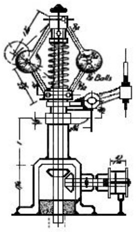

The NEMES Gazette

NEW ENGLAND MODEL ENGINEERING SOCIETY INC.

No. 222 | October 2014 | © 2014 NEMES

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http://www.neme-s.org

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Presidents Corner

Victor Kozakevich

Our monthly meeting is on the move again, but not far. Howard Gorin was kind enough to arrange for us to meet at the Waltham Museum, located at 25 Lexington St. in Waltham, about a half block north of City Hall. The parking garage a few members used last month for the library is across the street, but also accessible via Common St off Main. Be aware that Lexington St is one way at that section, flowing south to City Hall. You may need to circle around via School St. to the north. Area parking is free after 6 PM.

Our Speaker for October will be Ken Laune. He gave me a description of his talk , so I'll quote him here:

Maybe it wasn't the "World's simplest camera after all..."

'll give a few insights into product development at Polaroid (back in the day). I worked there as a design engineer from 1977 through 2005. Early on everything was done with drawing boards and manual prototyping, and the cameras were made in Norwood. By the end everything was done in CAD, with CNC prototyping. I'll bring in some various prototypes of some cameras you'll remember, and parts machined in Polaroid's extensive (and highly skilled) model shops.

Thursday, October 2nd, 2014

Waltham Museum
25 Lexington Street
Waltham, Massachusetts

Membership Info

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

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

Issue	Contributions Due
NOV	OCT 22, 2014
DEC	NOV 21, 2014
JAN	DEC 18, 2014

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Shop Tips

Bob Bober

Sunday 16 Aug my wife opened the cabinet door under the sink to discover our own little frog pond. A quick experiment proved that the disposal leaked only when I put water in it. Marlene wasn't satisfied with my science so I was off to the Depot to buy a new disposal unit. It was tax free weekend.

These things are kind of heavy and I was pondering how I could get the old one out. I hit upon the use of an old scissors jack from my 1972 Toyota Corolla. I jacked it up against the bottom, removed the drain connection and then smacked the locking ring that holds the disposal to the sink bottom. I steadied it with my left hand while I lowered the scissors jack with my right. It was smooth as silk.

Installation was just a reverse. With the new disposal balanced on the jack I could guide it into the locking ring. A quick twist and smack of the ring and there it was installed.

Shop Talk

Max ben-AAron

Communications, today, are so ubiquitous and so important that it would be no exaggeration to call this the ‘Age of Communication”.

The history of communication over long distances is fascinating and is worth telling. The subject is vast and it deserves encyclopedic treatment, which is beyond my scope, but a few words on the subject would not be amiss.

Hunting and gathering groups probably did not have much need for distance communication, but, they may sometimes, have needed to communicate beyond earshot and line of sight, especially in difficult environments like thick forest or mountainous areas. Taking a cue from birds, perhaps the earliest means of communications may have been whistled languages, which use *whistling* to emulate speech and facilitate communication. Whistled language is rare compared to spoken language, but, because they are found in cultures around the world, separate from each other, there is reason to believe that they may have primitive roots.

A whistled language is a system of communication can allow fluent whistlers to transmit a potentially unlimited number of messages over long distances. Generally, whistled languages emulate the *tones* or vowel *formants* of a natural spoken language, as well as aspects of its *intonation* and prosody, so that trained listeners who speak that language can understand the encoded message. Whistled languages are especially common where the spoken languages are *tone languages* where the whistled tones transmit the tones of the syllables (tone melodies of the words). This might be because in tone languages the tone melody carries more of the functional load of communication while non-tonal phonology carries proportionally less. The genesis of a whistled language has never been recorded in either case and has not yet received much productive study. A whistled language has been in use, recently, on the island of Madeira.

Other prehistoric methods of long distance communication were fires (beacons on hill-tops), smoke signals, horns (e.g. alpenhorns) and ‘talking drums’. The talking drums did not really talk, but made sounds that, if you hears them ‘out of the corner of your ear’, you could identify a phrase by its intonation, much like a whistled language.

