



YAVAPAI SIGNAL



The Yavapai Amateur Radio Club • Prescott, Arizona • DM-34 • Volume 29 - No.2 • February 2014



If you were not able to attend the January meeting, please welcome Tom Griswold WN7E as our newest Board member. Tom has served YARC well in the recent past and I am most pleased to have him on the BOD for 2014.

The YARC “Sweetheart” Party is coming up fast. Carol KA7LKW is doing a great job organizing the event. The date will be Saturday, February 22, 2014. The location is Stone Ridge Country Club in Prescott Valley. Please plan to attend and bring your “sweetheart”. The sign-up form is in this issue of the “Signal”, but time to register is getting very short. Carlo must tell the caterer the people count and the food selections in just a couple of weeks (from this writing). So, please mail your registration to me right away or bring it to the meeting.

As Bud N7CW told us at the January meeting, there is a year-long QSO party going on to celebrate the ARRL 100th anniversary, including the opportunity to operate as W1AW/7 during March and chances all year to earn points for QSOs with other ARRL members and officials, and to work the ARRL Headquarters station (now) W100AW. I am sure, that our guest speaker will have much to say about all the ongoing festivities.

Our special event club, the Granite Mountain Hotshots Memorial Radio Club, now has an appropriate callsign, N7GMH. Thanks to Doug KV8TD for all the footwork in applying for a new club call and then converting it to the “special” call.

I am looking for someone who would like to assume the task of coordinating our licensing classes. Hopefully, it won’t be a difficult job. But, if you visit the “classes” page on the YARC website, you will find that we are trying to get interested people to let us know what they need in the way of classes, and to work from there. Also, if you have taught licensing classes in the past, please let me know. We

would very much like to have a number of instructors available so we don’t burn out anyone.

I hope all of you make it to the February meeting, and welcome our guest speaker, Robert Spencer. **Don’t forget, 7:00 PM, February 6th.**

Don, WB7TPH

February Program:

By Don Bauer, WB7TPH

Following our February 6th meeting we will have a guest speaker, Robert Spencer. Rev. Spencer is the Arizona Section Manager for ARRL. He will have, I am sure, much to tell us about the status of amateur radio in Arizona and the ARRL’s 100th anniversary QSO party. Please welcome him to the Yavapai ARC.

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There was no December Board Meeting due to holidays

**Minutes of January 2, 2014
General Meeting
at Granite Mountain Middle School, Prescott, Arizona**

18:59 Meeting was called to order by WB7TPH.

19:01 All Members and guests were asked to introduce themselves.

19:11 A motion was made to accept December 2013 minutes as reported in the "Yavapai Signal". Motion was seconded and unanimously approved.

19:12 Motion made and seconded second to approve the Treasurer's report as published in the "Yavapai Signal". Motion was unanimously approved.

19:13 WB7TPH called for acceptance of new member applications. Accepted by acclamation.

19:15 Committee reports:

Event Communications: WA6ZZJ reported on upcoming events.

Patches and Badges: W7BJ has for sale patches and badges.

Shirts: K6VVR has shirts to deliver.

Repeater: K6VVR reported club repeater in good working order; looking for opportunity to add a 450 Mhz repeater and get IRLP back up.

Fox Hunt: K6VVR reported there will be a fox hunt Sunday 5 January 1:00 PM.

License Testing: WB7TPH stated that a testing session will be held 8 February 2014 @ 09:00AM.

School club: KB7TRE stated school club active with four regular members.

19:30: N7CW did a brief presentation on the ARRL cen-

ennial QSO party. YARC will have an opportunity to represent AZ as W1AW/7 during March. Sign up by contacting Bud N7CW.

19:44 WN7E offered to assume the vacant board seat left by Roger KD5VRW. Motion was made to approve; approved by acclamation.

19:46 WB7TPH issued Certificates of Appreciation to AC6AA (Yavapai Signal newsletter), AE7CG (past club secretary), K6VVR (fox hunt extraordinary), N7CW (club elmer), W6CCD(website), and WB9VGJ (VE Liaison).

19:52 Meeting adjourned by WB7TPH.

20:05 50/50 drawing: \$40 prize was won by WB9VGJ.

20:10 Presentation: "Techs on Ten" by Bruce Jaeger KE7TDR. Program focused on HF privileges available to technician licensees.

Respectively submitted by
Forrest Murdoch, WH6EAL
YARC Secretary

Need a Hand?

If you need assistance, we want to help you. If you are just starting out in ham radio, or simply have run across something that you could use a hand with... technical assistance or answers to questions about the Yavapai Amateur Radio Club, are available from knowledgeable club members.



Don't Hesitate to Ask for Help!!

CALL:

Bud Semon, N7CW at: (928) 771- 8267

or

Jim Zimmerman, N6KZ at (928) 713- 0542





Yavapai Amateur Radio Club
 PO Box 11994
 Prescott, AZ 86304-1994

**TREASURER'S REPORT
 December 2013**

**General
 Fund**

**Repeater
 Fund**

BEGINNING CASH BALANCE - November 30, 2013

8,975.00

2,069.20

Dues - Neil Warner	KG7GLK	new	18.00	2.00
Dues - Christopher Cone	KG7GTZ	new	18.00	2.00
Dues - Forrest Murdoch	WH6EAL	new	13.50	1.50
Dues - Stan Nordel	WF7SHN		18.00	2.00
Dues - Michael Barnes	AE7WP		18.00	2.00
Dues - Norman Seeley	KI7UP		18.00	2.00
Dues - Ralph Gendron	W7HAM		18.00	2.00
Dues - Sharon Gendron	W7PAY		0.00	0.00
Dues - Bob Armstrong	KB8NRI		18.00	2.00
Dues - Chuck Davis	W7CWD		18.00	2.00
Donation - Neil Warner	KG7GLK			5.00
Donation - Christopher Cone	KG7GTZ			5.00
Donation - Bill Munday	K0MUN			18.00
Donations - NRA Certificate Requests			4.00	
Patches (4)			12.00	
50/50 Raffle			81.00	
50/50 Raffle - Mike Scibilia			(40.00)	
Interest Income				0.09

