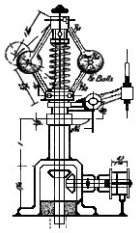


The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

No. 253 June 2017 © 2017 NEMES

Club Business

Rich Baker

Club Elections. NEMES elections will be held at the June meeting. Norm Jones put together a slate of officers for the next year. Dan Eyring will be running for President, Victor Kozakavitch for Vice President, Rich Baker for Treasurer, Todd Cahill for Secretary, Jeff Del Papa for Webmaster, and Jeff DelPapa for Gazette publisher.

Online Store. The NEMES Online Store is now live, and you can order NEMES apparel and pay your dues from the comfort of your living room. The link is available on the www.neme-s.org.

NEMES Apparel. We have NEMES denim button down shirts, t-shirts, and sweatshirts for sale. The denim shirts $35, sweatshirts $25, and the t-shirts $15. Order online or contact Rich Baker at 978-257-4101 if you would like to order one.

Next Meeting

Thursday, June 1, 2017, 7 PM

Charles River Museum of Industry & Innovation
154 Moody Street
Waltham, Massachusetts
Directions are Here.

Speaker for June:

Arthur Torrey will talk about machining from a Wheelchair. Or how to operate a Bridgeport when you can't reach half of it.

Deadline for submitting articles is two weeks prior to the next meeting.

Table of Contents

Steam Expo at the Newton Free Library

I hope many NEMES members will support this event, either exhibiting or attending.

From:

"Sara Levine" <slevine@minlib.net>

Subject:

Nemes at the Newton Free Library STEAM Expo

Hello

On Saturday, July 15, 12-3 pm the Newton Free Library will be hosting a STEAM Expo. Last year's Expo was a great success, with over 1,000 visitors! This time around we're expanding the day with even more participants. The purpose of the Expo will be to introduce the community to local makers, engineers, science clubs, artists, namely, YOU!

We would like to invite you to showcase your skill, business, project, new technology, or innovations at the library. The Newton Free Library is a cultural hub within the city. With 1,500+ patrons walking through our doors each day, ours is one of the busiest library buildings in Massachusetts and therefore makes us a great venue for connecting people with new ideas. We do an extensive amount of outreach to publicize all of our events and obtain media coverage which attracts attention to and attendance at our programs. While we are unable to pay honorariums, our media coverage does serve to draw a lot of attention to presenters who visit here.

The STEAM Expo will be set up in the Auditorium, Gallery and outside the Library. Each presenter will have a table with space to show-off their project. We hope you'll consider presenting what you're passionate about!

If there is someone else I should contact regarding the Expo please let me know. We look forward to hearing from you!

Sara Levine

Reference Librarian

Newton Free Library
330 Homer Street
Newton, MA 02459
617/796-1380

www.newtonfreelibrary.net
email:slevine@minlib.net

Tool Corner

Frank Dorion

October 2011

In thinking about this month's topic, I was mulling over what useful tool I could describe and recommend for use in the shop. As I was sorting through my own experience, it dawned on me that there is a much-overlooked tool that is potentially more useful than anything else you have in your shop, namely your library. Now "library" may sound a bit grandiose if you can hold all your books on metal working in one hand, but there are some publications that are so comprehensive in their treatment of shop technology that they can be considered a library in themselves. So, here are a few of my favorites.

First on the list (and the one I value most) is a two-volume set by Karl H. Moltrecht, titled Machine Shop Practice, In these books, Moltrecht covers just about every aspect of working with machine tools (except CNC equipment). Published in 1979, these books are the most recently written in-depth presentation on the subject of machine tool operation. There have been many books published to cover this subject, but I put Moltrecht's on top because of the clarity and detail he provides. With his instruction in hand, you can confidently tackle a first-time machining project and expect a good outcome.

