



The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

No. 110

June 2005

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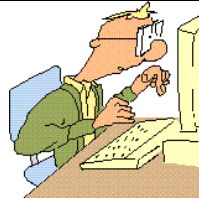
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Editor's Desk

Victor Kozakevich

While looking for inspiration to write this column, I got to thinking about how many different skills NEMES members acquire over a lifetime. We have boat builders, antique car restorers, wood carvers and things yet to be told. I was doing a little locksmithing yesterday, and I'm sure someone else was etching glass or rebinding a book.

One of the things that impressed me back when NEMES started was this diversity of the members and their willingness to share. We're living in a time when most people are either too busy to even think about doing some of these tasks themselves or didn't grow up in an environment that encouraged the kind of experimentation that helps to build the needed skills.

I hope we can see more member presentations or articles on some of these activities in the future. Curiosity keeps me moving forward. How about you?

See you Thursday.

Next Meeting

Thursday, June 2, 2005

7:00 PM. Meetings held at:
Charles River Museum of Industry
154 Moody Street
Waltham, Massachusetts

Membership Info

Annual dues of \$25 (via checks made payable to "NEMES" and mailed to our treasurer) for the calendar year are due by December 31st of the prior year.

Missing a Gazette? Send mail or email to our publisher.

Addresses are in the left column.

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President's Corner

Norm Jones

The Meeting

Our speaker for the June meeting will be J.D. Smith. Mr. Smith is a member of the American Blacksmith Society and is a "Master Smith". His talk and slide show will be about the art of forging Damascus Steel. Check out some of his incredibly beautiful work on:

<http://www.hammersmith.com>.

Election of Officers

The June meeting is when we traditionally elect officers for the coming year. The following slate of nominees to serve for the 2005-2006 year include: President; Norm Jones, Vice President; Steve Cushman, Treasurer; Dick Koolish, Secretary; Max ben Aaron, Director; Mike Boucher. Additional nominations will be accepted from the floor on June 2nd. I would like to thank Rob McDougall for serving as treasurer for the past four years. His efforts have been very much appreciated.

Ed Borgeson has graciously agreed to serve in the newly created position of: "Membership Coordinator", Ed will be maintaining the membership list and will coordinate the annual dues payment process. Thanks very much Ed.

A Thoughtful Gesture

Our speaker at the May meeting, Richard Saporetti has graciously donated his speaker's honorarium to The American Cancer Society in the name of MEMES. Thank you very much Richie.

Antique Machinery Show Season

It's that time of the year again! The weather left a bit to be desired, but those of us who are "die-hards" had a great time at the annual New Hampshire Power of the Past show in Dunstable Mass on May 1st. Thanks to Bill Lopoulos for letting me use a portion of his canopy to ward off the elements. Two major shows in the area:

Bernardston Mass, on May 28,29 and Orange Mass, on June 25,26 have lots of exhibitors, curious spectators and the opportunity for finding "treasure" to bring home. There is a standing offer for you to join me displaying your projects. I always bring an extra table and provide shade or shelter as the case may be. I encourage you to take a ride up to Dave Dearborn's show on June 4,5 in Campton NH. Dave loves steam and as such provides a real "steam table". There are very few opportunities to operate your steam engine model on "steam". Come on along, you won't be disappointed! Give me a call for further information on any of the shows.

See you on June 2nd

Norm



The Meeting

Max ben-Aaron

Show & Tell

Venerable President Emeritus Ron Ginger told about having received the first issue of a new magazine "Model Engine Builder", which fills the void left by the now defunct "Strictly IC". It looks like a worthy successor.

Ron also gave some details of the odyssey that he is taking, bringing his new-old boat down from Canada through a myriad locks and miles of canals. Bon voyage, Ron. We will be able to participate vicariously by following his progress on his web-site.

Dennis Norden, who used to work for BLH Electronics, brought in a couple of load cells. One was used to load atomic weapons into submarines. By using the load cells, the weapons could be inserted without the risk of bouncing off the walls of the 'silo'. The other was designed to be installed in the hollow axles of large commercial aircraft, giving

the crew readings of the wheel loading so the aircraft load could be balanced.

