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# The NEMES Gazette

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The Newsletter of the New England Model Engineering Society

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Our next meeting is at 7:00 PM on Thursday  
2-Aug-2001 (first Thursday of every month) at  
The Charles River Museum of Industry  
154 Moody Street  
Waltham, Massachusetts

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## The Editor's Desk

By Kay R. Fisher

This month we have one article (A ride on a buffer beam) extracted from a very old book. I have attempted to retain the flavor of the original writing as it was from an earlier time and much more colorful. The spell checker and grammar checker had a hard time with it but I think you will enjoy it much more "as is". Look for more "old English" in the future.

I've been getting a lot of good contributions from members lately. Keep it coming!

### *August Meeting*

In August Bob Cline will tell us how to get the 30,000 horsepower steam plant up and ready to go on a WWII destroyer. The destroyer had two of them.

Kay

### **Scrapper Workshop**

Saturday September 8<sup>th</sup> 9:00 – 12:30  
Charles River Museum of Industry

Michael Morgan, who produced the book and video on scraping, is now unable to do the scrapper workshop for us. He is very busy running his machine rebuilding business, producing his next

book on machine alignment, and inventing some new scraping tools. For more information see his web site at <http://www.machinerepair.com/>.

However, I think we can have our workshop anyway and still make it a worthwhile experience for those members who would like to attend. I have 20 members signed up. This would be Saturday morning September 8<sup>th</sup>, 2001 (the weekend AFTER Labor Day), from 9:00 AM to 12:30, with lunch afterwards at Jake and Earl's Rib House near the parking lot. I will endeavor to give a talk for the first hour or so on everything I have learned and experienced from reading Mike's book and studying his video, and my experiences of scraping in my Monarch 10EE lathe. Then, break up into groups of four or five, and go through some practice for each person. Larry Twaits and Fred Widmer are experienced scraper hands and will be on hand to provide in-house expertise and guidance.

We should be able to scrape together enough granite flats, hand scrapers, and bluing ink, etc. to enable 4 workstations. The museum will allow us to use the premises on this Saturday. We should make a donation to the museum for this and I would like to cough up a little bit to the club for our efforts. I am therefore thinking a \$10.00 donation from each participant.

If you signed up for the workshop when it was offered with Michael Morgan, could you let me know if you would still be interested on the basis above? I think it would be fun and, at the very least, I know the food and beer are good at the rib house.

Rob McDougall

## Obituary

### *Cal Guiry*

I am sad to report that club member and featured speaker at our August 2000 meeting, Cal Guiry, passed away on June 20<sup>th</sup> after a short fight with cancer. Cal was 86. After finishing trade school as a Tool and Die Maker, Cal started working for the Rivett Lathe Company and gained great experience in all facets of machine tool

production techniques. He then worked with Fafnir as a leading New England sales professional for many years.

During all this, he earned his wings as a pilot. For his service during WW11, Cal received the Medal of Honor from the Chinese government in 1976, on behalf of General Chiang Kai-shek, and in 1989, a belated set of wings from General Chen Hsing-Ling, the then Commander-in-Chief of the Chinese Air Force (Taiwan). All for his courageous efforts "flying the Hump" from India into China, bringing supplies to the Chinese military fighting the Japanese. Cal flew 198 runs, in lumbering C-46 cargo planes, over the hump between December 1943 and April 1945, carrying army trucks, engines, airplane parts and other munitions into Hunming from the U.S. base at the northern tip of India in Assam. These planes were built to carry 4,600 pounds, but were often stuffed to 5,200 pounds, packed with everything from ammunition to an eight passenger Packard with crystal flower holders – a gift from the U.S. to a Chinese general.

Cal has been a great friend to me over the past 16 years that I have known him – I will miss him.

Rob McDougall



## Random Ramblings

By Max ben-Aaron

### *Explosives - Part 2*

There are many different kinds of explosives, many specially formulated to serve different purposes. Some are water resistant, some are not. Some are extremely sensitive to potential detonating forces, some are really difficult to detonate. Some are more powerful, some less so.

The most important distinction from the user's point of view may be the speed of the blast wave produced. Explosives are often categorized as either "high" or "low". But, these terms may be misleading, for the speed of the reaction is, in truth, either rapid or extremely rapid, ranging from thousandths to millionths of a second. In a miniscule interval of time, the explosive material is converted from a solid or liquid to a gas. It is this rapid transformation that produces the well-known explosive effect. Detonation velocities of current commercial explosives range from about 5000 fps (1525m/s) to more than 22,000 fps (6700 m/s) for special types.

One can look at the situation from an alternative perspective, in terms of detonation velocity, which is the speed at which the detonation wave travels through the column of explosive. Many factors affect detonation velocity, including diameter of charge, degree of confinement and temperature. In these terms, a "slow" explosive tends to heave material while a "fast" one fractures it.

Regardless of what your ears tell you, a gun going off is an example of a deflagration, not an explosion. Despite the fact that the burn rate is obviously very high, the gases created still have time to push the projectile out as the material is consumed. If a true explosive were used in the cartridge, the gun barrel would burst.

The story of modern explosives begins with an Italian scientist, Ascanio Sobrero, who discovered nitroglycerine, a highly explosive liquid, in 1846. Nitroglycerine was much more powerful than the black powder commonly in use at the time, but Sobrero found its behavior so unpredictable and frightening that he warned strongly against its use.

Twenty years later, Alfred Nobel found that the tendency of nitroglycerine to detonate at unpredictable and inappropriate times could be improved by mixing it with kieselguhr, an absorbent earth-like material, making dynamite. While Nobel's dynamite, and his many other contributions to the field were surely positive ones, explosives were still highly dangerous to work with and many deaths resulted from their transport and use.

Alfred Nobel was a thoughtful man, and one of strong conscience and it bothered him that his name would be associated with the destructive aspects of the explosives that made his fortune, so he used some of that fortune to set up the Nobel Prizes. He hoped that it would be a counterweight, which it has proved to be.

