Ottawa Amateur Radio Club

Groundwave

P.O. Box 8873, Ottawa, Ontario, Canada, K1G 3J2

May 2013

From the Editor:

Bytown Marine Limited, Ottawa's only ham store, is going out of business. Owner Dick Walker says the demand is not there any more. All of the remaining stock is listed on the web site, http://www.bml.ca. Terms are cash only and the store is only open from 10:00 to 15:00 on Monday and Tuesday. There are a lot of accessory parts for older rigs and lots of good books still available. What doesn't get sold will go into the dumpster.

Take Note: At press time the room for the May meeting had not been finalized. Probably the Billings Room but it may be moved. Check when you get there.

Ian Jeffrey, VE3IGJ, Editor

Check out our Web Page: ***www.oarc.net***

Next Meeting 7:30 pm, Wednesday, May 8th
in the ? Room at Ottawa City Hall

In This Issue....

Ottawa Amateur Radio Club
Groundwave
May 2013

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Articles may be submitted for use in this publication provided that they portray events or activities that promote Amateur Radio. Letters and comments are also welcome. Submissions may be made by mail addressed to the Editor care of the OARC, or by e-mail to "ve3igj@rac.ca". Deadline for submissions occurs three days after the regular monthly meeting of the OARC.

Please support your local radio organisations. They support you!

Club Information

The Ottawa Amateur Radio Club Inc. is an association of Radio Amateurs devoted to the promotion of interest in Amateur Radio communications in the National Capital Area and to the advancement and achievement of club members.

Regular Meetings of the OARC Inc. are held on the second Wednesday of each month (except July and August) in the Honeywell Room which is on the second floor of Ottawa City Hall, formerly Regional Municipality of Ottawa Carleton Headquarters, on Lisgar Street. Meetings commence at approximately 19:30 hours. Further details about each meeting is elsewhere in this publication.

Executive Meetings of the OARC Inc. are normally held on the first Wednesday of each month at 19:30 hours. Contact the President to confirm the date, time and place of the next meeting.

The CAPITAL CITY FM Net meets every Monday (except some holidays) at 20:00 hours on the club repeater **VE2CRA 146.940(-)** to pass traffic and to make announcements of interest to Amateurs in the National Capital Region.

The SWAP Net is a service provided and conducted by Ed Seib, VA3ES. This feature appears on the Capital City FM Net. To list items and make inquiries, got to http://www.ncswapnet.ca. You may reach Ed at 613-738 8924 or e-mail him at va3es@rac.ca.

The Rubber Boot Net runs week days at 07:30 on VE3MPC, 147.150 + hosted by Ed, VE3GX or Mike, VA3TJP. The Rubber Boot net has been running since the early 1980's and is popular for the early risers and the go to work crowd.

The POT-HOLE Net is a SSB/HF net sponsored by the Ottawa Valley Mobile Radio Club and is conducted every Sunday at 10:00 hours on **3.760 MHz**. All amateurs are welcome to check in.

The POT-LID CW Net is an informal slow-speed **CW** net sponsored and conducted by Ed Morgan, VE3GX, and meets every Sunday, except during July and August, at 11:00 hours on **3.620** MHz, to promote interest in CW and CW procedures.

The QCWA CHAPTER 70 Net meets every Monday evening at 19:30 hours on repeater VE3MPC **147.150(+).** You do not have to be a QCWA member to participate.

The Ottawa Valley VHF/UHF SSB Net is sponsored by the West Carleton ARC. Look for it every Tuesday night (except the first Tuesday of the month) around 21:00 on **144.250,** (roll calls after net on 50.150, 432.150, 222.150, and 1296.100.) Horizontal polarization is preferred.

VE3TEN

Tuning in the beacon so that it makes sense requires you tune to **28.175** on **CW** and read the tone that is there . The spaces between the elements are the higher tone. If that doesn't work, tune to **28.175.28** on **lower sideband** for better results.

Voice (VHF) 146.94/146.34 100Hz CTCSS required
(UHF) 443.300/448.300

VE3TVA Amateur Fast Scan Television Repeater
Currently off the air and looking for a new home.

IRLP Node 2040 146.94/146.34 (VE2CRA/VE3RC)
(Code 411 for info) (Code 204 for activity)
(Code 88 for time)
For further information please contact the Repeater Chair.

