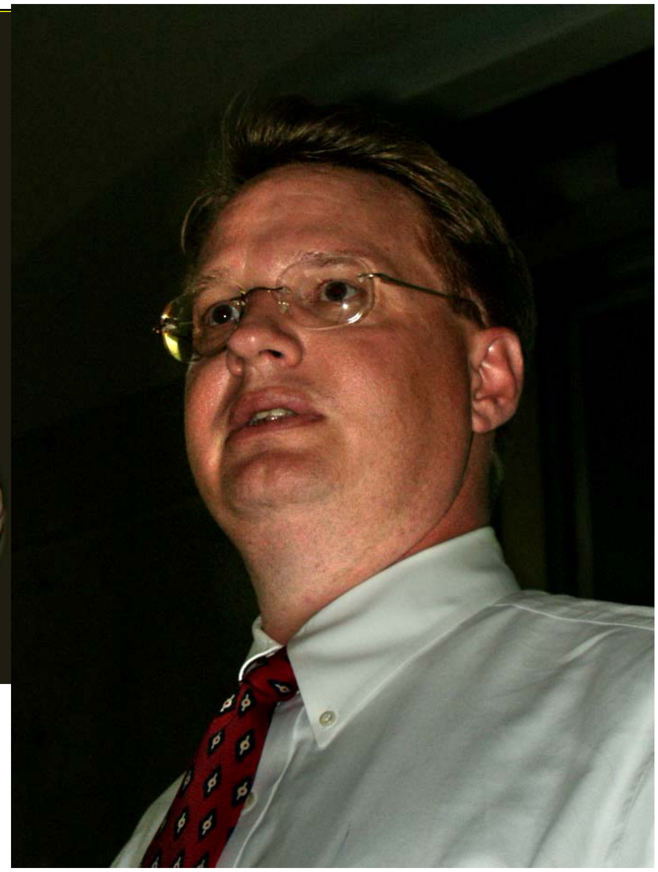

Gordon, K7HFV, and Brett, N7KG, gave us a presentation on Field Day at the June UARC meeting.

Volume 48, Issue 7, July 2005

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The Microvolt

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Prologue

The Utah Amateur Radio Club was organized under its present name in 1927, although its beginnings may date back as early as 1909. In 1928, it became affiliated with the American Radio Relay League (club #1602) and is a non-profit organization under the laws of Utah. It holds a club station license with the call W7SP, a memorial call for Leonard (Zim) Zimmerman, an amateur radio pioneer in the Salt Lake City Area.

Meetings: The club meets each month except July and August. The meetings are held on the first Thursday of the month at 7:30 PM in the University of Utah Engineering and Mines Classroom (EMCB) building, Room 101.

Membership: Club membership is open to anyone interested in amateur radio; a current license is not required. Dues are $15 per year, including a *Microvolt* subscription. *The Microvolt* and membership cannot be separated. Those living at the same address as a member who has paid $15 may obtain a membership without a *Microvolt* subscription for $9. Send dues to the Club Secretary: Dick Keddington, KD7TDZ, 1732 Woodside Dr. #32, Holladay, UT 84124-1624. ARRL membership renewals should specify ARRL Club #1602.

Contributions: Monetary contributions are gladly accepted. Send directly to the Club Treasurer: Chuck Johnson, 1612 W. 4915 S. Taylorsville, UT 84123-4244. For in kind contributions, please contact any board member to make appropriate arrangements.

Repeaters: UARC maintains the 146.62- and 146.76- repeaters. The repeaters are administered by the UARC Repeater Committee. Comments and questions may be directed to any Committee member. The Lake Mountain repeater (146.76-) has autopatch facilities on both the Orem exchange (covering Santequin to Lehi) and the Salt Lake City exchange (covering Draper to Layton). The 449.10 repeater has autopatch facilities into Salt Lake City only available to UARC members. Due to the volume of traffic, only mobiles should use this autopatch. Autopatch use is open to all visitors to our area and to all club members. Non-members who wish to use the autopatch are encouraged to help with the cost of maintaining the equipment by joining the club.

Ham Hot-Line: The Utah Amateur Radio Club (UARC) has a Ham Hotline, 583-3002. Information regarding Amateur Radio can be obtained, including club, testing, meeting, and membership information. If no one answers leave your name, telephone number and a short message on the answering machine, and your call will be returned.