TOTAL INCOME

214.50

45.59

Stone Ridge Country Club - Deposit 1180

100.00

TOTAL EXPENSES

100.00

0.00

ENDING CASH BALANCE - December 31, 2013

9,089.50

2,114.79

Signature: _____


David B Hanson, W7BJ, Treasurer

Date: 1/1/2014

**YAVAPAI AMATEUR RADIO CLUB
COMPARATIVE FINANCIAL STATEMENT FOR THE YEARS ENDED DECEMBER 31**

	GENERAL FUND	2013	2012
INCOME			
Club Dues		2,556.00	2,415.00
Donations & Equipment Sales		1,213.50	82.50
Patches, Decals, Misc		37.05	45.00
50-50 Raffle	1,003.00		1,204.00
Less: Paid out	501.00	502.00	602.00
Swap Meet			135.00
Less: Paid out	65.00	(65.00)	135.00
ARRL Membership	252.00		602.00
Less: Paid out	244.00	8.00	567.00
Annual Party	668.53		1,540.00
Less: Paid out	1,458.87	(790.34)	992.69
TOTAL INCOME		3,461.21	3,861.81
EXPENSES			
Field Day		150.72	239.63
Statehood Day		30.64	70.00
NRA Day		78.29	70.00
Program Meals		61.14	
Certificates & Plaques		128.68	
Donations		300.00	
Refreshments		176.03	222.37
Training Supplies & Projector		602.00	100.00
Office Supplies		16.75	208.39
Postage & Box Rental		116.94	172.80
Insurance		200.00	200.00
Web Site		83.40	83.40
Printing		62.75	322.37
Dues & Fees		30.00	7.50
Miscellaneous		58.09	134.72
TOTAL EXPENSES		2,095.43	1,831.18
NET INCOME		1,365.78	2,030.63
Cash in Bank – Beginning of Year		7,723.72	5,693.09
Cash in Bank – End of Year		9,089.50	7,723.72

	REPEATER FUND	2013	2012
INCOME			
Club Dues		284.00	270.00
Donations		108.00	92.00
Interest Income		1.10	1.65
EXPENSES			
Software		109.35	
NET INCOME		283.75	363.65
Cash in Bank – Beginning of Year		1,831.04	1,467.39
Cash in Bank – End of Year		2,114.79	1,831.04

Signature: 
David B Hanson, W7BJ, Treasurer

Date: 1/1/2014

SPECIAL EVENT COMMUNICATIONS.....

By Lloyd, WA6ZZJ



The Yavapai Amateur Radio Club has been dedicated to public service for many years. One aspect of public service is working on Special Event Communications such as Marathons, Bicycle Events, Walk-a-thons and Road Rally's to name a few.

YARC is an ARRL Special Service Club. Two of the requirements to maintain Special Service status are:

EMERGENCY COMMUNICATIONS

***Purpose:** Club members should become skilled in communicating effectively during communications emergencies and be prepared to assist when needed; Official Emergency Station appointment and participation in ARES.*

OPERATING ACTIVITIES

***Purpose:** Active participation as a club in one or more major operating or operating support activities to ensure that your club maintains a high level of operating skill.*

Participating in Public Service or Special Event radio communications can be a rewarding and fun experience for many different reasons. Some of these are:

- The camaraderie of being on a radio team (aka, working together).
- The chance to do something meaningful for a good cause.
- The satisfaction of using your radio equipment and opportunity to learn its various capabilities in real-life situations.
- The places and settings that you get to enjoy.
- Practicing for possible real life emergency communications.

Special events are normally held for the enjoyment of the public and often draw large crowds. They provide golden public relations opportunities for radio amateurs who provide support communications on a complimentary basis. They make our activities visible to non-amateurs. They sharpen our operating skills, and help justify our existence. And besides, operating special events is just plain fun!

Even if you are new to special event communications you will find that your fellow operators and net controls will work together to help you do a good job in the true Elmer spirit of our service. If we operate effectively we set an example for other amateurs and other officials we might someday serve. Outsiders listening to our communications will judge Amateur Radio and our club or group based on what they hear and see the club or group doing.

The first Event Communications of 2014 is the Sedona Marathon worked in conjunction with the VVARA. A full report on this event will be in next month's newsletter

Saturday, May 3, 2014 there is a new event this year. The 'Chino Valley Grinder' is a 106 mile ultra endurance cycling event beginning in Chino Valley and going to near Williams and then turning around to return to Chino Valley. There will also be a 42 mile ride. This ride will follow a good portion of the route used by the Prescott Rally. There will be Aid Stations located at 21 miles from the start and at 50 miles. More information can be found at: <http://epicgravelrides.com/>

The rest of the 2014 Event Communications schedule so far is as follows:

- Friday, Saturday and Sunday, April 25, 26, 27, 2014** will be the three day Whiskey Off Road mountain bike event in Prescott. They are anticipating close to 2000 riders this year so our communications will be very important to the success of this event. **Signups will begin at the February YARC meeting.**
- Saturday, May 3, 2014** is the 36th running of the Whiskey Row Marathon in Prescott. This year there are new race times with the marathon beginning at 7:00 a.m. **Signups will begin at the February YARC meeting.**
- Saturday, May 3, 2014** will be the Chino Valley

Grinder. With it being on the same day as the Whiskey Row Marathon, Bob Thompson, KC8BOB, has stepped up to coordinate this event.

