



# The Feedline

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## 48 RADIO MERIT BADGES EARNED

### CORRECTION

Last month I inadvertently made two errors in the production of this newsletter. First, I failed to add the authors attribution to the Buckeye Belles story.

Second, I was unaware of the authors requirement to retain his format of the document and the story was reformatted to fit the style of the newsletter.

I have sent an apology email to Mike and he has graciously accepted it. In an effort to make the situation right I am adding links to his original documents so you may read them in the format the author, Mike (WA8MKH), intended.

<http://w8al.org/pdf/What-is-an-amateur.pdf>

<http://w8al.org/pdf/The-Buckeye-Belles.pdf>

73, Pat (AE7QU)

### RADIO MERIT BADGES

This past September 7th, several members of the Canton ARC assisted with teaching Radio Merit Badge to 48 Boy Scouts.

Mike Mossor N8QYA made the initial plans to teach this badge months before. Eventually, the number of interested Scouts grew to the point where additional help was needed. Dana Powers (Ranger at Camp Tuscazoar in Zoarville) approached Dale Lamm (NX8J) and told him of Mike's plans.

Others were also recruited, Les Myers (KK8K) and Bill Hannon (N8PW), Jefferey Shreiner (KD8OUN) and Herbert Shreiner (an S.W.L. - Short Wave Listener.

On the morning of the seventh, we all arrived early and set up operations. The spacious Hoover Lodge became a classroom. Two HF stations were set up outdoors about a quarter mile apart from each other.

Dale handled most of the classroom work while Bill and Mike each ran an HF station. The requirements for the radio merit badge call for a basic understanding of radio and for the Scout to conduct a brief QSO, preferably on ham radio. Badge requirements and a slide presentation for the class portion are all on the BSA web site at [www.scouting.org/jota/radio\\_merit\\_badge.aspx](http://www.scouting.org/jota/radio_merit_badge.aspx)

The group of 48 students were split into two. While one group sat through the class, the other split into two and completed their QSO requirements at the two HF stations. When finished, the groups switched roles.

We started at 9:00 AM and by 2:30 PM, there were 48 new radio merit badges completed.

All had a good time. Looking at the completed written requirements, I could see many boys who understood the subject matter well. Of all BSA merit badges, radio is possibly the most technical. It is not as well known as others, such as Camping or Personal Fitness. These boys may be proud that they were all able to obtain a somewhat "rare" badge.

Dale (NX8J)

Photo's are on the last page of this newsletter.

## UK FUNERAL INTERRUPTED BY RF

We have all heard of RF getting into public address systems, but this one truly has to take the prize for the unusual.

Can you imagine being at a funeral service when the sound coming out of the loud speaker system is suddenly interrupted by airline stewardess' message to her passengers? Well it actually happened recently in the United Kingdom when what's been described as a mysterious voice was heard through a church's public address system during a funeral service telling passengers on a plane to prepare for landing.

The story goes this way. Friends and family of Brendan Duffy had gathered at St Edward's Church in Windsor, Berkshire, to pay their final respects after the Dublin-born grandfather-of-four who died on August 8th, at age 78. But just as his nephew Joe Duffy was reading the eulogy, everyone was suddenly told to fasten their seat belts and for the other flight attendants to prepare the aircraft's doors for landing.

While some might have thought it could have been a sign from the heavens above, a more rational explanation is that the church's wireless microphone system and the two-way radio system on the aircraft were on the same frequency. But that would not explain how the announcement, which was made using a closed loop in-cabin public address system, could get transmitted outside the airplane unless perhaps someone pushed the wrong button on the flight deck.

That said, as we go to press, the mystery of the RF signal from on-high remains unexplained.

Joe Duffy is a local personality radio. He told a news reporter that everyone at the service was looking around and up to heaven, trying to figure out where the voice was coming from.

## CALIFORNIA QSO PARTY OCTOBER 5 AND 6

The 47th running of the California QSO Party or CQP is slated this year to begin at 1600 UTC on October 5th and end at 2200 UTC on October 6th. The Northern California Contest Club sponsors this annual event and offers a variety of awards open to stations inside and outside of California. These include plaques for the top operators in various categories including a youth award for those under the age of 18. A list of the awards is included in the rules and can be found on-line [www.cqp.org](http://www.cqp.org).

## THE VOA DELANO CALIFORNIA STORY

A oldie but a goodie from radios recent past. If you have ever had the chance to listen to the Voice of America Shortwave station that operated from Delano California and can recall its booming signal up and down the West coast and out into the Pacific, here is the story of how it came about. Also, the way it operated for 63 years and its final non-descript signoff at 03:30 UTC on October 28, 2007. And there's even an amateur radio tie-in when one of the stations 200 kilowatt Federal Radio transmitters showed up on the ham radio airwaves calling CQ. We won't spoil it by telling you more. Point your web browser to [tinyurl.com/the-voa-delano-story](http://tinyurl.com/the-voa-delano-story) for a great story.



## NCDXC DONATES \$8,000 TO NCDXF FOR FUTURE DXPEDITIONS

The Northern California DX Club has presented an \$8000 check to the Northern California DX Foundation. This to assist in continuing the Foundations work in promote DX operations and DXpeditions where needed.

The Foundation says that this is the largest donation that it ever received from a club. It says that the monies will help to provide critical funding to DXpeditions high on the Most Wanted List. It adds that without this type of support that such DXpeditions might not be possible.

The Northern California DX Club was founded on October 10th, 1946. The beneficiary of its generosity, the Northern California DX Foundation is a private non profit organization founded in 1972. Its purpose is to assist worthwhile amateur radio and scientific projects with funding and equipment.

More details and a photo of the check being presented is on the web at [www.ncdxf.org](http://www.ncdxf.org) and [www.ncdxc.org](http://www.ncdxc.org).

## HYDROGEN FUEL FROM SUNLIGHT BREAKTHROUGH

A University of Colorado Boulder research team has moved closer to what some call the Holy Grail of a sustainable hydrogen economy — splitting water with sunlight.

The CU-Boulder team has engineered a solar-thermal system designed to use a vast array of ground mirrors to concentrate sunlight onto a single point atop a central tower up to several hundred feet tall. The tower would gather heat to roughly 2,500 degrees Fahrenheit (1,350 Celsius) and then deliver it into a reactor containing chemical compounds known as metal oxides.

As the metal oxide compound heats up, it releases oxygen atoms, changing its material composition and causing the newly formed compound to seek out new oxygen atoms. The team showed that adding steam to the system would cause oxygen from the water molecules to adhere to the metal oxide surface, freeing up hydrogen molecules for collection as hydrogen gas. To get the steam, the concentrated sunlight beamed to the tower would heat the water to boiling.

Conventional theory holds that producing hydrogen through the metal oxide process requires

- 1) heating of the reactor to a high temperature to remove oxygen
- 2) then cooling it to a low temperature before injecting steam to re-oxidize the compound and release hydrogen gas for collection. The innovation here is that no swing in temperature is required. The whole process can be undertaken at the same temperature, and can be driven by turning a steam valve on or off.

With the new method, the amount of hydrogen produced to power fuel cells or for storage is entirely dependent on the amount of metal oxide (a combination of iron, cobalt, aluminum and oxygen), and how much steam is introduced into the system.

The researchers envision building reactor tubes roughly a foot in diameter and several feet long, filling them with the metal oxide material and stacking them on top of each other. A working system to produce a significant amount of hydrogen gas would require a number of the tall towers, each with its own reactor, to gather concentrated sunlight from several acres of mirrors surrounding each tower.

A paper on the National Science Foundation-funded research was published in the August 2 issue of Science.