Publication: *The Microvolt* is the official publication of the club. Deadline for submissions to the *Microvolt* is the 10th of each month prior to publication. Submissions by email are preferred (uarc@xmission.com), but other means including diskettes and typewritten submissions can be mailed directly to: Telvin Mills, 6864 Beargrass Rd., West Jordan, UT 84084. All submissions are welcome but what is printed and how it is edited are the responsibility of the Editor and the UARC board. Reprints are allowed with proper credits to *The Microvolt*, UARC, and authors. Changes in mailing address should be communicated to the Club Secretary: Dick Keddington, 1732 Woodside Dr. #32, Holladay, UT, 84124-1624.

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Board Liaison & Autopatch Engineer: Gordon Smith, K7HFV	582-2438
Provo Autopatch Host & ATV Engineer: Dale Jarvis, WB7FID	224-3405
Repeater Monitor: Brett Sutherland, N7KG	298-5399

Contents

For late breaking news listen to the UARC Information Net Sundays at 21:00 on 146.62 or set your browser to:
www.xmission.com/~uarc/announce.html

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The Microvolt

The Official Publication of the Utah Amateur Radio Club, Salt Lake City, Utah
Volume 48, Issue 7, July 2005

QST from the Prez

Glen Worthington, WA7X

By now Field Day is another memory and we all (hopefully) have enjoyed ourselves at Payson Lakes. Next month I will give the additional and detailed thanks that all the help deserves, but for now I would like to thank Brett Sutherland, N7KG, and Marty Olsen, KE7AEW, as the chairman and vice chairman of the Field Day Committee.

One item I want to bring to the attention of the membership is with the help and advice of Garth Wiscombe, W7PS, and Brett Sutherland, N7KG, and the approval of the Board the club obtained its own trailer tower. This is an 85-foot electric crank-up Tri-Ex unit with a new generator and fuel! The monies spent were about 2/3 of the funds generated from the auction 2 months ago, so no unexpected club funds were spent. Our club continues to grow in many ways and thanks to the members who support us.

I am now looking forward to the rest of the summer ham radio activities which include the Bryce Canyon Utah Hamfest, reported to have featured guest Riley Hollingsworth, K4ZDH, the FCC's Chief enforcer for amateur radio. Also we have the UARC Steak Fry, so plenty of activities.

73 de WA7X Glen

Microwave Group

Photo: Ron Speirs, K7RLS

The microwave group had a get together June 4th.

Steak Fry

UARC's annual steak-fry will be held on the afternoon of Saturday, July 16th. If you haven't purchased your tickets, contact Dick Keddington, KD7TDZ, at 274-9638. The deadline is July 11th.

For The Fun Of It

Q: How many DXers does it take to change a light bulb?

A: All of them. One to change it and the rest to argue about whether it counts as a light bulb.

Q: If an antenna falls in the forest, and no one is there to see or hear it, does the SWR change?

Finally! Using all of the letters in "The Morse Code", rearrange them to make a Ham Radio related phrase.
(Solution found elsewhere in this month's issue of *The Microvolt*., no peeking!)

Member of the Month

By Linda Reeder

Photo: Ron Speirs, K7RLS

This month we are featuring Gary Hogan, K7PDN. Gary has been in amateur radio since 1961 and has his General class license. Gary became interested in amateur radio when a friend in Salt Lake City did a phone patch for him so he could talk to his friend, Arthur Caroll, in Hawaii. He thought that was pretty neat. It sure saved him a long distance phone bill.

Gary worked on the ship, USS Monterey, where they trained Navy Air Cadets to land on aircraft carriers. Gary was also on the USS Coral Sea. He was a control operator in the Mediterranean Sea where he navigated a crew landing in Japan. After Gary got out of the Navy, he worked at Hill Air Force Base for 33 years. Gary was a Production Planner in a welding shop where they would build things for aircraft.

Throughout the years Gary was a code instructor. He helped many people pass their code tests. In fact, in 1975, Gary taught John Luker, WB7QBC, the code. John moved to Green River, Wyoming and every Sunday at 1 PM without fail they communicated with each other by way of Morse code on 40 meters (7.004 MHz). Gary was using a Kenwood 430 and a loop antenna. At first it was a vertical antenna. Then Gary decided to make it into a horizontal antenna by laying it down. John Luker, W7QBC, made a special trip to Salt Lake to help Gary with this project. Gary said it worked great and he was able to make better contacts. In 1988, Gary taught Venus Cederstrom, KB7FXB, who is John's mother the theory and code.

Gary is a CW man. He is very good at it. He can send and copy code at 35 words per minute. Gary has done lots of DXing by way of Morse code. Gary and John Luker, WB7QBC, were seriously thinking of entering in to "*The Guinness Book of World Records"* as being the fastest in receiving and sending the Morse code. But when they were told that they had to write it down they gave that idea up in a hurry. Gary said they do not write down the code as they receive it; they copy it in their heads. Gary was even a CW operator in the Navy for four years. Gary is also a member of Air Force MARS.