Note: The IRLP link is not connected to ECHOLINK. Please do not try to connect using the alpha keys on your keypad. It just confuses the operator.
Note: The IRLP link is disabled during the Capital City Net each Monday. It is disabled from 2000 to 2145 Mondays except for May to August when the link is disabled from 2000 to 2020.

Ottawa Amateur Radio Club
Groundwave

May 2013

March Minutes

Meeting Opens
- 2013-04-10 19:30 EST

Guests

Recent Events

Silent Key
- VE3PU Ken Pulfer

Membership
- 85 numbers

Diefenbunker
- the board is meeting tonight to decide on the funding on the antenna project

Upcoming Events

- Rideau Lakes Cycle Tour, Cycle for CHEO, Lanark Highlands Rally all coming soon

- Cub Scouts Fly Day Radio Demonstration
  - May 18th
  - Looking for people to setup a station and demonstrate hamradio to the kids

Main Event

Homebrew Night
- Norm VE3LC
  - Wirewrapped VE3MPC repeater controller from 1981

- Mike VE3FFK
  - 160/80 dual band, horizontal, 1/4-wave antenna

- Ian VE3IGJ
  - 2m copper pipe J-pole that can be disassembled into pieces for transportation

- Dave VE3KL
  - A small windowline HF antenna design

Dates to Remember

2013

Feb. 9, 10	Canada Ski Marathon
Apr. 10	Homebrew Night
Jun. 12	OARC AGM and Elections
Jun. 22, 23	Field Day
Jul. 1	RAC Canada Day Contest
Sep. 7	Hamfest
Sep. 30	Membership Renewals Due
Nov. 1	Joe Norton Award Subm. Due
Dec. 28	RAC Winter Contest

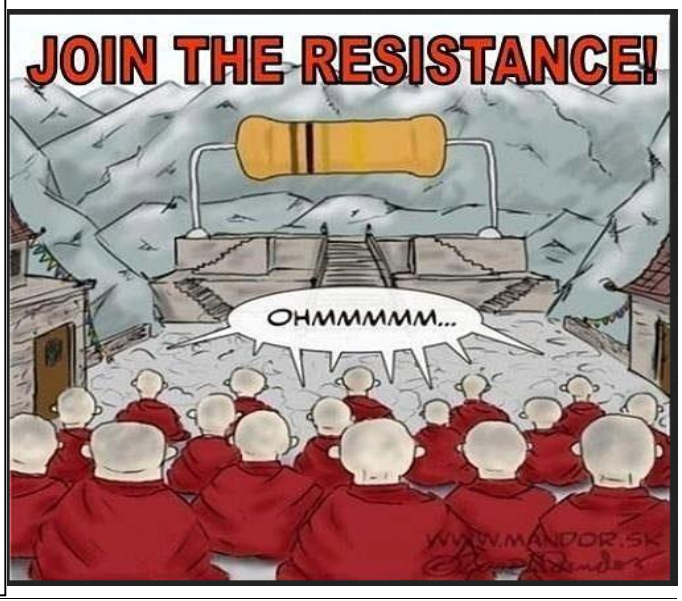
- Brian VE3ZRK
  - built a variety of loads at different impedances

- Doug VE3XK
  - built a static and lightning protector for his radio system

- Winner: Dave VE3KL
- People's Choice: Norm VE3LC

Prizes
50/50 - $18.00 to Norm VE3LC

Meeting Closed
- 2013-04-10 21:10 EST



mk's Word

Having a bad day. Fingers can't hit the right keys. Made two stupid mistakes at the grocery store. Blew my deadline for the Groundwave column. Up to my knees in the magloop project.
On the other hand... Backspace key works on the keyboard. Grocery store mistakes are only small change in the big scheme of things. I have a very forgiving editor at the Groundwave. The magloop project is coming along, with no show stopper snags on the horizon. The snow in my front yard has disappeared and April isn't even over yet. The bugs aren't out yet. Maybe it isn't so bad after all.

How did you feel about homebrew night? Turnout seemed low, as were the number of projects. Although interesting enough, there was something missing. There must be more people doing things out there. - Or are we all just a bunch of talkers now? Some of the interesting projects in recent years have been software. Is no one even doing that any more? What if we did homebrew night some year and no one brought anything? Should we just shut it all down at that point?

