

# The SIGNAL



The Newsletter  
of the  
Bella Vista Radio Club



Vol. 1, No. 1 – APRIL 2018

*Inaugural Issue*

Weekly Nets: 3820 KHz Roundtable, Sundays @ 4 p.m. • 147.255 Repeater Net, Wednesdays @ 8 p.m.

Monthly Meetings: 1<sup>st</sup> Thursdays @ 7 p.m., Highland Christian Church, 1500 Forest Hills Blvd

Club Call: N5BVA • [www.BellaVistaRadioClub.org](http://www.BellaVistaRadioClub.org)

*Welcome* to the inaugural issue of The SIGNAL, your new monthly newsletter of the Bella Vista Radio Club, with a keen focus on what's going on in amateur radio in and around the Northwest Arkansas area. A hearty thank you to new member Don Banta, K5DB, our new editor. This is your newsletter, so feel free to tell us what you would like to see more of, or perhaps what you don't care for.

73 – Glenn/WB5L & Ron/K5XK



# **BVRC Officers**

**President – Glenn Kilpatrick, WB5L**

**Vice-President – Chris Deibler, KG5SZQ**

**Secretary – Ron Evans, K5XK**

**Treasurer – Marc Whittlesey, WØKYZ**

**Technical Officer – Steve Werner, K5SAW**

**Repeater Trustee – Fred Lemley, K5QBX**

**Public Info. Officer – Gregg Doty, KF5ZIM**

*From Your Editor~* Hello all: I would like to take this opportunity to thank the officers of BVRC for their entrusting me with the position of Signal editor. I do not know all of you yet, but looking forward to getting to know each and every one of you. With attending the first BVRC meeting on 3/1, I already felt the camaraderie among you and already realize that BVRC is a great club. Yes, I am new to BVRC, but not very new to amateur radio...will celebrate my 50<sup>th</sup> year as a ham next year, lol.

In the issues to come, we will be featuring lots of articles and topics that we hope you will find beneficial and aid you in your enjoyment of amateur radio and BVRC. We also plan to have some just plain fun and entertaining articles to offer-up as well.

Again, I am honored that I was considered to undertake this work and will do my best – along with your help – to develop an enjoyable and informative newsletter for all of you. We are here to serve.

73 for now – *Don*, K5DB



**QST! QST! QST!**

**From: Fred Lemley,  
K5QBX**

To all amateurs, application has been made to the FCC for a club callsign for our Bella Vista Radio Club. The application has been granted by the FCC and the club has been granted the call sign **N5BVA**. The club call sign will be used for the ARRL Field Day, Jamboree on the Air with the Boy Scouts, and any other special events in which the club participates.



# Great Turnout and Great Program for BVRC March Meeting!

The BVRC March meeting was well attended with almost 40 members and guests who turned out to see and hear Mark Parmer, NW5AR, show remarkable photos and share observations, experiences and lessons learned while providing EmComm last fall on the hurricane ravaged island of Puerto Rico.



Among lessons learned from the experience, operators must be flexible, take as much gear & accessories with you as possible, and remember that there's nothing better than a good map!

Mark heads up the Southern Baptist's Disaster Relief Communications team for Arkansas, lives in Tontitown, and is active with the ARKAN in Springdale. Mark's PowerPoint presentation is available on the BVRC website, along the meeting minutes



BVRC President Glenn – WB5L presents Mark Parmer – NW5AR with the club's Certificate of Appreciation



Enlargement of certificate presented to Mark, created by BVRC Public Information Officer Gregg Doty – KF5ZIM

## From The Desk of the President

On behalf of the Officers, Committee Chairpersons and the great group of Amateur Radio Ops and their families, I welcome you.

You are among over 50 talented men and women who are members of the Bella Vista Radio Club, Northwest Arkansas' largest, and part of over 1,200 licensed Hams in the growing area of NW Arkansas region.

For some of you this may be your first radio club experience, and this newsletter is for you. We will report on a variety of news activities within our club, its function, and how it works on behalf of the membership. Enjoy this new club benefit, and as always, let us know how we are doing.

