

**FIFTH EDITION**

This OVARC email newsletter is sponsored by the Oro Valley Amateur Radio Club <http://www.tucsonhamradio.com>



**Happy Holidays** from

Editor Ron W7HD  
XYL Penny KC7HGX  
Son Sean AF7LP



**MONTHLY CLUB MEETING LOCATION**

**Ascension Lutheran Church**  
**1220 W Magee Rd**  
**Tucson, AZ 85704 (near LaCanada and Magee)**  
**NO CLUB MEETING IN DECEMBER**



**THANKS TO THE OFFICERS AND BOARD MEMBERS for 2014**

President	Bob Molczan	KA7VPR
Vice-president	Ron Herring	W7HD
Secretary	Howard Chorost	KC7AC
Treasurer	David Beauchesne	AK2L
Board Members	David Branson	KC0LL
	Scott Boone	K7ADX
	Dave Coccio	N7AKC
	Gary Schmitz	KT7AZ



**DUES INCREASE FOR 2015**

On January 1, 2015 the membership rates are going up to \$25 for regular members and we are adding a discounted rate of \$15 for members who are in the same household as a paid regular member. A household member is defined as someone who resides at the same address as the regular member.

As an incentive to renew early, the regular member rate is reduced by \$5 and the household member rate is available immediately.

So, to recap: Before January 1, 2015, regular membership is \$20 and additional household members pay \$15. After January 1, 2015 the regular rate of \$25 will apply. See <http://tucsonhamradio.com> for details and paypal links.

**BOARD MEMBER ELECTIONS**

Don't forget the board member elections at the January 2015 meeting. There are four positions open. Nominations are needed – send them to [AK2L@arrl.net](mailto:AK2L@arrl.net). Please verify that your candidate is willing to run before submitting their name !!!

You will be able to vote for up to 4 of the candidates.

Sunday Night Net 19:00 MST OVARC Repeater System  
Join the group every Sunday night at 19:00 MST (7:00PM) on the OVARC repeater system for the Sunday Night Net. On the Sunday after our general membership meeting we have our Radio Tradio where you can list ham radio items for sale. The other nights are a general discussion.

Everyone is welcome on the net regardless of club affiliation.

We are always looking for Net Control Stations so if you would like to try your hand at being NCS, contact Lanny, KF7LV our Net Manager.

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## OVARC LINKED REPEATER SYSTEM

The Oro Valley Amateur Radio Club currently has five wide area repeaters. All of our repeaters are normally linked via VOIP over internet connections, with the exception of the Dstar repeater (the newest of the five).

All of our repeaters are open to ANY licensed ham. We invite you to use these repeaters as often as you like.

### 2 Meters

**146.620(-) PL 156.7 - Callsign WØHF**

Located on Keystone Peak (Map: <http://g.co/maps/5tdjg>)

Antenna Height: 40+ Feet  
Elevation: at nearly 7,000 feet  
Power Output: 100 Watts  
Antenna: Decibel DB-224  
Feedline: 7/8" Hard Line  
Repeater: Kenwood TKR-720

**147.320(+ ) PL 156.7 - Callsign WØHF**

Located on the Oro Valley Police substation tower on Oracle Rd at Magee Ave, Tucson, Arizona

Antenna Height: 57 Feet  
Elevation: 2584 Feet  
Power Output: 40 Watts  
Antenna: Tram 1491  
Feedline: LMR-400  
Repeater: Kenwood TKR-720  
Auto Patch Instructions:  
PLACE CALL: ID, Push 1+Area Code(even for a local call)+Number. When done, to  
HANG UP: Press 2, Then, ID and Clear.  
You are welcome to place long distance calls as we are not charged for long distance.

### 70cm

**444.100(+ ) PL 156.7 - Callsign WØHF (MOVED to OVPD Main at Tangerine and LaCanada)**

WIDE Northwest coverage and additional Tucson Coverage (including Sahuarita)

Antenna Height: Feet (adi)  
Power Output: 50 Watts  
Antenna: JetStream JTB3  
Feedline: LMR-400  
Repeater: Kenwood TKR-820

**440.400(+ ) PL 156.7 - Callsign WØHF**

Located on the Golder Ranch Fire District tower on Golder Ranch Road in Catalina, Arizona.