# AREA NETS

## HF Nets

• Sunday	Massillon ARC	7:30 PM EST	3600.0 + or -		CW
• Tuesday	Massillon ARC	7:30 PM EST	3600.0 + or -		CW
• Thursday	Massillon ARC	7:30 PM EST	3600.0 + or -		CW
	Alliance ARC	8:00 PM	28.400		CW
		8:30 PM	28.400	SSB	PHONE

## VHF-UHF Phone Nets

• Sunday	6 Meter FM - Wide Area	7:00 PM	52.170+	PLs vary	FM
		PL's: Akron 107.2 - Loudenville 110.9 - Stonecreek 123.0 - Richfield 136.5			
• Monday	Summit Co. ARES	7:30 PM	444.50+	PL 131.8	FM
	Tusco ARC	8:00 PM	146.730-		FM
	Cuyahoga Falls ARC	8:30 PM	147.270+	PL 110.9	FM
• Tuesday	Stark County ARES	7:00 PM	147.120+	PL 110.9	FM
	NORMA - Swap	7:30 PM	147.015+	PL 110.9	FM
	Silvercreek ARA	8:00 PM	147.390+	PL 114.8	FM
	Homeland Security - AARC	8:00 PM <i>Last Tuesday Only</i>	147.510		FM - Sim
	Millersburg ARA	9:00 PM	146.670-	PL 71.9	FM
• Wednesday	Carroll County ARS	8:00 PM EST	147.075+		FM
		9:00 PM DST	147.075+		FM
	Wayne ARC	9:00 PM	147.210+		FM
• Thursday	Lake Erie ARA - Trivia	8:00 PM	146.760-	PL 110.9	FM
	Portage County ARS	8:00 PM	146.895-	PL 110.9	FM
	Wayne ARC DX	8:00 PM	147.210+		FM
	Alliance ARC	9:00 PM	145.370-	PL 88.5	FM
• Friday	West Stark Info	8.00 PM <i>No 1st Friday</i>	147.180+	PL 110.9	FM
• Saturday	None				

## Daily (or almost) Nets

Silvercreek ARA Barometer	7:25 AM No Sunday	147.390+	PL114.8	FM
Geauga Trivia	9:00 AM No Sunday	146.940-	PL 110.9	FM
6 Meter AM - Stark Co.	7:00 PM Daily	50.400	6 Meter	AM - Sim
Tri-County Training-NORMA	9:30 PM Tue, Fri & Sun	147.015+	PL 110.9	FM

## ATTENTION DXERS

OH2YY hopes to be on the air from Nepal between October 2nd and October 5th. He has applied for the callsign 9N2YY, but the final confirmation will not take place until he arrives in that nation. After Nepal he will be visiting the Kingdom of Bhutan between October 6th and the 10th where he has already been assigned the callsign A52YY. Listen out for him during his evenings and nights on 20 through 10 meter SSB. QSL via OH2YY, the bureau or direct. Electronic QSL's go via Logbook of the World.

JK1AJT will again be in Myanmar from September 18th to the 23rd signing X-Zed-one-Zed. He advises that he has spotted a better location atop a 1557 feet hill and will bring a tri-band Yagi with him in addition to the Ground Plains that he used last month. This next operation will be mainly CW. QSL via ClubLog Oh-QRS or direct to JH1AJT. Meantime the recent X-Zed-one-Zed Myanmar 2013 operation has been approved for DXCC credit. If you've had it rejected in a prior application, send a note to [bmoore@arrl.org](mailto:bmoore@arrl.org) to be placed on the list for an update to your record.

The Martello Tower Group are activating Herm Island again from October 4th to the 9th on 80 through 10 meters including the WARC bands. The group will be using SSB and some data modes. All QSOs will be uploaded to Logbook of the World and Club Log. QSL direct or via the bureau to G6NHU

WB6OJB and K5LBU will be active as A25JK and A25CF, respectively, from the extreme eastern part of Botswana through September 12th. They should have two stations running but the A25JK will be the main call to listen out for. Look for A25JK to operate SSB on 20 through 10 meters with a possibility of some time spent on 40 and 75. A25CF will be operating some PSK on whatever bands might be open and A25JK is not on. QSL via their home callsigns.

DL2MDU and his DO3HDA will on the air 8Q7CF from the Maldives between September 15th through the 27th. Their activity will be holiday style on 80 through 10 meters with the possibly 160 meters Modes will be CW and SSB with some digital. QSL via DL2MDU.

JA0RQV hopes to be operational from Tonga as A35JP/N between September 19th and the 24th. This operation will depend on weather and flight availability to the island and his time on the air will be limited because of limited supply of electric power. Operations will be on 80 through 6 meters using CW and SSB. QSL via his home callsign, by the Bureau, direct or electronically using Logbook of the World.

DL7AFS and DJ7ZG will be operational as D44TXT from Santiago Island, Cape Verde between October 19th and November 7th. The duo will be on 80 through 6 meters using SSB, RTTY and PSK31. QSL via DL7AFS.

Bill Moore, NC1L, the ARRL Awards Branch Manager, reports that the current JY9FC operation beginning this past August has been approved for DXCC credit. If you have a card for that operation now is the time to submit it.

HA3JB will be operational slash 4O from Montenegro between September 23rd to the 30th. Activity will be on CW, RTTY and SSB. QSL via HA3JB direct.

N4WDT and K4ZIN are planning to on the air from Sierra Leone between October 16th and the 21st. They are currently waiting for a license approval and plan to operate 160 through 10 meters with a focus on 30, 17 and 12 meters as well as the lower bands. QSL electronically via Logbook of the World or via their home callsigns.

## CHASING DXCC???

### RODRIGUEZ ISLAND DXPEDITION

After the success of the J52EME DXpedition by the Verona DX Team, the team is pleased to announce the activation of Rodriguez Island (AF-017, WLOTA 4265, WWFF 3BFF-004, WW Loc. MH10QH), for EME activity on 144 and 432 MHz as well as HF operations from September 2nd - 13th, 2013.

The team is currently awaiting approval of the callsign 3B9EME.

Operators include Walter I3VJW, Luc I3LDP, Rony IZ3KIF and Alessandro IK5MIC.

They will have 2 stations on at the same time on the HF bands, with an emphasis on 160-12 metre CW, SSB, RTTY, JT65hf and PSK31.

QSL via direct or via OQRS.

Further information and updates on their website at: [www.ari.verona.it/veronadxteam/3b9\\_2013.htm](http://www.ari.verona.it/veronadxteam/3b9_2013.htm)

### FIJI AND ROTUMA ISLANDS

Andy, LZ2HM, has joined the team of Stan LZ1GC and Rocky 3D2DD to be active from Fiji and Rotuma between September 20th and October 15th.

Their schedule is as follows: September 20-26th - Stan will be active as 3D2GC from the "Club Fiji Resort", Nadi, Fiji Republic, Viti Levu Island (OC-016, WW. Loc. RH82QF).

Activity will be on 160-6 meters using CW and SSB, with the following equipment: Kenwood TS-480 SAT + linear amplifier ACOM 1010/ACOM 1000. The antennas: EXP. GP 40-10m, 80/160 meters INV-L and GP.

September 27th-October 11th - Callsigns 3D2RA (Andy), 3D2GC/P and 3D2DD/P; from Rotuma Island (OC-060). Activity will be on all HF bands. Stan 3D2GC/P will active on all HF bands, CW/SSB together with Andy, 3D2RA and Rocky, 3D2DD. Rocky will also be active, but only on SSB with the callsign 3D2DD/P. Andy, 3D2RA, will be active on all HF bands, 160-2 meters CW/SSB/ DIGITAL (PSK & SSTV) and special attention will be made to work by EME on 50 MHz on JT65A.

October 12-15th - Callsign 3D2GC again from Fiji Republic. On October 16th, Stan, LZ1GC, will go back to Bulgaria.