On the other hand, there is the magloop project.. I guess it's time for an update for those of you who aren't part of the project, or haven't been getting to the build sessions out at the Tidman's hamshack. Tyler keeps referring to it as a "ship in a bottle", and the construction does resemble that, since the plan is to put the capacitor in a clear plastic tube at the top of the whole thing. The loop is the easy part. The hard part is turning the shaft of the vacuum variable capacitor. We now have motors, and after a lot of searching, finding the exact parts we need are exactly out of stock or worse, will soon have toothed timing belts and pulleys. There are a lot of fussy little bits that one doesn't initially think of, such as a means of attaching the capacitor to the loop. A simple wire won't do it, since it has to be as close to zero resistance as we can get it, while at the same time it has to avoid transferring any stress or torque from the loop back to the capacitor. We also need a ring to hold the capacitor firmly in the Lexan tube, an adjustable bracket to hold an idler / tensioner roller for the belt and a bracket to hold the motor to the tube. All of this has been done. We have a candidate for the box that holds the small loop, upper bias T, and upper RF connector. I expect this weekend's design session will be on the mechanical aspects of this box. We have an idea where the end caps for the tube are coming from. We still need to work out the fine details of getting the loop through the end caps, mostly about waterproofing and strain relief. We need to do a bunch of work on the bias T system, the control box and the dc wiring at the top end (for example, do we run the dc wire directly down from the capacitor tube to the small loop box, or do we run it down the inside of the radiating loop?) All in all, it's the kind of "high wire without a net" project that "real hams" have been tackling for ages. There is something exciting about building from the ground up without a schematic or article to follow unlike with kits and magazine based projects. Give it a try some time.

BTW, I see Bytown Marine is shutting down, with only a list of final clearance items on their web site. If you need an accessory "thing" for your rig, get it while you can.

73 , Keep on building
mk

Puns for Educated Minds

I thought I saw an eye doctor on an Alaskan island, but it turned out to be an optical Aleutian .

She was only a whiskey maker, but he loved her still.

No matter how much you push the envelope, it'll still be stationery.

A dog gave birth to puppies near the road and was cited for littering.

J. Kenneth Pulfer, VE3PU, SK

Ken Pulfer, VE3PU, of Ottawa, Ontario, passed away Sunday, March 31 after a long illness. He was 80. In 1994, Pulfer became the Secretary, then Secretary Treasurer for the Radio Amateurs of Canada (RAC), that country's IARU Member Society. He also served as the RAC's Vice President for Government Affairs and Vice President for International Affairs. When former ARRL Chief Technology Officer Paul Rinaldo, W4RI, retired in 2009, Pulfer took over as Chairman of the ITU Radiocommunication Sector's Working Party 5A Working Group 1, the "home" of the Amateur and Amateur-Satellite Services in the ITU structure. He served as an IARU Technical Representative for 15 years, culminating with the 2012 World Radiocommunication Conference (WRC-12).

"Ken Pulfer was a consummate gentlemen and a tireless worker for the IARU", IARU President Tim Ellam, VE6SH, told the ARRL. "His efforts as Chairman of the ITU Working Group cumulated with our success at WRC-12 in obtaining a secondary allocation at 472-479 kHz. When Ken announced his retirement at the annual dinner of the International Amateur Radio Club during WRC-12, he received accolades from many of those present, including ITU Secretary General Dr Hamadoun Touré, HB9EHT, and from the heads of a number of delegations. He was a well-respected member of the ITU community. We will all miss his keen intellect and support of the Amateur Radio Service."

ARRL Chief Executive Officer David Sumner, K1ZZ, recalled two of the many highlights of Pulfer's volunteer career with the IARU: "The first was his extraordinarily patient and dogged effort to secure protections for the Amateur and Amateur-Satellite Service at WRC-03, where an allocation for spaceborne Synthetic Aperture Radars (SARs) was created at 432-438 MHz. The story is told in Ken's own words in the September 2003 issue of QST. The constraints placed on SARs include significant protection for amateur satellites -- quite an achievement given that the allocation for amateur satellites at 435-438 MHz is on a non-interference basis. The second was his success in persuading the Canadian administration to give its active support to an amateur MF allocation, which contributed greatly to our achieving the new allocation of 472-479 kHz at WRC-12. Once again, it was Ken's persistence that carried the day."

"Ken's chairmanship capped a long professional and volunteer career in engineering and spectrum management, and was marked by the successful effort to obtain a secondary international MF allocation for the Amateur Radio Service at 472-479 kHz", said ARRL Chief Technology Officer Brennan Price, N4QX. "Ken spent 15 years in his retirement representing the Radio Amateurs of Canada and the IARU at various meetings in Geneva. His professionalism, insight and positive attitude inspired and improved all who worked with him."