- **Saturday and Sunday, May 17, 18, 2014** is the MS-150 bicycle event once again in the Verde Valley. As with the Sedona Marathon, we will be looking for support from the VVARA on this two day operation. Signups will begin at the March YARC meeting.
- **Saturday, September 6, 2014** will be the tentative date for the March of Dimes March for Babies in Prescott.

Some of the dates may be subject to change and more events will be added, but this is the schedule so far...

With YARC growing and getting a number of new members as well as new amateur operators it is encouraging to see some of the new people signing on to assist with our event communications in 2014. Any operators new to participating will be placed with 'veteran' communicators the first time or two that they participate to see just what is involved.

Check your calendars and be ready to sign up at the March meeting..... ■

Need Cards Checked for ARRL Operating Awards?

Jim Zimmerman, N6KZ can check your QSL cards for DXCC, WAS, VUCC, WAC, etc.

For information contact Jim at: (928) 713-0542.

Jim's QTH is at: 778 Grapevine Lane,
Prescott, AZ 86305.

Like to Submit an Article for the Yavapai Signal?



Share your experiences and/or knowledge with other club members.

Deadline for a submission is the 21st of the month.

Submit to Joe, AC6AA at: newsletter@w7yrc.org

Welcome to the Yavapai Amateur Radio Club

The Yavapai Amateur Radio Club (YARC) is an ARRL affiliated Special Service Club. The club participates in many activities in the tri-city area by providing communications for local events, emergency communications, and promotion of the hobby throughout the community.

Membership in the YARC is open to any interested amateur or non-amateur alike. Dues are \$20.00/year (Full-time students \$15). The YARC meets at 7:00 p.m. local time on the first Thursday of every month in the Technology Room 404, at the Granite Mountain Middle School, 1800 Williamson Valley Road in Prescott. It is about ½ mile north of Iron Springs road, and all amateurs and non-amateurs as well are invited. Programs of interest are included as part of the meeting.

The weekly Net is held every Wednesday at 7:00 p.m. local time on 146.880- repeater. All amateurs are invited to participate, and visitors are always welcome.

The Yavapai County ARES/RACES Net is held on Monday nights approximately at 7:00 p.m. local time on the 145.290- repeater on Mingus Mountain. A PL of 127.3 is required.

Club Repeater

The YARC 146.880- repeater is located on the hill above Willow Creek road and requires a PL of 100.0 Hz. Our deepest gratitude to Bill Kafka, W2YAV, (SK) for allowing us to acquire the original club repeater. ■

Plan to Join the ARRL or Renew Membership ?

Download the ARRL Club Membership application from the YARC Website. Complete the Application and return it to the Treasurer with the application fee.

There is no extra cost to you, and our club gets to retain a portion of the dues.

APP CHAT

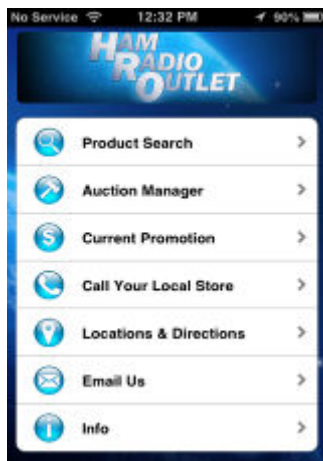
By Rex Mauldin/N7NGM

Last month I started a new section of our club newsletter devoted to applications for the iPhone or iPad relating to ham radio. This month, we shall take a look at a two apps that should interest all hams. The app called QST, allows you to download a digital copy of the magazine of the same name, hence the app name, QST. It is easy to find when doing a search and easy to install. After downloading the app and following the easy registration information, you are ready to download the issues. Each month, you get an alert that a new digital issue is available. You will soon be on your way to adding the issues in your QST catalog.



Having this on your device will allow you to read it while traveling without the added weight and you still get your hardcopy at your mailing address.

Another handy app to have is for HRO. When it comes time to order parts, HRO is an application that will allow you to search for a product, call your local store, get a list of locations and directions to the store of your choice.



As time goes by, more detailed descriptions will be available. ■

Spring Cleaning Time!

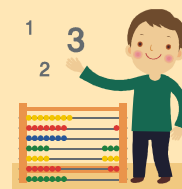
Start saving ham stuff for the Williams Hamfest. YARC will have a booth, and we will need stuff to sell.



You can bring donations to the club meetings or let Don Bauer know that you have stuff to donate. We can make arrangements to pick up.