I'm thinking particularly of the first time I ever cut a gear using my Bridgeport mill. I had to do a bit of interpretation because Moltrecht explains the process as done on a horizontal mill, and I was using a vertical mill. Nevertheless, he guided me reliably through every step, and that gear came out right on the money. His attention to detail really counts.

For example, most authors simply instruct their reader to center the involute gear cutter on the gear blank, leaving it to the reader as to just how this should be accomplished. Not Moltrecht. He describes a very specific process that, if done correctly, assures that your cutter will be dead center on the gear blank. And so it is with almost every operation he describes.

Now, to be balanced about this evaluation of Moltrecht's books, I should add that there is a bit of a trade-off involved in having him as your shop guide. Because he does go into considerable detail, you won't find yourself whipping through his description in a couple of minutes. It will take time and effort on your part to absorb all the information he presents. So, if you are not inclined by nature to be a careful reader, but would rather strike out on your own after a brief orientation on the subject, perhaps one of the other titles mentioned below would be more suitable for you.

One last bit of good news about Moltrecht's books. They are still in print and available from a number of sources, including here. If you are serious about learning to run your machines, you can hardly do better than Moltrecht's books.

Next on my list of favorites is a two-volume set titled Machine Tool Operation by Henry D. Burghardt. This set has been out-of-print for quite a few years, but thousands of copies were published over many decades so they are still relatively easy to find. For example, Part 1 can be downloaded for free from Google Books here.

Burghardt's books are not as comprehensive as Moltrecht's, but a bit of an easier read with not quite as much detail. Burghardt is like a friendly old shop teacher looking over your shoulder and guiding you through the wonderland of machine tools and their use. While he doesn't get into the detail or complexity that Moltrecht does, if you knew everything that is in Burghardt's book, you would be a pretty savvy machinist all the same. The Burghardt volumes were enduringly popular as textbooks for vocational training. First published in 1922, this set went through several editions. It was revised most recently in 1954 and published as an expanded edition under the same title, with the authors of this latest edition listed as Burghardt, Axelrod and Anderson. No matter which edition you find, you are sure to benefit from this classic work.

A third publication I would offer for your consideration is Machine Shop Training Course by Franklin D Jones, another two-volume set. Jones was a prolific author on the subject of machine tool operation over the years leading up to World War II. The above set, published during the war years, may have been the culmination of his writing on this subject since I'm not aware of more recent works by him. He takes somewhat of a different tack in structuring his books – they are written in a question and answer format. However, he does not slight his subject and his books are packed with useful information, particularly if you are using machines from that era. While out of print at one time, new editions of this publication are available, for example here.

Finally, I would be remiss if I did not mention two books by Robert H. Smith which are possibly the best early works on learning machine shop skills. The first, Elements of Machine Work, was published in 1910 and is a very basic text on the use of hand tools and bench work, but includes sections on hand scraping, heat treating and other interesting topics. Skills that were almost taken for granted at the time, such as using cold chisels (very versatile tools!) are treated with clear explanations. It would be a rare home shop machinist who couldn't learn something from this book.

The second book, Advanced Machine Work, published just after World War I, covers the full gamut of machining skills and processes. This text is organized as a series of expositions on many machine shop topics, each followed by an assignment to be completed with a very detailed Schedule of Operations for each assignment. Smith literally walks you through every step for each assignment, from cutting a square thread to running a shaper, including many of the more sophisticated operations such as precision hole location. Out of print for many decades, both of Smith's books are now downloadable at archive.org (use the links above).

Each of the four sets of texts I have mentioned above complement the others, and the authors' different styles keep redundancy at a minimum. Armed with their contents, you cannot help but be a better machinist yourself.