As soon as writing was invented, mail, i.e. a messenger, carrying a letter became commonplace. Written language was more or less coeval with large political aggregations (kingdoms and empires) where communication was necessary for administrative purposes although there was also mercantile use.

The traditional story relates that the Athenian herald Pheidippides (530 BC–490 BC), a ’day-long runner’, ran to Sparta —about 240 km (150 miles, in two days— from Athens, to request help when the Persians invaded Greece. He then ran the 40 km (25 mi) from the battlefield to Athens to announce the Greek victory over Persia in the Battle of Marathon (490 BC) with the word νικῶμεν ("We have won"), to then collapse and die.

With messages carried by heralds, who could be captured, cryptology came into being. The Spartans used *crytales*. This system used two rods of identical diameter and length. A strip of leather or parchment was tightly wound around the ros and the message was written on it. The message made sense only when it was tightly wound around a similar rod at the receiving end.

Julius Caesar used a transposition code: choose a ‘distance’ and replace each letter by the letter the same distance later. For example, using distance 4, ‘cat’ would be replaced by ‘gex’.

Ancient Babylonians made sure that the message was still secure when received, by enclosing the clay tablet in a clay ‘envelope’.

In Japan, where paper was used, security ensured by the sender having the written message folded up by an origami guru. Once the letter was opened, it was difficult, if not impossible to have it refolded in the same way.

In South America, the Incas, with their huge empire straddling the Andes mountain range, roads were narrow tracks to be used by couriers to administer the empire. Although they made wheeled vehicles as children's toys, the never actually used wheeled vehicles.

In the 5th century BCE: Pigeon post, using carrier pigeons was used.

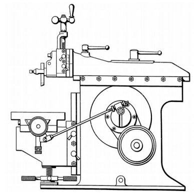
An ancient Greek system involved identical containers on separate hills; each container would be filled various predetermined *codes* at various points along its height. To send a message, the sending operator would use a torch to signal the receiving operator; once the two were synchronized, they would simultaneously open the spigots at the bottom of their containers. Water would drain out until the water level reached the desired code, at which point the sender would lower his torch, and the operators would simultaneously close their spigots. Thus the length of time the sender's torch was visible could be correlated with specific predetermined codes and messages. This system was described in the 4th century BC by *Aeneas* Tacticus and the 3rd century BC by the historian Polybius According to Polybius, it was used during the *First Punic War* to send messages between Sicily and Carthage.

Heliographs (shield signals) were used, ca. 490 BCE with light flashed off highly-polished shields.

There did not seem to be much progress until15th century CE when maritime flag semaphores came into use. They are still used, primarily by yachtsmen.

In 1672, the first experimental acoustic (mechanical) telephone was invented. Range was very limited.

Towards the end of the Eighteenth century armies used s *semaphore lines* (optical telegraphs) and in the middle of the nineteenth century *signal lamps* (Aldis lamp) with shutters were used by navies.



Metal Shapers

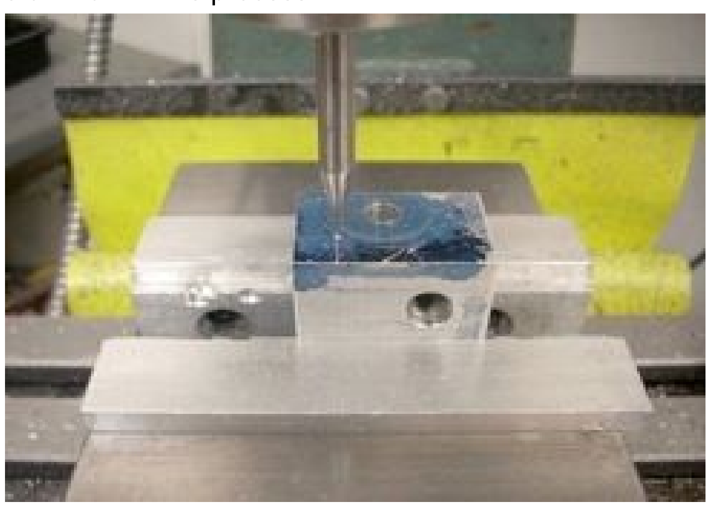
Kay Fisher

R. G. Sparber's Gingery Shaper - Part 54

The Vertical Screw Assembly (3 of 3)