Membership Count:

1st Thurs. in December....	185
Gain/Loss.....	-1
1st Thurs. in January.....	184



YARC Officers for 2014

President

Don Bauer, WB7TPH
president@w7yrc.org

Vice President

Rex Mauldin, N7NGM
vice.president@w7yrc.org

Secretary

Forrest Murdock, WH6EAL
secretary@w7yrc.org

Treasurer

David Hanson, W7BJ
treasurer@w7yrc.org

Board of Directors (includes Club Officers)

Creighton Grotbeck -- AD7YR

Ralph Gendron -- W7HAM

Bob Rosevear -- WB7RRQ

Tom Griswold -- WN7E

Newsletter Editor: Joe Oliver, AC6AA
newsletter@w7yrc.org

Upcoming Events

- February 1, 2014 - Sedona Marathon
- February 8, 2014 - VE Test Session
- February 22, 2014 - YARC "Sweetheart" Party

YARC Valentines "Sweetheart" Party, 2014

The Grill at Stone Ridge Country Club, Prescott Valley
February 22, 2014, Noon to 3:30 PM

Menu

No-host bar available

Luncheon served at 1:00 PM

Your choice of:

- **Prime Rib Au Jus**, with roasted red potatoes, salad, rolls, beverage
- **Chicken Marsala**, with au gratin potatoes, salad, rolls, beverage
- **Oven Baked Salmon**, with long grain and wild rice, salad, rolls, beverage

YARC will provide a cake for dessert

All this for only **\$22.00** per person

You must make your selection of entrée in advance, and bring your selection and check to the February meeting. If you cannot attend the February meeting, please mail your selections to:

**Don Bauer WB7TPH
7150 E. Acre Way
Prescott Valley, AZ 86315**

Name:	Menu Selection:	\$22 each
	Total Amt. included:	

January 2014 Foxhunt

By John Broughton, WB9VGJ

The monthly foxhunt was held January 5th. The fox was Mike, WA7ARK.

The hunters were:

1. Bob, WB6ODR, and Linda, KD7EEO.
2. Dave, W7BJ, and Bryan, W7BNW.
3. Pete, K6VVR, and Diane, KE7ODP
4. Jerry, KF7FPD and Dennis, KF7INF.
5. Jeff, WB7RFY, Forrest, WH6EAL, and I.



The weather was very nice with sunshine and little wind. Mike had said he was going to make the hunt a challenge. It turned out the challenge was varying signal strengths, the reason being that Mike had a yagi antenna on a pole and he sat on the ground turning it around 360 degrees. That meant that hunters could be pointing directly at it and have a strong signal one second and a weak one the next.

The winners of the hunt were Bryan, W7BNW, and Dave, W7BJ. From a statement made by Bryan, the next hunt may also be challenging as he has something different in store for us.

All teams except for Jerry and Dennis found the transmitters. It is always good when all hunters find the transmitters. However, it was still considered a successful hunt and the participants had a good time.

We had our usual after-hunt get-together at Denny's; the social aspects of the hunts are as enjoyable as the actual hunts.

You can see pictures of the hunt at <http://tinyurl.com/YARCJan2014Foxhunt>

If you want to see them in a slideshow, just click on the slideshow icon above the pictures. Or, you can view them simply by clicking on the first picture then navigating through them.

We would encourage more folks to get involved in the hidden transmitter hunts. They are really fun and help develop direction-finding skills.

73, John, WB9VGJ

Club contacts - At a Glance

President - WB7TPH	president@w7yrc.org
Vice President -	vice.president@w7yrc.org
Secretary - AE7CG	secretary@w7yrc.org
Treasurer - W7BJ	treasurer@w7yrc.org
Board Member - AD7YR	cgrobeck@gmail.com
Board Member - W7HAM	smokey7@cableone.net
Board Member - WB7RRQ	rosevear520@cableone.net
Board Member - WN7E	mrgriz@cableone.net
Arizona WAC Administrator	az.wac@w7yrc.org
Ask Elmer for Help	ask.elmer@w7yrc.org
Badges	badges@w7yrc.org
Field Day Chairman	field.day@w7yrc.org
Fox Hunts	fox.hunt@w7yrc.org
License Classes	classes@w7yrc.org
Mail List	yarc_mail@w7yrc.org
Membership Application	membership@w7yrc.org
Net Manager	net.manager@w7yrc.org
Newsletter Editor	newsletter@w7yrc.org
Program Inputs	programs@w7yrc.org
Public Information Officer	pio@w7yrc.org
Public Service - DEC	public.service@w7yrc.org
Repeater Trustee	repeater@w7yrc.org
Special Events	special.event@w7yrc.org
VE Test Liaison	testing@w7yrc.org
YARC Party Coordinator	yarc.party@w7yrc.org
Information	info@w7yrc.org
Webmaster	yarc@w7yrc.org
Webmaster	w7yrc@w7yrc.org