Licensed since he was a high school student in Manitoba, Pulfer received his first call sign, VE4KP, in 1949. Six years later, after coming to Ottawa to work for the Radio and Electrical Division of the National Research Council of Canada, he became VE3PU. In 1984, Pulfer -- now the NRC's Senior Vice President -- received an honorary doctorate from the University of Manitoba, his alma mater, in recognition of his contributions as "a very distinguished engineer and Canadian". In 2012, the Radio Society of Great Britain awarded Pulfer with its annual Calcutta Key Award -- given for work associated with international friendship through Amateur Radio -- for his work on behalf of the IARU with the ITU.

"Amateur Radio's strong position in the international telecommunications community has only come about because of the willingness of remarkable people like Ken to contribute their talents and extremely generous portions of their time on our behalf", Sumner said. "Their effectiveness sometimes requires that they stay out of the limelight, but they should never be forgotten."

From the ARRL web site www.arrl.org

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HF Amplifiers versus Antennas—One Ham's Opinion

By Kirk A. Kleinschmidt, NT0Z, 16928 Grove St, Little Falls, MN 56345, kirk@cloudnet.com

Think you need a shiny new linear amplifier to chase away your HF radio blues? Think again. What you probably need is a better antenna! Here's why....

Let's start by eliminating any thoughts of fairness and equality regarding this article's handling of the age-old philosophical struggle between amplifiers and antennas. More than a few hams will take exception to my biased statements (common when trampling sacred cows and sneering at tradition), but if you're a typical beginning ham, you're probably wondering whether to buy an amplifier or improve your antenna system—or maybe both.

It's a logical question. You want to improve your station's signal quality, make more QSOs, work more DX stations, rack up higher contest scores and chat with others while enjoying armchair copy. You want to know whether amplifiers are a good investment, whether they'll require additional equipment and services, whether they'll provide the boost in readability you've been desiring and so on.

By now you're thinking that I'm an "antenna guy," and that I'm here—through this article—to persuade you to improve your antenna system. You're right! But beyond the many nuts and bolts reasons detailed herein, I'd like you to at least consider a few philosophical reasons to keep your power output at barefoot levels (or less!). Then, if you're not convinced, we'll take a look at the cold, hard facts about amplifiers and antennas.

Amateur Radio's Middle Path

Amateur Radio operation in the US is constituted as a radio service , with rules, regulations and goals that go beyond the interest of mere hobby operation. In becoming licensed hams, we agreed to play by those rules. One of the most important rules compels us to use the minimum transmitter power required to communicate. That doesn't rule out the use of linear amplifiers, of course, but it does put a damper on their indiscriminate or habitual use.

Powering your amplifier through your shack's light switch certainly violates the rule, as does running maximum legal output power when chatting with the gang across town (or when propagation clearly doesn't require it). The minimum necessary power rule is designed to protect us all. It promotes responsible, considerate operation. Try it sometime! Reduce your 100-W signal to 50 or 25 W. Thanks to years of low-power operating, I know that you'll maintain effective communication most of the time. You'll also improve your operating skills, enjoy a greater sense of achievement and gain an intuitive sense of propagation.

By the way, the FCC's minimum necessary power rule isn't suspended for contest operation, to work DXpeditions, etc. About the only open-and-shut case for the automatic use of maximum available power is for emergency communications. When someone's life is on the line, the more power the better. That kind of service is what the Amateur Radio Service is all about.

Skill Versus Brute Force

Long before David and Goliath had their epic battle, skill has been tangling with brute force. I'm sure you have your favorite analogy. Basically, it comes down to the fact that any idiot can fire up a water-cooled Voice of America-

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size transmitter and blurt out a whopping signal. I place hams who take this approach in the same category as the guys who screech the tires on their 1-ton pickups or water their lawns during drought emergencies. Both are equally impressive, I'm sure. On the other hand, if you align yourself with the Davids of the world, substituting skill and persistence for brute force, you' ll be in better company—and you'll be upholding the tenets of the Amateur Radio Service.