From the Gazette Archives

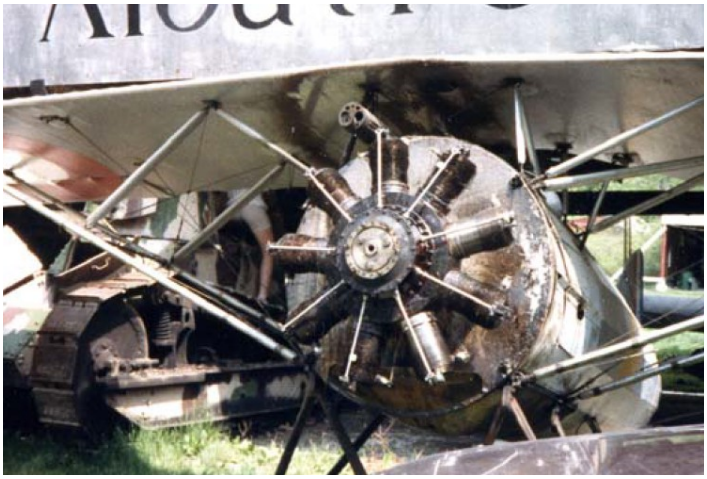
September and October 2011

Rotary Engines

By Jim Johnston

World War 1 aircraft were mostly made of wood and canvas. They were generally lightweight, small and evolving in design very rapidly with emphasis on combat agility for short periods of time. Throughout the war, the rotary engine substantially met the needs of designers such as Henry Sopwith for the Camel and 13 more production designs. Evolution and needs were so fast and extensive that the big French Hisso V-8, for the Spad, and the German 6 Cylinder Mercedes in the Fokker series did not displace the rotary, but just added to it. Radial engines, as we know them today, did not exist except for those few produced by Anzani.

Initially, these other engines suffered severe reliability problems with life as short as an hour. The rotary engine, at about 2 pounds per horsepower, was a significant solution to cylinder overheating, exhaust valve failure, and seizure from inadequate lubrication. The Seguin brothers in France invented the Gnome rotary as a means of cooling cylinders. The photo below is a 9-cylinder Gnome mounted on a Moraine-Salnier Parasol type airplane. After restoration, the writer saw this engine throw a cylinder, but the pilot landed safely. It is still flying after repairs at Old Rhinebeck Aerodrome in Rhinebeck, NY.



The French Gnome aspirated an excessively rich fuel-air mixture through the crankcase and thence to the cylinder intake valve, a flap-type valve in the piston head, to avoid explosions within the crank case. The exhaust valve was kept open during about 1/3 of the intake/suction cycle. Exhaust was swept away and fresh air furnished to the valve. The mixture was properly diluted for firing and at the same time the exhaust valve was cooled by this air--enough to allow cast iron valves of complex shapes.

Upon consolidation of the Gnome and LeRhone companies, rotaries went to two valves but retained all the other features. Exhaust ports, without any stacks, were aimed in the direction of rotation. Cooling and air thus obtained was used in the French Clerget, the German Oberusal, and the American Curtis-Wright as well as the Gnome-LeRhone. The Gnome-LeRhone Company still exists (now nationalized as part of Snecma.)