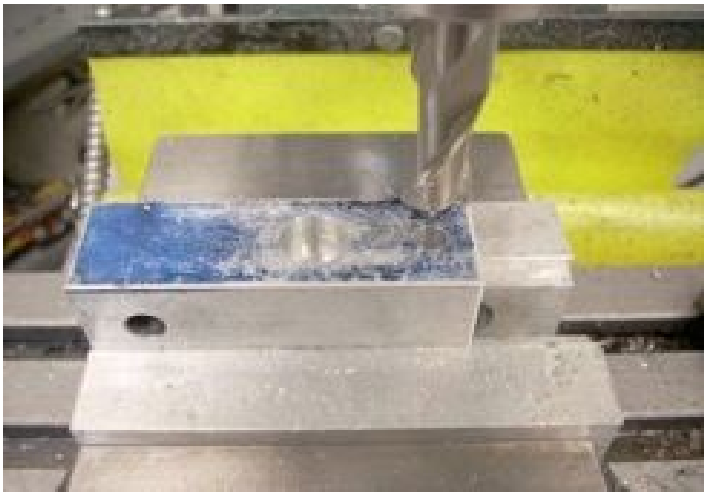
Cutting Upper End Photo by R. G. Sparber

The small hole to the right of the recessed screw is an alignment roll pin. I was able to tap it down below the surface to avoided milling it. Roll pins are made of spring steel and do not mill easily, and might deform the aluminum in the process.



Drilling Nut Photo by R. G. Sparber

Above I am drilling two holes for the nut. Gingery only uses one but I was concerned that it might rotate under load.

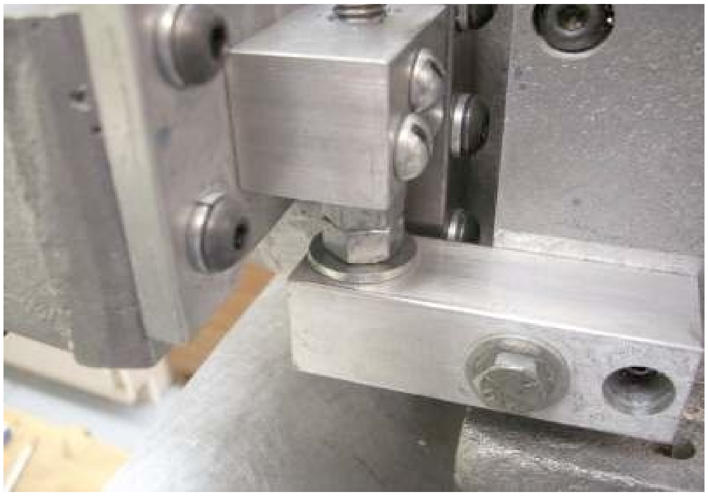


Drilling Lower Support Photo by R. G. Sparber

This is the lower support. I counter-bored down 0.5" because my screws are only 1" long. I'm using a ½" two-flute end mill for counter boring. Both holes are drilled for ¼"-20 clearance.

Fitting Lower Support Photo by R. G. Sparber

While fitting the lower support I suddenly discovered that I was supposed to use the existing $^{5}/_{16}$"-18 screw! Also, about this time I realized that I had an over-constrained system anyway so just opened up the lower hole from a close fit to one that is wide open. Note the temporary cap screw in the first hole.



Lower Support Photo by R. G. Sparber

The larger hole enabled me to live with the "surprise" constraint of needing to use that $^{5}/_{16}$"-18 screw. The washer was cut from 12L14. The two nuts lock together to complete the thrust bearing.

Vertical Drive Photo by R. G. Sparber

Here you see the hex drive end of the vertical screw poking out the top of the top support block. The hole is large enough to clear the rod. It will only support the rod if there is a side force when the hex is being driven. Otherwise it just floats.

Clearance Photo by R. G. Sparber

The cross feed nut clears the vertical screw because I trial fit the parts first.

