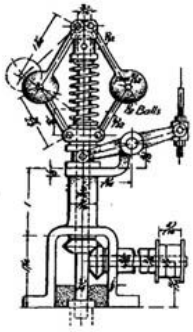

The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

No. 194 June 2012

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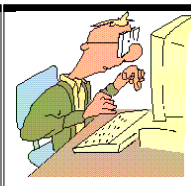

Editor's Desk

George Gallant

The annual ritual of selecting our club officers as arrived. The secret service has been providing protection to the front runners for a couple of months now and the federal elections commission will have representatives on hand to insure fair and open vote. Members will need to show three forms of identification prior to receiving their ballot.

Errol Groff has enabled some generic email addresses for the club. See the address column on the left. They get forwarded to the personal email for the intended recipient. For me, this mean that emails to the editor get routed to their own NEMES/Editor folder.

When submitting articles to the editor try to make the attachment names somewhat descriptive and unique.

As a general guideline we use paragraph type “Text body” with an Ariel 10 font. Currently, the column width is 3.64” so your pictures will get adjusted to fit. With luck, the aspect ratio will be close. Also, please preface all numerical numbers with a leading digit as in 0.001”.

Issue	Contribution Due
JUL	JUN 22, 2012
AUG	JUL 20, 2012
SEP	AUG 24, 2012
OCT	SEP 21, 2012

Next Meeting

Thursday, June 7th 2012

7:00 PM. Meetings held at:

Charles River Museum of Industry
154 Moody Street
Waltham, Massachusetts

Membership Info

New members welcome! Annual dues are $25 (mail applications and/or dues checks, made payable to "NEMES", to our Treasurer Richard Koolish, see right) Annual dues are for the calendar year and are due by December 31st of the prior year (or with application).

Missing a Gazette? Send a US mail or email to our publisher. Contact addresses are in the left column.

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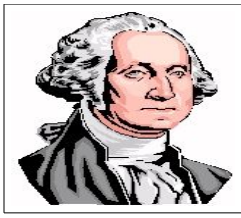


President's Corner

Dick Boucher

The Meeting

Gary Phillips will be our speaker this month. You may remember Gary spoke to us previously about the large vacuum table he built for gluing large pieces together and securing that they would remain flat. This month, his talk will be on the static winding system (bellows) design we worked out for the Cathedral Church of St. John the Divine, NYC, for their first class restoration of their pipe organ after a fire. He will cover his reasoning, complete with many pictures and a few samples.

Gary also writes "Since we are in the beginnings of the total restoration of a rather interesting little Wurlitzer theater organ in Rahway, NJ, it would be interesting to do a series, over time, of talks regarding certain aspects. Right now we are in the middle of restoring the Electro-pneumatic relay system. It's a series of switches ran by small magnets, primary and secondary air valves. It's really quite fascinating, probably the first mechanical computer!"

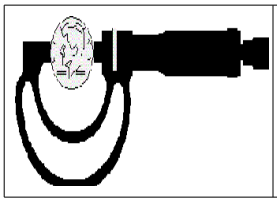
Miscellaneous Ramblings

Well this month's ramble took Bea and I up to Moltenborough NH for the steam show hosted by Bob and Gabriele Wallace. On the way through Melvin Village, I spotted a long time friend Richard Dicky firing up his beautifully restored Stanley Touring car, sorry I have forgotten the exact model year but it is a non-condensing car. As the car was all in steam, Richard graciously offered to take me for a short spin before Bea and I continued up the road to the meet. Well of course since he was gracious enough to offer the ride I figured it would only be gracious of me to accept the offer. (Note large grin on my face at this point). We left our wives sitting on the porch talking and headed off up the road. Like all steam vehicles there is no noise and commotion as the machine silently starts to move. Then one hears the gentle chuffing sound of the exhaust with smooth acceleration to speed with no gear changes, the only control the driver needs to manipulate is the throttle lever located on the steering column. Backing up is just as easy with the driver stepping on a pedal on the floor and again moving the throttle. Richard was also on his way to the steam meet.

After that great ride, Bea and I headed off to the day of steam activities. The Granite State Gas & Steam Association offered their portable boiler and steam table and the table quickly filled up with all types of steam engine models and small prototype engines. There were a number of members of our group in attendance but I will not try to mention any names for fear of forgetting someone.