Suggested frequencies are:

CW - 1822, 3510, 7007, 10104, 14010, 18070, 21010, 24892 and 28010 kHz

SSB - 1838, 3788, 7088, 14188, 18148, 21288, 24948 and 28488 kHz

RTTY - 1838, 3588, 7038, 10138, 14088, 18108, 21088, 24918 and 28088 kHz

SSTV - 3728, 7038, 14238, 21338 and 28688 kHz

PSK31- 1838, 3578, 7038, 10138, 14078, 18108, 21078, 21918 and 28078 kHz

6m - 50100/CW. 50118/SSB and 50200/RTTY kHz

## DX, DX AND MORE DX

OH6KZP, will be active as CR2X from the Azores during the CQ World Wide DX SSB Contest on October 26th and 27th, as a Single-Operator/All-Band/High-Power entry. Before the contest begins he may be on signing his own call portable CT8. QSL via OH2BH.

DJ7RJ will be active stroke FR from Reunion Island between September 28th and November 2nd. His operation will be on 160 through 10 meters using CW and SSB. QSL via DJ7RJ, direct or by the bureau.

K7AR will be active as E51AAR from Rarotonga in the South Cook Islands, between October 21st and the 26th. His operation will be mainly using RTTY but he will also participate in the CQWW DX SSB Contest. Log will be uploaded to Logbook of the World upon his return home. QSL via K7AR, direct or by the Bureau.

DL1YAF is currently on the air stroke VP9 from Hamilton, Bermuda. He will be there through September 25th operating holiday style on CW, SSB and PSK31. QSL via home callsign, either direct or via the bureau.

Members of Canada's Association de Radio Amateurs Sept Iles Inc. will be active as VE2CSI during the CQ World Wide DX RTTY Contest on September 28th and 29th as a Multi-2 entry. Operators mentioned are VE2EBK, VE2SG and possibly others. QSL via M0URX.

DL3JH will be operational from Sri Lanka as 4S7JG until September 29th. He is active on the High Frequency bands only. QSL via his home call.

J11LET will be active from Chichijima Island in the Ogasawara chain from October 25th through November 3rd operating signing JD1BOI. He will be active on 80 through 6 meters using CW, SSB and RTTY. QSL via his home call direct only

### SWAZILAND DXPEDITION UPDATE

Roger ZS6RJ and a Multi-International team of operators will be active as 3DA0ET from Piggs Peak, Swaziland, between November 18-27th. Some of the operators also took part in the 2012 7P8D DXpedition.

Currently, the 12 operators mentioned are Emil/DL8JJ, Chris/G8APB, John/GW4SKA (RTTY Team Leader), Frosty/K5LBU (Co-Leader), George/KL7GS, Neil/VA7DX, Don/VE7DS, Keith/VE7MID (Low-Band Leader), Bob/W5UQ, Victor/WB0TEV, Sam/ZS6BRZ and Roger/ZS6RJ (Co-leader). They plan to have 4 stations on the air, covering all the HF bands (160-10 meters) and 6 meters (secondary) using CW, SSB and RTTY. There will be a focus on RTTY, and they plan to have a dedicated full-time RTTY station on the air from start to finish.

Roger, ZS6RJ, says "We're also running an up-front survey (link on the home page) asking DXers what bands/modes etc. they need the most for Swaziland."

Activity will also include the CQWW DX CW Contest (November 23-24th) as a Multi-two entry.

# DXPEDITION UPDATE

## THE AMSTERDAM ISLAND DXPEDITION



The Amsterdam Island DXpedition team's progress continues unabated.

Essentially all the team's equipment is now in hand and at the Atlanta staging area or undergoing final testing in preparation for shipment to Atlanta. Gear will soon be sorted into contents bound for the Mafaf operating location and the Antonelli operating location (see our website at: <http://www.amsterdamdx.org/ft5zm-operating-sites>).

There will be no guess work about what piece of equipment goes to which site when we land. Efficiency means more time on the air and more QSO's.

Bob (N2OO), has been working on our maritime mobile operation to provide QSO's with some rare grids between Australia and Amsterdam Island. Arnie (N6HC), is our team doctor and has finalized his medical resources. Jerry (WB9Z), has been hard at work with his team cutting radials and coax, thousands of feet of each, but the job is now done. Bob (K4UEE), our chief financial officer has been watching our income and expenses and trying to be as frugal as possible without compromising our ability to generate lots of QSO's.

Craig (K9CT), has been putting our K3's and bandpass filters through extensive testing and has worked with Neil (VA7DX), Gregg (W6IZT), and George (N4GRN) on our network and logging protocol. Erling (LA6VM) and Andy (UA3AB) have been working hard to inform Europeans of our progress and peak their interest, while VE7CT beats the drum in Canada. Michel (FM5CD), has worked closely with the French authorities, answering their questions and Nodir (EY8MM), has focused on our low band capabilities. Jorge (HK1R), has worked hard to generate interest in South America.

The berth and fuel for our ship has been reserved in Fremantle, Australia, and our New Zealand customs agent has been retained. We've submitted a 'shopping list' to our friends in New Zealand and Australia; they will purchase items for us that will come aboard in either Tauranga or Fremantle.

Finally, a major milestone occurred recently – something that says, 'There is no turning back now'. We made our initial payment for the charter of our ship, the 'MV Braveheart'. This amounted to \$175,000 (NZD).

Our team members are now fully vested (all in) financially. Our next payment is due in December, so like all major DXpeditions of this magnitude, we will feel the cash flow crunch shortly.

We are hoping you can support us up front when we need the money and help us make Amsterdam Island a memorable DXpedition. If you've supported us, we greatly appreciate it. If you have not yet done so, please consider helping us now. All the team members will sleep a little better knowing you have our back.

Ralph K0IR



## CARC MEMBERS PARTICIPATE IN OHIO STATE PARKS CONTEST

The Ohio State Parks on the Air is organized by the Portage County Amateur Radio Service in 2007. The object of the contest is:

1. To promote public awareness of amateur radio and Ohio's beautiful state parks system
2. To contribute to the recognition that Ohio has a very diverse and wonderful ecology
3. To promote camaraderie within the ranks of Ohio's Amateur Radio Operators

A few years ago Craig (N8OH) and I set up a station at Quail Hollow State Park in early September and we had fun. Our call sign was W8ATM, Diebold Amateur Radio Club. It is a laid back contest so we could do a little rag chewing such as asking where different parks are located.

Since Doug (KD8RMY), is a new ham and never operated a contest. I suggested that Doug, Jerry (KF8EB), and I set up a station at one of the Ohio parks. On September 7th, Jerry and I went to Portage Lakes Park north of Green. Doug was leading a bike ride that morning but he said he would meet up after the ride at the park. The contest runs from 12 to 8PM. We used W8AL as our club call since we are all in the club.

Jerry and I got to park at 10AM and put a stake in ground and set up a military mast we borrowed from Scott (KK8D). We put up the mast, we stopped at (6) four foot sections (24 feet high). With 2 people we couldn't go any higher (we weren't strong enough to balance any more sections). But in this contest the low antenna is NVIS (high angle radiation) is OK since our main goal was Ohio state park contacts, 24 feet was a good height.

Setup time was an 1 ¾ hours with time getting end of the antenna wires into the trees. We used a G5RV (101 foot center fed dipole) with feedline on the 24 foot military mast. Since the twin lead was 30 feet we tied it the mast guy wires at 6 feet high so we had a 24 foot drop. We used my Elecraft K2 XCVR running abt 80 watts. I built the K2 in 2003 and it has been an excellent radio. It is a user friendly radio that is easy to operate. Since the G5RV is a multiband antenna we used a Ten Tek tuner to match the antenna to the K2. Jerry and I started the contest at noon and Doug joined us at 1:30 PM.

