



PCARA Update



Volume 18, Issue 3 Peekskill/Cortlandt Amateur Radio Association Inc. March 2017

Radio reflections

If you haven't noticed, we've been extremely busy lately. Our February 5th meeting was VERY well attended, sixteen members were present with two new members being added to our ranks. We filled the meeting room quite nicely! Bob N2CBH demonstrated his Tektronix Time Domain Reflectometer and Lovji N2CKD presented his Mini 'Boom-Box' for a dual band mobile transceiver as featured in the January 2017 edition of the *PCARA Update*.



Bob, N2CBH demonstrates use of a Time Domain Reflectometer (TDR) to analyze a length of coaxial cable at the February meeting.

The **Second PCARA Breakfast** was held on February 10th at Turco's in Yorktown. This appears to be a popular event that will hopefully continue on a regular basis. Thanks to Jared KD2HXZ and Lou KD2ITZ for their planning for this event. Watch for upcoming PCARA Breakfasts.

The first **PCARA TRACCS** (Testing Radios and Antennas, Circuit Construction, Show-and-tell) **Workshop Night** was held on February 15th at the Mohegan Volunteer Fire Association Headquarters in Mohegan Lake, NY. This workshop was organized and coordinated by Lou KD2ITZ and Bob N2CBH. The project for the evening was an audio amplifier circuit designed by K4ICY. The room was packed! Thanks Bob and Lou. Thanks also to Barry K2BLB, for arranging and allowing us to use space at the Mohegan Volunteer Fire Associa-

tion Headquarters in which to hold this event. [Report on p. 7 -Ed.] The next PCARA TRACCS Workshop is in the planning and may feature a Tape Measure Yagi for use in the upcoming PCARA Foxhunt.

Talking about foxhunts, the next **PCARA Foxhunt** is scheduled for Saturday May 13, 2017. Assembly for the hunt will be at 2:30 p.m. at the Beach Shopping Center on Dayton Lane in Peekskill, NY. The Foxhunt will begin at 3:00 p.m. and end at 4:30 p.m. Details to follow in subsequent issues of the *PCARA Update*, as well as on the PCARA website (<http://www.pcara.org>), and PCARA Yahoo! Groups site:

(https://groups.yahoo.com/neo/groups/Peekskill_Cortlandt_Amateur_Radio_Assoc/info). As ALWAYS, participation in the event is open to all interested parties. Perhaps members from neighboring clubs would be interested in joining us?

On the topic for a **Special Event Station**, we've had several suggestions. Among these were the 250th Anniversary of Old Saint Peter's Church on Saturday September 9, 2017 (at Locust Avenue and Oregon Road in Cortlandt Manor, NY), the 125th anniversary of the Croton-on-Hudson Fire Department's beginning, and the 100th Anniversary of the original Peekskill Radio Club, founded in 1917. [See p.6 -Ed.] Join us at the March 2017 meeting to discuss these ideas further.

Our next regularly scheduled meeting is **Sunday March 5, 2017** at 3:00 p.m. at New York-Presbyterian/Hudson Valley Hospital in Cortlandt Manor, NY. I look forward to seeing each of you there.

- 73 de Greg, KB2CQE

PCARA Officers

President:

Greg Appleyard, KB2CQE; kb2cqe at arrl.net

Vice President:

Joe Calabrese, WA2MCR; wa2mcr at arrl.net

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Adventures in DXing

- N2KZ

Course in Morse

Any licensed amateur can operate on HF. Yes; even Technician class licensees can hop onto 80, 40, 15 and 10 meters today. There is just one proviso: *You have to operate with CW.* (In fact, you can even operate with upper sideband phone on the 10 meter band from 28.300 to 28.500 MHz.) So, what are you waiting for?

CW should really stand for *Constant Wonder*. On CW, I can operate with a transceiver that I can hold in the palm of my hand, powered by AA batteries, and be heard around the world!

Perfect example: I built a Small Wonder Labs SW-40+ 40 meter transceiver. It uses AA batteries



Small Wonder Labs SW-40+ CW transceiver for 40 meters.

and transmits with one mighty watt. One of my very first contacts with my SW-40+ was F3NB, Andy in Cugnaux, France! *Très bon!*

Of course, there is one catch. *You have to learn Morse code!* That's why I am here. I teach code and, I promise you, it is not as hard as you think. Yes, it requires practice but it is worth the effort! Here's how it is done...

After learning how to send your callsign in Morse, the very first thing to learn is Q R S. This is the international Q code for 'send slower!' This is a very, very important thing to know! I often teach people code beginning at zero words per minute. We send basic words, double or triple sent, until we gain some confidence. Think of the fundamental requirements: NAME – QTH – DE – RIG – TNX – 73.

As Morse students copy their first words, the fun begins. Yes! They start to understand. We practice many, many basic QSOs. We start to use basic rig names — Kenwood, Icom, Yaesu, Ten-Tec. We talk about the weather — sunny, cloudy, cold, warm, hot.

