purchased a few years ago from a hobby shop. Finding black poly fiber fill may take a little searching, but it is well worth the effort and a bag this size will cover a lot of real estate the way I will explain using it.

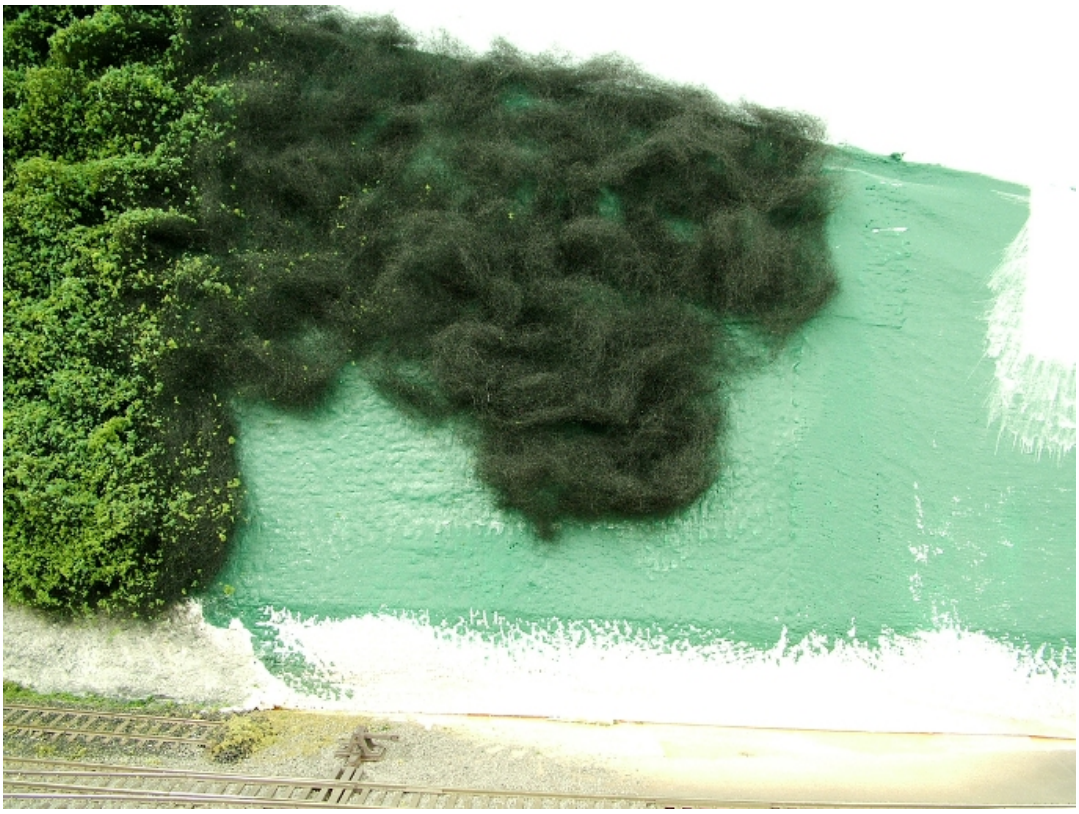
[Freaky Fluff is no longer available; black poly fiber fill is currently available from Micro-Mark (www.micromark.com) and from The Felt Store on Amazon.com, among possibly other vendors. – Editor]

To begin to forest a mountainside, using your favorite method, construct the base form of the mountainside terrain. In my case, using a hot wire cutter, I cut strips from a half-inch thick sheet of pink insulating foam board. These strips were cut into various contours and shapes to act as an armature for my terrain and were placed vertically approximately 5 to 6 inches apart to provide the rough outline of the mountainside. These vertical strips are held in place on the benchwork and backdrop with hot glue, a quick and easy bonding method. Once this basic armature assembly was complete in place, I shaped it a bit more using the hot wire tool. Then, a covering of plaster cloth was placed over the armature assembly to form the base terrain of the mountainside slope. The mountain slope in some places is vertical where the benchwork is very narrow and in other places is steeply sloped to a height of several feet above track level. This will form a good base for a representation of a mountainside when complete.

Once the mountainside base was in place, I painted the plaster cloth with a dark green flat latex house paint that I purchased at a local paint store for under $5 from their mismatched paint supply. The exact color green is not important just as long as the white plaster cloth is colored a similar shade to represent a forest color and avoid the opportunity for any of the white plaster cloth peeking through.