Drill bits and drilling

"The best laid plans of mice and men/ Gang oft agley". So said the poet Robert Burns, and so went the May meeting. It was supposed to start with Richard Saporetti (assisted by James Collins) of the Greenfield Division of the Kennametal Corporation, talking about drill bits, followed by a discussion of drill grinding machines and demonstrations of different drill bit grinding and sharpening approaches. The talk started off well enough, with Richard describing in great detail the nomenclature and characteristics of commercial drill bits and different sharpeners were shown and discussed. However, the grinding demonstrations never happened, which put me in a dilemma with respect to this report. I really do not want to go into twist-drill-bit nomenclature in excruciating detail, so I am just going to write about drills and drilling in general.

Stephen Morse developed the twisted drill consisting of two parallel spiral grooves with a straight cutting edge. He began manufacturing drills in October of 1861 with a small shop in East Bridgewater, MA. His original patent, No. 33119, is dated April 7, 1863. The Morse Twist Drill & Machine Company was founded and located in New Bedford, MA from 1864 to 1990. And of course, Morse invented the Morse taper to fit the drills to machines. Brown and Sharp made the mass-production of twist drills possible by creating the universal milling machine so a helix could be milled in the work piece.

It was a shame that the grinding demonstrations were a non-event because having an expert demonstrate how to offhand grind a drill bit would have been very educational (hint). Some drill sharpening apparatus was displayed and it would have been interesting to see some of the sharpeners actually used. I would particularly have liked to see how Howard Gorin's professional grade, heavy duty, industrial strength Optima sharpens a drill bit.

Drilling machines are economical to purchase, simple and use, and available everywhere. The drilling machine is so useful (and, relatively speaking, so cheap) that it is frequently the first

(and sometimes only) machine that an aspiring home shop machinist (HSM) acquires. Almost the only tooling required is a couple of drill bits, usually twist drills. High production is rarely a concern of a HSM, and he is usually satisfied with a common or garden, run-of-the-mill 'jobber's' twist-drill bits. A discerning buyer can usually find good quality bits, either new or used, and avoid the worst import junk.

Sets of straight-shank twist drill bits come in four flavors:

Wire-drills	0 - 80
Letter drills	A - Z
Fractional	$\frac{1}{64}$ " - $\frac{1}{2}$ "
Metric	1mm to 10mm

Drill bits larger than $\frac{1}{2}$ " diameter with $\frac{1}{2}$ " reduced shanks are called 'Silver & Deming' and are available up to 1". Drill bits are also available with Morse taper shanks. Up to about $\frac{1}{2}$ " one can get Morse #1 tapers. Up to about $1\frac{1}{2}$ ", the taper is either Morse #2 or Morse #3.

Although carbon steel drill bits are sometimes found in the cheapest sets, high-speed steel bits are common and not very expensive.

For special purposes, especially for very small holes, the use of spade drills is not to be scorned and for very deep holes there are gun-drills. It may sometimes be necessary to make a D-bit of a particular size that is not a standard size.

A drilling machine equipped with a sharp twist drill can remove more metal per unit of spindle horsepower than any other machine. This characteristic can often be a great time saver when, for example, an irregular shape needs to be cut out of plate. By drilling a chain of holes just outside the line of demarcation, the effort of filing or sawing the piece out can be greatly reduced. I find that using two hole sizes in the chain, (alternating) minimizes the frequency with which one hole breaks through to its predecessor and adds very little to the manual effort of cutting and removing the webs between the holes.

A very frequent question is "Can I get an end-mill and use my drill as a light mill?" Unfortunately, the spindle bearings usually used in drilling machines are not designed for side thrust, so the answer is "No", but I am sure that a patient and determined

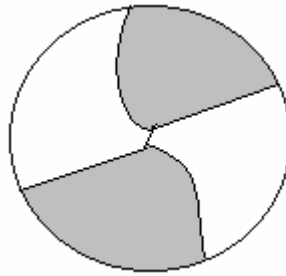
HSM (who has an auxiliary X-Y table) could succeed in doing *very* light milling in aluminum or brass, although I wouldn't recommend it. In all cases, the piece should be secured before starting to drill. Almost every HSM can tell a tale about a narrow escape from severe physical injury when the drill bit grabbed and a hand-held part started to spin.

Usually the locations of holes to be drilled are center-punched during the marking out process and then the part is transferred to the drilling machine. Actually getting the hole centered on the punch-mark can sometimes be difficult especially for small holes because of drill flex. If high accuracy is required, a center- or spotting drill should be used first, but this is time consuming and most times the HSM simply pecks at the part to cut a small depression. If it looks (use of loupe recommended) like the hole is drifting off the cross-hairs (so to speak) the 'pilot' can be moved by the judicious use of a center punch or small caping chisel. With care, you can locate a hole within a few thou. Greater accuracy requires a milling machine or jig borer.

