

The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

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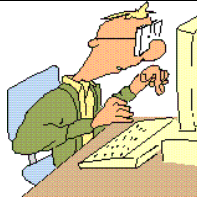
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Editor's Desk

Frank Hills

Trans "Who"?

In the scientific world there are few things more frowned upon, more scandalous than stealing someone else's idea. Of course, it happens all the time, especially in industry. In fact, some of the world's greatest technological advances continue to be credited to the wrong people, even though the truth be known! The most outrageous example of this, to me, is the story behind the invention of the transistor. Common knowledge has it that the transistor was invented by Bardeen, Brattain, and Shockley of Bell Labs in 1947. Though it is true that their work resulted in the first mass produced transistor, an archaic design used almost exclusively by the telephone company for a short time, and that Shockley's redesign of the device made them truly practical on a commercial level, they did not invent the transistor. What they did was sell it, with Bell Labs backing, and become famous.

The transistor is a major coup in the world of electronics. It allows electricity to be turned on and off using no

Next Meeting

Thursday, Sept 4, 2008

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

Membership Info

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

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

Addresses are in the left column.

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Editor's Desk

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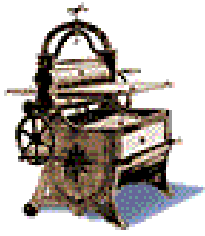
moving parts, and allows a small electrical signal to control a much larger electrical flow, thus “amplifying” the smaller signal. These processes used to be accomplished using relays and vacuum tubes, both of which require enormous amounts of power and wasting it as heat. The transistor does both of these jobs while requiring very little power for itself and producing practically no heat at all. In addition, while relays and the vacuum tubes have many complex parts, the transistor is constructed using a few layers of material called semiconductor. Conductors, like copper, allow electricity to flow easily, and insulators, like glass, prevent all electricity flow. But semiconductors are unique. They only conduct electricity under specific conditions. If you know how to create those conditions, you can control the flow of electricity through them. Their simplicity is a revelation in itself. Their effect on the future of electronics was astounding.

The unique properties of semiconductor materials were well understood long before the Bell Labs team started working with them. Ferdinand Braun invented the solid-state rectifier in 1874. This device takes alternating current, what you get out of a wall socket, and redirects it to flow one way like a battery. This type of flow is called direct current. Many of the devices found in your home run on direct current. G.W. Pickard perfected the use of crystal detectors in 1906. This device, an early form of the diode, allows only that portion of a radio wave that's already going the right direction to pass through a radio's circuitry and eliminates the rest. This allows a radio to pull just the music out of what, otherwise, is just static. And, more relevant to this discussion, in the 1920s, J. Edgar Lilienfeld designed and constructed several electronic devices, including the transistor. Lilienfeld was the first to describe the ability of semiconducting materials to act like electronic switches. When two layers of an electron-rich semiconductor sandwich an electron-poor semiconductor, electricity will only flow through the stack if a small amount of

electricity is allowed to flow through the middle layer first. Then the stack acts like a switch. If you modulate (change) the amount of electricity flowing through the middle layer, the amount flowing through the whole stack will change. Then the semiconductor sandwich acts like an amplifier, the large flow “copying” the much smaller flow. This simple trick is the miracle of the transistor.

So how do Bardeen, Brattain, and Shockley come into this? After publishing his work in the early 1920s, Lilienfeld actually built transistors and, to prove they worked, made a radio with them. He then tried to patent the idea, but, according to the US Patent Office, couldn't adequately describe how they worked. Instead of a concept patent, he received a design patent. That meant that anyone coming up with another design, even though it used his idea, was free to do so. Now skip ahead 27 years. Bell Labs needed a less expensive and more reliable means of amplifying cross-country telephone signals. Vacuum tubes work well, but they burn out quickly, are damaged easily, they're expensive, and they waste tremendous amounts of power. They found their replacement in the transistor. Though Bardeen, Brattain, and Shockley denied they were aware of it, Lilienfeld's work was very well known and the Bell “discovery” was fundamentally a reproduction of his concept with a change in design. Backed by Bell Labs, the team's transistor went into production and use by the telephone company. Bardeen, Brattain and Shockley try to patent their design and bypass Lilienfeld altogether, but after an initial acceptance, their application was rejected as being too close to Lilienfeld's work. The only way the patent would be accepted was if Lilienfeld was included (named as co-inventor) in the patent. Bell Labs accepted the stipulation and received the patent.