Your club and its leadership have a knowledgeable group of seasoned ops that are ready and willing to assist you. We have all the normal radio club activities such as the VHF repeater, regular meetings with engaging and informative programs, VE license testing, a robust website, and numerous club activities. We strongly encourage active membership participation because we believe the club is all about serving our members and communities. We are all learning and growing alongside one another, because the great "art" of radio has so much to offer. Our vision for the future is outlined in our [Mission Statement](#) on the website and we need you, so let us know your thoughts and ideas for the club. This is a place for you!

Hams are unique in our ability to enhance goodwill amidst the world's stage, as well as our local area. We want to thank you for your friendship and continued support. We stand ready to serve your needs.

73 and God bless,

*Glenn Kilpatrick – WB5L*

## DMR – The Choice by Randy – N5LML



Digital Mobile Radio is my digital mode of choice. D-Star (Digital Smart Technologies for Amateur Radio) and Yaesu System Fusion are good to, but they are proprietary. D-Star is tied to Icom (and now Kenwood), and Fusion to Yaesu.

Because DMR was first used by commercial radio, there are a number of used radios available, but better than that is the glut of Chinese inexpensive radios on the market – The \$89 Tytera. The TYT MD-380 is by far the most popular and is a well-proven solid handheld radio. The other digital radios by Icom, Yaesu and Kenwood have a much heftier price tag. My hope is that popularity, in time, will demand a single standard. I can't see many hams wanting to invest in three radios to do it all. 45-watt mobile transceivers are available, as well.

Most of what I say next would apply to DMR, Yaesu Fusion, and D-Star. As most of us know, digital signals get through when analog signals don't have a chance. So these digital modes can be used in ways that you never hear much about. You can use digital repeaters that are not tied to the online networks. This has a very distinct advantage in that it is full quieting as long as a signal is present, so there is no white noise. DMR, for example, sends what you say in 20 millisecond packets, so battery life in HT's is greatly enhanced. You also have extended range for simplex operation. I think this could be a real plus for emergency communication if we can ever settle on a common standard.

DMR, for me, allows me to do what I got into ham radio in the beginning for - to talk to other people with similar interests. I held out for months thinking things like, "Is DMR really ham radio? Will these modes cause us to lose valuable spectrum allotted to us?" Here is my personal conclusion: It is very important to do all we can to increase the numbers of new hams into the ham radio way of life.

One of the exciting things we have to offer are all the frequencies and modes, and most hams are curious by nature and if the money holds out, they want to try out as much as they can get their hands on. We must introduce all the facets of our hobby to new and prospective hams, or how will they know what the world of ham radio is all about? We are using some valuable under-utilized spectrum on UHF with these digital modes. What we use is what we will have available to us. So I am at peace with all that in my head.

Most DMR radios/repeaters are networked around the world or regions via the internet. You can talk on the air to a DMR repeater in two ways, with your HT or mobile radio. If you are not near a repeater, you are not out of luck at all. If you have the internet, you can use your radio to transmit to what is called a "hot spot" that is connected to the internet through an ethernet port on your router. This will allow you to communicate to a repeater the same as talking to it over the air. You can use your hot spot in and around where you live.

I live in a neighborhood with a POA that has antenna restrictions. This is what started my interest in DMR, and although I haven't had a lot of time with my radio, the time I have had has been very enjoyable. These digital modes give us a very reliable backbone of communication when radio conditions are poor.

All DMR radios must be programmed from a computer, and you have to request a DMR identification number from your network provider (for example, Brandmeister Network) in order to use DMR on the repeaters and talk groups. Whether you are talking around the world or across town, I know you will love it, and I look forward to talking to you on DMR.

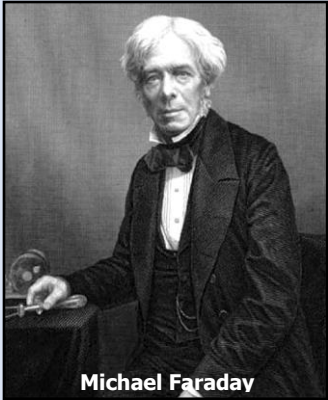
HAM RADIO  
is the  
Greatest!