The term 'pecking' usually refers to the practice of periodically withdrawing the drill-bit to clear the swarf from the flutes.

Unless the drill bit is symmetrically sharpened, (i.e. with the point in the center and both cutting edges at the same angle) the hole will be bigger than the nominal drill-bit size. For a properly sharpened drill bit, the swarf will come up the flutes of the drill in two equal spirals. If precision is required, choose a drill bit slightly smaller and finish by reaming. A drill bit should be measured across the margins close to the point. The shank is close the same diameter, but almost all drills have some taper so that the back doesn't rub the hole. In drilling thin material, the hole may drill out-of-round. The remedy to this is to back off the cutting edge by grinding or stoning a lip to create a slight land. This is also necessary when drilling brass or other materials that grab.

Max



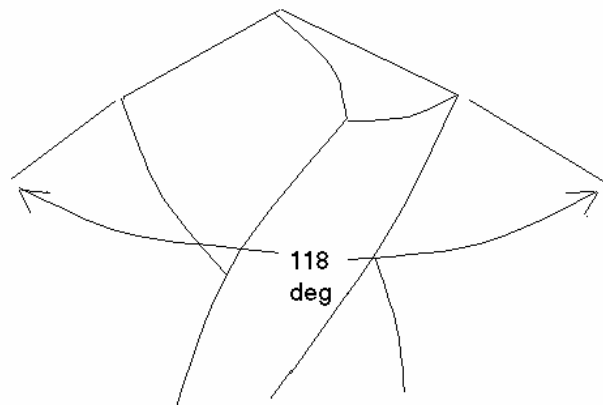
Doctored Drills

During last month's presentation on drill bit sharpening, some mention was made of a machine called the Drill Doctor. I've had a bit of experience with one, and offer a little advice for anyone owning one or considering purchase.

The Drill Doctor models 500 and 750 have a good collection of features that make them practical for the home shop. A little savvy shopping will get you a machine for about \$100. The manufacturer's website is:

<http://www.drilldoctor.com>

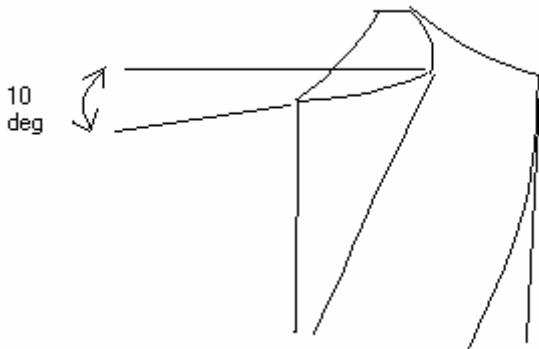
Just a brief review of concepts covered in the meeting: A twist drill bit point has two angles. The obvious one is the primary point angle, the angle between the cutting edges as viewed from the side.



The material being cut generally determines this angle. A narrower primary angle makes the cutting edge longer for a wider chip and faster material removal, a good idea in soft materials like wood. A shallower angle makes the cutting edge shorter and slows the removal of material. This is better when drilling tough materials like steel to reduce load on the bit and drill motor. High speed

steel 118 deg. points work well for nearly all materials. Cobalt-steel drills are intended for harder steels and are available with 135 and 140 deg. points.

The other angle, which some believe to be the more important one, is the clearance or relief angle behind the cutting edge.



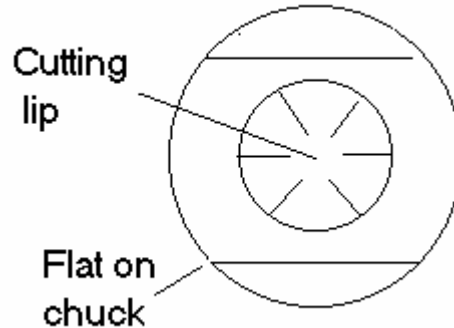
This angle determines the thickness of the chip. Once again, a soft material can take a deeper relief angle to speed material removal, but tougher materials require a shallower angle to avoid overloading the bit and breaking off the cutting edge. Clearance angles on new bits vary with the size: for a $\frac{1}{16}$ bit, a 22 deg. angle, for a $\frac{1}{2}$ inch bit, 11 deg.