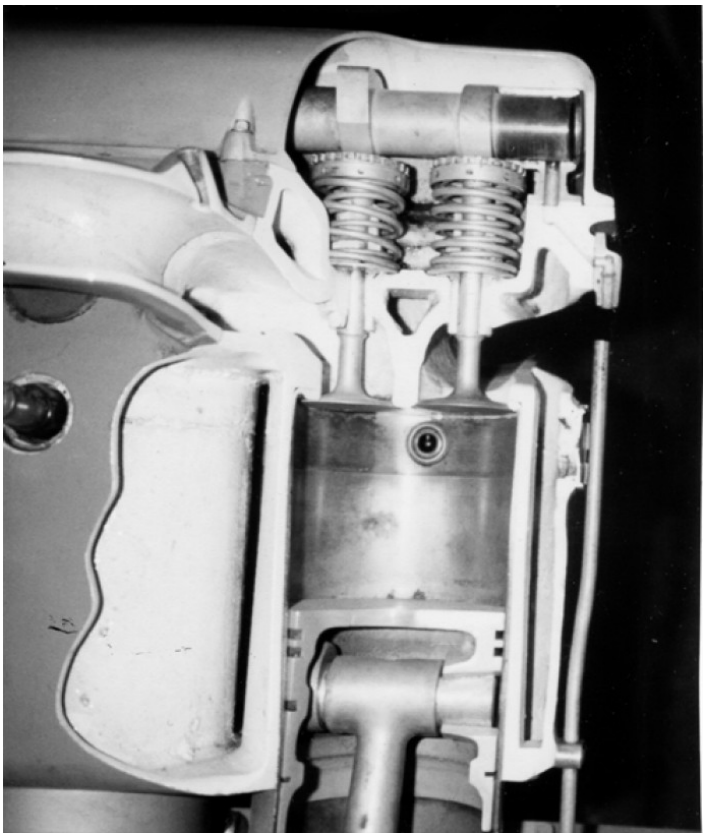
Oil for lubrication, non-soluble Castor oil, went through the crankshaft with the fuel, as it may today in some 2 stroke engines, because splash lubricating with cooling could not be used. Castor oil has been found essential and is very satisfactory in historical aircraft rotaries, without much plug fouling. No substitutes had been found up to the 1990s. Of course, the pilot would suffer from castor oil in his face and that's probably the reason for the historical scarf worn by WW1 pilots.

Incidentally, there is the cyclical noise of nonfiring cylinders that you would hear from nearly all rotaries. Intake passageways through the crank shaft are too long and mixture adjustment too sensitive to permit frequent operational throttle control. So, there is a switch in the cockpit that allows selection of 3, 5,7, 9 or zero cylinders firing. This is the pilot's control of engine RPM during combat and short flights. It was called blipping. Yes, fuel passes through unburned as well as castor oil, so in transit the pilot did adjust mixture for RPM control, and, yes, there were numerous aircraft losses due to both this and plug fouling. Rotaries typically realized 50 hours between overhauls. This maintenance cycle was probably an artifice, but it worked. All forces adopted this as standard operating practice. The US Army actually did a full tear down and completed overhaul with test stand operation. There are some wonderful old movies available that exhibit the entire overhaul process.

The Bentley BR-2, developed at the Royal Aircraft factory (RAF) by Lieutenant Bentley, was by far the best rotary of this era, but the war was over. Rotaries were too massive in gyro effect to continue with rotaries. Consider a 2-row 18-cylinder monster, such as the German Oberusal, at around 1000 pounds spinning at 2000 RPM. Haul back on the stick and you'd jerk violently to the left (?). Inexperienced pilots had a difficult time even taxiing. By mid-war, alloy steels came into being, pressure lubrication had been invented and engine block/head castings with water portals developed, so aircraft entered a newer war with the French Hisso, the German Mercedes and others. No rotary manufacturer ever succeeded in transforming their business to radial engines based on extension of rotary technology.(Remount a rotary on the crankcase and let the crankshaft turn). The author never found any reports in early magazines about such an experiment. Even the Bentley BR-2 (in the Sopwith Snipe) was very limited in production (about 50 units?). In 1921 for example, Gnome-LeRhone Company purchased British Jupiter radial engine plans with manufacturing process licenses,and made no attempt to incorporate any rotary features. The tens of thousands of rotary engines were "it" for most of the war but they had their day and were done, finished and actually buried in many instances.