Mb-A



## The Meeting

By Stephen C. Lovely

### *The Meeting, 5 July, 2001*

The July meeting was a poster session, and coming one day after the Holiday this year it was not quite so well attended as most of our meetings. It's hard to be sure that everything in the meeting was covered because lots of things were going on at once as folks clustered in small groups around the various items that people had brought in. So, if you brought something neat that I've missed, bring it in again so I can see it.

Henry Szostek admires Harley Solo Saddles, but didn't think that the one on his Moto Guzi looked quite big enough to match the bike. So, he added on to it where he felt it needed to be bigger.

Dave Piper continues to make progress with his steamboat. We've seen the engine through a series of steps from patterns to finished parts to assemblies, and now we're seeing the hull progress as well. The finished hull will be 25 feet long. Dave figures that will be big enough to be a reasonable boat and yet small enough to pull on a

trailer. This meeting he had a hull model that he had built to insure that the computer-generated stability figures and water line were close to correct before building the full size hull. He came out right on the money with his tests and should have a really nice steamboat when he's done.

Walter Winship is still trying to find the album he had put together on his 1925 SV steam car, but in the meantime he has duplicated most of it after tracking down negatives and getting new prints made. There are still some pictures from the original book that aren't in the new one though because he's not the one who took the pictures and doesn't have all of the negatives. So, if you come across the original photo album of Walter's SV restoration project, bring it along to a meeting for him or let him know where it is. I also had a very interesting talk with him about Bowling Balls. At one time he repaired candlepin balls for most of the alleys in New England.

Mike Boucher was asking for advice on how to hold locomotive wheels for machining a couple meetings back. He brought in the fixture he made from the advice he got. He also had a couple of fixtures for turning some different crankshafts he'd made and one for mounting a cylinder on his lathes saddle to bore it.

Larry Keegan is working on his own design for a Stirling engine. He had it almost working with the heat of an alcohol burner. Larry got a lot of good suggestions on how he can improve it and hopefully will get it running soon. He made the main cylinder from PVC pipe as he'd heard it should be something that doesn't conduct heat well. During trial runs, this pipe got hot enough to soften the base so that the bottom of it bulged out from the force of the studs holding things together.

Joe Donahue brought in a Victor Radiograph. It's a machine for holding a cutting torch and making either straight cuts or circular cuts. He got it from Brother's Machinery for a good price since there wasn't a torch with it and it was missing a few pieces. He made a rack for the vertical motion of the torch on his shaper. He said it was easy but tedious and he was looking for

suggestions on how to make the much longer rack he needs for side-to-side motion.

Gail Martha didn't bring anything model engineering related, but her display was a big hit. She brought the refreshments and they were much appreciated by everyone. Thanks Gail.

Jerry Weiss closed a couple of machine shops he owned because he retired. He still has a few things to sell, and sold a selection of them at the meeting.

Bill Schoppe brought in a set of paperwork he found for a 9" Southbend Lathe that was sold in 1936. The lathe sold for \$75 and the tooling for it was another \$39.60. The time payment contract had an interesting 15-cent Indiana tax stamp. There was also a nice letter from someone at Southbend thanking the customer for buying a Southbend Lathe.

Jeff Del Papa is building another recumbent bicycle. He brought in the frame with wheels on it. He also had a set of North Umbrian Small Pipes. They are like a bagpipe but with quiet pipes. With these you can practice without making the neighbors crazy.

Todd Cahill and Dave Robie had a joint display on metal spinning and had a lot of people gathered around the two tables of display that they had set up. Both had metal spinning tools and spun metal objects on display. Dave had small stuff. He had a variety of small items he had made as replacement parts for toy steam engines: things like stacks are typically made by spinning from straight tubing. Dave recommends Chevy six cylinder pushrods as good tools for spinning small items. The ends are hemispheres and after the engine has some miles on it they are polished up very nicely. Dave also often has to expand or contract a tube to fit. Today's standard tube sizes often don't match the older sizes on items he's repairing so the end of a tube will need to be expanded or shrunk to slide into or over the original part. Spinning is cold working, so you spin, anneal and then spin again until the piece is finished. Dave does metal spinning up to about 2 inches in diameter.

Todd had larger tools for larger projects up to 18 inches or so, and larger items that he had spun. Some of his tools were from a hundred years ago, but are still as useful and up-to-date as when they were new.

Both Todd and Dave were busy all night showing their tools and how they used them to do a variety of metal-spinning jobs.

Todd also had a roughly 1/10-scale model of a ten foot tall wind powered Zoetrope that will be going up in a Park in Charlestown. It will be geared and governed to keep an even speed in varying wind conditions. When you look through the slits in the moving cylinder, you'll see the city of Boston growing and shrinking in area as it goes from about 1800 to the present and back.

Ron Ginger brought in a Stuart Turner #9. It had very nice lagging on it. He said that it was made from walnut and that it was finished with motor oil.

Steve Peters is working with Bill Bracket on a pair of South Pointing Chariots. Steve is programming the parts for cutting with his Sherline CNC setup. The first set of parts is made from aluminum and a second set from brass. They displayed the blanks for the bevel gears and both the aluminum and the brass wheels. The wheels are similar to curved spoke flywheels, but with a much lighter rim than a flywheel, making them look more like a chariot wheel.

Fred Widmer brought a watch. It's from the period 1740 to 1790. It is signed "Cabrier London", but Fred is not sure as a chain inside it is more the style of the continental makers and it may be a knockoff. The chains sometimes broke and were replaced so he's not totally sure where it actually was made. He got it from a friend who collected watches and worked in the mid east. The friend got it at a bazaar in either Cairo or Tehran. When it was made the means of keeping dust and dirt out of watches had not yet been perfected, so watches went into a double case. The inner case had a hole in the back for the winding key. A piece of cloth between the inner and outer cases helped seal things between windings. The inner case was missing when Fred got it. Rob Butler raised the inner case

shape from flat silver sheet for him. Fred then cut the top ring off, added the hinge, and did the other work needed to make the silver form into a watchcase. The double case is also known as a pair case. The outer one is decorated, the inner one is plain. The outer one is made from horn painted to look like tortoise shell.