Don't forget antenna names, too... dipole, loop, vertical, Yagi, beam. To make it fun, I will add a few curve balls: NAME IS MICKEY. QTH IS MOUSE, TX.

One other important tip is to keep the lessons short and sweet. Twenty or thirty minutes



is plenty. I can hear exhaustion in the replies I receive from students and I know when to quit. Another essential tip is to send along at the speed they are used to but really, really **s l o w** down for difficult words.

When I finally send them my real QTH — Katonah, NY — I send it very slowly and several times. When your students finally understand what you are sending, you can hear the glee through the air! It's all about gaining confidence!

After the basic skills are secure, our strategy changes somewhat. The goal becomes creating a really good and efficient CW operator. Teach your students how to be as brief as possible, making every word count, and sending like your life depended on it. The more concise your message, the more you can send in less time. You can say more with less effort and the other guy gets to copy less. It's win - win!

Tricks of the trade

Good CW operators learn how to be graceful. If you make a mistake, don't send an endless series of dots to erase your thoughts. Just take a good pause and continue. I promise the other guy will understand! Also, I like to pass on a great tip given to me by an old railroad telegrapher. Send a period as a rapid X. It makes your sending sound zippy and very professional. Everyone I have ever worked since understands the rapid X. It is a great operating hint!

Similarly, learn abbreviations of numbers. Sending the number 100 or even 1000 can feel endless. Zeroes can be simply sent as long Ts. Instead of a zero being five 'dahs' it becomes just one long 'dah.' It can make a world of difference. Anyone who has participated in a contest is familiar with a perfect signal report sent as 5NN or even ENN instead of a longer 599. See how simple life can be?

You'll also enjoy the world of 'prosigns.' Using AR as 'end of message,' AS for 'wait' and BK as a quick break and over-to-you puts a really nice polish and shine on your new Morse skills. We can make you fluent in Morse in no time!

Prosign	Morse code	Meaning
AR	End of transmission, +
AS	Wait
K	. . .	Go ahead
KN	Go ahead, named stn only
BK	Break
BT	Pause, new paragraph, =
SK	End of contact (also VA)
CL	Closing down

Table of Morse Code procedure signals or 'prosigns'. When sent, barred characters (e.g. AR) are run together, with no space between the individual letters.

All it takes is a lot of practice and experience. You will know you are really getting proficient when you can anticipate what people will send. You'll find yourself listening to words instead of copying single letters. You'll be jotting down important facts instead of continuous copy of the entire conversation. One of the great breakthroughs of teaching Morse is when a student can confidently reply and answer what you have sent instead of faking replies due to lack of copy or (horrors!) simply stopping completely!

Bear with me

One other way to keep CW lessons student friendly and fun is to teach interesting ways to sign off.



Gil Stacy, NN4CW on the key.

'Time for dinner' or 'the XYL is home' are just plain boring. How about 'It's time to feed the fish?' Huh?

A very good friend of mine, Gil NN4CW and I created a kooky character to use while I was teaching

Gil code. Currently splashing around in my frozen swimming pool, you will find **Brutus** the polar bear! He has an insatiable hunger for smelt fish and likes to spend his free time with nuns. (Don't ask... it's just plain silly!)

Gil and I used to CW chat during morning grey line conditions on 40 meters between New York and his QTH in South Carolina. In time, our conversational content about Brutus the polar bear and his adventures became so unusual and bizarre that we often had an audience. After we ended a QSO with 'dit dit' to each other, we might hear another 'dit dit' or two as applause from our audience. Who says learning CW is not fun?



Brutus the polar bear copies CW, poolside.

After self-teaching myself code back in 1999 and then finding my way through hundreds of CW QSOs on 80 meters, I emerged as an evangelist in the name of Morse. Learning this skill will open a world of fun and adventure. You will be able to communicate more efficiently than any Twitter tweeter and speak in an ancient language known only by trained followers like yourself. No need for big power or complicated equipment! You can take it anywhere!

Also, I need to mention how CW conquers fading,

interference, bad band conditions and the need for high power. When you understand Morse well, you can miss large chunks of a transmission and still pull through the essence of the sent message. There is no need for software or complex equipment. The best filters are between your ears!

Straight talk

Hey, Karl! What do I use for a key? My best advice is to start simply. A straight key will teach you very precise character spacing and make it much harder to make wild and embarrassing mistakes. If you already have a rig, I

would suggest the Ameco K-1 key. If you need to practice, you can purchase a MFJ-557 Code Practice Set

which incorporates a key and a code practice oscillator together in a convenient package. A nifty (but expensive) gadget, the MFJ-418 Code Tutor, will churn out endless practice code for

you to copy. I used one for months and months when I was first learning.

Hints, dits and tips

Become a really, really good *listener*. Your ears are more important than your sending fist. A great place to tune in is 7100 to 7125 kHz on the 40 meter band. You'll often hear easy-to-copy slow coders on these frequencies and you can follow their QSOs to build your skills.