We used paper logs and paper dupe sheets which was a good method for a short contest such as this. We made 72 qsos on 40 meters and 8 qsos on 75 meter SSB. 1 CW qso!!!! Noise level was high on 75 meters which is normal for summer. Forty was pretty quiet and we got out well. Doug, Jerry and I had fun and we hope to do next year!! Maybe we can get some more club members to set up stations and get some good practice for Field Day. We had fun and are already plotting a strategy to increase our score next year!

To summarize, we made 80 contacts and talked to 38 Oh parks so our multiplier is 38 times 80 contacts for 3,040 points.

Jim KA8JIM worked us from his home QTH. Jim said it was the first contest he had participated in and worked 24 state parks. Jim, Thanks for the contact on Saturday. Scott, thanks for the antenna mast and the tuner.

Come join us next year or better yet set up in one of the parks and have some fun.

73, Roger  
(W8VE)



Four generations of workers, club members and volunteers can be a challenge to handle when their values are so different.

## COMMUNICATIONS TIP'S

### 4 Tips for Leading Across Generations

For the first time in history, we are faced with the challenge of simultaneously working with five different generations in the workforce and volunteer force. Each generation is characterized by its own unique working style and values. So how does one become an effective leader working with such a wide range of people? Here are some tips to master the art of leading across generations.

Be interested in generational differences. One can't be an effective leader without showing some interest in your team and their preferred styles and values. Make a point to get to know each member of your team and what working style suits them best. It's important to know the strengths of your own generation, but the ability to work effectively with the strengths and weaknesses of different generations will give you the edge you need.

Show respect for each generation. Just because you don't understand someone's process or values doesn't mean they are wrong, only different.

Observe reactions across generations. Since each generation has different desires and needs, make sure you are taking people's feelings and behaviors into consideration. You can gain a lot of insight by simply observing how different members of your team react to a common situation.

Be aware of the impact of your behavior on other generations. You need to model the behavior you want to see in your teams, regardless of which generation they're from. You may have a different way of thinking than the rest of your team and it's important to be able to back up your decisions, as well as take other viewpoints into consideration.

### 3 TIPS TO ENGAGE PASSIVE MEETING ATTENDEES

There are some people who say very little during meetings, who we sometimes call passive attendees. There are various reasons why a person might seem passive: shyness, lack of confidence, lack of familiarity in the subject or the organization.

Listening quietly may be the preferred learning style, while others may be quiet because they disagree with what's being said. Regardless of the reason, good leaders recognize the importance of gathering input from all meeting attendees.

Here are three ways to bring passive attendees out of their shell:

1. Foster an environment of openness in your meetings. Ensure you give positive responses to everything that's brought to the table to help less confident members feel comfortable speaking.
2. Provide attendees with a meeting agenda before the meeting. This enables everyone to think about the topic and be prepared. When people are prepared, you as the leader can call on specific members to share their thoughts without the risk of putting someone on the spot.
3. Ask for everyone to send their thoughts on the topic beforehand (provided you've sent an agenda), directly to you via email. Then, during the meeting you can engage with all members and allow them to elaborate on the ideas they've submitted, in a way that ensures they won't be outspoken by more talkative members.

## NASA JUNO MISSION

Radio hams to say 'HI' to Juno on 10m

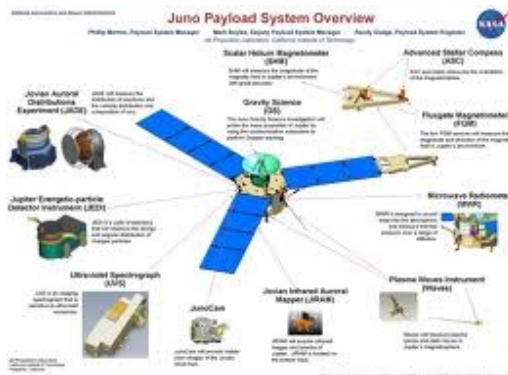
NASA's Juno mission is inviting amateur radio operators around the world to transmit a coordinated message on the 28 MHz band to the Juno spacecraft

NASA's Juno spacecraft will fly past Earth on **October 9, 2013** to receive a gravity assist from our planet, putting it on course for Jupiter.

To celebrate this event, the Juno mission is inviting amateur radio operators around the world to say "HI" to Juno in a coordinated Morse Code message. Juno's radio and plasma wave experiment, called Waves, should be able to detect the message if enough people participate.

Juno will have a better chance of detecting the signal from many operators if the signal is spread out across the spectrum. The Juno Waves instrument is a broadband receiver, and the detector being used for this event has a band width of 1 MHz. It is better for detection of the signal to have a broadband signal coming in.

For this experiment, we would like spread out in frequency across the plied a table of suggested frequency-based on the last letter of your call. tuned to 28MHz, the center frequency high pass filter limits low frequency so the frequency table excludes 28.5 MHz signals we expect to measure at number of discrete tones, so spreader is a good approximation to the But at Jupiter, we don't expect to be lemetry!



to ask those participating to 10 meter band. We have supplies between 28 and 29 MHz, When the HFR receiver is quency is 28.5 MHz. A 50 quencies hitting the detector, MHz  $\pm 50$  kHz. The natural Jupiter will consist of a large ing the signals out in this man-signals we expect to detect. able to decode CW in our te-

The 28 MHz band was chosen for this experiment for several reasons. The Waves instrument is sensitive to radio signals in all amateur bands below 40 MHz, but experience with the University of Iowa instruments on the Galileo and Cassini earth flybys shows significant shielding by the ionosphere at lower frequencies. As sad as it sounds, we hope for lousy band conditions on October 9, so an appreciable fraction of the radiated energy escapes the ionosphere into space, and is not refracted back down to the ground somewhere else on the planet.

Juno's antenna consists of a pair of tapered 2.8 meter long titanium tubes, deployed from the bottom deck of the spacecraft under the +X solar array and magnetometer boom. A high impedance radiation resistant preamp sits at the base of the antenna and buffers the signals from 50 Hz to 45 MHz. The elements are deployed with an opening angle of about 120 degrees. Ten meters is above the resonant frequency of the antenna and NEC analysis indicates a lobe generally along the spin axis of the spacecraft. This will be good for detection on the inbound part of closest approach to Earth.

The Waves instrument uses four receivers to cover the frequency range of 50 Hz to 41 MHz. Signals up to 3 MHz are bandpass filtered, sampled by A/D converters and FFT processed into spectra using a custom FFT processor developed by The University of Iowa under a grant from the Iowa Space Grant Consortium.

Please join in, and help spread the word to fellow amateur radio enthusiasts!  
Say "HI" to Juno!

## ASTRONAUT DISCUSSES ISS HAM RADIO CONTACTS

On his ESA blog, astronaut Luca Parmitano (KF5KDP) talks about his ham radio contacts from the International Space Station

I set the radio to the 'random' contacts frequency, and without knowing what to expect, I put on the headphones.

Physically, the International Space Station was still many kilometers away from the coastlines of Europe, but our horizon stretches out beneath us for thousands of kilometers and the various European ground stations could already see us. My ears were immediately overwhelmed by a cacophony of unidentifiable sounds and noises, voices, screeching and white noise.

Then suddenly, a voice surfaced above the other sounds; it was a young man, in my mind barely more than a boy. He was calling the ISS American radio call sign (NA1SS) and repeating his own call sign. I was taken aback by the emotion that rose in me as I tried to reply to the call, using the Italian call sign (IR0ISS).

But my excitement was nothing compared to the sheer astonishment and disbelief I heard in that voice, thousands of kilometers away. Speaking English with a beautiful Portuguese accent, the radio operator on the other side of the signal only managed to say a few words – "I don't know what to say... This is a dream come true for me!" – before our conversation was interrupted and buried by swarms of other calls.