To repair the outer case he made silver studs on an automated Swiss Screw machine he got out of a dumpster when the Waltham Clock company closed about twelve years ago. It's the smallest size – about the size of a sewing machine.

Then he made a die to stamp the pinheads on the studs into a rosette pattern so they would match the originals that were still in the case.

Fred also had some 4x5 transparencies of blown glass ornaments that he had made in the past when he owned and operated a glass furnace.

Scl

## **A Ride On A Buffer-Beam**

The following account of a ride on a buffer-beam was printed as an appendix to the first edition of the book titled "Description of Richards' Improved Steam-Engine Indicator; With Directions For Its Use" by Charles T. Porter. This was brought to our Gazette courtesy of Don Strang.

While this pamphlet was in the press, the author enjoyed the privilege, through the courtesy of Mr. Sinclair, Engineer of the Great Eastern Railway, of making a trip from London to Yarmouth and back, in company with Mr. Zerah Colburn, on the buffer-beam of an express engine; and it has occurred to him that an account of the method employed for taking diagrams and making the necessary observations would probably be interesting and useful to those who might wish to apply the Indicator in a similar manner.

The locomotive was one of the largest class, having outside cylinders of 16in. bore and 24in. stroke, and 7 ft. 1 in. driving-wheels, making 237 revolutions to the mile. The number of revolutions actually made rose occasionally to 250 and even to 260 per minute, the latter giving a speed at the rate of 66 miles per hour. The diagrams were taken

from the forward end only of each cylinder. Short bent pipes of 5/8" internal diameter were screwed into the cylinder-covers as near to the upper side as possible, and to the ends of these the Indicators were attached. A platform was laid over the buffer-beam, and enclosed with a stout iron railing, the ends of which were bolted to the smoke-box. Comfortable seats were provided, on one of which each operator sat, quite secure, with his back to the wind, and the Indicator between his knees.

The method employed for giving motion to the paper was very simple. A bar of light angle-iron, bent in the form A, was bolted on the upper guide-bar, and at the apex, about three feet above the center-line of the engine, a pin was set, projecting horizontally outward. A light arm swung from this pin, and received a vibratory motion from a pin projecting from the cross-head, and working in a slot in the lower end of the arm. A button-headed pin was inserted in this arm, about 7" below the point of suspension, and to this end a cord was attached, leading directly to the Indicator, giving to the paper a motion of about, 4 1/2". It had been found, at the highest speeds, to be a very troublesome operation, to hook on to the loop at the end of this cord, with the small hook with which the Indicator cord is furnished; a brass ring an inch and a quarter in diameter was therefore substituted for the loop, and a hook provided of corresponding size. The ring was also secured in position by two other cords, so that it could move the required distance back and forth, but would not fall, when disengaged, where it could not be readily seized. By this means it was found that the connection could easily be made at any speed.

It was arranged with the engine-driver that he should not run at any time with the throttle-valve partially closed, but should keep this quite open, when it was open at all, and should vary the power exerted by the engine, as should be required, entirely by changing the point of cut-off.

It was desirable that as large a number of diagrams should be taken as possible, because the number of carriages was changed at almost every station, the gradient up or down which the train was moving continually varied, curves of longer or shorter radius occurred occasionally, and the speed

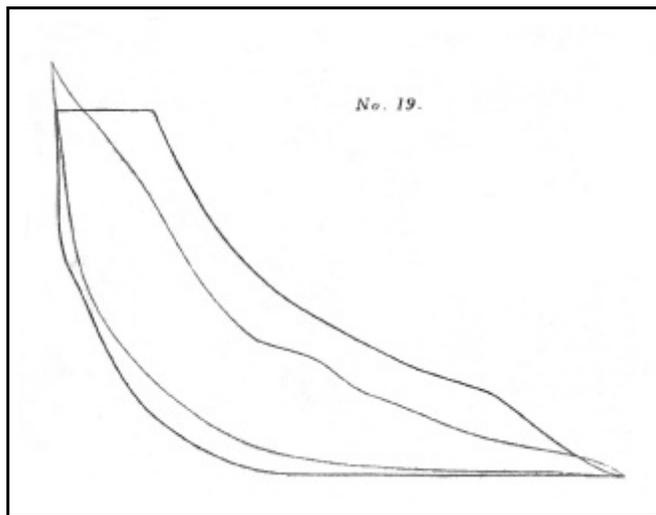
attained, and the point at which the steam was cut off, scarcely ever remained the same for more than a few minutes consecutively, so that, however frequently the diagrams might be taken, very few of them would be quite the same. The more nearly level and direct a road is, the less, of course, the changes in these conditions will be, both in amount and frequency. At the same time it was important to know precisely what the conditions were which would determine or affect the form of the diagram namely, the pressure of steam, the point of cut-off, the number of revolutions making per minute, the gradient, the curve, and the weight of the train – at the instant when each diagram was taken.

The plan hit upon for obtaining these data was as follows: - The two operators applied themselves without interruption to taking diagrams, each being able to take about one per minute when moving slowly, and one in a minute and a half when going at full speed. Those from one cylinder were numbered in order, and those from the other were distinguished by letters, each repetition of the alphabet being numbered, commencing a, a 1, a 2, and so on. We were accompanied by Mr. Maw, from Mr. Sinclair's office, who, standing between us, noted, in a book prepared for the purpose, the moment of passing each quarter-mile post, and of passing on to each gradient, and of taking each diagram, the number, or letter being called out to him.