One important aid in any drill sharpening is a magnifier. I find 4X to be useful for all sorts of inspection. And your shop has a small spotlight or desk lamp, right?

Alignment of the bit in the chuck is the most critical part of the sharpening process. The instructions that come with the Drill Doctor show how to use the alignment port on the side of the machine. The port has two spring steel jaws that open with a button push. When released, they grab the chucked bit across the flutes and spin the bit (with a little help from your fingertips) to the proper indexed position to grind the clearance angle. At the bottom of the port is a metal stop to set the maximum amount to be ground off the end of the bit (.020").

This process generally works well, but bits with a fast or slow twist will throw off the alignment. Similarly, small bits or short bits may be

difficult to grasp and assist alignment. I've found an alternate technique: put the bit in the chuck and manually align the bit according to this diagram. (Looking at sharp end of bit)



One of the drill's cutting lips should be in the 10 o'clock position with the chuck's alignment flats held horizontal. The reason is that the chuck has an oval-shaped cam midway along the body. It's this cam that determines the clearance angle, and depending on what part of the cam aligns with the bit's clearance face, the machine can produce a deep, shallow or even negative angle. For a deeper angle, move the lip toward 9 o'clock. For a shallower angle move it toward 11 o'clock. Then put the chuck in the alignment port with the jaws held open and be sure the bit bottoms against the depth stop. Tighten and check position of the lip.

There's a little known Drill Doctor accessory, a chuck to sharpen left handed drill bits! If you've never used a left handed bit, its primary purpose is to remove broken right-hand thread screws or bolts. Turned counter clockwise, the bit should grab the screw shank and twist it out. The chuck is available from Tyler Tool or the factory (part SA01506PA).

<http://www.drilldoctorstore.us/drildocsa01e.html>

The LH chuck just takes advantage of the clearance cam. You can do nearly the same thing with the standard chuck. Just set the cutting lip of a left hand bit to the 8 o'clock position.

Another tip mentioned in the instructions is to straighten the chuck jaws after tightening. Small bits put the jaws far out in their tracks and allow them to twist. Just loosen the chuck slightly until opposing jaws form a straight line.

With these techniques I've been able to sharpen a #48 (0.076") bit.

One other thing that has struck me is that the Drill Doctor's abrasive wheel and motor speed are appropriate for medium to large size bits. Sharpening small bits has to be done fast and with a light touch to keep them from turning blue on the 20,000 RPM wheel. To avoid this, I've made a simple speed control. It's just a double wide surface mount electric utility box with a wall-type light dimmer (600 Watt) and a double outlet. Wire the outlet where the ceiling lamp normally goes in the circuit. Fit it with a three-prong cord from a computer or peripheral, cover with a combo switch/outlet plate and you're done. This type of speed control works with the small universal AC/DC brush motors found in vacuum cleaners, kitchen appliances and most hand-held power tools.

I've found that half-speed works well with the smaller bits. As mentioned in the meeting, the true test of a successfully sharpened bit is those two shiny and equal chips peeling off the tip. That means the two cutting edges are equal length, are ground to the same point angle and have the same clearance.

Vic Kozakevich

Other Sharpeners

If you're looking for a drill sharpener, you have many choices. At the meeting, we saw a few different machines, but were unable to see any of them "in action". Here's a short review of sharpeners available.

The Black Diamond and the Optima are considered among the best. These sharpeners require a specific collet for each drill size, so a grinder would have to come with 50 or more collets to be useful. These sharpeners cost over \$5000 new but used Black Diamond sharpeners sell for as little as \$200 on ebay.

Brierley, Darex, Lisle, McDonough/Sterling, and TDR/SRD are other makers of excellent, production-duty drill sharpeners. Brierley and TDR/SRD are the best sharpeners for

extremely small bits. The Sterling sharpener is the best for large bits, and can handle 2" bits. Any of these would be a fine addition to any production or home shop.

The Drill Doctor is below these in durability. The housing and drill-holding collets are partly plastic. However, the sharpening principles of the Drill Doctor are the same as those of the Darex and other production machines. You can buy Drill Doctors for between \$35 and \$130 new, depending on features.

General has made sharpening attachments for over 50 years. Gene Martha brought in his, adapted to his grinder. Gene said that it required a fine-feed system to work well, but with that, it is very effective. Gene's fine feed system moves the attachment toward the wheel on precision slides with a fine screw adjustment so that only a small amount of drill is removed in each pass. You can buy a new General 825 for \$25 or a copy for as little as \$10.