Read the blog at

<http://blogs.esa.int/luca-parmitano/2013/08/13/message-in-a-bottle/>

Astronaut Luca Parmitano KF5KDP making ham radio contacts

<http://amsat-uk.org/2013/08/12/astronaut-luca-parmitano-kf5kdp-making-ham-radio-contacts/>

**How to hear the ISS**

<http://amsat-uk.org/beginners/how-to-hear-the-iss/>

## SATELLITE ACHIEVEMENT

Congratulations to John (K8YSE) for working and confirming all 488 USA lower 48 States grids. John states, "Satellite operators come and go and grids come and go with them. A grid might have a very active operator in it and then it is off the air when that person goes away for whatever reason. Interestingly, about half of the 488 grids that were worked were from those operating portable, not in the sense of using a radio with batteries, but in the traditional sense of operating away from their home station location. Once you have experienced being on the other end of a small pileup, you will want to do it again."

He also states, "I started with satellites in June 2006 and only had 47 USA grids by August 2008. From August 2008 till Jan 2009 I worked another 109. In 2009 199 were worked. 2010 was 76 and 2011 was 44. Only 4 new grids were worked in 2012 and 9 were snagged in 2013."

John is possibly the first person to ever work all 488 USA lower 48 States grids (at least in the past 10 years) on the satellites. **However, the sad part about this is there is no award for this amazing accomplishment.**



## NAB OPPOSES CHANGES TO RF EXPOSURE REG'S

The National Association of Broadcasters has come out in opposition to a pair of proposed changes to the FCC's RF exposure rules as outlined in ET Dockets 13-84 and 03-137. The trade association is focusing specifically on a suggestion to reduce the allowable amount of RF emissions for so-called transient persons near a radiating antenna.

Currently, the FCC allows broadcasters to treat transient people or persons, which include untrained employees or members of the public, the same as RF-trained employees. This is provided such transients are made aware of their possible exposure and such exposure is only brief and not normally repeated. The transient exception only applies to controlled environments, like fenced areas near tower sites or antennas on rooftops with locked access.

Under changes to the RF exposure rules the FCC recently adopted, workers in controlled environments must be made aware of their possible exposure by verbal or written communication and must receive training on how they can control their exposure. The stricter general population uncontrolled exposure limits typically apply to situations where members of the public or employees have no or little knowledge of potential exposure and little means to mitigate their exposure.

According to NAB Instead of applying the occupational or controlled limits to such transients, the FCC proposal would instead apply a newly created, and effectively undefined, general population controlled limit. This in turn would likely require significant and costly changes to the way licensees comply with RF exposure rules.

The broadcast lobby group also disagree with the FCC proposal that transient people should be supervised by trained occupational personnel within the controlled area where the general population limit is exceeded.

Comments on further changes were due to ET Dockets 13-84 and 03-137 were due to the Commission. by September 3rd. Reply comments are still open with a cutoff date of November 1st.

**If you believe this will not impact you as a ham you better think again. What if you now live or one day have to move to an apartment or an assisted living center? Think about trying to operate in a public place such as a park or for Field Day?**

## NEW EMCOMM GUIDEBOOK FROM DHS

A very informative guidebook authored by Ross Merlin (WA2WDT), and titled NIFOG is described as a great go-to compendium of radio frequencies, channels, and other tidbits of information that can be essential in times of an emergency.

The guide is authored by Merlin who works in the Department of Homeland Security Office of Emergency Communications. He authored the guidebook for the agency and says that it contains page after page of frequency information, operating procedures, formulas, and rules and regulations from both the FCC and the NTIA. Specific subject material includes frequency and channel data for Fire, EMS, Police, and Law Enforcement as well as Mutual Aid channels in VHF, UHF, 700 MHz, and others. Also included is communications information for marine, aviation, NOAA weather, MURS, GMRS, FRS, and just about any radio you might encounter in an emergency.

The guidebook is available in printed and downloadable formats. The primary Website where downloads copies are available is <http://www.publicsafetytools.info>. Copies printed on waterproof paper, are reportedly available free of charge from the Department of Homeland Security. Please contact NIFOG (at) HQ (dot) DHS (dot) GOV for details.



## STANFORD SCIENTISTS SOLVE SUN'S MYSTERIES

Solar scientists at Stanford University in California have solved one of the few remaining fundamental mysteries of how the sun works. It is something hams need to know because it affects propagation of signals.

According to researchers, the mechanism in question is known as meridian flow and is said to work something like a conveyor belt. Magnetic plasma migrates on the sun's surface from the equator to the poles. It then cycles into the sun's interior on its way back to the equator. The rate and depth beneath the surface of the sun at which this process occurs is critical for predicting the sun's magnetic and flare activity, but has remained largely unknown until now.

To find out how it actually worked, researchers used the Stanford-operated Helioseismic and Magnetic Imager or HMI instrument onboard NASA's Solar Dynamic Observatory to track solar waves in much the way seismologists would study seismic movements beneath the surface of the Earth. Every 45 seconds for the past two years, the HMI's Doppler radar recorded images of plasma waves moving across the sun's surface which were then radioed back to Earth. By identifying patterns of sets of waves, the scientists could recognize how the solar materials move from the sun's equator toward the poles, and how they return to the equator through the sun's interior.

One startling discovery is that the equator-ward flow is actually sandwiched between two layers of poleward flowing currents. This is a more complicated mechanism than previously thought. Its also one that could help refine predictions of the sun's activity.

For example, some computer models projected that the current solar cycle would be strong, but observations have since showed it is actually much weaker than the previous cycle. This inconsistency could be due to the previously unknown inaccuracies of the meridian circulation mechanism used in the simulations.

The report was published in the online edition of The Astrophysical Journal Letters.

## SCHOLARSHIPS FOR HAMS

A Fox business news story reminded me that Fall is falling and folks (young and old) are heading to school. Amateur radio can lead to a scholarship grant.

Read the article Fall Isn't Just Football Season, It's Also Scholarship Season

<http://www.foxbusiness.com/personal-finance/2013/09/16/fall-isnt-just-football-season-it-also-scholarship-season/>

ARRL Foundation Scholarships

<http://www.arrl.org/scholarship-program>



## WHAT THE HECK IS GROUND??

"Ground. We think that we know what it is and how to handle it, but do we really? Why not just have one really solid ground so all the bad noise and stuff can sink into it and disappear? Sort of like a black hole where everything goes in and never comes out?

Let's work our way through the ground maze.

Why not just have one really solid ground so all the bad noise and stuff can sink into it and disappear? Sort of like a black hole where everything goes in and never comes out?

We all want such a ground. Unfortunately, it does not exist and most of the misunderstanding is actually tied to the word "ground." In the U.K. "earth" meaning "safety ground" is common. In California and around the Pacific Ring of Fire we feel an earthquake and realize that ground stability is a relative thing. "To each his own," as the old proverb says.

In electronics ground should more properly be called reference or current return path. Think of Kirchhoff's laws. Generally for DC the laws say that all the current flowing out of the power supply must return to it. It's a lot like our personal finances - income must equal the outflow, except that with ICs we can't usually borrow electrons like money or put extra electrons when or where we want.

If that's the basic issue, the circuit really gets complicated when we use multiple power supplies with different voltages and purposes. Think of it as a maze.

Working our way through the ground maze, where multiple uncontrolled grounds mix into a disaster.

Let's consider a situation that is not so farfetched. We have one power supply for noisy digital devices and it is protected with logic thresholds. There is another motor supply with high currents and maybe arcing brushes, and then a third, clean analog supply. Sharing the ground indiscriminately mixes everything together, confusing everything which becomes noise by definition. There are basic rules that help optimize grounding in an initial design, but each circuit and PCB layout is unique and requires individual attention to current paths, PCB layers, and a myriad list of other considerations.