An assistant on the foot-plate of the engine noted, in a like manner, the changes in the pressure of the steam, and of the notch of the quadrant in which the engine was run. The fuel consumed was likewise weighed, and the water measured, and at each station the number of carriages was noted. It became thus a very simple matter to minute afterwards on each diagram accurately all the conditions under which it was taken, and then to observe the power required to move different numbers of carriages at different speeds, and on different gradients, or around different curves; and at least one diagram being obtained on nearly every gradient and curve, and the time occupied in running over each being known, the whole power exerted during the trip could be very closely approximated to, and the consumption of fuel and of

water per horse-power per hour could be ascertained, and of course the action of the steam at every speed and at each point of cut-off was completely revealed. Also the diagrams taken at an accelerating speed, when the momentum of the train was being accumulated, could be distinguished with certainty from those taken at a uniform speed, and which showed only power required to maintain an equilibrium with the retarding forces. A remarkable feature of these diagrams was the very trifling back pressure exhibited, which was accounted for by the width of the ports 1½", and the size of the blast orifice, 5" diameter.

Diagrams from locomotive engines, on account of the great variety of speeds and points of cut-off at which they are taken, and the variations which they exhibit in the power exerted, are of higher general interest, in some respects, than those obtained from either stationary or marine engines; and a careful study of them may confidently be expected to throw light on some questions, about which engineers now differ in opinion. They show at once, for example, at what speed of piston a certain area of port ceases to be sufficient for a given diameter of cylinder, and precisely how velocity of piston in different degrees affects the pressure obtained.



**Diagram Number 19**

This is illustrated in a remarkable manner in cut No. 19, where are shown two diagrams, taken on this trip, when the engine was carrying the same pressure of steam, and was running in the same

notch of the quadrant, and of course therefore cutting off the steam at the same point of stroke. The diagram shown in the heavier line was taken at a speed not exceeding 50 revolutions per minute, and the one distinguished by a lighter line was taken with the same instrument five minutes later, at the extreme velocity of 260 revolutions, or 1040 feet travel of piston per minute. The scale of the Indicator was 40 lbs to the inch, and the boiler pressure 120 lbs on the square inch, which the more excessive compression made at the higher velocity caused for an instant to be nearly reached in the cylinder.

Much, among other things, may also be learned from these diagrams from locomotives upon that most important vexed question – In what degree the cylinder acts as a condenser of the entering steam, and by what means and in what degree in non-condensing engines this vicious action may be corrected, and what, on the other hand, tends to aggravate it.

These diagrams are taken under fewer difficulties than would be at first imagined, if the weather is pleasant, and the proper provision is made for the comfort and security of the operators. The principal difficulty is from the wind, which, at very high speed, approaches; more nearly to a hurricane than anything that one is able to experience in this latitude in any other way, and the labour of resisting it becomes quite wearisome, if the operator is not some-what protected from its force. No unpleasant sensation whatever is produced by the rapid motion, the passing of trains is scarcely observed, and if no accident happens, there is no danger more than in the carriages. Good weather is essential to the satisfactory accomplishment of the objects of such an excursion.

## **Hobby Threatened by Government**

These two letters were snatched off the Internet for us by Jay Stryker.

As founder and chairman of the Algoma Model Engineering Society (AMES) I had the unfortunate "pleasure" of dealing with the TSSA inspector. In his opinion, my portable track, which

the club was using at a function sponsored at the Bushplane Museum fell under the amusement ride act. "This installation and devices shall comply with "Z-267-00" safety code for amusement rides and devices" as well as the Ontario amusement devices act and regulation (Code 119). This installation and or devices shall not be returned to service until inspected and authorized by a TSSA inspector".

It has been suggested by some modelers that we should lay low, however, this cannot happen as this inspector has indicated to me that they know these "installations" exist across the province and they will locate and shut them down. According to Gord Kanani - P. ENG. at TSSA head office Toronto, paying or not paying public in their interpretation, is not a determining factor. Only the owner of the equipment may ride the equipment. Even spouses, children, relatives, friends are considered to be "public", and even private installations, if riding the "public" will have to comply with the act.

Also, the exemption for miniature boilers will be superceded, if the "public" rides the equipment and will be under the amusement act. In my opinion this is going to have to be acted on immediately by all live steamers and model engineers, private or public, before our hobby follows the path of 1-foot to the foot steam engines.

RSVP

Sincerely & good steaming  
Lawrence Howard  
Chairman- AMES

In response to a request to print the above Lawrence had the following to say:

You made a request to forward and print my letter. This info, I believe, should be made available to anyone who is involved in any form of our hobby. YES, forward and print in your newsletter! I wish to clarify that our club (AMES) does not own equipment (except for an awning and a sign). In other words, each individual member owns his equipment and the portable track belongs to me. All of this equipment has now been deemed

to fall under the amusement ride act, and I may not even demonstrate my steam engine in public.

As you may appreciate, the first letter of course was meant to awaken & hopefully bring responses from perhaps other groups who may have had dealings with TSSA, and could assist us with some advice in dealing with them. In Ontario, this "Harris" government is downloading many services to save money. Thus, the enforcement, inspections, etc. of the amusement ride act, which used to fall under the Consumer and Business Services branch of the provincial government (and although they knew groups such as ours existed, turned a blind eye, as long as there were no incidents – major accidents, lawsuits, etc.) has been awarded to a private institution, namely the Technical Standards & Safety Authority (TSSA). As a private institution, they do not receive government funding. So how are they going to survive and pay shareholders? One can only guess. Under the amusement ride act, a "licensee" will require consulting engineers to work with TSSA engineers, licenses, annual permits, & annual inspections by a TSSA inspector. We have been placed in the same category as Canada's Wonderland or Disney World. As chairman of a small (16 members) group of diverse hobbyists I know that at this time, we do not have the financial resources to even begin to comply with the requirements of this act. In fact AMES may have to reassess its existence.