# The Birth of Radio

– by Steve Werner, K5SAW, BVRC Technical Officer

Radio communications has certainly become a common way of life today, but it really has not been very long since radio waves were first predicted and later demonstrated. Electrostatic and Magnetic effects have been known for centuries, but it was not until the 1800's that scientists demonstrated the connections between electricity and magnetism. Michael Faraday is credited with the idea of electric and magnetic fields, and he used those fields



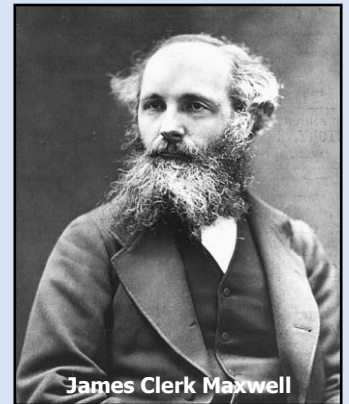
Michael Faraday

in 1830 to describe electromagnetic induction where a changing magnetic field creates an electric field. Many other electric and magnetic discoveries were made in the early to mid-1800's by Andre Ampere, Hans Christian Orsted, Jean-Baptiste Biot, Lord Kelvin and Felix Savart. However, James Clerk Maxwell in 1865 consolidated all these discoveries into four simple equations to describe all the known properties of the electric and magnetic fields as well as describing a new traveling electromagnetic wave created by electric and magnetic field interactions. Maxwell calculated the speed of the traveling electromagnetic wave in free space, and this speed matched the currently measured speed of light very accurately. This well confirmed that light was made of a traveling electromagnetic wave, but the equations did not limit the electromagnetic wave to the frequencies of light. Many folks postulated that invisible forms of this electromagnetic wave should exist, but it took another 23 years (~1888) for Heinrich

Hertz to demonstrate these invisible electromagnetic waves which were later named radio waves.

Maxwell's Equations in a nutshell.

- 1 The total electric field lines (flux) going into and out of a closed surface is equal only to the amount of charge inside the closed surface.
- 2 The total magnetic field lines (flux) going into and out of a closed surface is always equal to zero. This means it is impossible to have a magnetic monopole (i.e. just a north or just a south pole magnet).
- 3 A changing magnetic field produces an electric field. This is just Faraday's law of induction, and it is the principle behind electric generators.
- 4 An electric current flow will produce a magnetic field, and a changing electric field will produce a magnetic field.



James Clerk Maxwell

Equation number 4 is where radio waves were born. The first part of the equation (Ampere's Law) describes the magnetic field that results from electric current flow, and this is the principle behind an electromagnet. The second part of the equation, often called the displacement current, was hypothesized by Maxwell simply to make the equation mathematically consistent, but the implications of this hypothesized term were huge. Equation 3 tells us a changing magnetic field makes an electric field while equation 4 tells us a changing electric field makes a magnetic field. The electromagnetic wave is just the back and forth action of the changing magnetic field making a changing electric field and this changing electric field making a new changing magnetic field.

The final triumph for Maxwell was predicting the speed that an electromagnetic wave would travel in free space. The magnetic permeability ( $\mu_0$ ) is the measured resistance encountered when forming a magnetic field in a vacuum, and the electric permeability ( $\epsilon_0$ ) is the measured resistance encountered when forming an electric field in a vacuum. Maxwell showed that 1 divided by the square root of  $\epsilon_0$  times  $\mu_0$  was equal to the speed of light. It is truly remarkable that two measured physical quantities could be used to calculate the speed of light and radio waves.

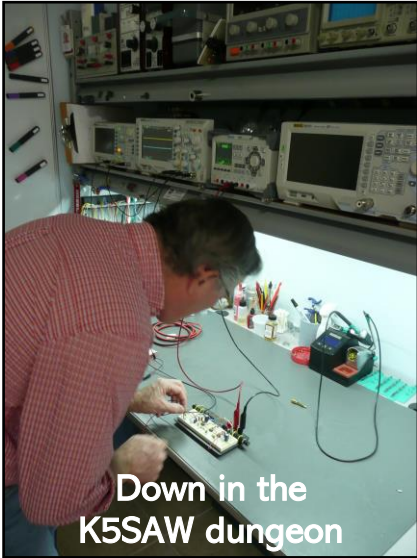
After Hertz's radio wave demonstration in 1888 (130 years ago) the pace of radio communication development was incredible, and by 1909 there were already 89 amateur radio stations listed in the *Official Wireless Blue Book of the Wireless Association of America*.

