The REPEATER

The OFFICIAL newsletter of the Rogue Valley Amateur Radio Club

W7OEK

Volume 2010, Issue 2 **February 2010**

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Next Club Meeting

Thursday, February 4, 2010, 7:00 PM
Red Cross Building, 60 Hawthorne St., Medford, OR
Across from Hawthorne Park
Program: Vacuum Tubes, Lud Sibley, KB2EVN

President's Letter

After the frivolity associated with the swapfest last month, it's time to get serious.

The February 4 meeting will feature Lud Sibley, KB2EVN telling us about vacuum tubes. Our treasurer and generous program presenter heads up the Tube Collectors of America and knows a lot about the topic.

A General Class course will begin:

- Thursday, February 11 7:00 PM, and convene on succeeding Thursdays at 7:00 PM.
- Location is at the Apostolic Faith Church at the corner of East Jackson and Sunrise Avenue in Medford.
- Professors will be Bud Larson W7LNG, Dale Trautman N7IXS, and Dave Akins KG7HJ.

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Secretary's Report

MINUTES OF THE 7 JAN 2010 MEETING OF THE ROGUE VALLEY AMATEUR RADIO CLUB.

The meeting was called to order by president Herb Grey, W7MMI at the Red Cross building Medford, OR at 19:00L.

Herb announced the 2010 club dues are due, $20.00 regular membership and $15 for seniors.

Herb suspended the reading of the minutes, the treasurer report and regular business so we could get on with the swap meet.

Don Bennett KG7BP put on the coffee and Jack WA7IHU brought the donuts.

Herb announced that on February 11th a

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President's Letter, Continued

- I recommend buying a study guide from HRO or ARRL although a few will be available at the class.

Spread the word – lets enlist some of those who have gotten their Tech licenses. Contact Bud Larson, W7LNG, at 541-773-5214 for more information.

ARES is having a Tech class presented by Bill Anderson, KU6Y.

I'm going to revive discussion about changing the Club's call. As previously mentioned, the existing call ending in "K" has posed some problems to the CW guys.

The executive committee of the Club has met to out line programs for the year.

73,
Herb W7MMI

Two Meter Repeater Frequency

In order to provide a common place to find fellow RVARC club members on two meters, we recommend using the K7RPT 147.62 / 02 repeater as a calling and monitoring frequency. This is an open repeater (no tone or PL access required). The repeater listens on 147.62 MHz and transmits on 147.02 MHz.

Secretary's Report, Continued

general class radio license class will start. All those interest call Bud Larson, W7LNG for details.

A good time swapping and eye balling was had by all.

Submitted by Jacob O. (Jack) Schock, WA7IHU, Secretary

2010 Amateur Radio Exam Schedules Announced

Our local VECs have announced amateur radio examination schedules in southern Oregon for 2010. You can take an exam in any area that's convenient.

Medford Area

Dates: February 28, June 19, and October 30

Time: All at 8:30 AM (Walk-ins allowed)

Contact: HARRY J EKELUND, (541) 282-0854, HEKELUND@EARTHLINK.NET

Location: VA DOMICILIARY-BLDG, 223 CRATER LAKE HWY -ROUTE 62, 2ND FLR NORTH (VA HAM RADIO RM, WHITE CITY, OR 97504

Bring ID, $15 check or money order, and proof of license or exam elements passed.

Grants Pass Area

Dates: February 26, May 21, August 27, and November 19.

Time: All at 6:30 PM (Walk-ins allowed)

Contact: WILLIAM A TYNER, (541) 476-2703, GOODGRENDL@GMAIL.COM

Location: FRUITDALE GRANGE, 960 ROGUE RIVER HWY, GRANTS PASS, OR 97526

Bring ID, $15 check or money order, and proof of license or exam elements passed.

2010 Dues are Due

2009 memberships expire at the end of this month (December) 2009. Dues for 2010 are due starting January 1st, I will hand out renewal information sheets starting at the January meeting. Last year they were mailed along with the newsletter, but the return rate was poor.

On the information sheets, you just need to note any changes in address, email, telephone number, ARRL membership, etc. They are used to help us keep our database up to date, correct any errors, track changes, and keep our ARRL-affiliation status current. Hopefully this is a low-effort way for club members to update their status.

Please consider if you can go to email-only newsletter, as currently it costs the club $1 per month per posted paper newsletter. The electronic version is in color, has better quality photographs, active hyperlinks, and you should receive it about a week earlier than the mailed version.

Membership dues are:

Senior (age 62 and above):	$15
Regular:	$20
Family:	$20
Student:	$10

Please make checks payable to:
Rogue Valley Amateur Radio Club

You can give check or cash to our treasurer, Lud at any meeting, or mail (checks only) to:

Rogue Valley Amateur Radio Club
c/o 3950 Southview Ter.
Medford, OR 97504

Baluns, Part 2

In last month's column, we described the purpose of a balun, and how to describe its ability to choke off common-mode currents. In this second and last installment we will focus on construction and materials.