In discussing this issue with some members of the Golden Horseshoe Live Steamers this morning, who have been working (3 years now) with the government to procure exemptions for our boilers under the Boiler Act, and, TSSA to obtain a "license" - it would appear that information that I have been given by TSSA, is not the same info that they are presuming to be able to operate under - Bureaucratic bumbling perhaps?

There may be questions concerning whether live steamers can run under the act or only "diesel" type engines.

Who are considered "public" for riding purposes - members, wives, relatives, children, etc.? However, I will repeat that, in my opinion, we as a group cannot hope to hide our heads in the sand or

lay low and hope that an inspector will pass by the driveway and not see our activities, which, with the information I have been given, would thus result in a shutdown order, and the need to be licensed to participate in a "hobby" in our own back yard.

We need to recruit new members and promote our hobby and share the enjoyment, camaraderie, and satisfaction that we who are presently active in the hobby receive collectively and as individuals.

This action in Sault Ste. Marie appears to be the beginnings of something in Ontario. Where next?

Sincerely & good steaming  
Lawrence Howard  
Chairman- AMES  
Sault Ste. Marie, Ontario



### Treasurer's Report

By Rob McDougall

As of 6/30/2001

Balance as of 5/31/2001:	<b>\$4,093.72</b>
Dues Received	80.00
Compensation from Museum for lost PA System	250.00
Donation from Jim Paquette	100.00
Interest Income	1.04
<b>Less</b>	
Gazette expense	-206.70
Front door security expense	-50.00
Balance as of: 6/30/2001	<b>\$4,268.06</b>

Rob

## Orrery Book Found

By Fred Jaggi

Ron Ginger mentioned some time ago that he was interested in orreries. There was a recent article in the Model Engineer showing the construction of one but did not give any dimensions or construction drawings. The 18 May 2001 issue of ME has an article by A. A. Garner on refinements to a George Thomas dividing head. Garner wanted to determine what dividing plates would be useful so he looked up many clock construction articles to determine common divisions that were required for the wheels.

He also looked up the book "Gearing To The Stars, The History Of Planetariums, Orreries, And Astronomical Clocks" to find ratios used in Orreries. Amazon lists the book as written by H C King in 1978. Sounds like a fascinating book and very useful for anyone contemplating building one of these devices. Amazon lists it as out of print but perhaps they can find a used one.

Fred

## Rebuilding A Monarch 10EE lathe

by Rob McDougall

In a previous article I put out the challenge as to which is the "ultimate lathe". While tongue-in-cheek, I offered up the Hardinge, Myford and Monarch as prime examples of very good manufacturers of lathes that would be in the Model Engineer's size range, if not always price range. I think we concluded that any lathe can produce good work in the hands of a skilled operator and I think of the analogy of bicycle riders who try to shave ounces off the weight of their racing bicycles while carrying an extra pound or two on their bodies. You've all experienced that dilemma, right?

In any case, after using a very nice South Bend 9 inch lathe for over 30 years, I have "upgraded" to a Monarch 10EE following on from a conversation I had on the bus to Cabin Fever a couple of years ago with Henry Szostek.

Now, "10EE"s can go for very big bucks indeed. Nice ones are typically in the \$8K - \$20K

range and like new ones up as high as \$60K. The one I purchased and spent 4 months rebuilding was in the “clunker” category and was obtained through eBay “sight unseen” (a big no-no). The only reason I did this was that, short of a cracked bed, I was prepared to view my new lathe as a “parts kit” (as Howard Gorin is fond of saying). And indeed it was. As sold, the lathe was unusable. The A/C side of the motor/generator was burnt out and the carriage hardly moved due to the built up crud and rust all over the ways and sliding parts. The taper attachment, for example, without any protective guards as it should have had, was encrusted deep with grime-grease and metal chips – a horror to view on such precision parts.



**As the Lathe Appeared on eBay**

So, the first weeks were spent completely stripping the machine down to virtually bare metal. Once I determined that the headstock had to come off, due to a broken forward/reverse selector arm deep inside the headstock housing, I resigned myself to stripping everything off and doing a complete rebuild. This allowed me to evaluate the shape of the ways and make a decision about grinding them or not.

In any project of this size, cost has to be a factor. And I soon found out that buying

replacement parts for a 10EE is like buying a residence in Newton – there is no relationship between what the actual product is and its cost – you are kind of buying a share of a certain market. For example, the cost of buying the vernier gearbox for the taper attachment from Monarch Lathe, Inc. is \$2,500 – that is more than the whole lathe cost me. Fortunately however, cork gaskets and other non-metal parts are affordable and they were the important pieces I needed. I did buy a new forward/reverse selector for \$300 as I thought this was too critical a piece to try fabricating.

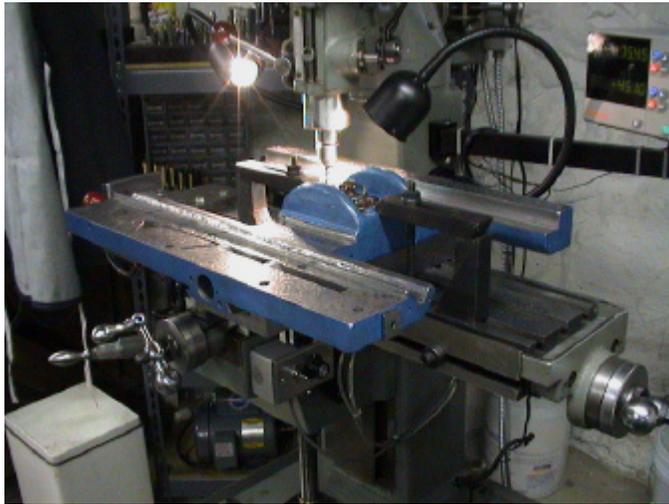


**Bed & Base Ready to Paint Photo by Rob McDougall**

The Ways: First major decision, once I had everything stripped down for evaluation, was the condition of the bed ways. With Larry Twait's help, and using a 4-foot straight edge that he has, we determined that the wear on the hardened (and perhaps chromed) ways was not too bad at all. At the worst point (front left side) the wear was about 0.0005". We used feeler gauges under the straight edge to determine this. You can sort of build up a topological map of the hills and valleys along the ways by this method. This can be double checked by using a Precision Master Level, which I also did. After much hand wringing, and with Larry's advice, I decided NOT to grind the ways and see how well the machine would perform first. This ran the risk of having to disassemble it again in the future.