# ALL – PASS FILTERS

by Tom Carroll – KE6UWB

## *All-Pass Experiments*

The other day Steve Werner, K5SAW, told me about an interesting experiment he was doing with CW audio phasing. If the left and right earphones are 180 out of phase the signal is supposed to appear to be floating in front of the listener's head. This may sound a little bit woo-woo, maybe a technique for doing code and yoga at the same time, but it is supposed to help the brain pull the signal out of the noise. It is called *binaural listening*.



Bob Heil sold the daylight out of his headsets that had a phasing switch for one phone, so who knows. I was sure I had heard of this technique in a recent era of QRP, but a trip through the stack did not produce the article.

Steve had built an opamp band-pass filter and modified it to an all-pass to try the binaural effect on 75. An all pass, as I didn't recall, gives the center frequency a 180 degree phase shift and gives everything else a shift determined by how far it is from the center. He thought if the 180 degree binaural phase shift only occurred at the desired frequency, that frequency would appear to be centered and the others would be spread to the left and right.

During his experiments he noticed that the lightning crashing, crackle, and hiss in one earphone was terrible, but not even audible on the other. It looked like the all-pass circuit was wiping out the impulse noise.

As you each recall, Mssr. Fourier informed us that a pulse waveform, with steep skirts and fast rise-time, is actually composed of a whole bunch of odd number harmonics all stacked together in a group, each harmonic beginning in phase.

I was surprised to learn that an impulse is different: it is composed of all the harmonics and everything in between; a continuous spectrum of frequencies. If the impulse is infinitely narrow, the spectrum has infinite frequency components. As the impulse widens, it goes through a no-man's-land until it is sufficiently wide to be called a pulse. In between, it is neither fish nor fowl.

There is only so much energy in the impulse to begin with. It is the tiny pieces of energy from each frequency all added up. When the all-pass spreads out the concentrated energy in time, each of the infinite frequencies takes away its piece of the energy, This should basically dilute the impulse to the point that it becomes inaudible. Viola!

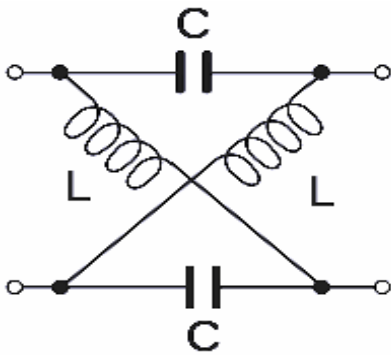
Naturally, when we went to give it a try, there was no lightning anywhere over the entire planet Earth on any band, so Steve had to set up a van de Graff generator for some of that old-fashioned, home-made lightning. We listened to 75 with our custom crashes in the background.

The left earphone was straight from the radio and the right channel from the filter. The noise in the left channel was noticeably louder with both earphones on, but sounded the same with one at a time. There was a distinct difference, but we couldn't tell if it was acoustic, psycho-acoustic, or psychosomething else. It's the old story of ending up with more questions than you start with.

The binaural effect, though, was a great improvement over simple phase inversion, and that was what the experiment was all about in the first place. It spread out the unwanted signals as expected and deserves more attention.

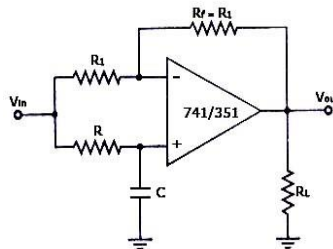
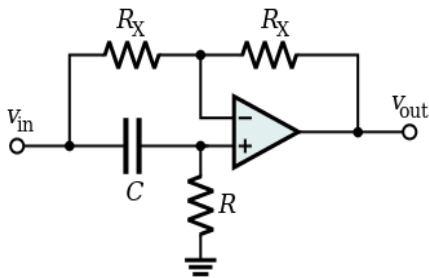
In the circuit we were working with, Steve didn't have the ability to sweep the filter, so that remains to be fooled with. Also, he patched in 1,2,3, and 4 stages, with each added stage increasing the phase shift. When the phase shift goes past 0 or 360 the big picture gets hard to think about.