I also got to spend some time at the Dunstable show hosted by the New Hampshire Power of the Past Club. This is a great small one-day show at the site of an old one-room schoolhouse in Dunstable. Many different machines from the sash cord winding machine (Bea calls it the bobbin machine) to tractors ranging in size from restored garden tractors to full size Farmalls and John Deeres.

I wonder if there is anyone still alive who went to that school. I did attend a one-room school myself, 3rd and 4th grades. It was just as pictured. Girls went in one door, boys the other. It was heated by a coal-burning stove and the teacher covered two grades. It is one of two schools that I attended that are still standing.



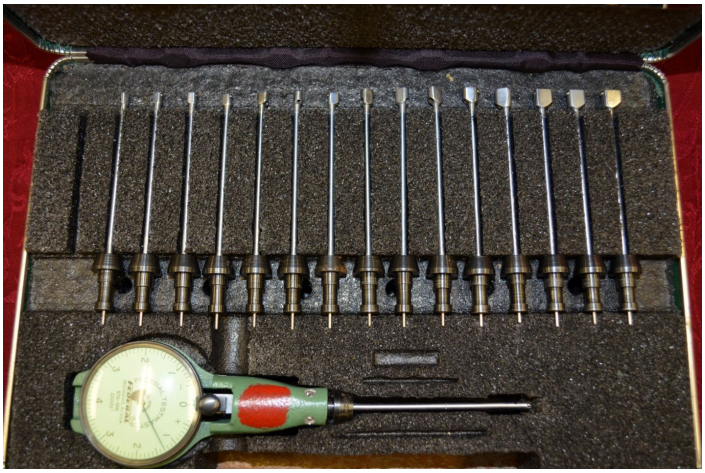
Tool Corner

Frank Dorion

Getting involved in model engineering usually means that, sooner or later, you will need to measure small holes. The old standbys for measuring small holes are pin gages (very good!), expanding small hole gages made by Starrett and Brown & Sharpe, and, less frequently, the taper gages we discussed recently.

However, when the accuracy requirements shift a decimal point to the right from thousandths to ten thousandths, more exotic measuring gear is required. Let's have a look at some of these high accuracy tools.

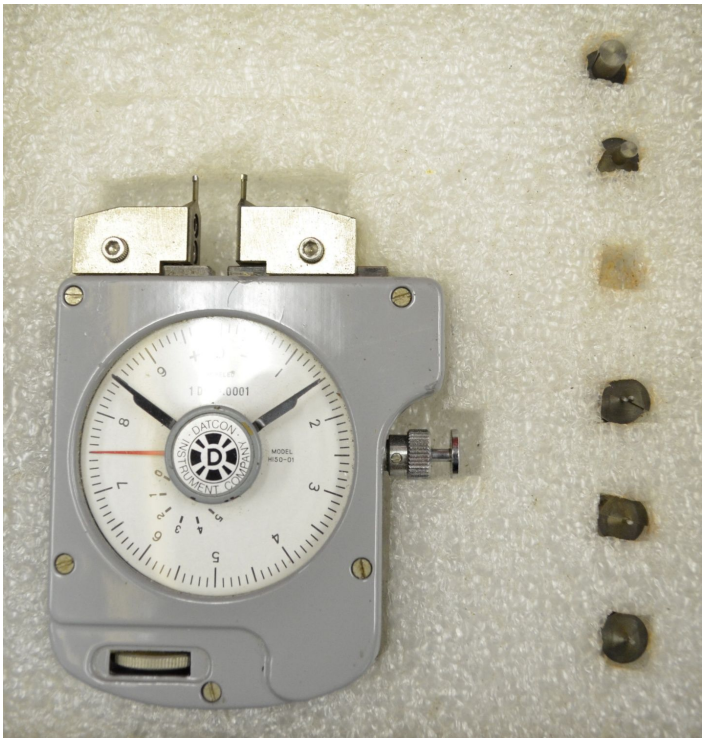
One industry standard for such tasks has been the traditional dial bore gage in miniaturized form. Here's a look at one set by Federal that measures hole diameters from 0.122" to 0.314".