Another terrific resource is CWCom software available at: http://www.mrx.com.au/d_cwcom.htm. It allows you to send code over the Internet license-free and actually see what you are sending so you can improve your fist. Everything that is sent or received appears in text form so you will never run behind or get lost. It's free and is a wonderful teaching tool. Alas, it is a Windows-only application.

CW is often a well-respected skill. I enjoy DXing on 6 meters and would like to share this tasty tip: VHF DXers will do nearly anything to pull in a contact. Since many operators prefer using upper sideband above



Ameco K-1 straight key.



MFJ-557 Deluxe Code Practice Oscillator combines a straight key with an audio oscillator and loudspeaker.

50.100 MHz, I will often try to get their attention by transmitting CW. (You have to offset your signal about 700 cycles up for your CW note to be noticed. It creates a readable tone instead of just a dead carrier.) I can't tell you how many times DX stations handling a pile-up will pause to try to work 'that guy using CW.' I have made some amazing QSOs happen! It doesn't matter that I am CW and they are USB. It works and we both love it!

Bird on the wire

Warning: Funny things can happen when you learn code well. I often find myself 'copying the mail' during a QSO and making verbal comments to myself. Imagine my wife's responses when I laugh or cheer or grunt as I am listening to 'beeps.' They may think you are crazy, but you will know you're not! You are on the inside now. Great fun!



If you would like personalized lessons, just drop me a line at N2KZ 'at' ARRL 'dot' net. I would be pleased to form a group to teach Morse using one of our PCARA repeaters or on-the-air on HF as you wish. Don't be a stranger! Don't miss the fun! Get to know CW and warm up your key today!

In closing, I would like to invite you to see Morse code in action! Mark your calendars! You are cordially invited to attend a special event station at Locust Grove, the historic Samuel F.B. Morse estate, in Poughkeepsie, New York – Saturday, April 29, 2017 from 9:00 am to 3:00 p.m. local time. Sponsored by The QSY



Locust Grove, Poughkeepsie.

Society — <http://qsysociety.org/qsypw/> — licensed amateurs will have a rare opportunity to send CW to the world from Mr. Morse's porch! Members of FISTS, SKCC and other CW clubs will be attending. Locust Grove — <http://www.lgny.org> — is located in Poughkeepsie, New York, just north of New York City. Come one – come all — everyone is welcome! See you there!

Want to talk about getting started in CW soon? Visit us on The Old Goats Net, Thursday nights at 8:00 p.m. on the PCARA 2 meter repeater: 146.670 MHz with a minus offset using a 156.7 PL. Have a great month and listen to some code!



- 73 de N2KZ Karl 'The Old Goat.'

From the archives – NA2M

[The very first issue of QST appeared in December 1915 and Bill, NA2M has been researching QST issues from the subsequent year. Extracts from QST appear by kind permission of the American Radio Relay League. – Ed.]



Cover of the June 1916 QST.

QSL beginning?

The QST editor's comment to the writer of the letter below — on page 142-143 of the June 1916 issue of QST — may be how 'QSLing' as we know it got started. I'm not sure who the editor was, probably Hiram Percy Maxim.

QSL

The Editor received a letter as follows from Mr. Edward C. Andrews of Philadelphia, Pa.:

I am enclosing a postal which I have received from Mr. W. T. Fraser of Buffalo, N. Y. (8VX) on which he states my signals were heard in Buffalo clear and strong. This is a distance of over 400 miles and I naturally felt somewhat elated as it was accomplished with 1-4Kw. Chambers open core transformer.

But aside from the fact that this is a fairly good record, I wish to commend the spirit of unselfishness that is quite evident in Mr. Fraser and others who send cards which tell of receiving the signals of a fellow amateur. While these cards of 8VX (Mr. Fraser) may have come to your attention before, I have never seen a notice about it in our magazine. When one goes to the trouble and expense of having a postal printed in order to inform those who signals he hears, it seems to me that a long stride has been taken, toward aiding the perfection and inspiration to amateur work.

Until I received word from 8VX, I thought my maximum sending range was seventy-five miles. At Mauch Chunk and the Delaware Gap my signals are slightly stronger than NAI and quite similar to WHE.

I would urge upon the members of the A. R. R. L. and the readers of QST to notify by postal and by the very next mail the owner of the station whose signals they hear and to give such other information as they may think of aid or inspiration to the recipient.

Respectfully,

(Sgd) Edward C. Andrews, 3TQ

EDITOR'S COMMENT: The idea of notifying the amateurs is a fine one, and the Editor earnestly recommends that all of our readers adopt this plan. At small expense a postal can be had and on it printed a short description of the receiving station and other data which bring the amateurs of our great organization in closer touch with each other.

["Postal" was an abbreviation for postal card or

postcard. NAI was the callsign of the Navy's coastal station in Philadelphia, while WHE was Marconi's Philadelphia station. – PCARA Ed.]