Probably Hiram Maxim experimented with an all-pass on his kitchen table at W1AW, but so far, our cursory search has not identified his prior art. In any case, an all pass filter can be built for your own enjoyment with this LC circuit. The inductors may take up most of your kitchen table, though.

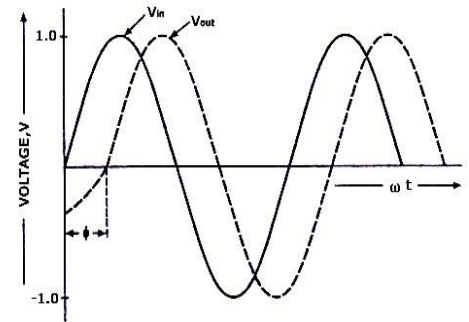


The van de Graff throwing a very small bolt to the knuckle. Unmolested, it will arc to the floor.

An opamp circuit might be a bit more practical. Here are two slightly different circuits lifted from the web; notice the venerable 741 still in there doing yeoman's duty:



Circuit Diagram

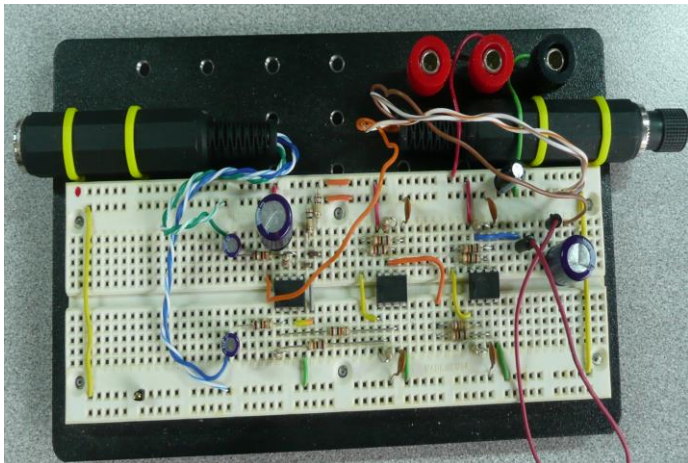


Input and Output Waveforms

All Pass Filter

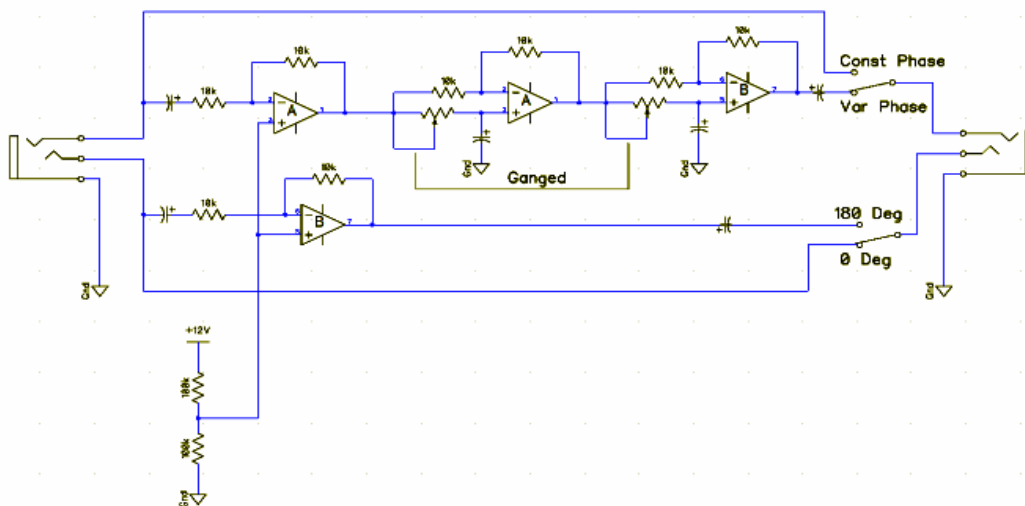


Here is Steve's more finished approach:



Buffer on the left,  
followed by two dual filter ICs

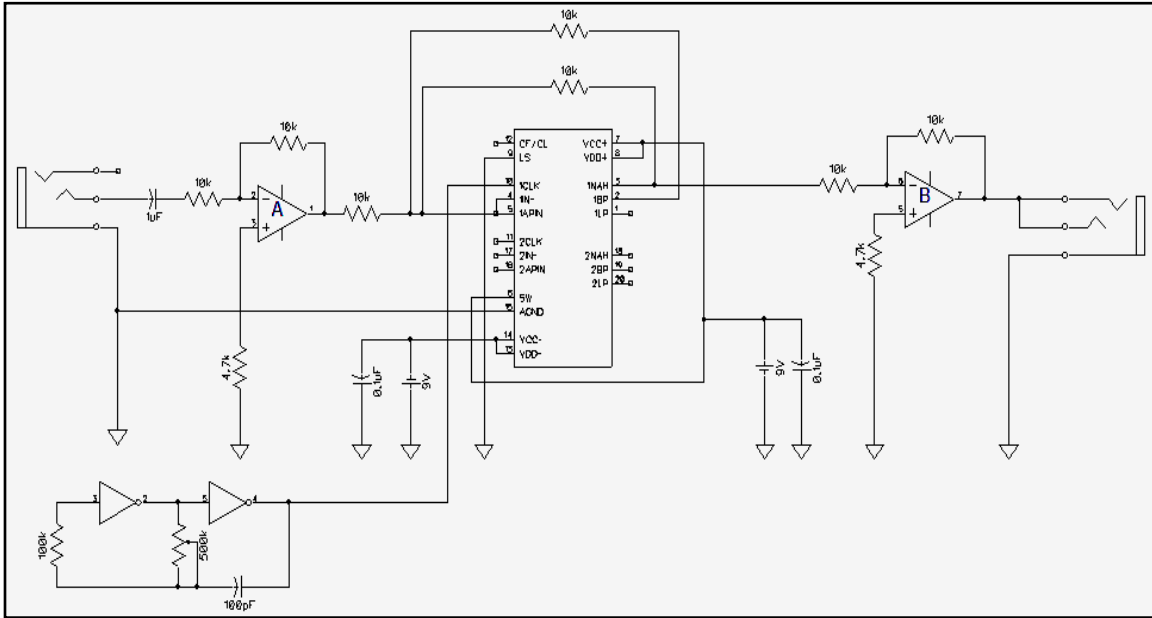
Buffers on the left followed by filters A and B of one package.



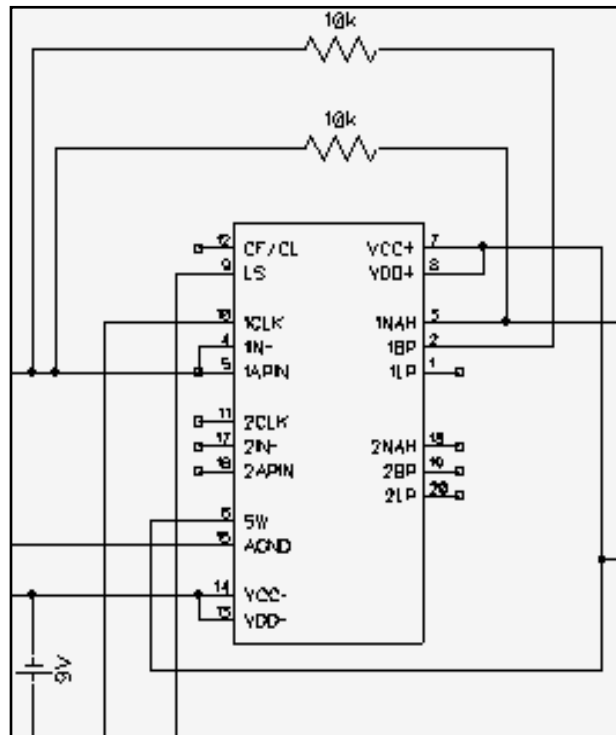
The two opamps at the input are impedance buffers, each biased to  $V/2$  by the divider. The all-pass is done with two stages to increase the phase shifting. A 10K filter resistor on each section has been replaced with a pot to allow the center frequency to be swept. The upper switch cuts the filter in and out and the lower switch cuts the binaural phasing in and out. The resistors are all 10k except for the divider which are 100k.