Antenna Height: 67 Feet  
Elevation: 3081 Feet  
Power Output: 50 Watts  
Antenna: Diamond X-30  
Feedline: Andrews 1/2" Hard Line  
Repeater: Kenwood TKR-820

**445.800 (-) DSTAR WOHF**

Located at Magee and Oracle with the 145.19 repeaters

Antenna Height: 50 feet

Elevation: 2584 feet

Power Output: 20 watts

Repeater: Icom V4000

Controller: Icom RP-2

Computer: Dell Dimension running CentOS 5.10 Linux and Icom RP-2 Gateway software

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### Public Service Opportunites

There are many opportunities to provide public service in Southern Arizona. Specific requests for help will be communicated via email. If you would like to volunteer for any of these events contact [public\\_service@tucsonhamradio.com](mailto:public_service@tucsonhamradio.com)

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The OVARC hamfest on November 8<sup>th</sup>, 2014, was a huge success. We cleared about \$900 more than 2013, resulting in over \$4500 in the treasury. Planning can now begin for the solar power setup for the 146.620 repeater on Keystone Peak.

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I recently built a 9:1 unun for my LDG S9V31 antenna. It works extremely well, and was relatively easy to do. Getting the 3 sets of 14 ga solid wire (about 3 feet each wire) to bend around the toroid core was the most difficult part, but that just required care while doing it. You may want to use color-coded 14-ga "soft" solid wire for the turns and a T200-2 or T130-2 toroid as shown below instead of the relatively stiff 14 ga solid annealed copper wire I used. This all assumes you will be running 200 watts or less of power. Since I'm using it with a barefoot Elecraft KX3 at 12 watts or less with an internal antenna tuner, it matches and works quite well with no worries.

Thanks to John MOUKD



In fact, most hams are surprised when they see the

QRP after my call. They assumed I was running 30-40 watts on PSK31 instead of 3-4 watts! If I get a solid-copy signal, I can usually work the station. I've consistently worked into Russia, Europe, South America, Japan, and South Korea with this setup on 10M. There is a 50-foot run of RG-8X between the unun mounted at the antenna and the rig, since I wanted the antenna as far away from the house as was practicable.

The 9:1 transformer provides several benefits:

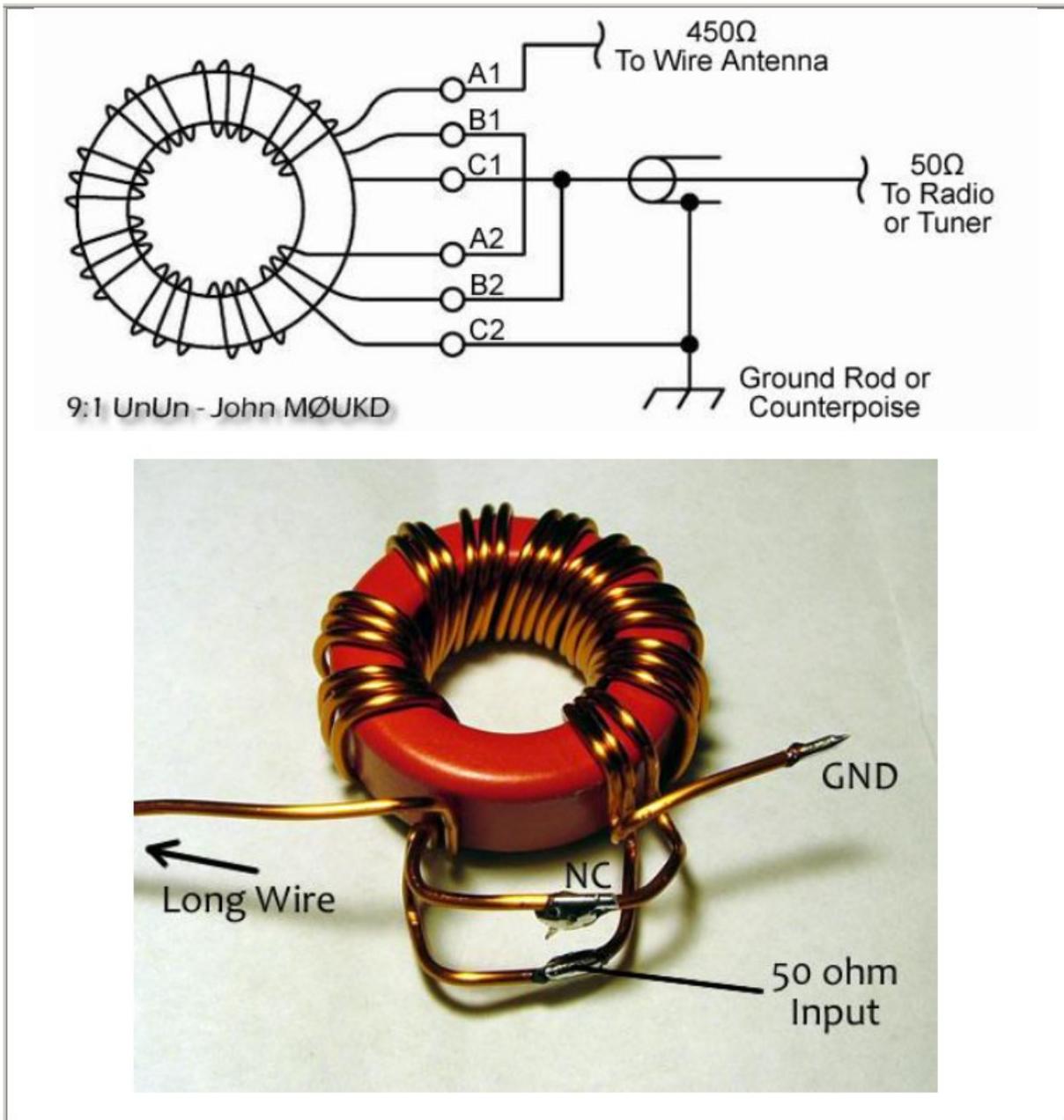
1. a much flatter broadband impedance response,
2. a static electricity-free antenna system (no buildup), and
3. common mode noise immunity (if space wound as shown).