The easiest construction method is to use an air-core balun. Just a coil of coaxial cable. It's been used for years when feeding beams and dipoles. An advantage of the air-core balun is that there is no magnetic material to saturate. A disadvantage is that core has no losses and thus the resulting balun is a very Hi-Q device. This is great if we want to use the balun for one amateur band, but a real problem if we want to use the balun to cover several bands.

For 80 and 160 meters the air-core balun requires a lot of turns, and the resulting size may not be practical.

The magnetic permeability of air is 1. To reduce the size of the balun at lower frequencies, a magnetic material with higher permeability can be used. Powdered iron cores with a permeability of roughly 10 are commonly available. Such a core can reduce the number of turns required by a factor of 10 compared to an air-core balun (if we had a core the same huge size as our air-core-balun). Unfortunately a 2.4 inch core is about the biggest available, and way too many turns are required than will fit. One solution is to wire the balun with smaller wire rather than coaxial cable. A common technique is to use two parallel conductors of Formvar insulated copper wire, perhaps 14 or 16 gauge. The wires need to be tightly coupled to one another (laid closely parallel) or else the leakage flux increases. Fifteen or so turns can be crammed onto a 2.4 inch core this way. Still inadequate for 80 meters.

Two practical difficulties arise with this parallel wire construction method:

1. The differential-mode loss of the balun increases at higher frequencies due to the poor transmission-line performance of the parallel wires. I've measured 1 dB loss at ten meters with a 5-turn line.
2. In feeders with high VSWR, the Formvar insulation will arc-over either to each other, or to the core quite readily causing catastrophic (perhaps even spectacular) failure of the balun.

The arc-over problem can be addressed by using Teflon-tubing to sleeve the wires. This increases the arc-withstand voltage a lot.

A third approach is to use higher-permeability ferrite materials instead of powered iron. Useful ferrites for HF can have permeability in the 125—600 range, and thus only a few turns are needed to form an effective common-mode choke. This means that coaxial cable can be used. Coax is good in that the differential mode loss is very low even at higher frequencies. The breakdown voltage of coax can be high if Teflon-insulated coax is available, or if larger cable, such as RG-213 is used.

In general, there are two types of ferrite: low-loss material, and higher-loss material. Low-loss material is used for transformers where we want the loss caused by core flux to be small. High-loss material is used for EMI suppression where we want greater bandwidth and loss in undesired current flows.

Mix 61 is a low-loss material suited for transformers. Unfortunately this material gives us the same problem as our air-core balun: very narrow bandwidth. Higher loss materials, such as Mix 31 provide a much wider bandwidth low-Q common mode inductor, provided that we do not allow differential mode signal to enter the core! Coaxial cable is good at preventing the differential mode signal from leaking into the core, parallel wire is

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not as good (as seen from the loss measurements). We cannot simply slide the core over a ladderline (even though this would be useful) because the differential mode flux leaks out of the ladderline and thus would escape into the core causing very large transmission losses (and likely would fracture the cores quickly due to heating).

found that this balun when connected to the antenna tuner coaxial output seemed to work a lot better.

The indication of better performance is three-fold:

1. The tuner settings are much touchier. Speculation is that the poorer balun placed more of the common-mode feedline impedance in parallel with the differential-mode impedances resulting is a lower-Q load impedance. The new balun isolates the common-mode load thus resulting in a higher apparent load-Q. This is good in that we then deliver more power into the differential mode.
2. RFI problems around the shack have been significantly reduced by using this balun compared to the one in the tuner.
3. The noise level on 80 meter receive is dramatically reduced. The ladderline when fed as an unbalanced load gives about S9 wideband noise on 80 meters.

Figure 1—1:1 Current Mode balun constructed from RG-213/U

Figure 1 shows a 1:1 current mode balun that I fabricated from five 2.4-inch Mix 31 cores. It consists of four turns of RG-213/U (solid dielectric, not foam).

This balun provides exceptionally good isolation on 80 meters compared to a commercial unit provided inside the antenna tuner. Since the jumper had been previously assembled, its construction required no soldering!

This balun is used in series with ladderline that feeds a commercial antenna tuner. Originally I used the balanced-mode output of the tuner and connected the ladderline to the two wing-nut screw terminals. However I

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Baluns, Part 2, Continued

The tuner with balanced outputs reduces that to about S7, and using the coaxial output of the tuner with the home-made balun reduces the noise to S0-S1 over most frequencies !!! (when the thunderstorms are quiet) The desired signals are the same level in all three cases.

This results in far improved receive capability on 80 meters. The combination of reduced in-shack RFI, and lower receive noise add up to quite an improvement in 80 meter operation. The cores were purchased from Mouser for $7 apiece, they're Fair-rite part number 2631803802. The Mouser number just adds a 623 prefix: 623-2631803802.

More detailed measurements and descriptions of various configurations of this balun have written up by Jim Brown, K9YC. I'd highly recommend reading his various tutorials on balun construction, isolation, and measurements. They can be found at his web site:

http://www.audiosystemsgroup.com/publish.htm

Jim also has a lot of good tutorials on RFI suppression at the same page. Well worth reading.

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