Gary recalls a year when he helped UARC with Field Day that was held on the shore of the Great Salt Lake. He said there was a north and south station. Gary operated the north station. One year they set up their own Field Day station at Rose Park. They would use their cars to hold up the antennas. They had a lot of fun and made a lot of contacts. They did this for several years. During the Olympics they had a station in Park City.

Gary builds most of his own equipment. Gary built a code keyer which he called the bug. This would enable Gary to send and receive Morse code while driving around in his car. Gary has built several phone patches. In 1976, Gary provided phone patch service for the victims of the Teton Dam disaster. Lee Barrett, N7NM, who is the top communicator for the LDS Church, had a station set up at Ricks College, which is now BYU Idaho, and Gary worked closely with him.

Gary and his wife Karla, have 6 children, all grown now. They have four girls and two boys. Gary is a member of UARC and has been for many years. Gary, we appreciate all of the contributions you have made to amateur radio.

73, N7HVF Linda Reeder.

Ohm's Law IV

This is part four of a four part series on Ohm's Law.

Thanks to OCARC for permission to reprint this article.

By Bob Eckweiler, AF6C

In our last discussion of Ohm's law we learned how to derive all twelve equations. This month let's look at some practical examples for these equations. First we'll choose the proper resistor to use with a new AllnGaP high intensity LED (See Sidebar). Next, we'll handle that dreaded phone call many people get. Finally we'll look at building a load bank to test that new 12-volt, 25-amp power supply you just bought surplus.

Example One - The Bright LED

You want to attach an indicator light to your 28VDC power supply so you will remember to turn it off when it's not needed. You don't want to use an incandescent bulb since they seem to burn out at the wrong time. Also, you want an indicator that is bright over a wide angle so you can see it from across your work area. You choose a new AlInGaP light emitting diode (LED).

A quick check of its specifications reveals that the diode drops 2.15 volts at its rated forward current of 70 milliamperes. Since the LED is a current device, you must select the proper resistor to limit the current through the device to 70 ma. from the 28.0VDC source. The resistor must also be chosen to handle the power it is dissipating. From Figure 1 we see that the resistor must drop 25.85 volts when 70 ma. is passing through it. Using equation (3) [Equations are from the February 2005 article on Ohm's Law]:

$$R = E/I = (28.0 - 2.15)/0.070 = 25.85/0.070 = 369 \text{ ohms}$$

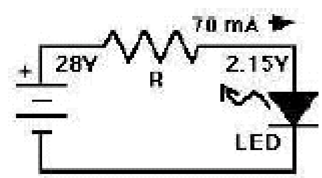

Fig 1 - LED Current limiting Circuit

The nearest 5% resistor value is 360 ohms. Using equation (2) the actual current would be closer to 72 ma. A better choice may be to use the next larger 5% resistor value, 390 ohms; this results in a lower current of 66 ma. which trades off some brightness for more life and reliability.

Are we done? NO! All resistors dissipate power when voltage is applied across them. If we put in a resistor that can't handle this power it will soon fail. If it fails open the LED goes out; if it fails shorted the LED burns out! Neither is desirable. Use

AllnGaP LED Sidebar:

A new type of light emitting diode, (LED), came on the market a few years ago. This LED was designated as AllnGAP (for its material elements…chemical symbols for Aluminum-**AL**, Indium-**IN**, Gallium-**GA**, and Phosphorus-**P**). These LEDs have colors between red and yellow and are much brighter than standard LEDs. They also have a higher forward voltage drop – 2+ volts versus about 1.6 volts, and a higher current requirement – 50 to 70 ma., versus 20 to 30 ma.

To give you a rough idea of the improvement in brightness…a high efficiency red LED (old type) with a viewing angle of 36 degrees, has an intensity of 8.7 mcd. At 20 ma.

Compare that to: The AllnGaP LED has a viewing angle of 90 degrees and an intensity of 1250 mcd. at 70 ma.

Quite an improvement!!!

equation (12) (from Feb.) to find the power dissipated in the 390 ohm resistor:

W = E2/R =(25.85 x 25.85)/390 = 668.2/390 = 1.7 watts

If you used a common quarter-watt or half-watt resistor, a new fragrance would be in the air soon after you turned your power supply on. You could use a two-watt resistor, which would give a small 17% safety factor. But since this resistor will see continuous duty, a larger safety factor would be added insurance. One excellent solution would be to use two 750 ohm, 2-watt resistors in parallel. This would give:

R = (750 x 750)/(750 + 750) = 750/2 = 375 ohms

I = 25.85/375 = 69 ma. (very close to the desired 70 ma.)