The 31 foot vertical was connected directly to the long wire side, with ground being a couple of 31 foot radials laid on top of the ground. This allows it to tune 80M-6M, although the antenna is supposed to be for 40-6M. Keep in mind that altering the length of the antenna by a few feet makes a dramatic difference in SWR readings. So does the number and length of the radials.

My fully-extended 31-foot vertical shows the following SWR (pre-tuner) readings.

3.580	6:1	3.800	5:1	3.990	5:1	80
7.035	3:1	7.150	2.9:1	7.250	2.7:1	40
10.104	3:1	10.120	3:1	10.148	3.1:1	30
14.070	3:1	14.200	2.9:1	14.340	3:1	20
18.104	3.5:1	18.130	3.5:1	18.160	4:1	17
21.070	3:1	21.200	3:1	21.400	3:1	15
24.890	1.4:1	24.920	1.4:1	24.980	1.3:1	12
28.120	1.5:1	28.700	3:1	29.650	5:1	10
50.100	2.5:1	52.500	4.5:1	53.900	4.5:1	6

In terms of performance, everything above 7 Mhz seemed to perform about equally well when I do actual QSO's, since the internal tuner on the KX3 brings everything to a 1.2:1 or less SWR. The point of the SWR measurements was to insure that the antenna was within the 10:1 range of the tuner.



A type 75 core was used here with No. 14 solid copper wire because it is being used for transmitting. The turns ratio is 3:1 for a transformation of 9:1 with the 3-wire windings. The impedance is the square of the turns ratio ( $Z = T^2$ ). Properly designed and constructed toroid transformers are NOT lossy! On the test bench with a 52 ohm source and 450 ohm load, the transformer shows a loss of no more than 0.6 dB with about 0.45 dB being average, and a low reading of 0.2 dB.

The unun can also be used for any end-fed antenna. If you are mounting this up on a tower, the tower itself can be the ground side of the antenna, assuming the tower is properly grounded at the

bottom. For very low losses, use 450-ohm twin-lead from the antenna and tower to the unun "long wire" connection and ground down near the shack, then a short run of coax to get inside the shack. Be SURE the ground side down near the shack is a good RF ground, as well as being earth ground. This provides the minimum amount of introduced noise. NEVER use the neutral lead of the AC power, since that maximizes noise pickup from all over the neighborhood.

Incidentally, this unun feed method also minimizes RF in the shack, which was a problem I had with the 18-foot vertical on the back of my fifth-wheel using a 4:1 balun. Since I was using an elevated feed (about 3 feet from the top of the fifth-wheel), RF in the shack was causing the LDG AT-100 auto-tuner to go bananas on some bands. The 4:1 unun from LDG cleared up that little problem.

For those in HOA housing, if you need a nearly invisible antenna, an end-fed antenna consisting of insulated 14-ga wire spaced about 2-3 inches underneath the soffit on your house makes an effective and invisible antenna with the unun connected between one end of your wire and the RF ground outside your shack. If you have a chimney, a wire run up beside the chimney also works well. A wire run alongside or underneath the ridge of the roof is another alternative. Even one run just under the roof peak from one end of the house to the other in the attic will still work decently. Just be sure to space it at least 2 inches from the wood. They can get VERY hot at the ends when you run more than 10-20 watts. I've seen them glowing white hot, so be aware!