Peekskill pioneer

The following letter was posted in the "Radio Communications by the Amateurs" column on page 34 of the December 1916 issue of QST by John W. Dain, 2CE of Peekskill, NY. There were no W's in front of call signs in 1916.

Questions: Was John W. Dain the first ham in Peekskill? Was he the founder of Dain's Lumber Yard in Peekskill? I did find that he lived at 1100 Orchard Street*. I don't know if anyone is around to answer the questions. I wonder what band or frequencies he heard the stations on.

IS YOUR CALL HERE?
 Editor QST:—
 The following stations have been heard at 2CE between October 24th and November 4th. I am sure that there are many who will be glad to see their call here. 1QX, 1LE, 1ZD, 1IZ, 1CM, 3WN, 3SZ, 3VH, 3AMP, 4DI. (I wish that 4DI would drop me a card), 8HQ, 8AEZ, 8ADB, 8AKK, 8OH, 8VX, 8ADE, 8NH, 8WO, 8FR, 8AKP, 8ETM, 8AAR, 8AEH, 8CO, 8QK, 8AOF, 8IK, 8CL, 8ALE, 8MF, 8AHN, 8VW, 8JX, 8NF, 8HB, 8JG, 8VC, 8ACK, 8LE, 8JA, 8ACI, 9PC, 9WF, 9WG, 8VY, 9ACM, 9SX, 2BE, 2AME, 2NN, 2RA, 2AZ, 2BG, 2NP, 3KS, 2AEB, 2MY, 2AGJ, 2DA, 2AUG, 2ZH, 2BW, 2IK, 2ALS, 2RS, 2LC, 2AIO. I have heard many of these as early as 4 p. m.

John W. Dain, Peekskill, N. Y.
 Letter from John W. Dain, 2CE in QST, December 1916.

IS YOUR CALL HERE?

Editor QST:—
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John W. Dain, Peekskill, N.Y.

Dahms, H. H.	21 Manitou Ave., Poughkeepsie, N. Y.	550	2BJ
Daily, Harold T.	25 Lydecker St., Nyack, N. Y.	500	2IS
Dain, J. W.	1100 Orchard St., Peekskill, N. Y.	1,000	2CE
Dairymple, Stephen Paul	12 Spruce St., Dover, N. J.	50	2ASI
D'Amico, A.	521 Grand St., New York, N. Y.	54	2QW
Dane, John J.	92 3rd St., Kewmont, N. J.	500	2MV

*Extract from Dept. of Commerce publication 'Amateur Radio Stations of the United States', June 1920 showing location of John W. Dain's station 2CE and licensed power (1000 watts).

– 73 de Bill, NA2M

Notes from PCARA newsletter editor:

Vintage QSTs make fascinating reading. ARRL's entire QST archive from 1915 to 2011 is available to ARRL members at the following web address: <http://www.arrl.org/arrl-periodicals-archive-search>.

In answer to some of Bill, NA2M's questions... According to QST for October 1916, all issues up to that time were published by Mr. Hiram Percy Maxim and Mr. Clarence D. Tuska *personally*. So editorial comments in 1916 were likely made by Hiram P. Maxim or Clarence Tuska themselves. Subsequent issues were published by the QST Publishing Company to protect the writers from lawsuits.

From contemporary obituaries **John W. Dain** was born in Peekskill on Oct 4 1899, studied at Union College in Schenectady, and graduated from Columbia University in 1922. So he would have been 17 years old when he wrote that letter to QST. He served in World War I — his name is on the Peekskill World War I Monument at Orchard and N. Division Street. He subsequently moved to Mahopac where he was involved in the lumber industry, becoming president of the Dain Supply Company. He was a charter member and first President of Lake Mahopac - Carmel Rotary Club,



John W. Dain in a later photo. [Pic trx - N2KZ].



Location of 2CE, John W. Dain, at 1100 Orchard Street, Peekskill.

founded in 1932. He was active in civic affairs as president of the Mahopac Hospital Board, Mahopac School Board of Education and a Commissioner of Mahopac Fire Department. John W. Dain passed

away in Mahopac on January 1 1964, at age 64.

According to the N. Dain's Sons Company Inc. website, the lumber store located at 2 North Water Street in Peekskill was founded on the



Historic sign over Dain's Lumber store in North Water Street, Peekskill.

banks of the Hudson in 1848 by John W. Dain's grandfather, **Nathaniel Dain**.

Radio amateurs of 1916 made use of spark transmitters tuned to approximately 425 meters (MF) or 200 meters (SW). Low power stations employed a vehicle ignition coil as their source of the spark, while higher powered stations had a rotary spark gap — where an electric motor rotates a number of electrodes or 'plugs' past stationary electrodes, interrupting high



“Old Betsy” rotary spark gap transmitter as used by Hiram P. Maxim around 1920, on display at WIAW, ARRL Headquarters.

voltage from an AC transformer and generating an RF signal with a musical ‘note’. Reception was accomplished with a galena crystal detector or a regenerative audion tube detector.