After the paint has dried, a rough green mountainside terrain form is present. At this point the fun really begins. Using Elmer's white glue full strength, paint a fairly heavy coat on about one square foot of the green mountainside terrain form. Then take a "clump" of the black poly fiber fill material and stretch it out very thin and wispy. Pull the material fairly thin until you have an amount large enough to cover the area where the white glue was applied and press it firmly to the area. Press and pat the poly fiber fill into the white glue to make sure it gets a good hold. At this point, it does not need to be neat; in fact you want it to have texture and to purposely be random in nature. By pulling and stretching the black poly fiber fill thin and wispy, a small amount will cover the area where you are working. Now move to another adjacent area and paint white glue on the mountainside terrain form and repeat the procedure. Continue covering your terrain in approximately one square foot areas until all of the plaster cloth is covered and then let it dry overnight. As you can see, there is little uniformity and complete coverage is not necessary as the green plaster cloth randomly shows through, thus the recommendation for painting the plaster cloth.

The next day, when everything is dry and firmly glued to the plaster cloth, go over the entire area and "tease" the poly fiber fill for a little more texture by randomly pulling and stretching it in every direction. Again, nothing uniform, just something to add more texture. I feel it is important to avoid a flat even-matted look that doesn't look natural. Think about how tree branches randomly fight their way through each other for sunlight creating a random texture effect on a hillside.



The appearance of the poly fiber after it has been glued down, prior to being "teased."

Using the Elmer's Spray Adhesive, spray a generous area of the poly fiber fill covered mountainside. Make sure it is coated evenly but not overly heavy, just enough to be tacky but not soaked. It's a good idea to have the layout area well ventilated and to wear a respirator as this step can be a bit objectionable. After applying the spray adhesive, begin by lightly sprinkling on the Woodland Scenics course turf starting with the dark green color first. Hold the canister above the mountainside and shake it to let the course turf lightly fall onto the poly fiber fill. Keep moving around the area that has been sprayed with adhesive so as to avoid getting the course turf on too heavy with this first color. It is important to not get complete coverage with this step; something like 30-40 percent coverage is fine with plenty of black poly fiber still visible. When satisfied with this coverage, add the light green course turf, lightly sprinkling it as described with the dark green course turf. It is not necessary to apply more spray adhesive since the poly fiber fill has not been completely covered with the dark green course turf. Add the light green course turf until about 85-90 percent of the mountainside is covered and a small percentage of the black poly fiber fill is still visible. If done correctly, the tops of the poly fiber fill have caught the course turf and underneath, the black poly fiber shows through as shadows. Thus, the secret of using black poly fiber fill is the shadow effect it creates, just like in looking at a forested mountainside from a distance. As a final step, sprinkle on a light dusting of Woodland Scenics burnt grass fine turf to add a hint of sunshine highlights. The remaining tacky spray adhesive will catch these fine turf highlights.

As can be seen in the photo below, this method produces a representation of a heavily forested mountainside with texture and depth created by use of the black poly fiber fill. The area shown required about one third of the 16-ounce bag of poly fiber fill, proving that a little bit of this material goes a long way.

This method provides a quick and easy way to foliate a large dense mountainside without the need to make hundreds of individual trees. Adding individual trees randomly or in foreground areas can enhance the overall effect of the scene just like structures and drainage features. All these things help set the stage for our actors – the trains.

Making Trees from Poly Fiber

Howard Heltman, Photos by Cindi Heltman

The method described here is a quick and easy way to "forest" large areas on your model railroad. This process is simplicity itself. Form your mountains using the usual cardboard strip webbing method and then cover it with the heavy brown paper used by contractors for protecting the floors in homes under construction. This paper comes in rolls at home improvement centers and is easy to work with and much cheaper than using the plaster impregnated gauze. (Do not use the resin backed paper.) You will not see the "ground" under the trees when you are finished anyway.

Regardless of which method you use to form your mountains – plaster wrap or brown paper – paint it flat black or dark green before adding the "trees". Once the paint is dry, begin planting your "forest." You can use green poly fiber (Woodland Scenics), black poly fiber, or regular pillow batting (spray paint it green or black). Black poly fiber is available from Micro-Mark and some craft stores, and seems to give the forest more "depth."

Let's begin.
Brush on diluted white glue.