At the lowest end of the market are imported sharpeners that look like electric pencil sharpeners. These are sold under names like Chicago Electric and are not capable of grinding the right relief angles.

If you're thinking of buying a used drill sharpener, keep in mind that after years of production shop use, grinding grit may have worn out some of the critical parts. Also, if the machine uses a separate collet for each drill, make sure that you get a full set of collets with the machine. Replacement parts can be prohibitively expensive.

Here's one more tip: to determine if a bit is freshly sharpened or quite used, look at it with a 4X magnifier. If the ends look shiny and polished, it's dull. If the ends look rough, it's freshly sharpened. It seems backwards, but it makes sense. The grinding process leaves scratches from the wheel while the drilling process tends to polish and burnish the end of the drill.

Bob Neidorff



Treasurer's Report

Rob McDougall



For Sale

Balance as of: 3/31/2005	\$8,698.70
Donation received	80.00
Dues Received	75.00
Gazette Production Costs	-153.30
Web site lease payment – 2 years	-382.80
Balance as of: 4/30/2005	\$8,317.60

Well, due to time constraints with my commodity trading business, I will not be able to stand for re-election at the June meeting as Treasurer. It has been an enjoyable 4 ½ years in the role and a great way to meet many more members in the club. Thank you all for the opportunity. The club kitty remains strong – we need to find good ways to spend some of it.

I'll continue to see you all at meetings and events. Best wishes.

Rob McDougall, Treasurer

Rob

Lathe for sale

Atlas lathe 6 x 18. With 3 jaw chuck, 3 tool holders, etc. \$425

Call Pierce 781-341-1110

machyman2@cs.com

Shaper Work CD

Put out in 1944 by the New York State education Department this 326 page manual is chock full of valuable tips and information on using the King of Machine tools....The Shaper. Covered is everything you need to know about the care and feeding of the shaper, use of the shaper, even how to sharpen tools for the shaper. Scanned and saved in Adobe Acrobat format. \$5.00 shipping included.

Errol Groff

180 Middle Road

Preston, CT 06365 8206

errol.groff@snet.net



Tool

Wanted

Harry Holland

In Memoriam

I'm sorry to report that one of our members, Harold Holland, passed away on May 6, 2005. Harry was a skilled, imaginative machinist who worked as a shop foreman and methods engineer. He operated his own businesses as a locksmith and then as a prototype machine shop, H&H Modified.

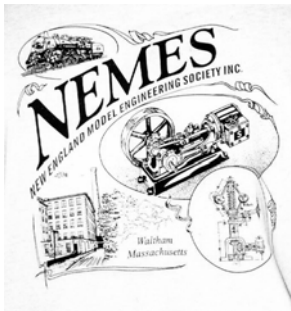
Submitted by Fred Jaggi

My son is a farmer in the western part of the state. He grows winter squash and would like to sell it to restaurants peeled and cubed. I'm considering building a peeler based on a hand- cranked kitchen apple peeler. I need a lathe to begin the development, so I'm looking for a bench lathe in "beater" condition. I'm willing to move it.

Bob Bober

508-872-4165

bbober@rcn.com

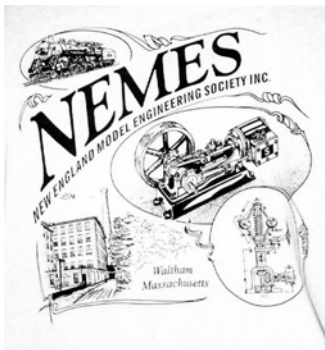


NEMES clothing

NEMES Tee Shirts

NEMES tee shirts and sweat shirts are available in sizes from S to XXXL. The tee shirts are gray, short sleeve shirt, Hanes 50-50. You won't shrink this shirt! The sweat shirts are the same color, but long sleeve and a crew neck. Also 50-50, but these are by Lee. The sweat shirts are very comfortable!

Artwork by Richard Sabol, printed on front and back:



Rear



Front

Prices:

	Tee Shirts	Sweat Shirts
S - L	\$12.00	\$22.00
XXL	\$14.00	\$24.00
XXXL	\$15.00	\$25.00

Add \$5 shipping and handling for the first tee shirt, \$1 for each additional shirt shipped to the same address. Sweat shirts are \$7 for shipping the first, and \$1.50 for each additional sweat shirt.

Profits go to the club treasury.