The Saddle and Tailstock: The wear on these items was considerable. Setting the saddle upside down and using the unworn machined top of the crossways as a reference, I measured a major wear pattern of up to 0.012" of wear at the worst part.

Also, there was a 0.006” dip in the saddle right in the middle – due I suspect to the actual casting “flexing” like a potato chip. This was most noticeable on the area where the apron bolts up to the underside of the saddle at the front. The top of the apron was flat so I had to start by scraping this part of the saddle flat. Otherwise, the minute I bolted the apron up it would distort whatever scraping I might do on the actual slides.



**Machining the Saddle Ways** Photo by Rob McDougall

I also determined that the angular wear on the rear flat slide way needed so much metal removal that I would start by machining about 0.006” off using the vertical mill (see photo above).



**Saddle Being Scraped In** Photo by Rob McDougall

Scraping the saddle was definitely the most time consuming job on the rebuild. My objective was to ensure that the top of the saddle sat on the bed ways in a level plane to the bed. So, my

reference was to first set the bed level on the floor by using the Master Level and adjusting the 3-point leveling feet under the bed. Then, by measuring the saddle while sitting on the bed, scraping metal away until the Master Level was the same left to right and back to front, using the scraped crossways as reference surfaces. The other important angle to constantly check is the perpendicularity of the saddle to the headstock. This I measured by clamping a precision parallel across the faceplate and running a dial indicator across it while stuck on the cross slide (previously hand scraped to match the top of the saddle).

The tailstock was a much easier affair. I knew I would have to add shims to get it to the right height after leveling it so I was able to mill and then surface grind the underside of the base until it too was level with the ways, front and back, and left to right. In the end, I had to add 0.023” of shim packing to get it to the center height of the headstock spindle. This is more than I would prefer and I probably should have added Moglice or Turcite to the base and scraped it down – I took a short cut. Since I don’t anticipate moving the tailstock over for taper turning, I thought I could get away with this. (The lathe has a taper attachment).



**Headstock Ready to Paint** Photo by Rob McDougall

The Headstock: Apart from replacing the broken gear selector and checking the spindle bearings, just major cleaning was required on this item. The amount of crud that was built up on the inside floor of the headstock made me glad I was able to dip the whole thing in a solvent bath and

wash it out. There must have been a quarter inch or more of black silt down there from the 50 plus years of coagulated oils. Fortunately, the spindle bearings were A-OK as these are very expensive to replace. And, the pre-load settings are built in to the spacing shims that go onto the spindle before assembly so all I had to do here was knock the spindle out and whack it back in (very carefully).

**The Drive System:** The original Monarch drive system was state-of-the-art at the time (early 1940s) and went a long way to account for the relatively high cost of these lathes originally. I was disappointed to learn that the motor/generator was unsalvageable as the rest of the electrics, including the nice big 3 HP DC motor, looked in reasonable shape. But, to rewind the A/C motor was prohibitive when compared to the very low cost these days of a VFD and A/C motor combo. I am told that this set-up will not produce as much torque at low speeds as the original Monarch system. This should not affect me given the relatively light work I expect to do on the lathe, but it might be a negative if I were ever to sell the lathe to a commercial shop. If need be, I can fit back the original reduction gearbox which gives a 5 to 1 speed reduction. The new system is a 5 HP Dayton motor driven by a Speecon 10 HP variable frequency controller. I needed to go for double the motor capacity on the VFD because I am supplying it with 220-volt single phase. The machine could also be hooked up directly to a 3-phase system and functions very well either way. I placed a 4-inch double row pulley on the motor, which drives the 6-inch spindle pulley. With this 2 to 3 reduction and the VFD, I can run the spindle down to about 30 RPM and up to the maximum of 2,500 RPM. After a top speed on my South Bend of 1,150 RPM this seems very fast indeed. I can only see using this top speed for fine drilling or polishing small parts. The “sweet spot” of turning speeds for me is in the 600 to 1,000 RPM range.

**Painting and final assembly:** Frank Dorian has an original brochure from Monarch showing the 10EE in living color. The royal blue of the machine in the brochure just dazzled me so that was the color I tried to match on my machine. Painting involved bondo on some rough spots, car body spackle for

smaller holes, then two thick coats of rusty metal primer, followed by two coats of final paint. All applied with a spray gun and using oil based “industrial” quality paint. I used Benjamin Moore and had the store color match the final coat. I masked everything, waited the prescribed time for drying, and then dug out all the paint that got where it shouldn’t be. I don’t like seeing wearing surfaces with paint on them and think that painted-over fasteners are unsightly. At this stage I had to totally disassemble the lathe and reassemble it without messing up the paint job.

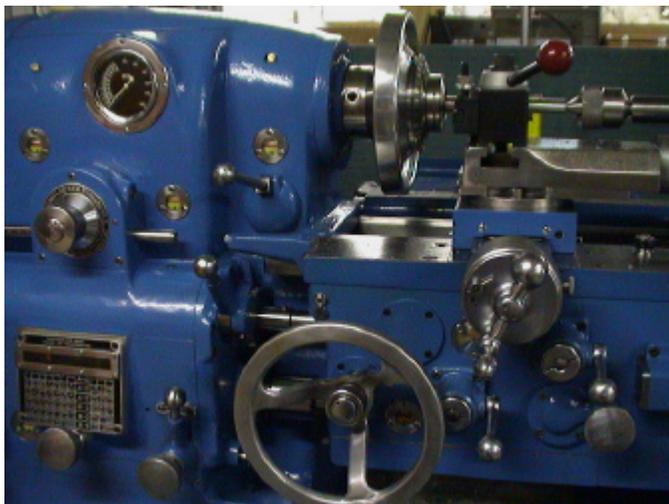


**Bed & Base in Spray Booth** Photo by Rob McDougall

Assembly was straightforward enough except for the spindle, which I put together incorrectly the first time. There is a spacer at the front of the spindle, which has an oil passage hole that goes to the bottom and then a retaining hole at the rear of the headstock. I initially put this on back to front and had to take the spindle completely off and apart to correct - a 3-hour detour. The new motor required that a base plate be fabricated. Also, some bracketing for the VFD enabled it to sit nicely in the base of the bed on the right hand side.