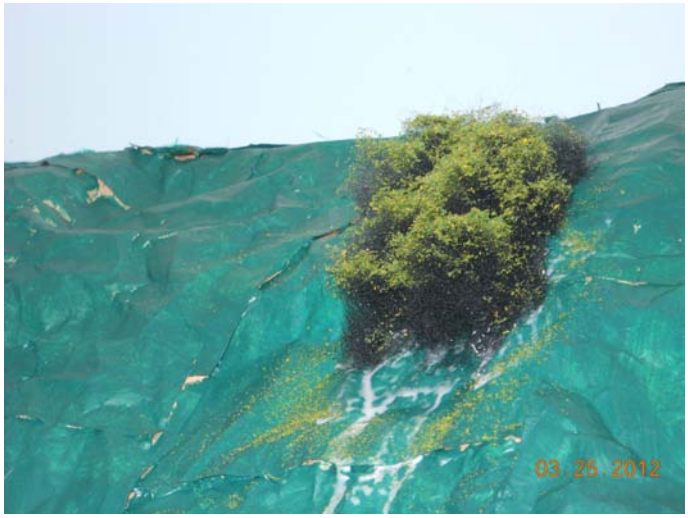
Stretch poly fiber and stick it on the glue.

Cover an area approximately one square foot in size with diluted white glue (about a 50-50 mix of glue and water). Then take a small amount of the poly fiber and form the "trees" by stretching it so that it looks almost web-like. Then stick it on the glue. Take another small amount of poly fiber and repeat the process, placing each piece of stretched poly fiber up against the last piece you put in place. This can be done very quickly. Caution: Once a piece of poly fiber is placed in the glue don't try to move it or rearrange it as you will end up with a mess. When the glue is dry, gently pull up on some of the material to give your "trees" the appearance of different heights.

Spray the poly fiber with cheap hairspray.

When the area you want to "forest" is covered with the stretched material simply spray it liberally with a cheap hair spray. Use a pump-type container as opposed to an aerosol can if possible, although either will work. While the hair spray is still wet, sprinkle on the various colors of very fine ground foam.

Adding individual trees in front of your "poly fiber forest" will give the impression that all the trees behind the individual ones are just as detailed.



I've never had much success with hairspray. For many years I used flat or satin latex deep tint base paint as a scenery adhesive. It worked very well as an adhesive - it sticks to just about anything - but it does have a small amount of a flattening agent that made a very faint color change to the underlying material, expecially if you got carried away with the application. It can only be seen on dark substrates such as coal loads and cinder ballast. Recently both Zar and Minwax have marketed a satin finish water based urethane wood finish. It's a lousy wood finish, but a great scenery adhesive. The flattening agent has a much less tendency to cause a white blush.

Editor

The Bump Cap

Rod Vance

The ERB Bump Cap, modeled by Mike Montgomery
Available at *amazon.com/ERB-19400-Adjustable-Ball-Bump/dp/B004BG4KAK*

I admit it – I am "folliclely challenged." That is, I'm going bald.

Accordingly, anytime I'm working underneath my layout, my tender scalp seems to be magnetically attracted to any piece of benchwork nearby. During these work sessions, I frequently engage in the kind of expressive verbiage that you don't want your kids or grandkids to hear – not to mention the sight of blood trickling down your face. Based on the various JRD meets that I've attended and the many operating sessions in which I've participated, I know that I'm not alone in this "challenged" condition.

The other day one of my model railroading friends and a fellow JRD member, Mike Montgomery, showed up wearing what's called a "Bump Cap." Honest! Mike's particular cap is made by a company named ERB Safety, and is a baseball-style cap with an ABS (a type of styrene that is stronger than polystyrene) shell insert with foam padding. The cap is specifically designed to protect the head from lacerations, and minor bumps and bruises in areas that do not require certified safety helmets. The space beneath the typical model railroad layout definitely fits that description. (The vendor notes that the cap is not designed to protect the head from falling objects, so beware of derailed locomotives and rolling stock while you're under the layout!?)

Mike's particular cap – the "ERB 19400 Adjustable Ball Cap Bump Hard Hat" – is adjustable to fit your head and can be embroidered, in case you want to add your favorite railroad logo. I found the cap on Amazon.com for a list price of less than $12 and a sale price of less than $9, not including shipping.

So if you've got a birthday coming up or you want to get an early start on a wish list for the end-of-year holiday season – or you're just tired of leaving delicate flesh on the benchwork underneath your layout – you might want to consider the Bump Cap. It's one of those "why didn't I think of that" type of products.

Code for the Fusee Arduino microprocessor by Fred Miller

Comments by the editor are in italics. If you want to use this code, first strip out all the italicized text.