We know that we don't have all the answers in one tidy column or even document. But what advice can we offer to help our fellow engineers? For example, Kirchhoff's laws, skin effects, star points, ground planes with slots, system and safety grounds. What else can you think of? Have any references to help each other?

Don't let noisy power burn you

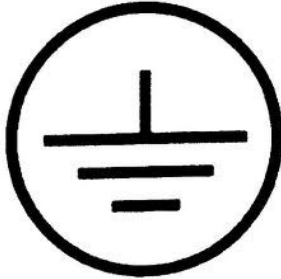
Power supplies are ubiquitous in today's highly integrated designs and they require decoupling capacitors to maintain reliable, accurate power.

**Article continues on page 16**



## GROUND, CONT'D

Whether operating in linear or switching modes, power supplies use feedback to compare the output voltage with a reference. To maintain stability, the feedback loop typically contains a lowpass filter to limit the bandwidth. Therefore, high-frequency noise is not attenuated by the feedback mechanism. Noise such as radio frequency interference (RFI), switching transients, or oscillations from other circuits can bounce around and pass right through the regulator. Instead, the high-frequency attenuation is a combination of series impedances and resistances from wires, circuit-board traces, inductors, resistors, and ferrite beads that impede noise and act together with low-impedance parallel capacitors that shunt noise to ground. In fact, the whole system acts as many lowpass filters to control and reduce high-frequency noise.



The capacitors are a two-way street for high-frequency noise; they transfer noise between power and ground. The object is to homogenize power and ground, so there is a DC difference but the AC potential is the same. If this happens as planned, the circuit doesn't react to the noise. But, as an old adage says, "things can so south quickly." If the ground has noise and the power is clean, we can transfer noise from ground to the voltage. Definitely not the plan.

The capacitor has parasitic components inherent in its structure. One series inductance makes the capacitor self-resonant, i.e., the single capacitor itself forms a resonant circuit. At low frequencies the capacitor is an effective capacitor passing noise. But at frequencies above self-resonance, the capacitor acts like an inductor blocking high frequencies. This necessitates using multiple parallel capacitors to cover the frequencies of interest. Further, those frequencies may not be obvious. You might think we only have a 1MHz clock, but remember that a true square wave contains odd harmonics between the fundamental and infinity. Practical clock drivers have softer edges so the harmonics are not so bad. RFI is also picked up and needs to be reduced. The danger is that even out-of-band RFI can be rectified by any semiconductor junction and interfere at lower frequencies.

Bill Laumeister (Senior Applications Engineer)

## FRESNEL AND THE LIGHTHOUSE LENS



The lighthouse with its beam of light relies on a lens that is now routinely used by voice light-beam experimenters - and is finding more modern applications. Augustin Fresnel designed a lens of large aperture and short focal length, in a much smaller package than was the convention.

Lighthouses were able to blaze many times brighter, further and more efficiently. As the French Lighthouse Commission Secretary of the day he illuminated the entire coastline of France.

The British initially shunned it, and so did the Americans - but quickly acknowledged the superiority of the Fresnel lens.

A fascinating book entitled 'A Short Bright Flash' by Theresa Levitt, talks about the man, has 60 illustrations and is a must-read for history, lighthouse and Fresnel fans.

Jim Linton (VK3PC)

(There is also a Fresnel effect with some antenna's. Have some fun. Read up on that subject.)

## SWR

Of all the things Amateur Radio operators measure, Voltage Standing Wave Ratio (VSWR) is probably the most misunderstood and misused. The “SWR”, as it is usually referred to, in an antenna circuit is a measure of the match between the impedance presented by the antenna at its feedpoint, and the characteristic impedance of the feedline. This is important because, the intrinsic impedance of a feedline is that value of resistance which, if used to terminate the line, will result in maximum energy transfer from the line to the load. A 50-Ohm coaxial cable will only deliver its maximum energy into a 50-Ohm resistive load.

SWR is measured as a “ratio”, as the name indicates. A ratio is a comparison between two numbers, in this case, the highest and lowest RF voltage on the feedline. This uses the total power (forward plus reflected) compared to the reflected power. An SWR value of 1.0:1, means all power is leaving the antenna and none is reflected, a “perfect” value. In theory, the highest SWR would be infinite, but in practical context, very high values tend to be inaccurately displayed. Normally, a value of somewhere between 2:1 and 3:1 is considered the threshold at which most modern transceivers begin to cut drive in order to keep the reflected power below a safe limit. Excess reflected power ends up being dissipated in the power amplifier, as heat, the enemy of solid state electronics.

The correct place to measure SWR in an antenna system is at the point where the feedline connects to the antenna. Most folks install the meter in the ‘shack’ because that is more convenient. If you do use an SWR meter at a location other than the base of the antenna, however, be aware that the reading you get will be “better” than the real value. An example should illustrate this point. Assume a 100-watt transmitter feeding the antenna through 100-feet of coax cable. Our coaxial cable has a 3dB-per-100-feet loss. Three decibels represents 50%.

An SWR of 3:1 represents 25% reflected power. Assume we measure the SWR at the antenna. Our 100-watts leaves the transmitter, and 50-watts arrives at the antenna (the 3dB loss). The “forward” power is actually the “forward plus reflected” power, or 50-watts. The reflected power is 12.5-watts. The actual forward power is 37.5-watts, and compared to the 12.5 reflected we get an SWR of 3:1. Most Hams would consider this an unacceptably high reading. Now let’s move to the ‘shack’. The meter there compares 100-watts (forward plus reflected) and 6.25-watts reflected (our 12.5-watts adjusted for the 50% loss traveling back down the feedline). The meter compares 93.75-watts forward (100-6.25 watts) with 6.25-watts reflected, for an SWR of 1.05:1. Most Hams would consider this a “nearly perfect” value. We are measuring the exact same antenna, but from two different locations.

So a lower SWR is always better, right? Not necessarily. Assume I have a quarter-wavelength vertical antenna, cut for 80-meters, worked against two radial wires for a ground. The intrinsic impedance of the radiator portion of this antenna is about 35-Ohms. Each of the radial wires represents a similar 35-Ohm impedance. The pair, in parallel, combine to make the ground circuit impedance 17.5-Ohms. The combined impedance is 52.5-Ohms, which will give an almost perfect SWR of 1.1:1, as the ratio of 52.5 (antenna) compared to 50-Ohm cable.

The problem is, 35% of the power is going into the ground system, heating up the Earth instead of radiating to your target station. Now let’s improve the performance of this antenna. A third of the impedance of this antenna is in the ground system. A “perfect” vertical would have a zero ground impedance contribution. I’m going to add 20 more radials, for a total of 22. The ground impedance is now 1.6-Ohms. The total impedance of the antenna is now 36.6-Ohms. The measured SWR will be in the range of 1.4:1. In this case, even with the “worse” SWR, the ground impedance is only 1.6-Ohms, and the ground is only soaking up 3% of the power. So this antenna will radiate 97-watts, where the previous one will only radiate 65-watts.

An SWR meter is designed to operate in a specific impedance environment. In the case of our communications equipment, that is generally 50-Ohms. If the antenna or feedline impedance is very far off 50-Ohms, the meter may not indicate correctly, particularly if used at the ‘shack’ end where the coaxial cable effect is greatest. SWR is a tool, and like all tools, it can only help us if it’s used correctly.

de NM7R

## BACKUP POWER FOR THE SHACK

In this project we will learn a few basics of safely installing a battery backup for D.C. powered equipment in your ham shack. Technology has evolved in both battery technology and controlling the system. While it may appear to be straight forward to add a battery backup for emergency radio operation in the ham shack there are several considerations the foremost being safety.