John W. Dain is mentioned in the April 1916 issue of *QST*, in the article “Washington’s Birthday Amateur Relay Message”. William H.

Kirwan, 9XE describes how the birthday message, originated by Colonel Nicholson at the Rock Island Arsenal (near Moline IL), was transmitted from 9XE in Davenport, Iowa then relayed and received by amateur stations all across the country — before delivery to local officials. One of the “Incidents” went as follows:

APRIL, 1916 QST

Peekskill, N. Y. J. W. Dain, 2CE, was sick in bed, but still had plenty of pep left in him. Against the Doctor’s orders, he tried to receive the message, and with chattering teeth and trembling knees, he finally copied it. How’s that for spirit?

Victor, Colo., William C. Colburn of the Colburn Ajax Mines and one of the prominent members of the American Radio Relay League, received the message at his Special



Incidents of the Relay

Peekskill, N.Y. J. W. Dain, 2CE, was sick in bed, but still had plenty of pep left in him. Against the Doctor’s orders, he tried to receive the message, and with chattering teeth and trembling knees, he finally copied it. How’s that for spirit?

The Peekskill Radio Club

John W. Dain played an important role in founding the original Peekskill Radio Club as shown by the following report from *The Wireless Age* for May 1917:

The Peekskill (N. Y.) wireless amateurs have organized under the name of the Peekskill Radio Club. The officers are: President, John W. Dain; vice-president, Ernest W. Hawkins; secretary-treasurer, George I. Olson. The charter members of the club are John W. Dain, Ernest W. Hawkins, Clinton S. Ferris, Lester M. McCoy, William E. Murray, Donald S. Ferris, Arthur Mansfield, Harold Vogt, Charles R. Doty and Gilbert F. Oakley.

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The Wireless Age was “An Illustrated Monthly Magazine of Radio Communication” published in New York from 1913 to 1925 and originally associated with the Marconi company. One of the staff members was David Sarnoff. The magazine included a column “With the Amateurs” where news of the original Peekskill Radio Club first appeared.

A later entry in *The Wireless Age* for March 1922 reports that the Peekskill, N. Y. Radio Club had elected Charles R. Doty, 2NS as president and moved into new premises:



AT the annual meeting of the Peekskill, N. Y., Radio Club the following officers were elected for the coming year: Charles R. Doty, president; George I. Olson, vice-president; Charles MacW. Moore, secretary-treasurer.

The club has taken over the hall on the top of the old post office building, formerly occupied by the Beaver Lodge, as their club rooms. They will take possession this week. Plans are under way for the installation of a wireless set to be used in the club rooms.

Considering the fact that the club did not solicit for members until October, the officers expressed great pleasure at the progress of the club which consists of thirty-two members. Anyone interested in the Peekskill Radio Club is asked to communicate with Secretary C. W. Moore, 934 Liberty street.

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According to a Peekskill Walking Tour booklet, the Post Office was located until 1915 on the first floor of the Riley

Building, at the corner of South Division Street and South Street.

Later this year, we might want to commemorate founding of the original Peekskill Radio Club in 1917. Does anybody have further information about this interesting organization and its members? – Ed.]



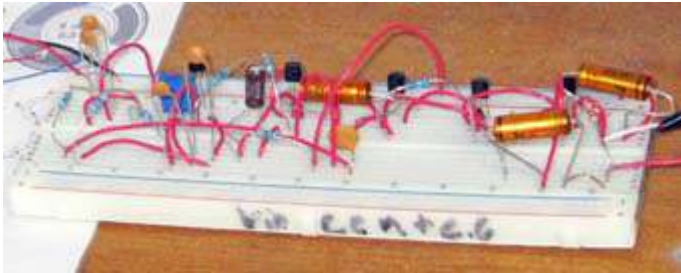
Riley Building.

First TRACCS Workshop

PCARA's first TRACCS (Testing Radios and Antennas, Circuit Construction and Show-and-tell) Workshop took place on Wednesday February 15. The venue was Mohegan Volunteer Fire Association Headquarters on Rt. 6 in Mohegan Lake, courtesy of Barry, K2BLB. Our brightly-lit meeting room was directly behind one of the Ambulance Bays.

A total of 10 people were in attendance including organizer Lou KD2ITZ, Bob N2CBH, Mike N2EAB, Mike N2HTT, Fred KD2GJJ, Jared KD2HXZ, Barry K2BLB, Joe WA2MCR, Greg KB2CQE and NM9J.

Lou had brought instruction sheets, wire jumpers and solderless breadboards for constructing a three transistor audio amplifier which is part of K4ICY's Weekend Radio project: "The Pleasant Code Practice Oscillator". See: http://www.k4icy.com/weekend_radio_3tr-audio-amp.html for details.



K4ICY weekend radio project previously constructed by Lou KD2ITZ on solderless breadboard.

Component kits for this project had been supplied by Bob N2CBH — so that all you needed to take part was a 9 volt battery and an 8 ohm loudspeaker.