And still, when the history of the transistor is told, no one hears about Lilienfeld! This is an excellent example of how doing the hard work doesn't necessarily win you the accolades. But the opposite can also be true! Next month, “Demanding Too Much Credit!”



NEMES Gazette Editorial Schedule

<u>Issue</u>	<u>closing date for contributions</u>
Oct '08	Sept 22, 2008
Nov.'08	Oct. 20, 2008
Dec. '08	Nov. 21, 2008



President's Corner

Dick Boucher

The Meeting

Our speaker for September will be Jim Abrams. Jim has converted a Bridgeport mill to CNC with the ProTrack system from Southwestern Industries. He will be speaking for a while on his experiences with the conversion. Then he will devote a considerable amount of time on the merits of "Conversational Programming" with a hands-on keyboard for anyone interested in the process to have a try with it. Jim will have a representative from Southwestern Industries at the meeting to help with technical questions. He will also have a copy of **The Digital Machinist** for the first fifty attendees at the meeting courtesy of the Village Press. Southwestern Industries web site is <http://www.southernindustries.com>

Miscellaneous Ramblings

There is not much to report this month. Things have been quiet. A visit from our daughter and granddaughter from Kentucky kept us busy for a little over a week, including running around touring the Northern New England sites including a trip to Clark's Trading post and the White

Mountain Central Railroad for a day. The White Mountain Central will be hosting their annual Steam Fan Weekend on September 26th and 27th. Three locomotives in steam and the steamroller will be operating this year. This is always a good day or two for any steam buffs.

Also remember the *Innovations of Yesterday* exhibit at the Charles River Museum of Industry and Innovation on September 13th. If you are interested in participating contact Elln Hagney at: 617-823-5081 or at ellnhagney@gmail.com

Well, Bea and I are off to a weekend at the Waushakum Live Steam Club. I hope we will see some of you there.

Dick B.

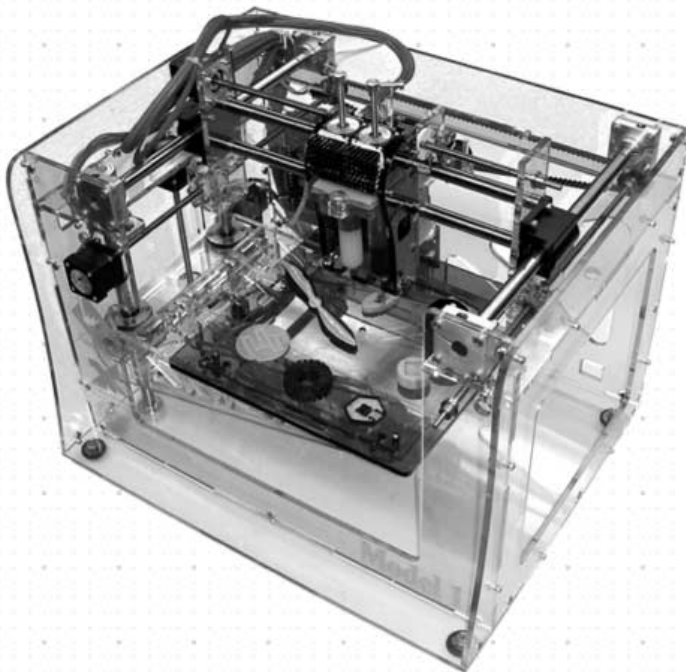
Homemade 3D Printer

There has been quite a bit of excitement about 3D printers. These are machines that work like inkjet printers, but instead of printing with ink, they print with plastic; depositing plastic layer after layer, building up a solid part. If you're a big-budget engineering firm, you can buy a commercial 3D machine for under \$19,000 and instantly make prototypes of your next product. Some of the big names in the 3D printing industry are Dimension <http://www.dimensionprinting.com>, American Z Corp. <http://www.zcorp.com>, and Desktop Factory <http://www.desktopfactory.com>.