VE Testing

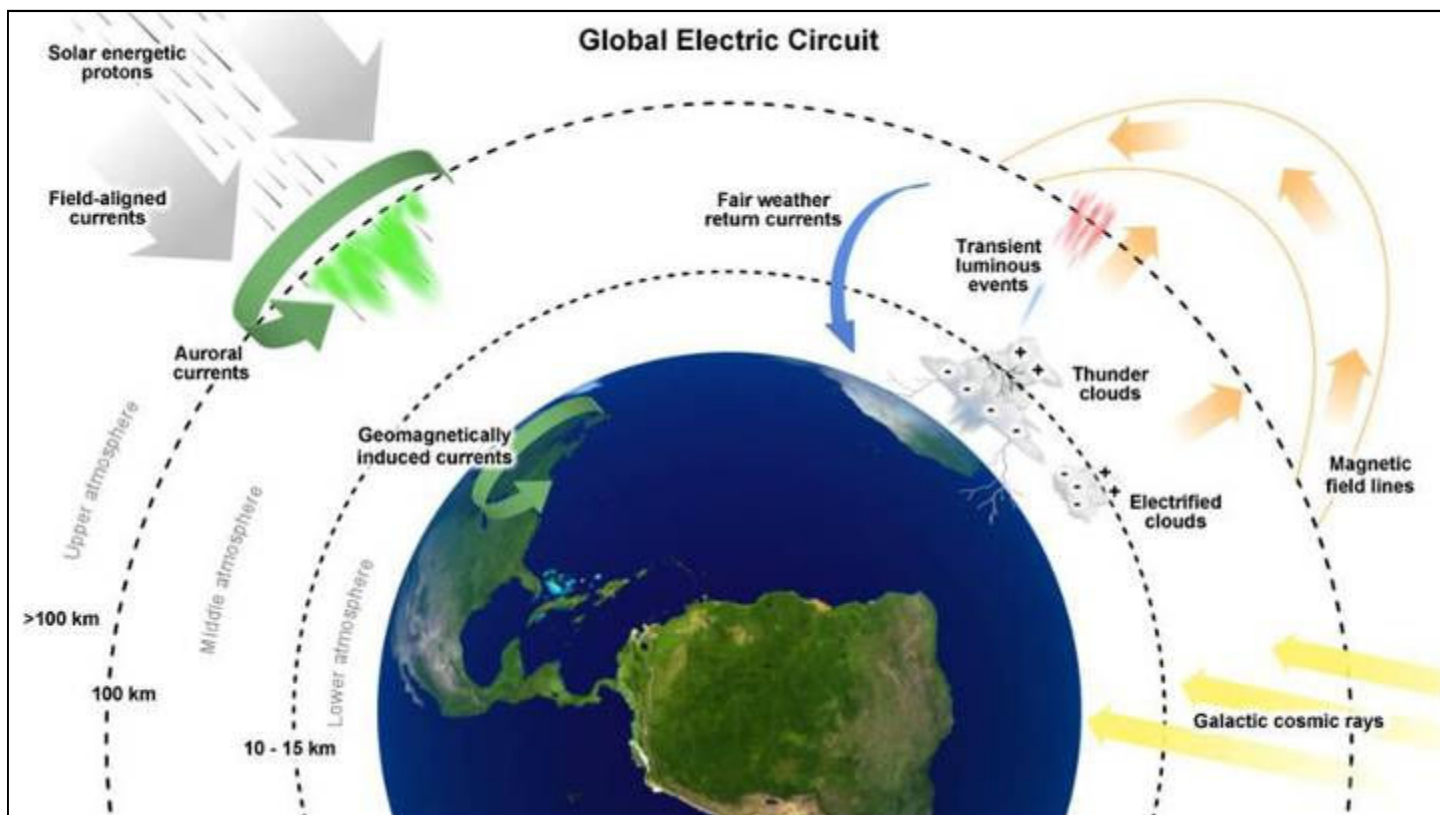
By Don Bauer, WB7TPH

Our first testing session for 2014 will be 9:00 AM, on February 8th. Are you ready to upgrade? Are you helping someone get their first ticket? Put it on the calendar-2/8/2014.



Earth's Atmospheric Global Electric Circuit

By Joe, AC6AA



Ever hear of the “Schumann Resonance” or “Transient Luminous Events” (Sprites, Elves, and Blue Jets)? These all play a role in the Global Electric Circuit, an atmospheric system that links the electric field and current flowing in the lower atmosphere, ionosphere, and magnetosphere, forming a giant cavity, or spherical condenser between the earth’s surface and lower edge of the ionosphere. The ionosphere is a part of the atmosphere filled with charged particles, which begins about 60 miles above the earth, and has a direct bearing on amateur radio high-frequency communications.

Thunderstorms charge the global electric circuit to a potential of several hundred thousand volts. Each lightning burst creates electromagnetic waves that begin to circle around the earth and, if they have just the right wavelength, combine to produce the “Schumann Resonance”, whose fundamental frequency is very low -- about 7.83 Hz.

Since the ionosphere has such a direct bearing on amateur radio high-frequency communications, most of us are aware that the sun plays a major role in determining whether or not our HF bands will be usable. The sun produces electromagnetic energy in various forms and ionizing radiation that pro-

duces ions (charged atoms) within earth’s atmosphere, including the ionosphere. Charged particles from coronal mass ejections interact with the earth’s magnetic field to produce strong electromagnetic fluctuations. Solar winds also collide with atmospheric gases to produce auroras, known as Northern and Southern lights.

Sources, other than the sun, also affect the ionosphere. The Sun, the Earth, Earth’s magnetosphere, and the atmosphere’s layers, ionosphere, clouds, particles, lightning-filled thunderstorms, and Transient Luminous Events are all essential components to Earth’s Global Electric Circuit. For a better overview of how these various sources interact with each other, go to: https://spark.ucar.edu/sites/default/files/images/video/2013.GEC_3.21_1.pd.

An interesting hour long video by Nova, “At the Edge of Space”, discusses Sprites, Schumann Resonance, and other phenomena., and can be found at: <http://www.pbs.org/wgbh/nova/earth/edge-of-space.html>. ■

Hunting Schumann Resonances

16 September 2011

By Kjell Bergqvist, SMØFOB

Quote [Wikipedia](#): The Schumann resonances are a set of spectrum peaks in the extremely low frequency portion of the Earth's electromagnetic field spectrum. Schumann resonances are global electromagnetic resonances, excited by lightning discharges in the cavity formed by the Earth's surface and the ionosphere. This global electromagnetic resonance phenomenon is named after physicist Winfried Otto Schumann who predicted it mathematically in 1952.