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## Baluns and ununs simplified by Ron Herring W7HD

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As long as you think of a balun as a broadband transformer, you'll be okay. Like most things involved with antennas, they are usually over-hyped and over-priced. A balun is essentially just a transformer with the toroidal core acting as a coupling between windings. This is why most manual antenna tuners include a 4:1 balun for the balanced input leads from 450-ohm twin lead - to get the voltages down to manageable proportions, and get a ground-reference point for input to the tuning elements.

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The unun has as its primary task a voltage divider, because it allows you to tap off at a lower voltage point. The antenna itself is the high-voltage point. Thus a 9:1 unun transforms the ( typically 450-ohm but wildly varying ) high impedance of the antenna to a lower impedance ( around 50 ohms ) more easily handled by antenna tuners and feedlines. Since it is DC grounded by nature, it gives you the no-static characteristic ( no static cling, hi hi ). In Arizona, or any high-wind location, this is essential.

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I used to put a neon bulb with a series 47K resistor across the antenna terminals inside the shack and could watch the static build-up as it reached 90 volts on a windy day. That bulb would be

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flashing continuously as it discharged the static! Think what that could do to the input circuitry on your rig. Dusty and windy combined are especially nasty about static buildup. Even rain and snow can get in on the static act (symptom - lightning). This was why I also will now put a high-value resistor across the feedpoint of a dipole. The resistor value was determined by the band involved. For example 10 meters used a 100K, 20 meters a 200K, etc. This made identifying the antenna from the shack easy using just an ohmeter. The resistor itself could be a low wattage, typically 1/2 watt, since it only had to dissipate the static buildup before it reached high values of voltage. One thing to keep in mind is to use flexible leads (such as a short piece of coax shield) if tying it directly to the antenna elements. If you were using a fixed connection, such as a 1:1 balun, then the resistor could be across the terminals.

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How can you tell when you are getting static buildup just by listening? If you hear a squealing sound, especially during lightning storms, you are listening to static buildup. These buildups typically terminate with a popping sound as the lightning discharges (hopefully NOT nearby).

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The impedance transformation ratios will depend on the antenna itself. A resonant vertical or dipole doesn't need changing - it is already at 50 ohms. A 1:1 balun does nothing more than change the common-mode currents so that a dipole, which is a balanced feed, doesn't use the coax as a radiating element. It's when you are going to use the antenna for multiple bands that you need the impedance transformation because the voltages get really high at the feedpoint.

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Off-center fed or end-fed antennas need the baluns or ununs simply to get the voltages involved down to manageable levels. That's because they are non-resonant antennas, thus impedances are typically in the hundreds or thousands of ohms. That's one reason you really have to make sure the end of any antenna, which is the highest impedance point, is nowhere near something flammable, because they can get white hot from just proximity coupling (I've personally observed this).

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This means that the antenna tacked to the eave needs to have the last few feet droop down away from anything flammable. Better still is to use 3"-6" spacers for the entire length of the antenna, such as the antenna standoffs for twin lead and coax used by the television industry for so many years. These can still be found wherever roof-mount TV antennas are sold! For example, Radio Shack Model 15-853, which is a 4-pack of 3-1/2" wood screw standoffs available for \$2.79 to \$3.99, depending on sale pricing. They also carry a 4-pack of strap-on standoffs for about \$2.50.

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If the antenna is in a closed loop configuration, this doesn't apply, but then you need the entire antenna away from nearby objects anyway. That distance is determined by how much coupling is desired to the nearby object - you might be using it as a reflector or tuning element.

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These may be over-simplified explanations, but they cover the essentials.

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As always Your Mileage May Vary.

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Need to run an old DOS-style program in Windows 7 or 8? Get this file:

DOSBox0.74-win32-installer.exe

from [www.download3k.com/Install-DOSBox.html](http://www.download3k.com/Install-DOSBox.html)

DOSBox is a free Microsoft DOS operating system emulator which creates an application window that supports DOS commands. Load up your favorite DOS games or applications and run them fully in the DOSBox window. There are many classic DOS based games that fans would love to play if they were only able to but more recent Windows versions no longer include a DOS version underneath Windows so they've been unable to play these games. With a package like DOSBox they are able to use this DOS emulator to play these classic games. The DOSBox package is available for Windows, but also runs with a version for Mac OS X and Linux as well.

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Note that Linux Mint 17 now has good support for touch-screens. So if you want to dual-boot your new Windows 8 touchscreen laptop, you now can do so. You will want to use Linux Mint Cinnamon 64-bit version for best results, available from <http://www.linuxmint.com> .

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===== END NEWSLETTER =====

Enjoy,

Ron Herring W7HD