To get the program into a ATtiny85 chip, google "how to program ATTINY85"

There are many ways to write code. Every programmer developes a style and there is not right or wrong way - as long as you can understand it a few years later when you may want to make a change.

Arduino microprocessors are programmed in the C language. This can be a problem for people more familiar with Visual Basic because of the very different syntax (a fancy name for punctuation and structure). Arduino code is called a Sketch because it does not include all the code. There is a bunch of code hidden from you that runs the chip and it's accessories. All you have to worry about is the working code.

Comments are text that the processor ignores. Comment blocks are bracketed by / and */. Single line comments begin with // and end with the carriage return.*

```
/*  FUSEE program - F. Miller 9/2015 - ATTINY85 Version
   This sketch illuminates an LED as a Fusee when PB is pushed.
   The LED is blinked ON/OFF in three different modes:
   (1) Startup (ignition) with equal ON/OFF periods runs for ~ 0.6 seconds
   (2) Main operation with ON/OFF periods biased to ON - runs for selectable
       1, 5 or 10 minutes (actual)
   (3) Sputter OFF with ON/OFF Periods biased to OFF runs for ~  1.2 seconds
   The loop count is based on 33 loops/second
   The Mode 2 run time is selectable with jumpers to bring AdjPin:
   (1) down to ground - 10 minutes
   (2) ground via 4.7K - 5 minutes
   (3) floating (no jumper) - 1 minute
*/
```

In C, each line is ended with a semicolon, not a carriage return. An important detail explained later.

A const (constant) is a value that can not be changed. They are used so you don't have to remember that the pin to the fusee is pin 0. An int is a whole number like 1, 2, 14, etc., no decimal point allowed.

Note that the LOGICAL pin (fuseePin, startPin, etc.) values DO NOT correspond to the physical pin location

```
const int fuseePin =  0;                // (CHIP-5) the number of the Fusee LED pin
const int startPin = 3;                 // (CHIP-2) PB to start pin
#define adjPin A1                       // (chip-7) analog pin for Pot - where jumper voltage will be set
int ledState = LOW;                     // keep track of LED/Lightning state initialized LOW / off
unsigned long previousMillis = 0;       // store last time in milliseconds LED was updated initialized to 0
unsigned long currentMillis;            // capture current time in milliseconds
int randNumber;                         // develop a random number actually a variable to store a random number
int runMode;                            // 0=off; 1=begin; 2=run; 3=sputter; 4=off
int runLoops;                           // working loop counter names are a personal preference - I'd use loopCount
int mode1Count = 20;                    // Beginning (start up) loop counter
unsigned int mode2Count;                // Settable Main loop counter (1980 - 60sec, 9900 - 300 sec, 19800 - 600 sec
int mode3Count = 40;                    // Sputter off loop counter
unsigned int jmpVoltage;                // Analog read of jumper
```

As its name implies, setup *is code that runs once when power is applied. All pins must be defined as either INPUT or OUTPUT.*

```
void setup()
{  pinMode(fuseePin, OUTPUT);       // (0) goes to LED
   pinMode(startPin,INPUT);         // (3) is a pushbutton to start
   randomSeed(analogRead(0));       // make 'perfectly' random
   pinMode(adjPin,INPUT);
   digitalWrite(adjPin,LOW);        // ensure pullup is OFF
}
```

```
void loop()
This loop runs continuously as long as power is applied.
millis(), used in subroutins doit() begins counting milliseconds from the time power is applied.
{
  if (digitalRead(startPin)==LOW && runMode ==0)      // PB begin LED flashing series
  {  runMode = 1;                                     This executes if the button is pressed (startPin is LOW) and the
     runLoops = 0;                                    program isn't running (runMode is 0).  This prevents an accidental
  }                                                   restart of the program.
  else                                                else executes on every loop when the start pin is not pressed (LOW)
  {  jmpVoltage = analogRead(adjPin);                 If runMode is 0 it drops through the following switch and does nothing
     if (jmpVoltage > 900)                            Fred uses a voltage divider to determine how the jumper is positioned
     {  mode2Count = 1980;                            This sets the number of loops for each burn mode.
     }                                                // No jumper - set run time to 1 minute
     else if (jmpVoltage < 200)
     {  mode2Count = 19800;
     }                                                // jumper to RIGHT (to GND) set run time to 10 minutes
     else if (jmpVoltage > 500 && jmpVoltage < 900)
    {mode2Count = 9900;
    }                                                 // jumper to LEFT (to GND via 4.7K) set to 5 minutes
  }
  switch (runMode)
  { case 1:                                           // Startup (ignite) mode
       if (ledState == LOW)
       { randNumber = random(1,100);                  // Off range, sets the OFF time for the LED to 1 to 100 milliseconds
       }
       else
       { randNumber = random(1,100);                  // On range, sets the ON time for the LED to 1 to 100 milliseconds
       }
       doit();                                        Calls subroutine doit() listed below
       if (runLoops >= mode1Count)
       { runMode = 2;                                 Ran out of startup loops so set runMode to next running mode
         runLoops  = 0;                               Reset loop counter to 0
       }
       break;
    case 2:                                           // main running mode
       if (ledState == LOW)
       {  randNumber = random(1,20);                  // off range Here the fusee should be burning continuously.  The off
       }                                                      time (1 to 20 ms) is much shorterer than the on time.
        else
       {  randNumber = random(1,100);                 // On range 1 to 100 ms
       }
       doit();                                        Calls subroutine doit() listed below
       if (runLoops >= mode2Count)                    // reached end so...
       { runMode = 3;                                 // set to sputter mode
         runLoops  = 0;                               // reset loop count
         ledState = HIGH;
         digitalWrite(fuseePin, ledState);            // Turn LED on
       }
       break;
```