Schumann resonances occur because the space between the surface of the Earth and the conductive ionosphere acts as a closed waveguide. The limited dimensions of the Earth cause this waveguide to act as a resonant cavity for electromagnetic waves. The cavity is naturally excited by electric currents in lightning. Schumann resonances appear as distinct peaks at extremely low frequencies around 7.83 (fundamental), 14.3, 20.8, 27.3 and 33.8 Hz.

Observations of Schumann resonances have been used to track global lightning activity. Owing to the connection between lightning activity and the Earth's climate it has been suggested that they may also be used to monitor global temperature variations. It has been speculated that extraterrestrial lightning (on other planets) may also be detected. A new field of interest using Schumann resonances is related to short-term earthquake prediction.

Today Schumann resonances are recorded at many separate research stations around the world. The sensors used to measure Schumann resonances typically consist of two horizontal magnetic induction coils for measuring the north-south and east-west components of the magnetic field, and a vertical electric dipole antenna for measuring the vertical component of the electric field. The Schumann resonance electric

field amplitude (~300 microvolts per meter) is much smaller than the static fair-weather electric field (~150 V/m) in the atmosphere. Similarly, the amplitude of the Schumann resonance magnetic field (~1 picotesla) is many orders of magnitude smaller than the Earth magnetic field (~30–50 microteslas).

It is not an easy task to receive Schumann resonances, especially if you live in a radio polluted area, disturbances from grid power, community trains exciting strong magnetic field, sound waves from nearby power heating stations and even electrostatic popping noise from flowers and trees in the garden! This has not scared Sven, SM5LE in building a station for reception of Schumann resonances. He is very fond of difficult technical challenges.



Figure 1 - Sven, SM5LE with receiving equipment. In front of Sven is his vertical antenna for receiving the Schumann resonances' electric field part. The big box contains an amplifier, built with a single transistor. The amplifier feeds his indoor PC sound card. The amplifier is battery operated and the battery is charged by solar power.



Figure 2 - Sven points the trace of a Schumann resonance at 7.83 Hz. His attic is almost occupied by a loop antenna, which is near completion for receiving the magnetic field part of Schumann resonances.

A lot of information about receiving Schumann resonances and other very low frequency signals can be found in Renato Romero's, IK1QFK, home page Radio waves below 22 kHz, at <http://www.vlf.it/>.

Live data can be seen from IK1QFK station. ■

Underground Reception of Schumann Resonances

by Sven Nordin SM5LE

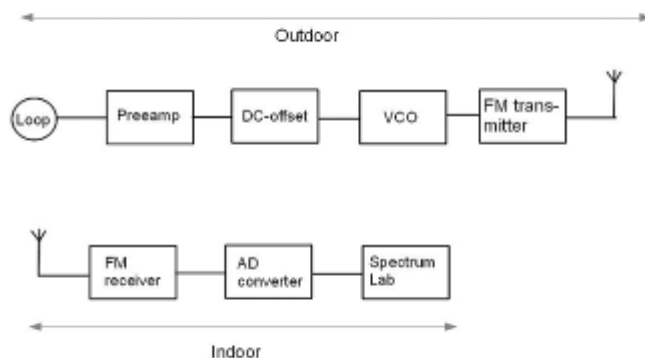
Editors Note: Only portions of Sven's article have been included herein. To view his complete article, go to: <http://www.vlf.it/sven/schumannunderground.html>

After two years of searching for Schumann resonances, both in- and outdoor, all attempts resulted in no substantial reception. The indoor reception failed because of house acoustic resonances and 230 V AC noise. False Schumann look-alikes was the only result. Outdoor was the usual problems, acoustics from highways, wind, rain, nearby job activities etc. So as a last attempt I said "Why not test underground?". At first I measured 230V AC "earth currents" with a stick in the ground to find 230 V AC minima in the garden. And then I started to dig a 1.5 m deep hole ...

This article describes the equipment being used and the measured results.

Technical Description

Block Diagram



Loop – Initially made for indoor use on a wood frame. The loop is modified to function reasonably outdoor in the ground. It is isolated with volcano tape and also with some layer of plastic and glass wool. There is also a single shield layer, made of aluminum foil. The foil is connected to equipment ground. The loop is center tapped. It consists of 2x1500 turns of 0.2 mm Cu wire, in total a resistance of 7860 ohm. The loop diameter is 1.2 m and total wire length is approx. 11 km.

Preamp – Is the op amp INA114 . The circuit diagram is taken from the data-application sheet.

DC-offset op amp OP27 - Is used for adjusting the pre-amp DC output level to fit the VCO (Voltage Controlled Oscillator) input.

VCO XR2206 - Frequency is set somewhere in the range 500 -700 Hz . The frequency is chosen as to lay in middle of ordinary speech/music audio range. Then the VCO signal is fed to the FM transmitter.

FM transmitter - A very low power transmitter for cordless audio connection use between an iPhone and a car FM radio. No license is needed in Sweden for this type of transmitter. The receive distance is about 10 m, enough to isolate from house AC mains etc.

FM receiver – An ordinary consumer FM broadcast receiver is connected to the A/D converter.