This set illustrates one consequence of miniaturization: the large number of gage heads required to cover the relatively small overall range of measurement. Most of the gage heads in the above photo have a range of only 0.008" each. Also, like other larger dial bore gages, they need to be set to a standard such as a ring gage before use because these gages are comparators rather than tools for taking measurements directly. In use, the gage is set to zero using a standard and, when inserted in the hole to be measured, the indicator dial shows how much the hole being measured deviates from the standard's dimensions. There have been many variations on this design with the differences usually found in the mechanism by which the gage head transmits its movement to the dial indicator.

Most of them share the problem of being somewhat delicate for use in the shop and generally they are probably better suited for the kinder environment of a dedicated inspection area.

The next gage we'll look at is a specialty item by Datcon Instrument Company:

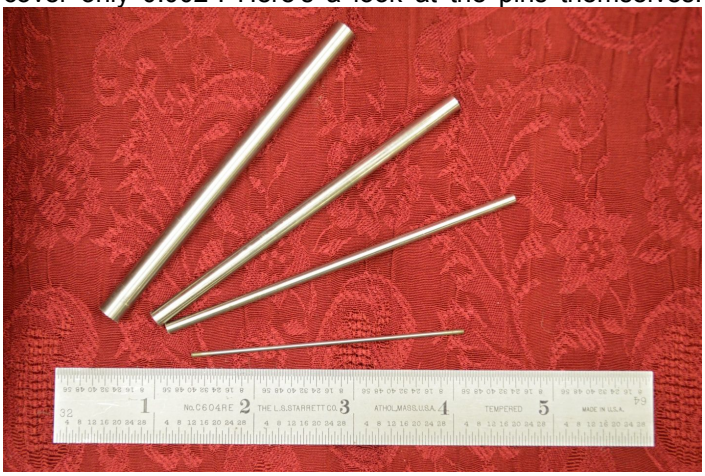


This is a very versatile gage for small hole work. As you can see, it comes with several pairs of different-sized interchangeable anvils that allow measurement of holes down to 0.040" in diameter. The carriers for the anvils are themselves mounted on sliding dovetailed ways that permit adjustment of the space between the anvils. Pressing the small button on the side of the housing moves the anvil carriers closer together so the anvils can be inserted into the hole to be measured. Releasing the button brings the anvils into contact with the sides of the hole and the reading can then be taken from the 0.0001" graduations on the dial. As with the dial bore gage we discussed above, this gage measures variation from a standard rather than direct measurement of the hole's diameter. An excellent additional capability of this gage is that the anvil carriers can be positioned far enough apart, about ¾" max., so you can use it to measure the distance within that range between two small holes of known diameter.

The next hole gaging system is a total departure from the complex mechanisms above. Here's a look at it:

This system consists of a large set of tapered pins that can be used to measure hole diameters from 0.252" down to 0.052". Most of the pins in the set are 3¾" long with the bottom row of the smallest sizes being shorter at 2¾". Take a closer look below:

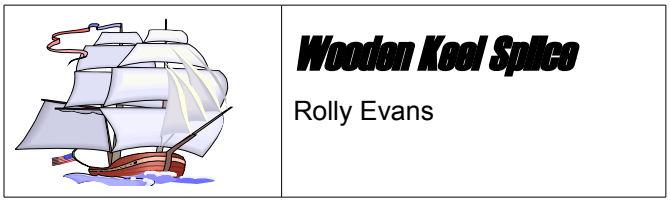
Note that the longer pins in the upper row have a size range of 0.003" while the shorter pins in the lower row cover only 0.002". Here's a look at the pins themselves.



Let's talk about how these pins are used to get 0.0001" accuracy, focusing on the longer size as an example. As mentioned, the larger pins are 3¾" long. The first ¾" on each pin is simply used to start the pin in the hole. The upper 3" of the pin's taper is precision ground to a taper of 0.001" per inch, with the top of the pin being the major diameter. As a result, each tenth of an inch on the pin's length represents a change of 0.0001" in its diameter. To

use, you insert the pin in the hole as far as it will go and then measure how much of the pin's length remains above the surface. For example, if a pin with a range of 0.090" -0.093" has 1.3" of its length above the surface when fitted into the hole, then the hole's diameter = 0.093 - (13 x 0.0001), or 0.0917". To get "tenths" accuracy, you only need to measure the projecting pin to the nearest 1/10", something that can be done easily with a common machinist's rule. Theoretically at least, you could measure to even closer tolerances with a more precise measure of the pin's projection.