The Golden Rule

Hams treading the Middle Path are concerned about others—hams, neighbors, family members, etc. They try to fit in, to get along, to accommodate a community of interests in addition to their own. They practice the Golden Rule Do unto others as you would have them do unto you (reasonable variations notwithstanding). As hams who comprise a federally licensed emergency service, we enjoy certain protections from Unreasonable local restriction. These privileges are welcome and necessary as a whole, but they can be easily abused. Just because we can transmit a 1500-W signal doesn't mean we should . Just because we can erect a 200-foot-high antenna tower doesn't mean we should.

Hams who follow the Golden Rule integrate their radio pursuits with the pursuits of others—not because they have to, but because they want to! Governments can't legislate common sense. That's up to us. Okay, that's the end of my emotional pitch for restraint. If you're still tempted to reach for the power switch (the high power switch) or dig into your rainy day fund to purchase an amplifier, let's look at the facts.

The Ham Next Door

To start, let's assume that you have a typical shack. A 100-W transceiver graces your operating desk and "talks" to a coax-fed dipole (or two) through a 300-W antenna tuner. Thanks to the tuner, your rig can happily put out full power regardless of actual antenna/feed line SWRs on the various bands you work. You use the same setup as your "Elmer" and most of the guys in the local radio club. Uncounted thousands of hams have used similar setups over the years, so they must work pretty well, right?

Maybe. But maybe not. In fact, you might have noticed that working stations on some bands doesn't seem as easy as it should—especially DX stations. You might even be dreaming of solving your problem by cranking up the power. By adding a gleaming, glowing monster amp to your modest shack, you might think, those stations with once-marginal copy will respond with ease.

It's a comforting image, but it's probably more fantasy than reality. Although you may not yet know it, you'll likely get a lot more signal for a lot less money if you upgrade your antenna system before shelling out the bucks for an amplifier.

The Price of Power

Let's boost our signal a step or two at a time and see how the decibels stack up against the greenbacks. If your amplifier budget is modest, a small solid-state or single-tube amplifier will boost your 100-W barefoot signal to about 500 W. That's enough to be noticed, or so you think—but just how noticeable?

Here's the law every amplifier has to measure up to Every time you double your power output, stations that are receiving your signal hear a 3-dB increase in strength. That's half an S unit! To twitch the needle a full S unit you need to quadruple your power output (a 6-dB increase)!

The power output progression looks like this 100 W doubled to 200 W equals a 3-dB in-

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crease. Next, 200 W doubled to 400 W equals a 6-dB increase. Then, 400 W doubled to 800 W equals a 9-dB increase (exceeding the output power of our entry-level amplifier). Finally, 100 W times 10 equals 1000 W, a 10-dB increase in power output. Our 500-W output amplifier gives us a smidgen more than a one S-unit boost on the other end. That's not much—especially when you consider the cost.

More Power

So, you want to run even more power? Using our calculations from before, boosting your signal to a kilowatt output provides a 10-dB shot in the arm. That's just under two S units on the other end—S3 to S5, S7 to S9, etc.

That's enough of a difference to be noticed, but still not enough to "burn down the barn." And by the way, the most affordable kilowatt amplifiers cost about $1500. If you really go for the gusto and buy a legal-limit amplifier, your 1500-W signal will be about 12 dB stronger than your "barefoot" transceiver. Because of the "price of power," 1500 W is still only two S units stronger! And a legal-limit amplifier is hardly a casual purchase. It'll set your wallet back about $2500.

Hidden Costs

Don't think you can get away with just an amplifier! The power output curve is often deceptive. For example, above 300 W output or so, you'll need a beefier antenna tuner. Expect to spend up to $500 for a good one.

And don't forget about the ac mains, either. You can probably get away with running a 500-W output amplifier on 120 V ac, but beyond that, it's 240 V all the way. (Don't believe me? A 500-W output amplifier runs about 1000 W input power. That's 8.5 A at 120 V. With your rig added in, that's more than 10 A. Believe me, the lights in your house will "jump" to the rhythm of your code key or your spoken words!)

Chances are good that you won't know how (or won't want) to install that 240-V line yourself, either. The materials and an electrician to install them likely will total $300 to $500. Many first-time amplifier users don't consider their beast's power supply requirements until they've set up the amp and started "browning out" the rest of their house! If this is you, you'll be lucky if you don't trash your TV set or your home computer in the process of "modulating" your 120-V power feed!

If you live in an urban setting, don't neglect the potential "public relations" costs of firing up a killer signal in the midst of all those consumer electronics devices. I know...you can legally stand on the solid rock of FCC-mandated power output limits—but be warned, that it can be a lonely vigil.

A Better Way?