### Objective:

Provide backup D.C. power to communications equipment with automatic switching between power supply and battery while float charging the battery to maintain a state of readiness for emergencies.

### Project Requirements:

We will need a regulated power supply, battery with safety fuses, proper sized wiring, switching circuit between the battery and primary power supply, and a regulator to provide a float charge to the battery. Since I am powering more than one piece of equipment I also need a fused distribution panel; universal connectors and the ability for quick exchange of equipment in the event of a failure or upgrade. For this I am also incorporating Anderson Powerpole® connectors.

This project while straight forward for the experienced ham may be full of unknowns for the inexperienced. Let's look at some basics for the various items we will need for the project.

### Power Supply: Which should I use?

There are several types of power supplies on the market from general purpose to specialized units.

For this project we will need a fixed voltage with sufficient current capacity for the project. If you are looking at surplus power supplies make sure it is a 60 cycle power supply, the wrong frequency power supply such as a 400Hz type used in avionics can damage equipment real fast. A 50Hz will not operate well either.

**We need 12V right?** Well not exactly, in the specifications portion of manual for your equipment you should find the recommended operating voltage. This is normally the lowest voltage for the radio to operate correctly. Modern D.C. powered ham radios operate at 13.8V +/- 10 to 15 percent depending on the manufacture. Most mobile transmitters will not produce full RF power at 12V and can become unstable below 12V. Never go above 14V it can damage equipment.

Let's look at two of the A.C. to D.C. power supplies common to hams today: Analog: Consist basically a transformer, rectifier, regulator and filter; they are the time tested, heavy beast most of us have used for years. They are commonly used for fixed voltage applications and heavy duty operations such as repeaters.

## BACKUP POWER, CONT'D

**Switching:** A switching power supply generates a square wave, samples its output voltage then compares it to a reference voltage to regulate its output. It contains a good filter to eliminate internally generated spurious signals. This type of power supply is lighter since it does not contain the heavy transformer traditional analog power supplies rely on. This makes it particle for GO Kits for use when AC power is available. Be careful not to remove the cover unless you are qualified, these power supplies contain dangerous voltages inside.

**Voltage and current needs:** Research the manuals of the various pieces of equipment you plan to operate with this backup system. Plan for worse case which is 34 Amps in this case, realistically I will not be transmitting on two radios at one time. This system will handle 35 Amps maximum from the power supply. I am also installing a 50 Amp safety fuse on the battery in case of a catastrophic short, we will discuss why as we talk about fusing the battery for safety.

**Batteries:** Warning: These batteries contain highly corrosive sulfuric acid, and can explode if mistreated.

Always use caution working with high current batteries, use safety glasses, rubber gloves when handling acid and always safety goggles when making electrical connections. Keep the battery in a plastic container in the shack in case of an acid leak. Never make the last connection be to the battery, this could draw a spark and cause an explosion in the presence of vented gasses. Ensure you are properly charging the battery; overcharging charging can cause the battery to overheat and explode. Never short a battery it can explode.

**Which type of battery to use?** The standard automotive or marine lead acid was the choice for many hams since it was rugged and cheap. It required outside ventilation when it charged and regular checking of the acid/water level.

Today's technology has made improvements; today's choice is the Valve Regulated Lead-Acid Battery. (VRLA) The VRLA battery is commonly known as a sealed battery; they do not require regular service of the water/acid and vent far less gas than the old style flooded lead-acid battery. Among these are the Gel Cell and AGM batteries. They are designed for use in confined and poorly vented spaces.

In a lead-acid battery the internal reaction breaks down water, oxygen is produced by the positive plates, in a conventional flooded-lead- battery it escapes into air through the vents along with hydrogen gas. This depletion of gases on is the reason for water loss.

**NOTE:** Use distilled water only when servicing flooded batteries, impurities in faucet water will contaminate the cells and shorten the batteries life.

VRLA batteries are really recombinant batteries this means the oxygen generated by the positive plates will primarily re-combine with the hydrogen on the negative plates reducing water loss. Gel-Cell: The electrolyte is mixed with silica dust to form a gel reducing the possibility of a spill AGM: the AGM or Absorbed Glass Mat battery has its electrolyte impregnated in a fiber glass mat separator installed between the lead plates. Though these batteries are called "sealed" they always include a pressure relief valve for safety. Unlike the old style flooded battery they cannot spill their electrolyte if inverted or knocked over. VRLA batteries also contain much less acid than the flooded battery, hence their other name "Acid Starved." Check out this "AGM/Gel Cell Battery Capacity Calculator" for a fast determination of AGM & Gel-Cell battery capacity vs. load. [http://www.westmountainradio.com/capacity\\_calculator.php](http://www.westmountainradio.com/capacity_calculator.php)

## BACKUP POWER

### Charging:

The requirement for charge voltage varies by battery type; some chargers are intelligent and can determine the type of battery you are using, and the proper charge state needed. Some need to be manually programmed and others are dedicated to the particular battery type. For AGM 14.5V is typically for a charge and for Gel 14.1V is the norm. Either way when floating a battery, the output voltage should be maintained around 13.8V to the equipment being powered. This is why we need a charging circuit that includes a regulator.



Any deep cycle AGM or Gel-Cell that meets our voltage and current requirements will be suitable for our needs. They are available from several sources local, Hamfest and on line.

I am using a HR12-350 AGM by Energy Storage Technologies. The battery is a storage pull from a company that services UPS systems for major corporation's. They can only keep spare batteries on the shelf for a limited time then discard them even if never used. Most cities have these companies and they are often willing to donate these batteries to local hams for EMCOMM purposes if asked nicely. You can also purchase suitable batteries from West Mountain Radio at:

<http://www.westmountainradio.com/batteries>

### Controller/Regulator:

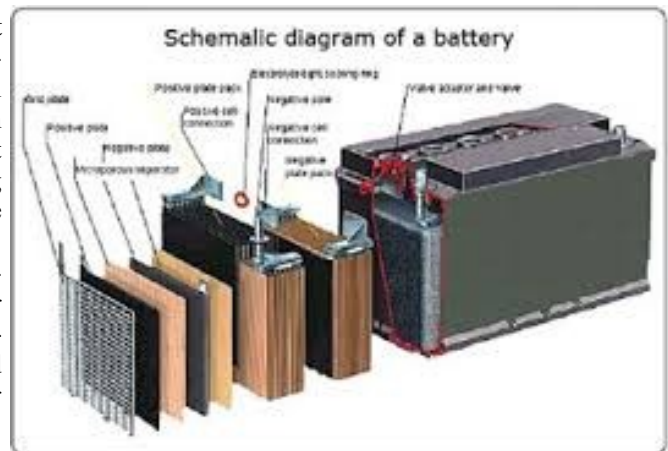
Basically all you need to switch between a battery and power supply is a pair of switching diodes of proper voltage and sufficient current capacity configured in to an OR gate. We also want to properly charge the battery. For this project I chose the Super PWRgate PG40S.

### Distribution:

There are many ways to distribute the output of the power gate to the radios. Building your own cables using Powerpole® connectors is not hard; if you are not familiar with them take a look at this link for information on how it is done. <http://www.westmountainradio.com/videos>

For correctly installing Powerpole® connectors with ease consider the PWRcrimp Crimping Tool. An inexpensive tool that works well. I have purchased additional dies for use crimping RF connectors making it a more valuable addition to my Powerpole® connector kit. <http://www.westmountainradio.com/PWRcrimp>

I also selected the RIGrunner 4012 it has a fused 40A input and fused outputs varying from 20A to 1A. I can add additional equipment and can increase the capacity of any output by changing the fuse sizes including the primary just keep in mind the maximum current limit of the system. For the radio connections do not double fuse by using fused factory power cables doing so will increase the delay time in protecting a circuit. Instead purchase or build non fused power cables.