These pins have been something of a mystery to me. They came in a beautiful high-quality wooden case with individual aluminum tubes to protect each pin. There is no maker's name anywhere on the box. Only the name "Ralmike", indicating the gages were sold by that now long defunct New Jersey industrial supply house. I would appreciate hearing from any reader that can tell me more about these gages.

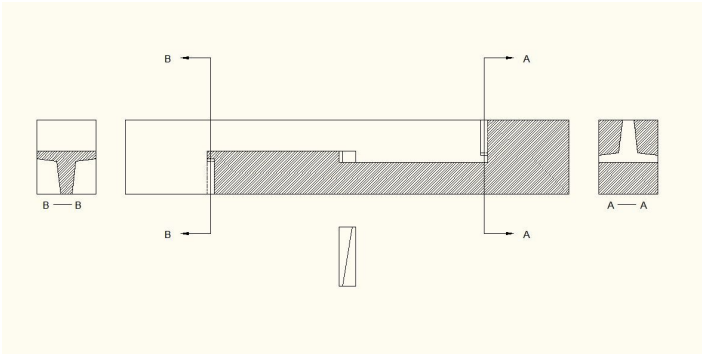


Wooden Keel Splice

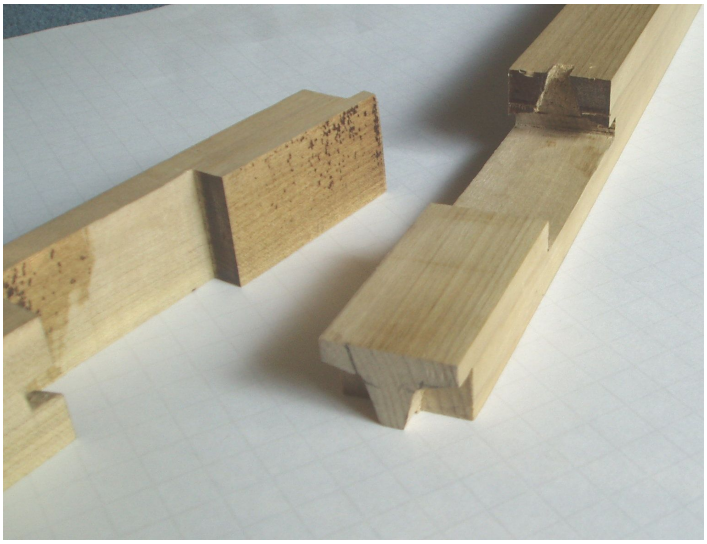
Rolly Evans

Wooden Boat Magazine
Ancient Keel splice
100 BC 400 ton merchant ship.

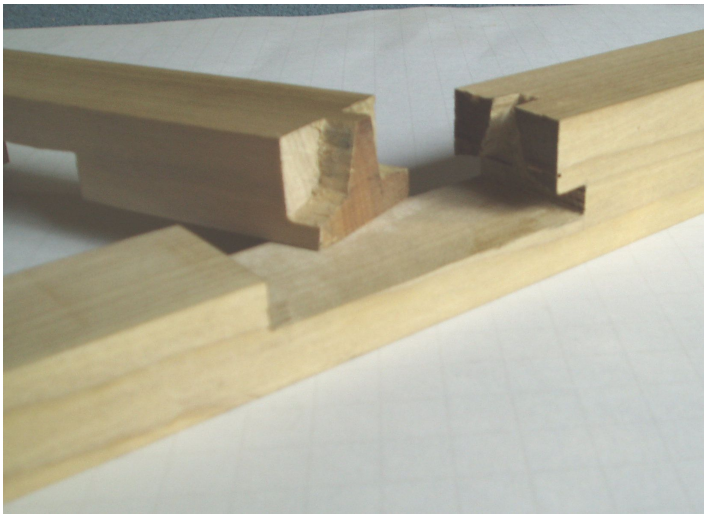
Having built several wooden boats, I was reading some back issues of Wooden Boat Magazine looking for a particular. I remember reading about a unique keel splice.