But we're different. We like to make things ourselves and we're cheap. So why not make our own 3D printer? It can't be that hard. It is just an XYZ moving carriage that holds a plastic-spitter and a computer to control everything. Oh yes, there's also software. If you've ever been involved in software development, you are painfully aware that bits and bytes can be even harder to make than real things. ☺

Starting in 2006, a group of tinkerers like you and me started a project to develop a 3D printer, and have their design, list of components, and software available on the web for free. This project is called Fab@Home and is documented on the <http://fabathome.org> website. This group has done very impressive work, first in developing a working printer, and then in creating the network of builders, developers, and documenters to make the project easy for anyone interested. They even got a company to sell complete kits of parts for \$3,000 for lazy people. If you're not lazy and don't have any materials on hand, you can hunt and buy the individual parts for approx. \$2,000, and even less if you're resourceful.

Here's a photograph of the assembled kit of parts, from the website of Koba Industries, the retailer of the kit of parts, <http://www.kobaind.com>:



That doesn't look hard to make at all. It's really just a plastic spitter, a few linear bearings, lead screws, stepper motors, electronics, and a plastic support structure. The firmware and software are available for free, too, so you don't have to deal with that part of the job.

I haven't started this project yet, but it sounds very tempting. If anyone here has built one or is interested in collaborating on one, let me know.

John Wasser has been following the development of home made 3D printers and added this additional information:

"There is an active group of 3D printer makers in New England, calling themselves the RepRap project (Replicating Rapid Prototyper). Their website is <http://www.reprap.org> and they recently had a meeting at Olin College. One novel difference between the RepRap project and previous 3D printers is that the RepRap machine is able to "replicate itself", printing substantially all of the parts required to make a new RepRap machine."

Bob Neidorff

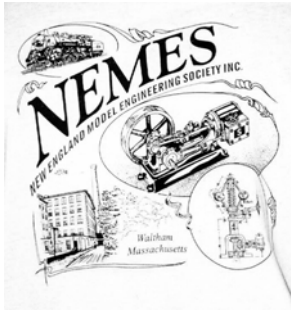


For Sale

Shaper Work CD

Put out in 1944 by the New York State education Department this 326 page manual is chock full of valuable tips and information on using the King of Machine tools....The Shaper. Covered is everything you need to know about the care and feeding of the shaper, use of the shaper, even how to sharpen tools for the shaper. Scanned and saved in Adobe Acrobat format. The CD now has a lot more info on it, and the price has increased accordingly. \$10.00, shipping included.

Errol Groff
180 Middle Road
Preston, CT 06365 8206
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NEMES clothing

NEMES Shop Apron



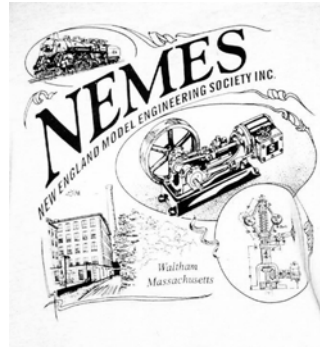
Look your best in the shop! The NEMES shop apron keeps clothes clean while holding essential measuring tools in the front pockets. The custom strap design keeps weight off your neck and easily ties at the side. The apron is washable blue denim with an embroidered NEMES logo on top pocket.

Contact Rollie Gaucher 508-885-2277

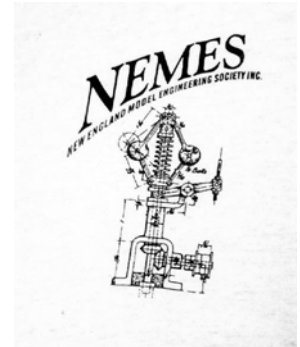
NEMES Tee Shirts

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

Artwork by Richard Sabol, printed on front and back:



Rear



Front

Prices:

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

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

Profits go to the club treasury.

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

From Don Strang

Closing shop. If you need something that's not on the list, call. I probably have it.