**First test cut and a problem:** The big day came when I was able to turn on the lathe, see the spindle go around and take a first test cut. After running the machine “in” for a couple of hours using all the dials and controls and making sure everything ran smoothly and without binding up anywhere, I cut a piece of one inch diameter 12L14 for about 5 inches to see how straight it cut – THE BIG TEST! Here I am expecting better than

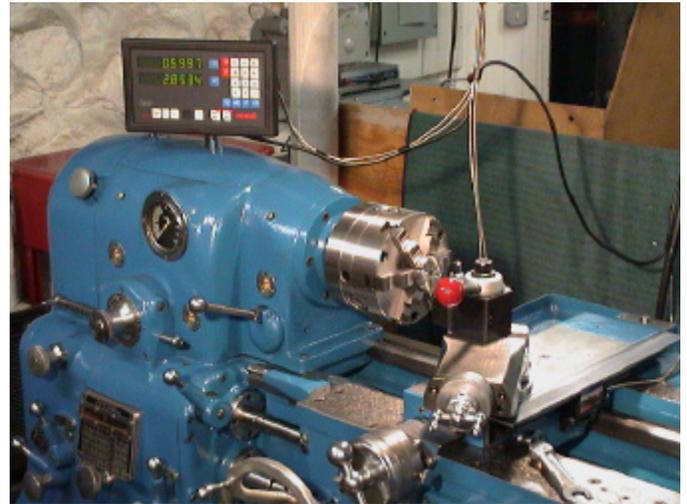
0.0004" over 4 inches and I got a taper cut of 0.0012" over four inches. What the heck was this all about? I measured the levelness of the bed and levelness of the cross slide and they were spot on. Could only be the headstock. But I had assembled it meticulously and tightened up the hold down clamps with equal pressure on each bolt. How could this be off? To this day I don't know but it was. I used a 20 inch long motorcycle front fork tube as a test bar in the four jaw and set this so that it turned concentric with the spindle over it's entire length.



**Cutting the First Test Piece** Photo by Rob McDougall

Running a DTI along the bed on the saddle, I measured deflection from parallel with the bed ways of about 0.003" on the far end. That's a lot. It should be virtually undetectable with the crude measuring equipment I was using (laser equipment would be better). At this point I was lost regarding what to do. I certainly was not equipped to scrape in the underside of the headstock – it is too heavy to lift about 300 times to do this. I therefore cheated again. You will all cringe but I shimmed the front rear underside of the headstock 0.0025". I basically kept adding shims until the test bar measurement came out parallel with the ways. My test cut then yielded 0.0001" of taper over 5 inches – this was the result I was looking for – in fact much better than I expected as I would have been very happy with .0004 thou. My South Bend can get about .0005 thou parallel on a good day. But, the real advantage of this lathe is how solid it is. I can take "real" cuts with it, producing streaming blue chips. I could never do this on the little South Bend. I find myself

not giving a second thought to cutting down a piece of stock from say 1.5 inches to 1.25 and then drilling it out to one inch in order to fabricate a part. Such cutting would be a major undertaking on the South Bend. I have had no problems with the VFD set up, either. It seems to have loads of torque at very low speeds. Probably cutting a 10-inch cast iron driver for a locomotive would bog it down, but slower lighter cuts should get around that.



**Newall DRO Installed** Photo by Rob McDougall

After using it for a few weeks and deciding that this machine was good enough as a "keeper", I had to put a DRO on it like my other lathe and mill has. I decided on a Newall with Microsyn scales. The cross slide scale reads with accuracy of 5 microns over one meter (about 0.0002" over 3 feet). The saddle scale reads to 10 microns.



**Completed Monarch 10EE** Photo by Rob McDougall

**Final thoughts:** Doing all this work is not for everyone, but it can be done. Learning how to scrape was essential otherwise the machine would not be much better than when I got it (just prettier). Given that scraping is time and not money, I would recommend to any club member to try your hand at it. You won't pull another machine apart and put it back together again without feeling the need to scrape in the sliding ways.

One other thought – rebuild an old machine like I did or buy a new Asian import? From what I have seen and read, if you were to buy an Asian import and see it as a “casting kit”, I think you could rebuild it as I did this old Monarch clunker and have a very nice accurate machine indeed – with all modern features. And for a very reasonable budget. But, if circumstances prevent putting in the rebuild time, then I still think a good condition older American built machine is a better bet than taking a chance on a nice shiny Asian import where the leadscrew is cut in metric pitch and is somehow meant to give English threads.

Rob

## Dumore Toolpost Grinder

By Bob Neidorff

If anyone needs help with a Dumore toolpost grinder or other Dumore tool or motor, they are still in business:

Dumore Corporation  
1030 Veterans St  
Mauston, WI 53948  
888-467-8288  
<http://www.dumoretools.com>

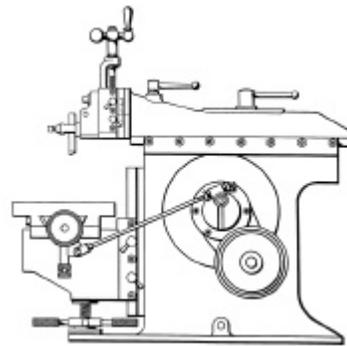
The website isn't very helpful but has an interesting story on the history of the company and the origins of their high-speed electric motors.