A/D converter E-MU 0202 – The FM radio audio output is connected to the A/D converter. An FM/FM system is rather good and robust for a transmitting/receiving link

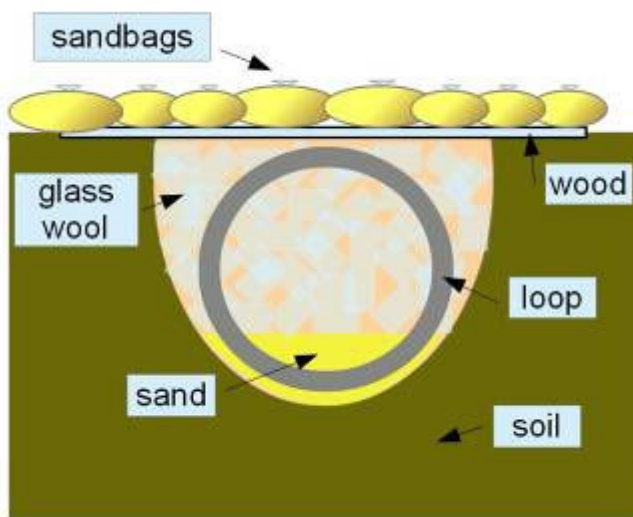
system.

Spectrum Lab - A freeware program. The VCO output is FM-modulated with Schumann resonances and are demodulated by Spectrum Lab FM demodulator.

Not included in the block diagram is the outdoor power supply, which is a car battery with a solar panel and a DC/DC converter +/- 15 V.

Ground Cross-section View

The loop is buried in north/south direction. The top of the loop is approximately 20 cm below ground surface.



Measurement Examples

Waterfall - Night Measurement
(Time is UTC)

From left: (see [Figure 1](#))

0 to 2 Hz: Noise, mostly from equipment.

- First Schumann resonance at 7.8 Hz
- 12.5 Hz is 50 Hz/4
- 14 Hz is second Schumann resonance
- 16 2/3 Hz from local commuter train
- 20 Hz is third Schumann resonance
- 25 Hz is 50 Hz /2
- 25 Hz and up is noise from 230 V AC and some Schumann resonance

The amplitude response is not flat, it is higher gain on higher frequencies. This was later on corrected by the low pass filter.

The spectra to the right in the waterfall emanates from the received FM modulated 700 Hz signal.

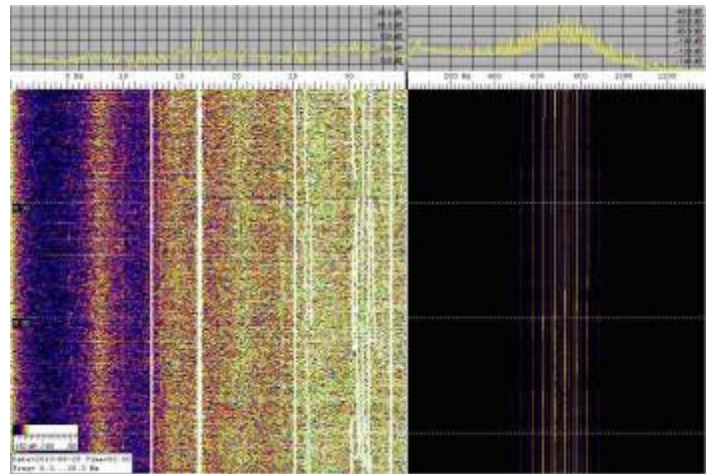


Figure 1
7.8 Hz 14 Hz 20 Hz (1st, 2nd, and 3rd Schumann Resonance)

Frequency and Amplitude Plot (see [Figure 2](#))

Schumann resonance frequencies 1, 2, and 3 are added and then divided by 3. The frequency scale is relative. The lower green plot shows amplitude. Horizontal scale length is 36 h (1 1/2 days).

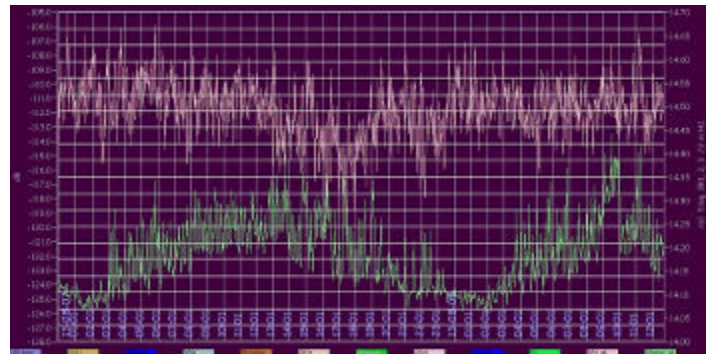


Figure 2

Reception Environment

The garden, where the loop is placed, is in a typical residential area, 20 km south of Stockholm. Height above sea level is 40 meters. Location coordinates are N 59.1827236 deg and E 18.1510906 deg and QTH locator is JO99bd.

In less than 2 km radius are a commuter train station, bus stations, highways, a 10 MW gas turbine power station, substation, surrounding houses with their own heating equipment, ADSL telephone lines, coaxial cable-TV, etc.

Houses mains supply are both 3-phase and single phase 230 V AC. Unbalance and nonlinearity in the main cause subharmonics, 50 Hz divided by 2, 3, 4, 5 etc..

It is amazing that Schumann resonances can be received at all. Even if the resonances are weaker during night time, the reception is better at that time. Rain and wind does not affect the reception.



Loop ready for “grounding”. On the bench box and FM transmitter.



Loop in Hole

Thanks to:

Renato Romero who helped me to understand Schumann resonances. It is not like receiving signals from a radio amateur station. He also encouraged me to not giving up and go on with the project.

Wolf Buscher, DL4YHF for helping me with Spectrum Lab. ■

Holy Humor



There was a very gracious lady who was mailing an old family Bible to her brother in another part of the country.

"Is there anything breakable in here?" asked the postal clerk.