If you note, the pots are ganged to track in unison. This is a practical problem for the builder unless you are knee deep in ganged pots. They used to grow on trees, but alas, no longer do.

The next incarnation of the all pass was this circuit that used the old Texas Instruments MF-10 universal switched capacitor filter.



Note split +9V supply to MF-10. The clock is on a separate 5V supply.



Detail of hook up.



If you have never played with switched cap filters, you are in for a treat. They are easy to use, have almost no parts, and the chips are pretty cheap. This is how they work: if an RC filter has the cap connected *all* the time, the circuit thinks the cap is its nominal value. But if the cap is switched in only *half* the time, the circuit thinks the cap is *twice* the nominal value. The center frequency is tuned by changing the clock rate that switches the cap in and out.

The dodge here with the MF-10 version is to use a cheap, single pot to control the clock going to both filter stages and get around the requirement for the expensive ganged pot.

There are lots of universal switched cap filters. You might look at Maxim, Analog Devices, Linear (now part of AD), and TI, and I'm sure more.

The current TI MF-10 is a SOIC part and does not appear to be available any longer in a through-hole DIP package. They are about \$4.00.

I ordered some freebie samples from Linear: The single section 14 pin DIP LTC1059 and 20 pin DIP dual filter LTC1060.

**Go here:** <http://www.linear.com/product/LTC1059>

On the upper right hand side there is a "BUY" button and a "Request Samples". Click on "Request Samples", select QTY= "2" for your cart, you will then be directed to the name and mailing address page. A few days later, magically, they will show up in your mailbox. Most of the chip manufacturers sample out parts.

I will follow up this article with the late-breaking updates. There are also some other interesting all-pass experiments to be tried. If you know something about this or have some results from your own experiments, throw in your 2cents.

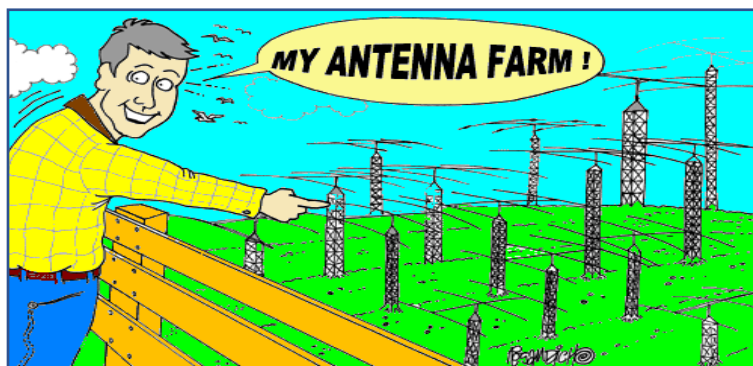
**NEXT BVRC  
MONTHLY MEETING!!!**

Thursday, April 5, 2018 – 7:00 pm  
Highland Christian Church  
1500 Forest Hills Blvd.  
Bella Vista, Arkansas

**April Program: What is EMP???**

Why is it important to you and your family, and how to prepare for it. Steve, AF5YM, a friend of our 3820 Roundtable on Sunday afternoons, will be making the 3-hour drive over from Newton County to present this must-see program. Spread the word! Bring a friend or guest with you!

See [www.BellaVistaRadioClub.org](http://www.BellaVistaRadioClub.org)  
for the location, a Google Map, and more.