To save wear and tear on your neighbors, fellow hams, your wallet and even your house wiring, consider improving your antenna system before investing in an amplifier. Here are some ideas to get you started.

One almost universal way to get out more signal is to get your antenna farther up in the air (your present antenna or a new one). Build a taller mast, find a taller tree or put up a tower.

If that dipole just isn't cutting it, put up a contest-winning and DX-catching secret weapon a full-wave horizontal loop for 40 or 80 meters (up as high as possible, of course!). Feed it with coax and use a tuner on bands above the fundamental frequency. That's a "cheap 'n' dirty" way to snag an extra 2 to 10 dB, depending on frequency. Disconnect the feed line from your coax-fed single-band dipole, the one you try to use on several bands,

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and replace it with 450-ohm ladder line. With a coax feed, even though your antenna tuner may be presenting a happy impedance to your transmitter, feed line losses due to high SWR may slash your signal by 6, 10 or 25 dB, depending on the band and the size of your dipole! By using 450-ohm open-wire line you'll likely reclaim most of that lost power. Now that's a 6 to 20-dB shot in the arm that anyone can afford!

For less than the price of an entry-level amplifier you can buy a multiband beam antenna and a decent rotator. This dynamic duo, mounted reasonably high, will offer a 5 to 7-dB steerable improvement to your signal. Remember Amplifiers only boost your transmitted signal and do nothing to improve reception. By rotating a directional antenna you can often achieve a double-whammy—boosting the signal you're trying to receive while attenuating signals that are unwanted. For example, if I'm working a European ham from my Minnesota QTH, a potentially interfering signal from an op in Florida—located in the side null of my directional antenna—may drop 25 dB or more! The difference, more than 30 dB of signal enhancement, could never be achieved by a lone amplifier. On SSB, learn the correct use of your rig's speech processor. There's another 3-dB (or more) improvement, this time in the modulation department! No purchase necessary!

Aftermath

So, after looking at the cold, hard facts, do antennas win out over amplifiers at your shack? Or will your operating table soon be sporting some heavy iron? As always, the choice is yours. Amplifiers do have their uses—especially after you've tweaked your antenna farm. Add a 10-dB amplifier to a 7-dB beam antenna and you've got a whopping 17-dB improvement in signal strength! That will put you on the map—especially when the minimum necessary power required to communicate calls for maximum smoke. And when conditions are poor an amp may make the difference between being heard and being lost in the noise.

As long as it's confession time, let me come clean.... Most of my operating over the past 23 years has been at QRP or barefoot power levels, but I've used an amplifier every now and then. The first was one that I built myself from scavenged parts. I was seduced by the possibility of a glowing 4-400A transmitting tube, and I was trying to work DX on 80 meters with a poor antenna. The amplifier helped me put a few difficult QSOs in the log, but collateral considerations forced me to abandon my glowing metal and glass monstrosity. The 150-pound amp was collapsing my operating desk, and its draw from the 120-V mains was overwhelming! I could only use it in the wee hours when everyone else was in bed.... After I put up a decent 80-meter antenna, I never looked back. Given the choice, I'll take a "killer" antenna instead of a "rock crusher" any day! How about you?

S Meters and Radio Lore

Something needs to be said about S meters: With a few exceptions, they're inaccurate, nonlinear and of dubious calibration! Each S unit on a typical S meter is supposed to indicate a 6-dB increase in the strength of a received signal. But it probably doesn't. Or it might—at one frequency on one band (or a few frequencies on a few bands). On other frequencies and modes, however, it might provide readings that are way out in left field.
S meters appeal to our senses and to our need to categorize and stratify things in our environment. They can be useful, but we shouldn't rely on them for precise measurements. That's what your brain is for. Use it and forget the bouncing needle!

When Less is More

Now that you've seen that it takes a whopping

amount of extra power to make a noticeable difference in received signal strength, you might be wondering whether the cold equations work in the other direction—and they do!

If you have an okay signal with 100 W, you'll likely have a workable signal with 25 W, or even 5 W. That's the Holy Grail of QRP (low power) operation. The power output numbers work, just like before, in reverse. Let's say that you have an S9 signal with 100 W output. Cutting your power to 50 W provides a 3-dB decrease in strength. Cutting power to 25 W adds another 3-dB reduction. Therefore, going from 100 W output to 25 W output has reduced your received signal strength by 6 dB—only 1 S unit! By drastically cutting your power output, your signal has dropped from S9 to S8! That's not a big deal!