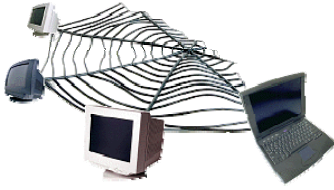
Mike Boucher
 10 May's Field Rd
 Lunenburg, MA 01462-1263
mdbouch@hotmail.com

NEMES Shop Apron



Look your best in the shop! The NEMES shop apron keeps clothes clean while holding essential measuring tools in the front pockets. The custom strap design keeps weight off your neck and easily ties at the side. The apron is washable blue denim with an embroidered NEMES logo on top pocket.

Contact Rollie Gaucher 508-885-2277



Web Sites of Interest

Sign up for the NEMES mailing list at:
<http://groups.yahoo.com/group/nemes>

Brierley, a UK drill sharpener manufacturer that makes an excellent sharpener for small drills:
<http://www.brierleymachines.demon.co.uk/>

Darex, maker of production drill sharpeners like the V390 and XT3000:
<http://www.darex.com>

Drill Doctor, maker of quality, lower priced drill sharpeners such as the model 500 and 750:
<http://www.drilldoctor.com>

General Tools, makers of the General 825 drill sharpening attachment for grinders:
<http://www.generaltools.com/>

Lisle, maker of the 91000 precision drill sharpener:
http://lislecorp.com/grinder_index.cfm

McDonough, maker of the Sterling drill sharpener for very large drills:
<http://www.mcdonough-mfg.com/drillGrinders.html>

TDR/SRD, makers of an excellent drill sharpener for small drills and also an excellent model for regular-sized drills:
<http://www.tdrsrdgrinders.com>

Ron Ginger purchased a boat and will sail it from Ottawa, Ontario to his home in Boothbay Maine. Follow the log of his odyssey on his website at:
<http://plsntcov.8m.com>

Here are some sites relating to home anodizing of aluminum. Careful with the battery acid!

"Anodizing Aluminum" by Ron Newman
www.focuser.com/atm/anodize/anodize.html

"Anodizing at Home" by Jim Bowes
www.geocities.com/n3umw/Anodizing-at-Home.txt

"The Anodizing of Aluminum"
<http://www.caswellplating.com>

Description of a home anodizing experience:
quartz2.cyberstation.net/~dwpaul/bs-cleanup.htm

Editor's note regarding home experience: Ron Newman at Cabin Fever recommends the Caswell dyes for anodizing. The particle size of RIT fabric dye will not fit pores in anodized surface.



**MARK
THIS
DATE**

Upcoming Events

Bill Brackett

To add an event, please send a brief description, time, place and a contact person to call for further information to Bill Brackett at wbracket@rcn.com or (508) 393-6290.

June 2nd Thursday 7PM
NEMES Monthly club meeting
Charles River Museum of Industry 781-893-5410
Waltham, MA

June 4-5 Cranberry Flywheelers Meet
Edaville RXR Carver MA
David Moore 508-697-5445

June 4-5 Dearborn Homestead Show
Campton, NH Dave Dearborn 603-726-3257

June 11-12 Hinsdale Show
RT 119, Hinsdale NH
Douglas Wood 802-254-6758

June 11-12 Skowhegan Show
Skowhegan Fairgrounds
Skowhegan ME. Joe Kelley 207-862-2074

June 12 Owls Head Transportation Museum
Rods, Customs, Muscle Cars & Antique
Aeroplane Show

June 19th MIT Flea Market
Albany Street Garage, Cambridge MA

June 25-26 Orange Show
Orange Airport Orange MA

June 26 Owls Head Transportation Museum
Ford Festival and Antique Aeroplane Show

July 2-3 Owls Head Transportation Museum
The Fabulous '50s, Sensational '60s & Antique
Aeroplane Show

July 7th Thursday 7PM
NEMES Monthly club meeting
Charles River Museum of Industry 781-893-5410
Waltham, MA

July 10th Pepperell Show
RT 111 Pepperell, MA Ken Spalding 978-433-5540

July 17th MIT Flea Market
Albany Street Garage, Cambridge MA

July 23-24 Owls Head Transportation Museum
Trucks, Tractors, Commercial Vehicles & Antique
Aeroplane Show

July 30-31 Raitt Homestead Show
Eliot ME. Lisa Raitt 207-748-3303

July 30-31 Owls Head Transportation Museum
Wings & Wheels Spectacular; Classic Cars &
Antique Aeroplane Show

Bill