Follow these links to interesting articles and stories for this month:

[Orlando HamCation event: Ham radios offered lifeline to Puerto Rico after Maria](#)

[Passion of Amateur Radio](#)

[How to Prepare Now for the Emergencies, Disasters You'll Likely Be Facing Tomorrow](#)

[Ham Radio from a prepper's perspective](#)

Hamfest calendar: Go to the [Club website](#)

## Member's Corner

B  
V  
R  
C

### **Happenings and goings-on with Bella Vista Radio Club members:**

WD9AEN – New member Joe in Springdale, “Raking the yard and waiting for the UPS truck to deliver my new IC-7300 (at which point all raking will cease!). Then I need to decide what to do with my trusty ol’ Kenwood TS-430S!”

AC5LX - Bob recently donated a Radio Shack HTX-202 H.T. with speaker-mic and up-sized rubber duck antenna to the club, for loan to new hams.

KF5ZIM - While Gregg has patiently awaited warmer weather to finish-up his tower and antenna projects, our new PIO has been busy designing a wide variety of banners, signage, name badges and other personalized 'swag.' Did you notice Gregg's new plaque design?

KG5ANT – Frank added a new balun to his K4KIO HF Hexbeam and is recovering from a computer crash, reconfiguring his HRD (Ham Radio Deluxe) software.

K5UNX – Wayne is contemplating a new multi-band wire antenna to go up in his trees before the leaves become dense. Wayne has also agreed to assume the job as club Secretary. (Thanks, Wayne!)

K5SAW – Steve has been experimenting with “EasyPal” digital slow scan TV.

W0KYZ – Marc participates in an ‘almost daily’ on-air HF propagation group. In addition to discussions, they QSY (shift frequency) from band to band, to investigate openings and favorable propagation.

N5LML – Randy has new DMR gear and is thoroughly enjoying the new digital mobile radio standard.

K5XK - Ron is planning to bring down the remnants of his big HF Cubical Quad and replace it with a Hexbeam.

K5DB – New member Don operated mobile on Mar. 10 & 11 in the Oklahoma QSO Party, traveling almost 800 miles. He activated 28 counties while operating HF mobile CW and SSB across Eastern OK!

## *Welcome new BVRC members!:*

San Hutson – K5YY – Springdale  
Jay Bromley – W5JAY – Tontitown  
Mel Hagen – AF5GF – Johnson  
Brian Doty – KD8VSD – Rogers  
Tom Pitts – KG5TUE – Bella Vista  
Eric Nilsson – W4ALW – Rogers  
Alan Katz – KEØQFO - Washburn, MO

Paul Dixon – KK5II – Springdale  
Kathy Bromley – WQ5T – Tontitown  
Jessie Costulis – KG5YJV – Bentonville  
Stephen Rockwell – KEØPWA – Pineville, MO  
Don Banta – K5DB – Springdale  
Bob Rainbolt – WBØAUQ – Bella Vista

## **S**trays.....



A few members of BVRC recently attended the Arkansas River Valley Hamfest on March 3 in Russellville, AR, where they also had a very good visit with ARRL state and division officers. From left to right: Ron Evans – K5XK, Jay Bromley – W5JAY, ARRL Delta Division Director David Norris – K5UZ, ARRL Delta Division Vice Director Ed Hudgens – WB4RHQ, ARRL Arkansas Section Manager Jay Ferguson – N5LKE, and Don Banta – K5DB (Thanks to Jay's XYL Kathy – WQ5T for snapping the pic for us!)



**That's it for this month everybody! Enjoy the arrival of spring, and we'll be looking for you at the next BVRC meeting on April 5<sup>th</sup>!!! Until then...vy 73!!!**

**THE SIGNAL** newsletter is published monthly for members of the Bella Vista Radio Club. BVRC disclaims any responsibility for the accuracy or the content of articles published herein. The opinions expressed are solely those of the authors. BVRC neither necessarily endorses nor opposes said opinions, brand names, products, businesses, etc. As the pursuit of excellence of amateur radio related news, items, articles, and material in this newsletter is ongoing, suggestions or requests as to how to improve its quality are welcomed. BVRC members are encouraged to submit articles to the editor, Don Banta-K5DB, 3407 Diana St., Springdale, AR 72764 (or E-mail to: [arsk5db@gmail.com](mailto:arsk5db@gmail.com)) for possible publication in this newsletter. The deadline for articles is the 5th of each month.