I called them to get advice on repairing my No. 14 Tom Thumb toolpost grinder. They referred me Bill Sopko Jr. at:

William Sopko and Sons  
26500 Lakeland Blvd.  
Cleveland, OH 44132  
216-289-1400  
<http://www.wmsopko.com>

Bill Sopko Jr. was very friendly and helpful. He sent me a parts diagram, offered to answer questions about the tool, and said that they sell repair parts and rebuild these grinders.

Bob



## Metal Shapers

By Kay R. Fisher

As you are by now all well aware my original intension was (and still is) to write a book about shapers. In compiling data for that book and this column I have had several ideas cross my mind for a proper title. Below is a list from a chapter called “Fun Stuff”. If you have any other suggestions please get them to me. I would hate to have missed a really good and frivolous idea.

### *Alternate Titles for this book*

- To Shape or Not to Shape — That is the Question.
- Metal Shapers for Dummies
- Idiots Guide to Metal Shapers
- Shape Up or Ship Out
- The Shape of Things to Come
- The Shapers Bedside Reader
- Harry Potter and the Wizards Shaper

### *From Tabloid Headlines*

- Elvis Spotted at Shaper Convention
- Nostradamus predicts Shaper 2000 years before...
- Aliens Abducted My Metal Shaper
- Women Impregnated by Alien Shape Shifter

- Secretary Confirms President Was Alone With Metal Shaper
- President Declares March as Valuing Shaper Diversity Month
- El Nino causes upturn in shaper sales

### ***Song Hits***

- No Matter What Shape Your Stomach's In
- Shaping by the Dock of the Bay

Kay

### **Metal Supplier Recommended**

By Gil Greenberg

After trying several local metal suppliers and having some disappointments, Gil Greenberg placed an order with Metal Express. They advertise in Home Shop Machinist. He was delighted with the service, price and low shipping costs. Because he ordered over \$50 they knocked off 20 percent almost making the shipping free. They are on the web at <http://www.metalmart.com>.

Gil



### **Calendar of Events**

By Bill Brackett

Aug 2, 2001 Thursday 7PM  
NEMES Monthly club meeting  
Waltham, MA  
Charles River Museum of Industry (781) 893-5410

Aug. 4-5 Scribner's Mill Show  
Sebago-Long Lake Region Near Harrison, ME  
Call (207) 583-6455

August 4-5 27th Annual Transportation & Aerobatic Spectacular  
Owls Head Transportation Museum  
Route 73 Owls Head, ME (207) 594-4418

Aug. 9-12 Pagent Of Steam  
Canandaigua, NY:  
Gary Love (716) 394-8102

Aug. 10-12 Cumberland Valley Show  
Twin Bridges Campground, Chambersburg, PA  
John Bricker (717) 263-5588

Aug 11-12 Conn River Museum Show  
Steam Engine & launch Show  
67 Main St. Essex, CT (860) 526-5147

Aug. 11-12 Straw Hollow Show  
Boylston, MA  
J.A. Resseguie (508) 869-2089

Aug 15-18 Rough & Tumble  
Kinzers, PA  
Call (717) 442-4249

August 18 24th New England Auto Auction  
Owls Head Transportation Museum  
Route 73 Owls Head, ME (207) 594-4418

Aug 19 Sunday 9AM  
MIT Flea Market, Albany and Main St.

Aug. 25-26 CT River Ant. Col. Club Show  
Rt 5 At Old Ely Store, Ely, VT  
Call: Douglas Driscoll (802) 333-3243

September 2 Antique Motorcycle Festival  
Owls Head Transportation Museum  
Route 73 Owls Head, ME (207) 594-4418

Sept 6, 2001 Thursday 7PM  
NEMES Monthly club meeting  
Waltham, MA  
Charles River Museum of Industry (781) 893-5410

Sept. 7-9 Dublin Engine Show  
Dublin NH Rt. 101  
(603) 495-3640

Sept 10-16 Lees Mills Steamboat Meet  
Moultonboro, NH  
David Thompson (603) 476-5617

Sept. 13-16 Fitchburg Show  
The Fitchburg Airport, MA  
Grover Ballou Jr. (413) 253-9574

Sep 16 Sunday 9AM  
MIT Flea Market, Albany and Main St.

September 16 Tribute to Convertibles  
Owls Head Transportation Museum  
Route 73 Owls Head, ME (207) 594-4418

Sept 22-23 Cranberry Flywheelers  
So Carver Ma. At Edaville RR  
Davie Moore (508) 697-5445

September 30 Antique Chevy Meet  
Owls Head Transportation Museum  
Route 73 Owls Head, ME (207) 594-4418

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@ultranet.com or (508) 393-6290.

Bill

## For Sale and Wanted

### *Van Seats*

Bench Seat for a Ford Econoline Van. Blue color, never used. From the 1970s. Free !

Alan Bugbee, Simsbury CT (860)658-4764

### *Horizontal Mill*

Barker horizontal mill with Sherline vertical mill attachment on it. \$300 firm.

Art Hillier, Yarmouth MA (508) 362-6592

### *1.5 HP Motor*

Baldor Industrial Motor #VL3514T 1 1/2 HP 115/208-230 V 16/8.4-8 A 1725 RPM 60 HZ \$80

Bill Brackett (508) 393-6290

## Web Sites of Interest

NEMES home page

<http://www.naisp.net/users/fisher/nemes.html>

The Metal Source

<http://www.metalmart.com>

Michael Morgan scraping web site.

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

Dumore Corporation

<http://www.dumoretools.com>

Wm. Sopko & Sons, Co. - America's largest manufacturer of spindle accessories.

<http://www.wmsopko.com>

Industrial Surplus in Berlin CT where Errol Groff spotted a vertical shaper just like the one he operated as an apprentice about 33 years ago.

<http://www.industrialsurplus.com>