Jared KD2HXZ and Fred KD2GJJ settled down with instruction sheet and breadboard to build a K4ICY amplifier, guided by Lou and Mike, N2EAB.

By the end of the evening, Fred and Jared had completed construction of their projects and after a



Mike N2EAB (left) and Lou KD2ITZ (standing) assist Fred KD2GJJ and Jared KD2HXZ with constructing their K4ICY audio amplifier projects.

short troubleshooting time with multimeters, both amplifiers were producing sounds. Congratulations all round!

Fred had brought along an LM317 Adjustable Power Supply Kit which he had recently constructed, but which was not yet functioning. After re-making a few soldered joints, the power supply sprang into life, with a glowing voltage display. (For kit details see: <http://alexnl.com/product/us-plug-110v-diy-lm317-adjustable-voltage-power-supply-board-kit-with-case/>)



Fred's LM317 Adjustable Power Supply Kit.

Bob, N2CBH had brought two items of test equipment — first an IFR Communications Service Monitor COM-120B and, second, a



Bob N2CBH checks spectral purity of the QRP TX constructed by Mike N2HTT.

used to check harmonic levels of a 40m QRP transmitter built by Mike N2HTT and of a BaoFeng UV-5RV2 handi-talkie belonging to Lou.

The BDI digital RF Power meter was employed to check power output — with high accuracy — of various transmitters and transceivers that members had brought in.

At the end of the session, we found the weather had deteriorated, turning the car park into an ice

rink. Nevertheless, everyone left the warmth of the Fire House meeting room in good spirits, with a definite sense of accomplishment. Our thanks to Lou, Barry and Bob for all their efforts.



Bob demonstrates the BDI DPS-100D digital RF power measurement system.

- NM9J

Fix a solar yard light

Off topic

Fixing solar yard lights might seem an odd topic for a newsletter concerned with radio communication — but several skills associated with our hobby can keep those solar lights a-shining.

History

The efficiency of photovoltaic silicon panels has increased substantially from the early days. In 1953, while researching silicon for its possible applications in electronics, Bell Labs physicist Gerald Pearson made a solar cell that was 600% more efficient than existing solar cells based on selenium. Two other Bell scientists — engineer Daryl Chapin and physical chemist Calvin Fuller — refined the design and developed the first solar cell capable of converting enough of the sun's energy to run electrical equipment. Bell Labs announced the invention in 1954 in Murray Hill, New Jersey. They demonstrated a solar panel with conversion efficiency of around 6%.

Modern multicrystalline silicon solar cells have a conversion efficiency of 15% – 20%. When combined with a white-light LED (see *PCARA Update* for November 2014) and a battery, they provide practical, nighttime illumination, independent of the AC main supply.

Construction

Efficient solar lamps have been available at moderate cost for 8-10 years. The last batch I bought were only \$1.00 each from the dollar store! Construction is usually along the following lines.

Electronic parts are housed inside a case at the top of the lamp. The silicon solar panel is on the flat top where it can absorb radiation from any angle of the sun. Some designs incorporate a photoresistive CdS cell alongside the solar cell — to detect when sunlight is present.

Under the top cover is a rechargeable cell held in a battery holder. You may encounter a **nickel cadmium** cell (NiCd) or a **nickel metal hydride** cell (NiMH) in AA or AAA size. Capacity of the original cell can be surprisingly low, for example only 250 or 300 milliamperere hours (mAh).

Higher power lamps may have the solar cell on a separate hinged panel which can



AAA and AA size nickel cadmium cells supplied with solar lights. Capacity 250-300 mAh.



Solar yard light.

then be oriented for maximum light pickup. Some of these lamps have a **lithium iron phosphate** cell (LiFePO₄) with a higher voltage of 3.2V compared with the 1.2V of NiCd or NiMH cells. They come in sizes such as 14500 (14 × 50 mm, AA size), 14430 or 18500 (18 × 50 mm).

Also mounted under the top cover is a charge controller board which routes current from the solar panel into the rechargeable cell during daylight then switches the LED on at night. The charge controller should prevent total discharge of the cell, which could cause chemical damage. If the design includes a CdS photoreistor to detect the presence of daylight, the charge controller will have an input for that device. Some controllers include an inverter circuit to step up voltage from the solar panel — to check, hold an AM radio close to the lamp while the panel is charging.

The white light LED is wired to the controller board. Since an LED emits most light in a single direction, it is usually pointed straight down into the clear plastic bowl, toward an aluminized reflector at the base. The exception is higher power spotlights and floodlights which have an adjustable parabolic reflector *behind* the LED to focus light in the desired direction.

Solar lights are always shipped with the rechargeable cell disconnected, so the cell has to be connected before installation. The connection is accomplished with either a small slide-switch, accessible under the top cover, or with a plastic pull-tab which needs to be removed from one end of the battery holder.



Construction of typical solar yard lamp.