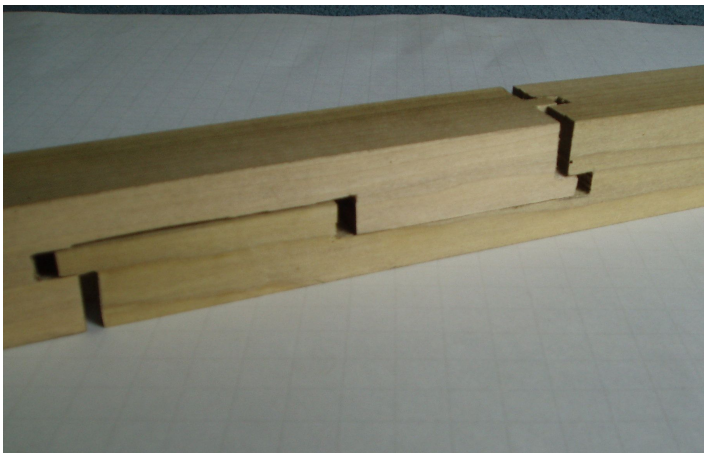
What was interesting about this splice was that it was used on a 400-ton merchant ship that sunk off the coast of France 100 years BC. The ship was 131 feet long and had two of these splices in the keel. I was intrigued by it and always wanted to make a sample of it to see how well it worked. This is a fantastic joint. I hope you can get a sense of it from the following photos of my replica.

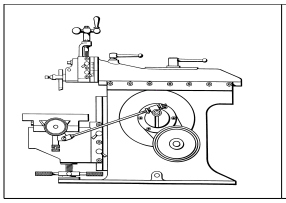


Did you ever try to find an article in a back issue? I looked through every issue I had and could not find it. Then I went on the Internet and looked up Wooden Boat and sure enough, they had a search bar for past articles. I hit it first time and went back to my pile of magazines, found the issue, looked up the page, and there it was.



I cut mine out of a piece of 1½ square Poplar. The keel on the 40-ton ship was 14 inches wide (sided) by 16 inches high (molded).





Metal Shapers

Kay Fisher

R. G. Sparber's Gingery Shaper - Part 25

A Little Side Trip: The Protractor Pointer Block

For some crazy reason, I decided I wanted to make a fancy pointer support block using a trick I learned decades ago but never got to try.

Starting Support Block Photo by R. G. Sparber

I measured the diameter of the downfeed head disk and set my boring bar cutter to match. A piece of scrap aluminum was then cut so it will make full contact with the disk.

Milling Width Photo by R. G. Sparber

Note that the curved part is left attached to the bar. This makes it much easier to machine.

Drilling at TangentPhoto by R. G. Sparber

I eyeballed the tangent of the curve at the two points that will pass screws. Above you see the first hole being center drilled.

Both Holes Done Photo by R. G. Sparber

Clearance Drilling Photo by R. G. Sparber

The curved section on the bar was a false start. The curved section that will be the final part is facing down. I am using a clearance drill to align the bar in preparation for counter-boring.

Drilling with End Mill Photo by R. G. Sparber

I have chucked a 2-flute end mill into my drill chuck but this is OK because I am only drilling with it. Never try to mill with an end mill in a drill chuck. More than likely, the chuck will break loose from its tapered mandrel.

Checking Depth Photo by R. G. Sparber

The first hole has been counter-bored and a screw is used to check the depth.

2nd Hole Photo by R. G. Sparber

The second hole is now being counter-bored. With both holes machined, I then sawed the part to rough size and cleaned up the ends by milling.

Support Block Mounted Photo by R. G. Sparber

The block was pressed against the downfeed head disk and the first hole spotted through with my clearance drill. The tap drill and 6-32 tap were next. Once the first screw was fitted, I did the second hole. Here you see the block mounted. It turned out to be a rather close fit.

Mounting Top View Photo by R. G. Sparber

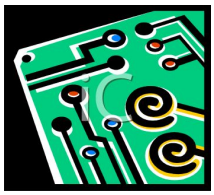
The block even came out square with the disk which is something that I never get without using a lot of fixturing and my mill/drill.

The block is entirely unimportant and will be difficult to even see. Yet it came out perfect. This is a common occurrence in my shop. The more important and/or visible a part, the more likely I will screw it up.