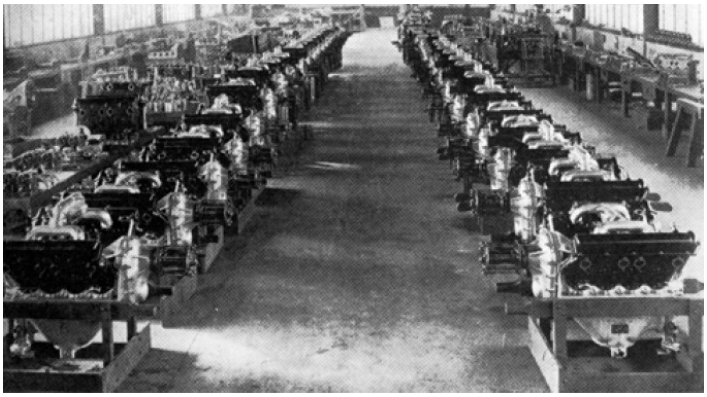
We'll take a peek at the Hispano-Suisse (Hisso), Rolls-Royce series, Puma, and German Mercedes next month.

Photo 1 is a cutaway view of a cylinder of a V-8 "Hisso" with overhead camshaft operating directly on the valves, dual ignition, forced oil lubrication. The Hisso, brief for Hispano-Suiza, has aluminum blocks, aluminum heads, aluminum crankcase, aluminum valve covers and oil pan, weighs-in at 470 pounds (without water or radiator) and produces 187 shaft horsepower at 1800 RPM. There was also a version with gearing to produce 260 horsepower. Both versions are just slightly larger than our modern automotive V-8s. It even fits in a WW1 wood, cloth and wire Jenny trainer airplane, which could be seen flying recently at old Rhinebeck aerodrome, as well as another Sopwith aircraft known as the Dolphin.



The Hisso was prototyped for high-end autos by Marc Birkigt, Swiss Engineeer, who moved from the Spanish company to France in about 1914, to join the Societe Francaise Hispano-Suiza/Clerget companies which survived even after WW2. Development then proceeded with many licensees, including Wright-Martin in the US, Wolseley and Sunbeam in Britain and a number of sub-companies in France. The French Spad fighter of WW1 used it exclusively, which accounted for the bulk of production by many hopeful manufacturers. The photo 2 is the interior of the RAF facility with over 50 geared type Hissos. Perhaps these were for the British SE5 but never got utilized due to gear problems. Even Henry Sopwith designed a brief airplane series for this engine, called the Dolphin. The author met and talked with an American WW1 pilot, Arthur (Ray) Brooks Capt. USASC, about the SPAD. He told me that most of his colleagues thought of it as the flying brick. They just wished it had a longer service life between overhauls, and that it did not have operational limitations. With care, 20 hours between overhauls was about the best that could be achieved.

The Hisso was clearly a major achievement so soon after the birth of aviation, but there were big problems with it. The Hisso, and another aluminum engine, the British straight 6 Puma, would identify a significant materials shortfall---that of the quality of aluminum castings. The writer has seen figures of as many as 50000 units, and dozens of licensees. If true, the failure rates must have been monumental--well over 75%-- and it was the cause of failure of most licensees. There was a workaround solution to the porosity problem. Suspect parts could be treated like stove enameling. A low melting alloy, probably somewhat like TSR2000 which pools and covers widely, could be applied with the aluminum casting at higher temperature, to seal off holes. Metallurgists had not then recognized the role of silicon in aluminum castings but the lesson appeared to have been learned by 1918.



The French Hisso employed a shell drawn steel, cylinder sleeve, threaded and screwed into the aluminum block casting. Threads transfer heat from the steel to the Aluminum and thence to the coolant. Threads accommodate a minor amount of operational overheating as compared to shrink fitting. The somewhat thicker head-end of the drawn shell, was machined for valve seats and camshaft support. The Aluminum heads were contour machined to fit the head-end and allowed for a gasket(?). The heads were bolt-clamped to the blocks, again with heat transfer through both metals.

Wright-Martin eventually changed this cylinder design to a straight, threaded steel(?) tube, with aluminum head serving directly as the top of the combustion area. Valve seats were a bronze alloy pressed into the aluminum. Photo # 2 is probably the later version by Wright-Martin as it has a flat aluminum surface over the combustion area. This was successful by 1918 and Wright-Martin continued the sale of Hissos though the 1920's. Hisso offered 12 cylinder versions at about 690 HP and eventually 900 SHP. It appears that the screwed sleeve approach was continued by all Hisso licensee manufacturers' right up into WW2.