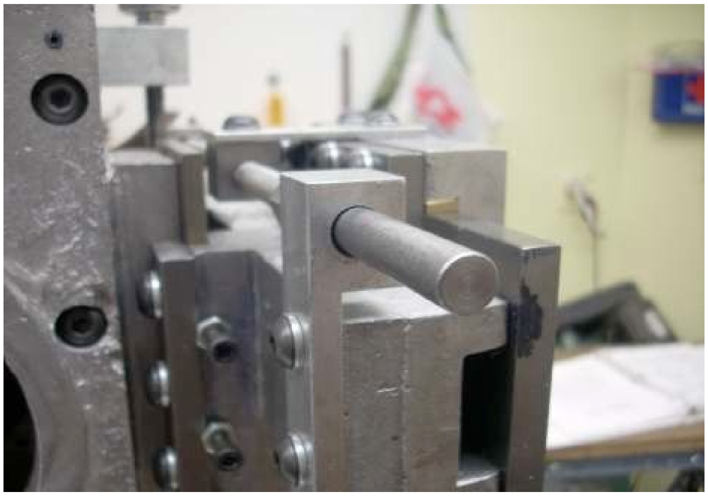


Table Left Side Photo by R. G. Sparber

While I was thinking about over-constrained systems, I decided to enlarge one of the cross slide bearings. It did improve the cross feed screw action yet should not add any play.

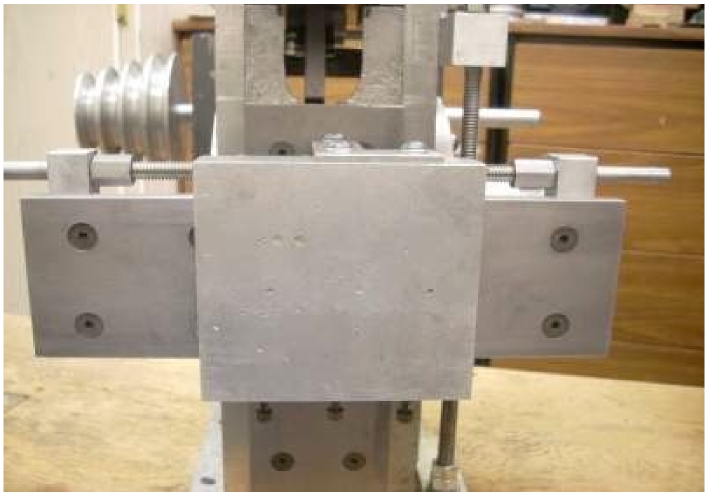


Table Front Photo by R. G. Sparber

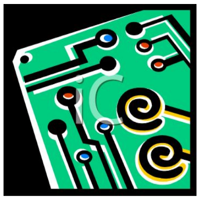
The above photo shows the vertical screw installed and freely moving.

Shaper Right Side Photo by R. G. Sparber

The knob on top of the vertical screw has a hex hole in it. I can move the table support down with it since gravity is on my side. An electric screwdriver easily raises the table support now. Once the table has been added, it might be harder.

Stay Tuned for part 55 from R. G. Sparber next month.

Keep sending me email with questions and interesting shaper stories.



Circuit Corner

George Gallant

For that last month I have been involved with building a lake water temperature sensor. The original idea was 4 temperature sensors, one at 2 meters, one at 1 meter, one surface water, and one air temperature plus an ambient light sensor. All connected to my home computer with a radio link.

Lots of effort, very little progress. I am on my third attempt at a water proof housing. First one sank, second leaked badly, third is tight below water level but the top is not air tight. My plumbing skills are clearly deficient. I now install a Schrader valve in the top plug and test for leaks with compressed air. Also going to add some sort of floatation ring to keep things above water.

To get a results before winter sets in I have reduced the scope of the system to just one temperature probe at approximately 30 inches.

Mechanical unit consists of a upper chamber made from 2” PVC pipe with a drain plug at the top and an end cap at the bottom. The end cap is drilled to fit a 0.5” pcv bushing with a 2” extension to a PVC 0.5” pipe thread fitting. Suspended from this is a 24” 0.5” PCV nipple to a 0.5” brass coupler. PCV cement where ever possible plus silicone sealer or Teflon tape on the threads.