The only change I made to Fred's code is the location of the curly braces {} to make it more readable. These are critical and must be used in pairs to indicate blocks of code. The compiler ignores spaces and carriage returns except when terminating a single line comment. So with comments removed case 2 could be written:
case 2:if(ledState==LOW){randNumber=random(1,20);}else{randNumber=random(1,100);}doit();if (runLoops>= mode2Count){runMode=3;runLoops=0;ledState=HIGH;digitalWrite(fuseePin, ledState);}break;

```
   case 3:                                  // Sputter out numbers
     if (ledState >= LOW)                   If led is off
     {  randNumber = random(10,100);        // Off range  the LED will be off from10 to 100 milliseconds
     }
     else                                   the LED is on
     {  randNumber = random(1,5);           // On range  the LED will be on from1 to 5 milliseconds
     }                                      Our eyes retain light memory so the LED is on far less than it's off
     doit();                                Calls subroutine doit() listed below
     if (runLoops >= mode3Count)            // reached end so...
     {  runMode =4;                         // set to terminate mode
        runLoops  = 0;
        ledState = HIGH;
        digitalWrite(fuseePin, ledState);   // Turn LED on
     }
     break;
   case 4:                                  All done, terminate execution and wait for another button press
     runMode = 0;                           // terminate mode so init all parms
     runLoops = 0;
     ledState = LOW;
     digitalWrite(fuseePin, ledState);      // Turn LED off to ensure end OFF
     break;
  }
}
void doit()                                 // Function to flip ON/OFF after delay
{   delay(randNumber);                      This pauses execution for randNumber milliseconds.
                                            The program spends most of its time waiting for this to timeout
    currentMillis = millis();
    if (currentMillis - previousMillis >= randNumber)
                    I don't quite see the need for the above if statement
                    The program was delayed for randNumber milliseconds so the above if statement should always
                    be true and the folling code will always be executed.  However, there's nothing wrong with a belt
                    and suspenders approach.  If it does prove to be false, execution simply drops to the runLoops ++
                    statement (adds 1 to runLoops, the loop total) without changing the LED condition.
   {  if (ledState == LOW)
      {  ledState = HIGH;
         digitalWrite(fuseePin, ledState);  // Turn LED on
      }
      else                                  It wasn't LOW so it must be HIGH
     {  ledState = LOW;
        digitalWrite(fuseePin, ledState);   // Turn LED off
     }
     previousMillis = currentMillis;        // reset for next time around
  }
  runLoops ++;                              // Increment loop counter
}
```

Software engineers will see some improvements that can be made to this code, but it works and this isn't supposed to be a course in programming, so let's not have a bunch of letters to the editor.

Simple programs like this one can be written and debugged with the free Arduino software. The only extra hardware needed is a USB cable. The limitation is that the only debugging tool is the ability to print out variable values. For more complex programs Atmel Studio is available for programming Arduino boards. The software is free, but the hardware interface is about $100. It is not a perfect solution, but it does allow you to monitor global variables in real time, set break points, and other basic debugging tasks.