There were other operational problems as well with broken crankshafts, and overheated, warped. exhaust valves. Reduction gears were another tantalizing source of failure. It is not clear from the limited discussion in various books, whether the gear failure was a widespread heat treating problem, alloy composition, or gear tooth design. The gear reduction problem was solved by the wars' end, as evidenced by the frequency of occurrence in many engines, but not all. Wolseley, for example, had a contract for about a thousand 200 SHP Hissos. Wolseley's geared engines were not acceptable, and so Wolseley went back

to development to boost the HP of the non-geared engine. Wright-Martin had similar troubles, and simply reduced performance to 180 HP, until the gear problem was resolved.

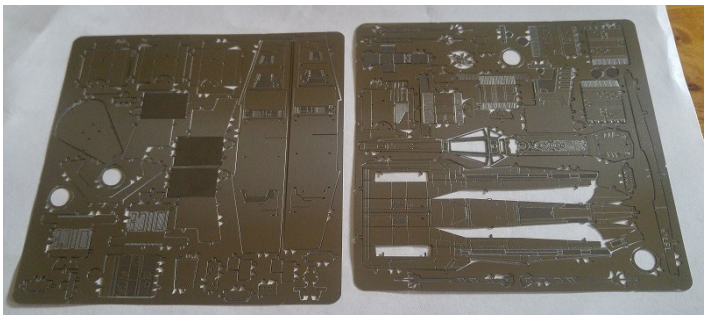
The French Hispano-Suiza Company entered supercharger development quite early. This work evolved into a very successful line of V-12 engines by the end of WW1, still with the screwed-in steel barrel with the clamped-head of the WW1 years. The Hisso moved on into Russia as well as Western Europe, and by contract served as the "inspiration" for the Russian line of V Klimov engines, right up through WW2.

Metal Origami

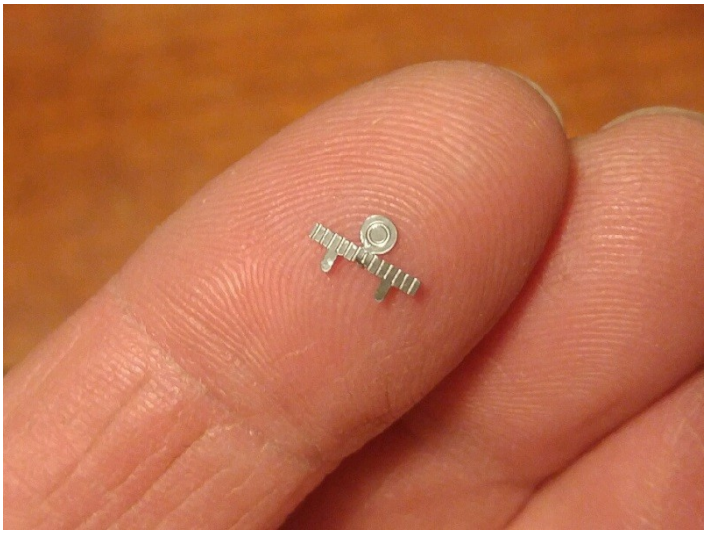
Mike Boucher

Here's a bit of a diversion from your usual "model engineering". When I took the trip up to Owl's Head Transportation Museum for their model show, with my father and Norm Jones, I brought a few of the finished models, and one to build while I was at the show. I got a lot of comments about them, and Norm seemed particularly interested in them.
The company is "Fascinations", and the models are called "Metal Earth" models. They have a web site at http://www.fascinations.com/metalearth. You can find them at hobby shops (I've bought them at "Spare Time Shop" in Marlboro, MA) or on Amazon. I first heard about them about 3-4 years ago, and I've built several of them since then.