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Lamp designs with a *separate* solar panel usually have the rechargeable cell and controller board mounted beneath the solar panel. Look for a separate base that can be unclipped or unscrewed.

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Spotlight with separate solar panel.



LiFePO₄ cells supplied with higher-power solar lights. Capacity 600 - 400 mAh.

The remaining mechanical components of a yard lamp include a metal pole to support the lamp 6 to 9 inches above ground and a plastic ground stake — stowed inside the metal pole for shipping.

Operation

A new yard light should operate satisfactorily when first installed. The chosen location needs to be in direct sunlight for at least four hours a day in order to fully recharge the small cell. Bear in mind that the sun is lower in the sky and available for fewer hours during winter. Watch out for shadows cast by shrubs, leaves, trees and buildings that could shorten the hours of sunlight on the solar panel. And remember that a single low power LED is not going to light up the entire yard!

Problems

Problems with solar yard lights can show up after a few months or after a few years of use. The LED might only light for a short time after sunset or fail to light at all.

The first thing to check is the solar panel. The clear protective cover might have become covered in soil and dirt, reducing the amount of light reaching the panel. Clean the glass cover with a mild detergent. Instead of glass, some solar yard lamps have a plastic cover over the solar cell. This plastic can become opaque over time, obscuring the silicon solar panel — in a similar manner to those hazy car headlamps molded from polycarbonate. Suggested yard lamp fixes



Yard lamp with plastic cover over the solar cell — which had become opaque. The fix was fine sanding and a coat of nail polish.

include gentle abrasion with a fine sanding sheet to remove the hazy top layer, followed by a coating of clear nail polish to restore the original, transparent finish. The solar cell should be

Take it apart

The next component that needs to be checked is the rechargeable cell. Access will require disassembly. My recommendation is — do this *outside* the home! There could be creepy-crawlies inside the lamp housing and dirt around the ground stake.

For the standard design with solar panel on top,

the upper part of the lamp containing the LED, solar panel and rechargeable cell should twist off the clear bowl below.



This solar yard lamp was disassembled by twisting the metal body and lifting away from the plastic bowl.

Grasp the two parts firmly, turn the top cover anti-clockwise (as seen from above) by 20° or so, then pull up. Don't force it! You should be able to see the LED under the top section and possibly a battery cover to allow access to the rechargeable cell.



In this solar lamp, the battery cover (arrowed) and LED are visible after twisting the upper body off the plastic bowl.

If the battery is not yet visible, inspect the lower part of the plastic body. It is probably fastened to the upper part with two or three small Phillips screws. Remove the screws with a Phillips #0 or #1 screwdriver, then



This solar lamp had the plastic body parts secured with two Phillips screws. After separation, AAA-size NiCad cell and controller board are now visible.

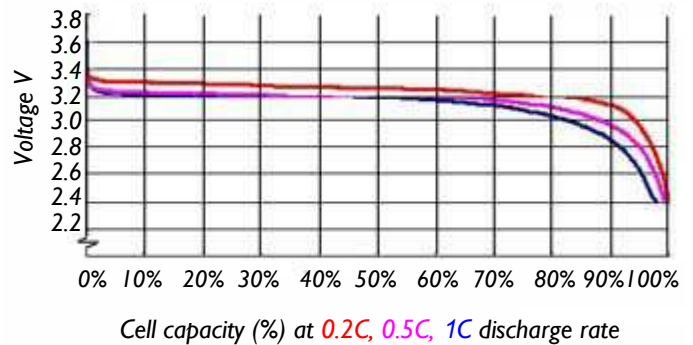
gently pull the two plastic sections apart. Be careful as there will be fine wires connecting the two halves. You should now be able to see the battery holder and charge controller board.

Battery check

Check the voltage of the rechargeable cell with a digital voltmeter or multimeter. A good nickel cadmium cell or nickel metal hydride cell should have a voltage above 1.3 volts when fully charged, ~1.25V during discharge and less than 1.2V when discharged. If a NiCd or NiMH cell is stuck at low voltage, it may be possible to fix it by fast-charging it once or twice in an external, AC-powered charger designed for the task. However, if the fully charged voltage is not restored to >1.3V by recharging, the cell is damaged and needs to be replaced.



Checking cell voltage with a digital multimeter.



Discharge curve for a lithium iron phosphate (LiFePO_4) cell at three different discharge rates.

If the lamp has stopped working altogether, check for a broken cable — connections to the charge controller board are quite fragile.

Reassembly

Before you replace the rechargeable cell in its battery holder, lubricate all contacts with a DeoxIT pen or similar switch cleaner to prevent corrosion. If there is a slide switch, lubricate its contacts as well.