Stay tuned for part 26 from R. G. Sparber next month. Keep sending me email with questions and interesting shaper stories.

KayPatFisher@gmail.com

Kay



Circuit Corner

George Gallant

Bill Brackett and I have spent about a year building an EDM spark erosion machine that was intended to remove broken taps in soft metal. We purchased a design from Ben Flemming that included a book, a blank PCB, and a bill of materials. Total cost including spare and fried components was about $200. A source for information regarding this and other DIY EDM machines can be found on the web at EDMHomeBuilders@yahoogroups.com. We generated a printed schematic that was derived from Ben's assembly instructions. I will ask him for permission to post online.

Bill has successfully burned holes of different shapes and sizes utilizing brass and copper electrodes. The jig requires considerable tweaking of various analog trim pots and switches to obtain a continuous spark, definitely more art than engineering. Once sparking, the audio feedback lets you know that it is working and you can leave it alone.

The part is usually immersed in a dielectric fluid such as kerosene that improves the arcing and provides for cooling and flushing. Our fluid is circulated using a oil burner pump with an attached filter.

Here is the basic operation. The electronics charge a capacitor to about 70V DC and lower the electrode (via lead screw) until a spark is detected or the electrode touches the work. Then it raises the electrode to stop the spark and recharges the capacitor. The movement is ideally about 0.005" and cycles multiple times per second.

There are a few problems with this implementation - the primary one being I do not understand much of the circuit. As a result, I have been designing a digitally controlled version that will deliver a more controlled spark at several hundred hertz at a higher power .

Our plan is to design a PCB to host most of the electronics. The major blocks will contain:

- Power Regulators
- Microprocessor
- Stepper motor drivers
- High power arc & spark drive electronics
- Spark detect
- USB interface for setup & status

Several of the components have already been selected and are based on what I have in stock and what can be fabricated with home-shop tools. The electronics are generally SMD components for the low-power elements and thru hole for the connectors and high power.

All tools used for schematic capture, PCB layout, and code generation are freely available. I will post the schematics, PCB artwork, and source code on the NEMES web site should anyone be interested.

The mechanical up/down mechanism will be similar to that used by Bill. Differences will be a stepper instead of a continuous-rotation gear-head motor and a little tighter tolerances in the slide.

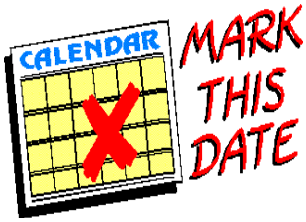
Note: we are provisioning for three stepper motors in case it actually works well enough to do metal etch carvings.

For Sale

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



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 events@neme-s.org

Calendar of Events

June 7th Thursday 7PM
NEMES Monthly club meeting
Charles River Museum of Industry
Waltham, MA
781-893-5410
http://www.neme-s.org

June 16th-17th Wings and Wheels Open House
The Collings Foundation
137 Barton Road in Stow, MA Cost at gate: $10 Adults
www.collingsfoundation.org/cf_OpenHouseEvents12.htm

June 15th-17th Father's Day Meet
Pioneer Valley Live Steamers
Southwick MA.
http://www.pioneervalleylivesteamers.org/

June 24th 11th Annual Van Brocklin Meet
Waushakum Live Steamers
Holliston MA
http://www.waushakumlivesteamers.org/

June 17th 9:00am The Flea at MIT
Albany Street Garage at the corner of Albany and Main Streets in Cambridge
http://www.mitflea.com/

June 23-24th Orange Show
Orange Airport Orange MA
http://www.cmsgma.com

July 5th Thursday 7PM
NEMES Monthly club meeting
Charles River Museum of Industry
Waltham, MA
781-893-5410
http://www.neme-s.org

June 30th Antique Engine Meet & Tractor Meet
Boothbay Railway Village
Rt 27 Boothbay ME
http://www.railwayvillage.org

July 8th Pepperell Show
RT 111 Pepperell, MA Ken Spalding 978-433-5540

July 15th 9:00am The Flea at MIT
Albany Street Garage at the corner of Albany and Main Streets in Cambridge
http://www.mitflea.com/

July 27th-28th Eliot Antique Tractor & Engine Show
Raitt Homestead Farm, Rt 103
Eliot ME. Lisa Raitt 207-748-3303