## BACKUP POWER

### **Wiring:**

It is important to have to proper size and type of wire for the current draw and voltage. In the US we typically use the American Wire Gauge or AWG for measuring wire size. Look on the jacket for the AWG # for example 8AWG this is the wire size. If you are trying to determine the wire gauge physically do not include the wires insulating jacket as part of the wire size. The insulation jacket thickness can vary by manufacture and intended application. The safest way is to identify by the jacket markings or the spool if one.

### **Should we use stranded or solid wire?**

If a wire is made up of several small strands of wire instead of one large wire it has a larger surface area allowing the capability to carry more power than a solid wire. This also results in less heat dissipation of the power in the wire. It also allows more surface contact with a connection in comparison to a solid wire. It is more flexible than solid and therefore fewer tendencies for breakage from movement. This is why good automotive battery jumper cables and welding cables are commonly made of fine stranded wire. Some stranded wire will have less and larger strands depending on the intended capability of the wire to handle a given load and physical size. In our application we are using red/black zip cord. Beware of discount wire that has fewer strands.

West Mountain Radio is a good source for quality zip cord. See their site recommendations of wire size with Powerpole® connectors. When using a wire capacity chart remember automotive and other D.C. wire is stranded and home and A.C. wiring is typically solid. Keep in mind the length of the wire run as well as the current load and of course voltage.

Here is a very useful calculator to aid in determining the correct stranded wire size for a 12v D.C. system. <http://www.westmountainradio.com/cable>

I have found in the ham world the size of your factory power cable will vary typically eight to ten feet in length and be of varying gauge depending on the radios current needs.

### **Starting to put it together:**

It is good to start any installation by performing a survey of the area to be used, locate the power receptacle and identify where to locate the best places for the components such as battery, distribution panel and Super PWRgate PG40S to be installed. How long will wiring runs need to be and how you will keep them away from feet and so on. Keep in mind accessibility for maintenance, especially the battery and fuses. Use the calculator above to ascertain the correct wire sizes. I need a 3' wire between the PWRgate PG40S and battery then between the power supply and PWRgate PG40S then to the RIGrunner 4012. #16 AWG is sufficient. The manual for the Super PWRgate PG40S recommends #10 AWG for the battery wire which would give you plenty of capacity for the 40 amps it is capable of and could encounter in a recharge of the battery. If in doubt use a heavier gauge wire for safety and efficiency.

I need a six foot wire between each radio and the power gate, #14 is sufficient. For a computer interface #24 AWG was correct for one half amps on a six foot run. Remember, you can always go up in size but never go down below the load rated size for safety sakes.

## BACKUP POWER

I mounted the PWRgate PG40S on the top of a plastic marine battery box and the RIGrunner 4012 under my radio bench. Be sure to not create a potential short within the box between the battery and hardware. The same goes for any hardware that might rub or puncture the battery case. There are preassembled versions of DC Battery Back-up Boxes available by following this link. <http://www.westmountainradio.com/dc-power>

### Fusing the Battery for Safety:

I chose to use a standard automotive ATC type blade fuse for the battery. These are easy to obtain and DC rated. Resettable D.C. breakers can be used instead of fuses they are however expensive, your choice.

**CAUTION:** Use only D.C. rated circuit breakers.

Everything that is true for fusing A.C. circuits is true in D.C. circuits; but with the addition of one important consideration. D.C. voltages do not go through zero volts twice a cycle like A.C. voltages. What this means is they will not break a D.C. circuit as easily as an AC circuit. What happens is the current wants to keep flowing and sustain the arc that exists when a fuse blows. A fuse will sometimes have two voltage ratings, one for A.C. current, and one for D.C. current. The D.C. current voltage rating is typically lower for these dual rated fuses. Not only does the voltage not go through zero volts, but the inductive load will want to keep the current flowing whenever the circuit is opened.

An overload is an over current condition where the current exceeds the normal full load capability of the circuit and no short-circuit present. A momentary overload condition (known as inrush currents) often occur when a circuit is first initialized due to capacitors charging and/or motor start up. This is especially common when you start up your vehicle with the radio on.

A short circuit is when a low-resistive path is suddenly created which will cause the circuit current to increase as the circuit resistance is decreased. When this occurs the current can exceed 1000 times the normal current of the circuit. When this happens to a battery it rapidly overheats, swells and can explode and or catch fire. Even if it holds the case integrity it often damages the plates beyond further use.

Remember you want to fuse above the maximum current you expect from the battery but still protect it from a dead short. I chose to use a 50 amp fuse however a 75 amp would work just as well.

Hint: keep spare fuses handy for all the values used in the system. It would be a bad day to blow one during an emergency or training net.



## BACKUP POWER

### Conclusions:

I measured at the battery input as well as the output of the Super PWRgate PG40S. There is a good device for testing and recording parameters from West Mountain Radio. I would suggest: PWRcheck. It handles 8 display modes including voltage, current flow in either direction, wattage or amp hours measuring 0V to 60V, 40A continuous load. I measured voltage and current at with all equipment on in receive mode as well as transmit first with individual transceivers one at a time then with both transceivers simultaneously operating in full power transmit in to dummy loads, the V/U radios in FM and the HF rig in AM mode and modulating the audio. The voltage held at 13.11V and worse case for the current was 21.6A. Add the computer interface the power demands at a half of an amp, the system is well within or needs.

Like any project this has been fun, remember such projects can be a learning experience while adding to your resources. Technology is always evolving so there is always something new to learn. I hope you found this useful.

Have fun and be safe.

Steve Blankinship (AG4SO)

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## HAM RADIO CAN BE A HACKERS PARADISE

The weekly electronics publication EE Times carries a short report on amateur radio.

Read the EE Times post at

[http://www.eetimes.com/author.asp?section\\_id=36&doc\\_id=1319600](http://www.eetimes.com/author.asp?section_id=36&doc_id=1319600)

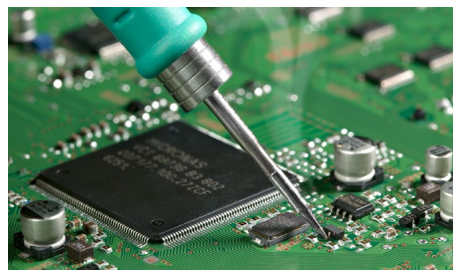
The post highlights an article on Hack a Day written by Bill Meara (M0HBR/N2CQR) who is well known for his Soldersmoke Podcasts.

Read the Hack a Day article at

<http://hackaday.com/2013/09/23/guest-rant-ham-radio-hackers-paradise/>

Soldersmoke

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



# **W8AL**

[www.w8al.org](http://www.w8al.org)

**The Canton Amateur Radio Club, Inc.**

**P.O. Box 8673**

**Canton, OH. 44711**

**President - William Hannon (N8PW)**

**Vice President - Dale Lamm (NX8J)**

**Secretary - Scott Duncan (KK8D)**

**Treasurer - Roger Gray (W8VE)**

**Trustee - Jerry LaRocca (KF8EB)**

**Trustee - Jim Manson (KA8JIM)**

**Trustee - Dennis Moriarty (K8AGB)**

**Trustee - Jerry Shrigley (N8YB)**

**Trustee - Justin Corner (W8JKC)**

**Trustee - Alan Lamb (KB9TAY)**

**Publicity Director - Dennis Moriarty (K8AGB)**

**W8AL repeater = 146.790 MHz**



Our monthly meetings are held every third Wed. at 7:30 P.M. at the Stark County EOC (Emergency Operations Center) (lower level) at 4500 Atlantic Blvd. NE in Canton,.

See our website for a handy map to the location. All are welcome, especially visitors.

## **RADIO MERIT BADGE CLASS PICS**