As you reassemble the parts, make sure the LED is poking through the center hole in the lower part of



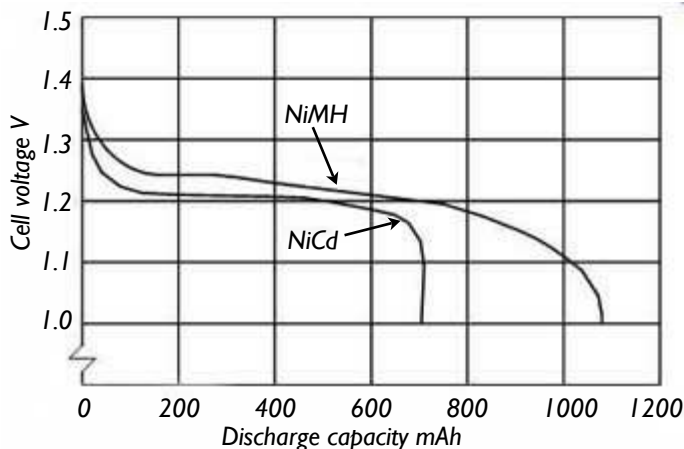
DeoxIT pen.



Working again!

the plastic body. The LED should be pointing *straight down* toward the reflector at the base of the transparent bowl. If the bowl is dirty, clean it with mild detergent. The aluminized reflector at the base may also benefit from a cleaning.

After the unit is reassembled, cover the solar panel with your hand and make sure the LED illuminates. When you remove your hand and expose the panel to bright light, the LED should extinguish.



Discharge curves for a 700 mAh nickel cadmium cell and 1100 mAh nickel metal hydride cell.

My recommendation is to replace any nickel cadmium cells with a modern nickel metal hydride cell of equivalent size. Modern NiMH types have no 'memory' effect, hold their charge better, have higher mAh capacity — and will not contain any toxic cadmium compounds. (Used NiCd cells must be disposed of responsibly.) Rechargeable NiMH cells in AA and AAA sizes are readily available at Walmart and other vendors.

If the lamp contains a LiFePO_4 cell, then battery voltage will be significantly higher than with NiMH or NiCd types. The LiFePO_4 cell should have a voltage of 3.5 V when fully charged, a voltage of 3.2 V during discharge and below 3.0 V when discharged. A faulty cell will need to be replaced with a similar type and size, though the replacement item could well have higher milliampere-hour (mAh) capacity than the original. Suitable replacement cells can be purchased from Home Depot and Internet vendors.

Bits and pieces

If you have any lamps that are beyond repair, I would keep a small stock of the main components. You may be able to combine parts to make a working lamp from two bad lamps in the future.

One of the weakest points is the plastic ground stake, which is prone to breaking off when assailed by lawn mowers, weed-wackers and plowed snow. Replacement ground stakes are available from Home Depot.

- NM9J

Peekskill / Cortlandt Amateur Radio Association

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Newsletter contributions are always very welcome!

Archive: <http://home.lanline.com/~pcara/newslett.htm>

PCARA Information

PCARA is a **Non-Profit Community Service**

Organization. PCARA meetings take place the first Sunday of each month* at 3:00 p.m. in Dining Room B of NewYork-Presbyterian/Hudson Valley Hospital, Rt. 202, Cortlandt Manor, NY 10567. Drive round behind the main hospital building and enter from the rear (look for the oxygen tanks). Talk-in is available on the 146.67 repeater. *Apart from holidays and July/August break.

PCARA Repeaters

W2NYW: 146.67 MHz -0.6, PL 156.7Hz

KB2CQE: 449.925MHz -5.0, PL 179.9Hz

N2CBH: 448.725MHz -5.0, PL 107.2Hz

PCARA Calendar

Sun Mar 5: PCARA Meeting. New York Presbyterian - Hudson Valley Hospital, 3:00 p.m.

Hamfests

Sat Mar 11: Cherryville RA Hamfest, North Hunterdon HS, 1445 State Route 31, Annandale, NJ. 8:00 a.m.

Sun Mar 12: Bergen ARA *Auction*, Westwood Regional HS, 701 Ridgewood Rd., Township of Washington, NJ. 12:00 noon.

Sun Mar 19: Southington ARA Flea Market, Southington HS, 720 Pleasant St., Southington CT. 8:00 a.m.

VE Test Sessions

Mar 4, 11, 18, 25: Westchester ARC Radio Barn, 4 Ledge-wood Pl, Armonk, NY. 12:00. Pre-reg M. Rapp, (914) 907-6482.

Mar 9: WECA, Westchester Co Fire Trg Cen, 4 Dana Rd., Valhalla, NY. 7:00 p.m. S. Rothman, (914) 949-1463.

Mar 12: Yonkers ARC, Will Library, 1500 Central Ave, Yonkers, NY. 1:00 p.m. Pre-reg John Costa, WB2AUL, 914-969-6548.

Mar 17: Orange County ARC, Munger Cottage 183 Main Street, Cornwall NY. 6:00 PM. Joseph J. DeLorenzo (845) 534-3146.

Mar 20: Columbia Univ ARC, 531 Studebaker Bldg, 622 W 132nd St, New York. 6:30 pm, Alan Crosswell (212) 854-3754.



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