The kits themselves are etched steel. The kits come as one or two etched sheets, about 4" square.
The two sheets used to make a “Star Wars X Wing” are pictured below.



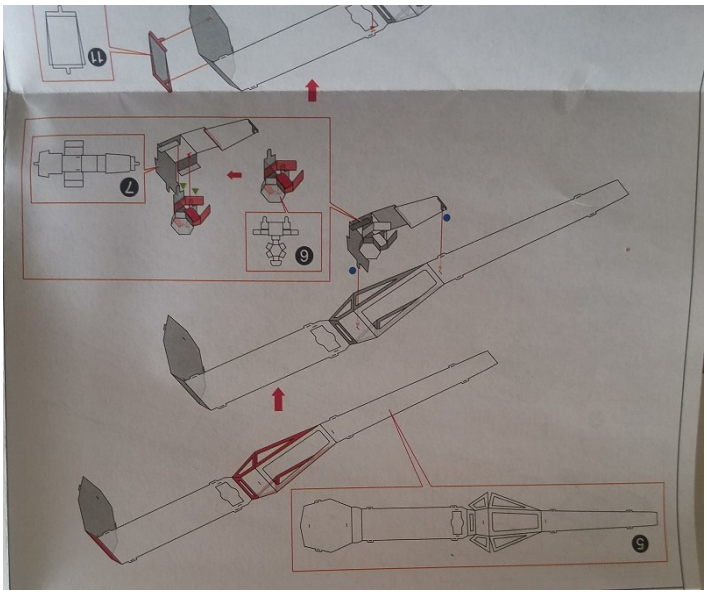
They don't require any glue. Everything goes together by inserting small tabs into small slots and bending or twisting the tabs. Because of this, you can build these models with just a few simple tools: some wire cutters, needle-nose pliers, and a needle file. If your eyes are like mine, optivisors are also VERY helpful! Some of these pieces are VERY tiny.



I use the cutters to remove the etches from the sheet, hold them in the pliers so the edge of the part is parallel to the edge of the pliers, and use the needle file to file off the sharp barb left from removing the piece from the sheet. If you look at the above photo, you can see where I had to file just below the circular part, about ½ way between the two tabs.

Then, you have to bend the part to shape. There are 1/2 etched in fold lines to help here. You have to be careful to bend them the right way, as if you bend them the wrong way, then you're likely to break the part if you attempt to re-bend the correct direction. Above, the ½ etched lines in the “straight” part are to help bend that part into a circle.

The instructions are simply diagrams showing how to bend the parts, and which tabs go into which slots. Here’s a sample of the instructions for the X-Wing.



As you can see, you have to discern which direction to bend which piece. Most of them are pretty easy, but some shapes, like part #6 above, take a bit of study. Making curved or spherical shapes can be quite a challenge. I tend to make curves by wrapping the piece around an appropriately sized drill, but you have to guess the size, as the instructions don't specify the final diameter.

When you're all done, you have a small display model. Here's a few of the models I've finished…

Quick note. That small part in the photo above, the one on my fingertip? That's one of the wheel hubs on this model of Cinderella's Carriage…

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For Sale

On Wed, Apr 5, 2017 at 2:45 PM, Robert Carter <carterrj@verizon.net <mailto:carterrj@verizon.net>> wrote:

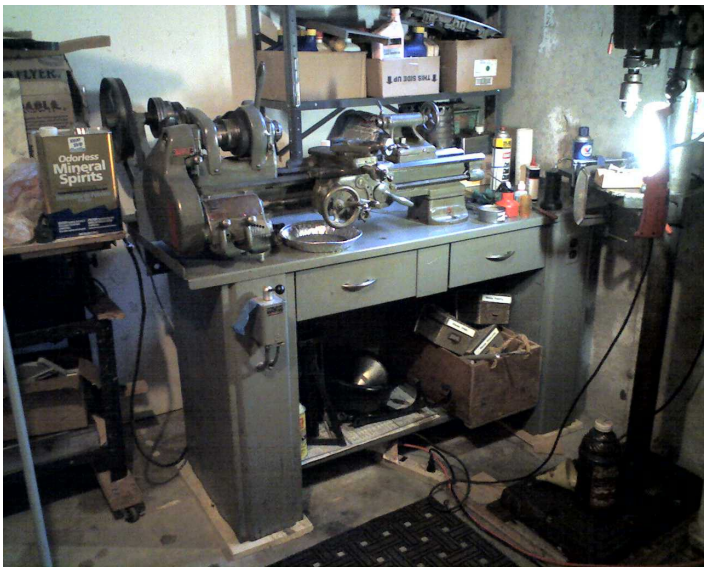
Hi --
I picked up a few years back a South Bend 9A from a gent that retired in my neighborhood and moved south, but using it just hasn't panned out for me. I can't justify the space it is taking up in the garage for how little I've used it. I've attached a picture of it.

I've been down to some of the shows in Waltham, so I thought of your crew. I'd like to make sure this machine gets into the hands of someone who will teach others how to use it properly.

Can you hook me up with someone that might be interested in it? Is it possible to run an an add in the clubs newsletter?

Many thanks,

Bob Carter
Westford MA
tel:978-692-0686> home
tel:978-614-6796> work



Coming Events

Errol Groff

June 3 Maine Antique Power Assn. 44th Annual Show
Skowhegan ME

Skowhegan State Fairgrounds, St. Rt. 201, Madison Ave., use Beech Street or main gate at Walmart entrance.
Contact: Joe Kelley, 25 Wessnette Dr. Hampden, ME 04444; 207-862-2074
email: wildirishman52@gmail.com
www.maineantiquepower.org

June 2-4 The Granite State Spring Gas and Steam Engine Show
New Boston NH
Hillsborough County Youth Center Fairgrounds on Rt. 13 N.

Contact: Andy Mackey 603-878-2845, Brian Barden, 603-563-8006, Richard Keegan, 603-899-5285

www.granitestategasandsteamengineassociation.com

June 4 Ocean State Vintage Haulers 23rd Annual Antique Truck Show

Johnston War Memorial Park. 1583 Hartford AveJ ohnston, RI 02919 8 AM to 2 PM

June 4th British by the Sea Car Show

Harkness Memorial State Park, Waterford Ct

4 June 4th Annual Spring Tractor Show and Farm Open House

Roxbury CT
1-84 exit 15. North on Rt. 67 to Roxbury, right on 317, left on Painter Hill Road to Toplands Farm at the top of the hill.
Contact: Nikki Hine, 102 Painter Hill Rd., Roxbury, CT 06783 860-354-0649;
email: ddlivinghistory@aol.com www.toplandsfarm.com

11 June Charter Day Antique Tractor Pull and Show

Granby MA

Feature: Allis-Chalmers; Case; Farmall;

Friday; International Harvester; John Deere
Dufresne Recreation Area, Taylor Street entrance.
Contact: George Randall, 52 Taylor St., Granby, MA 01033 413-467-9541;

email: george.randall3@comcast.net

June 10 & 11 ATCA CT Yankee Chapter Show
Bethlehem Fair Grounds, 384 Main St Bethlehem, CT
Contact Bill 203-739-0118, Enfield, CT Show Flyer HERE

24-25 June 41st Annual Central Massachusetts Steam Gas & Machinery Association Yankee Engine-uity Show

80 Airport St. Orange MA

Feature: Allis-Chalmers; Abenaque engines.

Contact: Grover Ballou, PO Box 32, Orange, MA 01364; 413-249-2895

email: info@cmsgma.com www.cmsgma.com

June 25 ATHS Nutmeg Chapter Antique Truck Show

Brooklyn, CT At Route 169. Antique Truck Show,Flea Market and Toy Show.

http://nutmeg.aths.org Contact John Raymond 860-608-5033