1" mike Starrett #230
2" mike Starrett #214-C
3" mike Starrett #227
4" mike B&S 55
5" mike B&S
6"mike B&S 69
7" mike Scheer-Tumico
Thread mike 8-13 B&S
Inside mike Starrett
Depth mike Starrett 440-A
Slot mike B&S 218
Dial Indicator Starrett 655-341
Depth Indicators Starrett 644-441, 604-R431
Hole Gages Starrett 644-441, S830F, S829E & S831E
Wiggler B&S
Thread depth Indicator Starrett 643
RPM Indicator Starrett
Verdict Jr Indicator Starrett 53410
Bevel Protractor Moore & Wright 990
Vernier Height Gage B&S 585
Bore gage ¼ - 1" Federal 621
Granit Surface plate 12x18
Cast iron surface plate 10x30
Dial indicator set B&S M8431
Precision Square 7x14 B&S 540
Planer Gage Starrett 246
Master Square Doall 4-190
Small hole gages #70-.380" Hamilton #20, 30, 40

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Millwaukee #1 Universal miller w/tooling
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Quorn w/variable speed, tack and accessories
14" shaper Gould-Everhardt w/vises
Surface grinder Reid 2-B
Engraver Gorten P1-2

Plus

5 Kennedy and Gerstner tool boxes, dozens of motors, tool steel, drill rod, dividing heads, arbor presses, rotary tables and all the other stuff a machine shop will collect over a life time.

Call Don Strang (978) 456-3611



**MARK
THIS
DATE**

Upcoming Events

Bill Brackett

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

Bill

Calendar of Events

To add an event, please send a brief description, time, place and a contact person to call for further information to Bill Brackett at thebracketts@verizon.net or 508-393-6290.

Sept 4th Thursday 7PM
NEMES Monthly club meeting
Charles River Museum of Industry
Waltham, MA
781-893-5410
<http://www.neme-s.org>

Sept 6th-7th Dublin Show
RT 101, Dublin, NH 603-863-4696

Sept 13th Innovations of Yesteryear
Charles River Museum of Industry
Waltham, MA
781-893-5410
<http://www.crimi.org>

Sept 5th-14th The 36th Annual Lee's Mills
Steamboat Meet
Lake Winnepesaukee Moultonboro NH
David Thompson, 603-476-2224

Sept 21st Sports Car & NE Corvette & Antique
Aeroplane Show
Owls Head Transportation Museum Owls ME
<http://www.ohtm.org/>

Sept 21st 9AM The Flea at MIT
[Albany Street Garage](http://web.mit.edu/w1mx/www/swapfest.shtml) at the corner of Albany
and Main Streets in Cambridge
<http://web.mit.edu/w1mx/www/swapfest.shtml>

Starting September 20th and every weekend through
Oct 1PM-5PM
'Yankee Siege' trebuchet
Greenfield, New Hampshire
<http://www.yankeesiege.com/>

Sept 28th Earth Movers & Shakers & Antique
Aeroplane Show
Owls Head Transportation Museum Owls ME
<http://www.ohtm.org/>

Sept 26-28th Connecticut Antique Machinery
Museum
Fall Festival \$8.00 entry
<http://www.ctamachinery.com/2004FallFestival.html>

Oct 2nd Thursday 7PM
NEMES Monthly club meeting
Charles River Museum of Industry
Waltham, MA
781-893-5410
<http://www.neme-s.org>

Oct 4th 9AM-4PM The Original Yankee Steam-Up
The New England Wireless and Steam Museum
1300 Frenchtown Road East Greenwich, RI
<http://users.ids.net/~newsml/>

Oct 5th Noon-5PM
Roland's Shop visit
90 S. Spencer Rd. Spencer Ma.
508-887-2277

Oct 12th Foreign Auto Festival & Antique Aeroplane
Show
Owls Head Transportation Museum Owls ME
<http://www.ohtm.org/>

Oct 19th 9AM The Flea at MIT
[Albany Street Garage](http://web.mit.edu/w1mx/www/swapfest.shtml) at the corner of Albany and
Main Streets in Cambridge
<http://web.mit.edu/w1mx/www/swapfest.shtml>

October 25th 9AM-5PM American Precision Museum
9th Annual Model Engineering Show
Windsor Community Center, Windsor VT
<http://www.americanprecision.org> 802-674-5781.

Oct 31st – Nov 2nd World Championship Punkin
Chunkin
East of Bridgeville, Delaware
<http://www.worldchampionshippunkinchunkin.com/>