W = (25.85 x 25.85)/750 = 0.9 watts (in each resistor) A very conservative 120% plus safety factor.

W(total) = 0.9 + 0.9 = 1.8 Watts for both resistors.

Example Two - "Dad [Mom] [Honey], The Car Won't Start"

Eventually, we all hear or say those words in one flavor or another. Often the problem is that the lights or other battery-draining device was left on; other times the battery has reached the end of its life. Rarely it is an expensive component (starter motor, etc.) that has failed. What do you do?

In our scenario you've just gotten the call and are puzzled. Your wife swears she didn't leave the lights on and the battery is only a year old. Also, she has reported a few times lately that the car was "starting funny". Armed with that information, a few simple tools, jumper cables, your trusty multimeter and some Ohm's law knowledge you head to the mall where the car sits. Upon arriving, the first thing you do is try to start the car. All you hear is a rapid clicking as you turn the key and you notice that the overhead light dims to almost nothing in rhythm with the clicking.

Figure 2 is a simple schematic of a starter circuit. Some resistors have been added that aren't really resistors but are part of the circuit none-the-less. R(bat) is the internal resistance of the battery; R(term) is the resistance of the connection between the battery post and the clamp on battery connector. R(wire) is the resistance of the wire. These resistances are normally VERY SMALL!

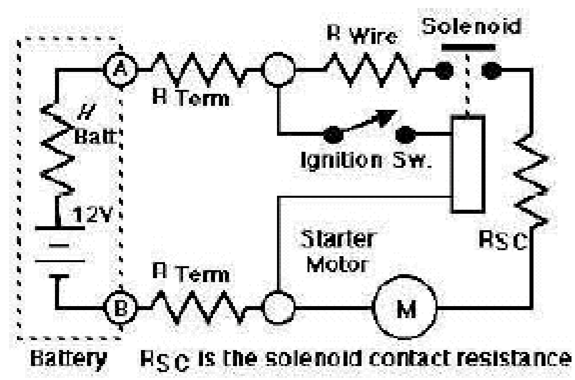

Fig 2 - Typical Starter Circuit of Automobile

The first thing you do is measure the battery voltage across the battery post: 13.1 volts – the battery is not dead.

You'd like to check the battery under load, so you ask your wife to turn on the headlights. They light, but dimly. Again you measure the battery voltage right on the battery posts (Points A). The meter reads just a bit lower than it did before but it's too small to read the difference; 13.09 volts you surmise. The problem is not the battery.

Quickly you move the meter leads to the battery cable clamps; whoa, here the meter reads a lowly 7 volts. You immediately wiggle the cable and are greeted by a sizzling noise, the lights flicker and the meter jumps between 7 and 13 volts. You ask your wife to turn the lights off and the meter returns to 13.1 volts.

A few minutes with your tools and you've removed the battery terminal, cleaned the corrosion out and reinstalled everything. This time, when you turn the key the car starts like new and your wife decides to go back into the store to buy you something special for dinner!

What happened here? One of the R(term) resistances became higher due to corrosion, a common occurrence with car batteries. How high? Typical low-beam headlights (along with the associated tail and marker lights draws on the order of 8 to 10 amperes. Assuming 10 amperes, a battery voltage of 13 volts and that all the other extraneous resistances are zero, this amounts to a resistance of just 1.1 ohms (Can you use ohm's law to get this answer?)

When the key is turned the solenoid (which doesn't require a lot of current) closes, switching the starter motor into the circuit. The 0.2-ohm starter motor that would normally draw about 50 amperes is suddenly in series with this 1.1-ohm terminal resistance. The result is a voltage divider circuit, which we studied in a previous Ohm's law. The starter motor is seeing less than 20% of the voltage it normally would see. Also, the solenoid sees that same voltage which is too low to keep the contacts in, and they open disconnecting the starter motor and causing the solenoid to contact again; thus the rapid clicking sound.

This is just one of many scenarios. If, after turning on the lights, the voltage at the battery posts drops substantially then R(batt) is dropping the voltage and the battery is probably defective. If the battery, with no load, measures low then it is either discharged, defective or the car's charging system is malfunctioning. Look at each resistance in Figure 2 and think about what would happen if any of them became too large.