Dropping from 100 W to 10 W is a 10-dB reduction—less than 2 S units. Dropping to 5 W, the commonly accepted threshold for QRP operation, totals 13 dB—just a smidgen more than 2 S units. Your signal will go from S9 to about S7! Again, not a big deal! Add a decent directional gain antenna to the QRP equation and you're back in the old ballpark—while running a lot less power. That's QRP. And it's a lot of fun.

From *QST*, November 1998.

Geomagnetic Effects on Radio Propagation

The Sun emits electromagnetic radiation that spans a continuum of wavelengths from radio, through microwave, infrared, visible, ultraviolet x-ray and beyond. Ultraviolet radiation interacts with the upper atmosphere to form an ionized layer known as the ionosphere. Radio waves interact with the ionosphere in a variety of ways depending on their frequencies. For frequencies below about 30 MHz, the ionosphere can act as a reflector, and this property permits very long distance radio communications around the world. At higher frequencies, above 30 MHz, radio signals usually pass through the ionosphere.

The ionosphere sometimes becomes disturbed as a reaction to some types of solar activity and, as a result, radio wave propagation may be degraded or disrupted. Solar flares emit electromagnetic radiation, such as x-ray emissions which can cause increases in ionization in the lower ionosphere, with consequent phase shifts in low frequency radio signals and increased absorption (fading) in HF and VHF radio signals. The wide spectrum of radio noise emitted from a flare may interfere with a wanted radio signal. These effects may be experienced at all latitudes. At frequencies above 30 MHz, unexpected reflections of the radio waves by the ionosphere may cause radio interference. Ionospheric irregularities may produce fluctuating signals (a phenomenon known as scintillation) and may distort the paths of radio waves. During geomagnetic storms and the associated ionospheric disturbances, scintillation activity may affect certain applications of navigational aids such as the Global Positioning System (GPS).

Solar flares may be accompanied by streams of very energetic particles that travel at near the speed of light. These particles (mainly protons and electrons) enter the upper atmosphere in the regions near the magnetic poles. As a result, the lower levels of the polar ionosphere become very ionized, with severe absorption of HF and VHF radio signals. Such an event is known as a polar cap absorption (PCA) event and may last from days to weeks, depending on the strength of the stream of solar particles and the location of the source region on the Sun. HF radio communication in polar regions is often impossible during PCA events.

Large clouds of plasma (ionized gases), known as Coronal Mass Ejections (CME), can be emitted from the Sun, and may reach Earth, causing disturbances in the geomagnetic field and in the ionosphere. Coronal holes, regions of the solar corona with diminished x-ray emissions, also emit streams of charged particles that can result in disturbances of the ionosphere. Ionospheric disturbances are especially significant at auroral latitudes, such as over much of Canada, and during magnetic storms and substorms at these latitudes, HF radio communication may be unreliable.

www.spaceweather.gc.ca

2012-2013 Membership Application/Renewal

Ottawa Amateur Radio Club Inc., Box 8873, Ottawa, Ontario K1G 3J2

☐Single $25 ($20 after Feb 1, 2013)
☐Family $30
☐Junior $15 (under 18 years of age)
☐New Ham - Free (if licensed in current Membership year)
☐Emailed *Groundwave* ☐Mailed *Groundwave* (add $10.00)

Please Note: Membership year is September 1, 2012 to August 31, 2013.

Family Name: _____ First Name/Initials: _____

Address: _____

City: _____ Prov: _____ Post Code: _____

Home Phone: _____ Work Phone: _____

E-mail address: _____ (For *Groundwave* mailing)

Callsign(s): _____
Qualifications: ☐ Basic ☐ Advanced ☐ Morse Code
Year Licensed: _____ RAC Member? Yes ☐

Other Family Members

Name: _____ Callsign(s): _____
Qualifications: ☐ Basic ☐ Advanced ☐ Morse Code
Year Licensed: _____ RAC Member? Yes ☐

Interests: _____

Comments/Suggestions: _____

All members who are in good standing on or before the December General Meeting will be eligible for a free one-time name badge. Members who wish a second or replacement badge may purchase one at the Club Price (approx $7.50 plus tax). Ordered badges will be available in January.

Do you want an **OARC NAME TAG?** Yes ☐ Second or Replacement Yes ☐

ORDER DETAILS - As to appear on badge:

First Name _____ Call Sign _____