"Only the Ten Commandments." answered the lady.

=====

Somebody has said there are only two kinds of people in the world. There are those who wake up in the morning and say, "Good morning, Lord," and there are those who wake up in the morning and say, "Good Lord, its morning."

=====

A minister parked his car in a no-parking zone in a large city because he was short of time and couldn't find a space with a meter.

Then he put a note under the windshield wiper that read: "I have circled the block 10 times. If I don't park here, I'll miss my appointment. Forgive us our trespasses."

When he returned, he found a citation from a police officer along with this note "I've circled this block for 10 years. If I don't give you a ticket I'll lose my job. Lead us not into temptation."

=====

There is the story of a pastor who got up one Sunday and announced to his congregation: "I have good news and bad news. The good news is, we have enough money to pay for our new building program. The bad news is, it's still out there in your pockets."

=====

While driving in Pennsylvania, a family caught up to an Amish carriage. The owner of the carriage obviously had a sense of humor, because attached to the back of the carriage was a hand printed sign. "Energy efficient vehicle: Runs on oats and grass. Caution: Do not step in exhaust." ■

2014 Arizona Section Convention

10th Annual

Yuma Hamfest

Yuma, Arizona

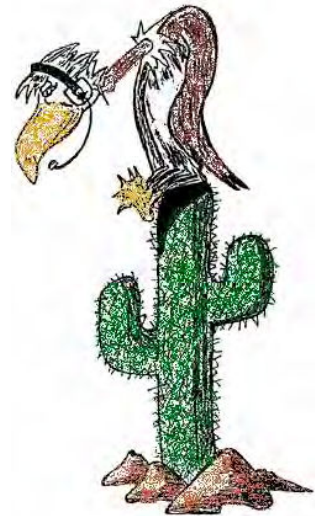
Feb. 14 & 15, 2014

Yuma County Fairgrounds

2520 East 32nd Street, Yuma, Arizona

www.yumahamfest.org

Check the Website for Additional Information



Gates Open for Camping
Thursday, 2 pm
Vendor Setup

Event Hours
Friday, Noon - 5 pm
Saturday, 8 am - 5

Buzzard BBQ &
Grand Prize Drawing
Saturday Night

Vendors & Exhibitors

Consignment Sales

License Testing

Hourly Door Prizes

On-site RV Camping

Famous Buzzard BBQ

ARRL Speaker

Transmitter Hunt

\$5.00 Admission

Tailgating (Swap Meet)

Full Seminar Schedule

DXCC Card Checking

Incredible Grand Prizes

Emergency Preparedness

Admission Prize

Hospitality Area

“Near Space” Balloon Launch

Antenna Clinic



Hamfest Talk-In Frequency: 146.840 (-) PL 88.5 Hz

Email Contact: info@yumahamfest.org

Presented by the Yuma Amateur Radio Hamfest Organization



Area Repeaters

Weekly Breakfasts



Wed. Morning Breakfast:

7:00 a.m. at

Iron Horse Restaurant

(Hwy 89 in Chino Valley)

(N 34°43'56.5" W112°27'15.4")

informal – all are invited

Breakfast at Masonic Lodge: 3rd Saturday of each Month at 9:00 a.m.

(1280 Willow Creek Road,


2nd Floor; above Bank of America)

informal – all are invited

* Location data (per WGS84) provided
by Fred Zimmermann, N7PJJ

Freq.	PL	Location	Owner/ Club	Auto- Patch	Links	Vo IP	Notes:
52.560-	100.0	Mt. Union	N7NGM			IRLP	Node 3301
144.390	Simplex						APRS- www.aprs.fi
145.290-	127.3	Mingus Mtn.	K7YCA				ARES/RACES
145.350-	162.2	Wildflower	W7QHC				Dawn
146.760-	131.8	Hayden Peak	N7SKO				WECOM INC
146.780-	91.5	Bill Williams Mtn.	K7NAZ			IRLP	BWMRC LITZ, 3178
146.880-	100.0	Prescott Heights	W7YRC				YARC
146.920-	162.2	Mount Ord	W7MDY				ARA
146.980-	162.2	Mt. Elden	W7ARA				ARA
147.000+	162.2	Mingus Mt.	K7MRG				MMRG
147.140+	162.2	Mt. Elden	W7ARA				ARA
147.220+	162.2	Mingus Mtn	W7EI				VVARA LITZ
147.260+	103.5	Mt. Union	K7YCA				ARES/RACES
147.260+	127.3	Mt. Francis	K7YCA				ARES/RACES
147.360+	162.2	Mt. Ord	W7MDY				ARA
442.150+	100.0	Mingus Mtn	WA7UID				MMRG
446.025	Simplex		N7NGM			Echo	
448.475-	100	Mt. Elden	W7ARA				ARA
448.875-	100.0	Mt. Elden	W7ARA				ARA
449.250-	192.8	Chino Valley	K7POF				
449.7250-	107.2	Mingus Mtn	K6DLP				
927.0875-	151.4	Mingus Mtn	WB7BYV				
927.3875-	151.4	Prescott	WB7BYV			Echo	ARA

Y.A.R.C. IRLP NODE
Node Number 3182
146.100 MHz No PL Tone

T-Hunt Frequencies:
 Primary - 145.100 MHz
Secondary - 146.565

For more Repeater Information & Listings refer to:

- www.w7ara.org/Web/
- www.azrepeaters.net
- www.azfreqcoord.org/listings.htm

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Many thanks to Dick Hughes, W6CCD, our Webmaster