Example Three – A Load to Test Your Power Supply

You're in your garage. It's a late night on the third Friday of October. You've just come home from the local radio club auction with a surplus 12-volt power supply. It's rated at 25 amperes and will be ideal to run your mobile rig when it's out of the car. Before you hook it up to your expensive rig you want to be sure it operates. You plug it in, turn it on see the voltmeter rise to a nominal 14 volts. With your old oscilloscope you look for AC ripple on the output. It's just a few millivolts and you begin to think you've acquired a real prize. Carefully you tweak the voltage adjusting control as you look on your trusty meter; you set it right on 13.8 volts - the ideal voltage for equipment designed to run off a 12-volt car battery under charge.

Everything looks ideal, but how will it perform with a 25- ampere load? What can you use as a test load? A few moments with you calculator and Ohm's law and you find you need a 0.56-ohm 350-watt power resistor. Darn, there was one at the auction, but you didn't bid on it, thinking; "What would I ever use it for?" Looking in your junk box you find numerous low resistance 100-watt resistors. Can you use them? Maybe!

Each power resistor has a specified resistance and a specified wattage. These are usually marked on the resistor body. Using Ohm's law you can calculate the maximum voltage and current the resistor can handle using equation (9) for the voltage and equation (10) for the current. (I often tag these values on power resistors). For 100-watt one, 2- and 5-ohm resistors these voltages and currents are 10V/10A, 14.1V/7.1A, and 22.3V/4.5A respectively. Remember that these are maximum values above which you will exceed the 100- watt power rating of the resistor. The 1-ohm resistor can only handle 10 volts so we can't use them unless we series them; the 2-ohm resistors will just handle the voltage, but since this is a short test we will ignore any safety factor. We can place three 2-ohm 100-watt resistors in parallel across the power supply. At 13.8 volts each will draw 6.9 amperes for a combined 20.7 amperes. The resistors can be applied one at a time so the power supply can be checked at 6.9 and 13.8 amperes too. To get the load up to 25 amperes, we still need to draw another 4.3 amperes. We can add the 5 ohm resistor to raise the total current by 2.76 amperes to 23.46 amperes.

This should be close enough, but if your motto is: "Perfect is close enough" then you need to draw another 1.54 amperes. The maximum voltage for a 10-ohm 25-watt resistor is 15.8 volts. We have one, so lets add it in parallel with the others. At 13.8 volts it draws an additional 1.38 amperes; our total is now 24.84 amperes. We're now less than 1% from 25 amperes, way within the tolerance of typical power resistors.

At all currents the power supply performed well and you are very satisfied. By now it's way past midnight and you think about bed; but you suddenly realize it's nice and warm in the garage for an October night and you pull out the next treasure you picked up at last night's auction...!

This concludes the series on Ohm's law.

Morse Code To Music: Learning Code The Fun Way

For those trying to upgrade and are having trouble learning Morse Code, putting it to rhythm and music may be the solution. Or, if anyone is tired of listening to 800 hertz beeps, here's something different.

http://www.philtulga.com/morse.html

http://www.cognimetric.com/acrawford/page/morsemusic!Morse%20Code%20Music

Exam Schedule

7/06/05 (Wed.) Farmington
Contact: Rena Skeen, AD7BX
Phone: (801) 773-7048

7/20/05 (Wed.) Provo
Contact: Steve Whitehead, NV7V
Phone: (801) 465-3983

7/20/05 (Wed.) St. George
Contact: Ronald C. Sappington, WI7Z
Phone: (435) 673-4552

7/26/05[1] (Tues.) Salt Lake City
Contact: Eugene McWherter, N7OVT
Phone: (801) 541-1871

7/28/05[1] (Thu.) Roosevelt
Contact: R. Chandler Fisher, W7BYU
Phone: (435) 722-5440

8/06/05[1] (Sat.) Salt Lake City
Contact: Gordon Smith, K7HFV
Phone: (801) 582-2438

8/17/05 (Wed.) Provo
Contact: Steve Whitehead, NV7V
Phone: (801) 465-3983

8/17/05 (Wed.) St. George
Contact: Ronald C. Sappington, WI7Z
Phone: (435) 673-4552

8/30/05[1] (Tues.) Salt Lake City
Contact: Eugene McWherter, N7OVT
Phone: (801) 541-1871

9/10/05 (Sat.) Logan
Contact: Heidi Black, AC7ZC
Phone: (435) 753-7487

[1] Pre-registration required. Contact the contact person prior to the examination date.

For more detail either call the contact or checkout the information on our webpage:

http://www.xmission.com/~uarc/

Utah Hamfest

The Utah Hamfest will be held July 29 – 31 at Ruby's Inn in Bryce Canyon.

Special guest is:
Riley Hollingsworth.
Grand Prize: Yaesu FT-857D.

For additional information go to www.utahhamfest.org.

(Puzzle Solution: "Here Come Dots")