The stainless steel temperature probe is epoxied into a brass plug which than gets screwed into the lower brass coupler. I need the weight of the brass fittings to keep the unit vertical.

The upper chamber houses a battery, cpu board and radio. Program is quite simple: once per minute the processor does a temperature reading and transmits the result out the radio to a receiver in my basement. For long term use, the readings will be spaced at 15 minutes with the system entering a low power mode to conserve the battery.

First headache was programming the temperature probe. The probes, DS18B20, were selected because they were cheap, $1.70, water proof, and had 1 meter cables. I know about cheap Chinese stainless steel and power regulators. Well, I now know about cheap Chinese water proof probes.

The DS18B20 reference manual is very extensive but the terminology is somewhat foreign to me. Found a number of less than useful software packages on the web. Eventually started to get consistent results. Not end of story, in seems that these probes generate heat. Measured ice at 33.5.

The original nRF24L01 radios have a line of sight range of about 10 meters. I would need multiple repeater stations to get the 50 meters from pond to house. Have since purchased some more powerful (expensive) radios that have a range of over 300 meters. They are still in the shipping bag.

The electronics are just loosely placed in the upper chamber. Trying to get a 3D printed bracket made to neaten things up. The only placement requirement is that the antenna be above water level. A small 9 volt battery is currently supplying power. Would like to use a LiPo but need some confidence that all is watertight. Can't imagine the mess if a Lipo got flooded. Probably release enough gas to crack the PVC!

Long term goal is to build some water quality sensing hardware and integrate it with a home weather station. Have a paper design for conductivity analysis turbidity esting. Have approximately 10 different types of LED's, lasers, and light sensors to experiment with this winter. There are plenty of research papers on the topic.

A major problem with leaving sensors deployed for multiple months seems to be "pond scum". It coats the lenses and electrodes. One quite expensive unit has wiper blades and is still only good for a week.

There is a online group called publiclabs that has a subgroup concerned with making low cost DIY water testing equipment. They have an active New England presence in Somerville and UMass Amherst. Additionally, a researcher from UMaine has been doing a long term study in my region.

With some luck, I expect to have something in the water before the ice sets in.

One of the newer radios that has attracted my interest is the ESP8286 module. It is a low throughput Wifi solution that cost about $4.50. The specs and documentation are completely lacking in bot quality and quality. Would be ideal for this project if it has the range. One "claim" I rsaw is 300 meters. Looking at the board, antenna, and power consumption, I suspect it is 30 meters.

Very intriguing being able to put a Wifi on a $5 CPU board. Add a pressure sensor to your beer stash shelving and get an email whenever the load changes!

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

Oct 1-2nd Design-2-Part Show
Royal Plaza Trade Center
Marlboro Ma.
Free admission at http://www.d2p.com/ShowInfo

Oct 4th 8:00-4:00 The Original Yankee Steam-Up
The New England Wireless and Steam Museum, Inc.
1300 Frenchtown Road East Greenwich, RI
http://www.newsm.org/index.html

Oct 5th 12:00-5:00
Roland's Shop visit
90 S. Spencer Rd. Spencer Ma.
508-885-2277

Oct 2nd Thursday 7PM
NEMES Monthly club meeting
Waltham Museum
Waltham, MA

Oct 4th -5th
Foreign Auto Festival & Antique Aeroplane Show
Owls Head Transportation Museum Owls ME
http://www.ohtm.org/

Oct 19th 9:00am The Flea at MIT
Albany Street Garage at the corner of Albany and Main Streets in Cambridge

Oct 11-12th 8:30 to 4:30 Battle for the Airfield
The Collings Foundation
137 Barton Road in Stow, MA Cost at gate: $20 Adults
http://www.collingsfoundation.org/cf_OpenHouseEvents12.htm

Oct 24-26th World Championship Punkin Chunkin
East of Bridgeville, Delaware
http://www.worldchampionship.com/

October 25th 9-5 American Precision Museum
15th annual Model Engineering Show
Windsor Community Center, Windsor VT
http://www.americanprecision.org
802-674-5781.