

COMMUNICATOR

Volume XVIII Number 1

February 2006

What I Learned This Month

Bill KCØTIR

Broadband OverGas Lines?

We've had several discussions on BPL (Broad Band over Power Lines). Here's a new wrinkle of which you might be interested. Nethercomm Corp has announced a new idea (at least to me) that might eliminate the problems of BPL while delivering television, telephone, internet and so forth to your home. The process has been named BIG – Broadband in Gas. Their introduction was covered in the January 2006 issue of *Nuts and Volts* (p 9). The idea is to communicate over existing natural gas pipelines. Investigators at the University of Missouri – Rolla have shown that it is possible. This method of broadband also solves the very expensive issue of the "last mile" due to the fact that pipelines *have* to cover that last mile to your home *and* they already exist. The investigators have found two methods that work over gas lines, one is to use the pipeline as a microwave waveguide and the other is to use the metal pipe as a conductor. They also boast that there is no need for modifications to the existing natural gas infrastructure. You can check it out at: www.nethercomm.com. Their plans are to have BIG going to 18 million homes by 2010. Approximately 70 percent of homes and 35 percent of businesses have access to gas lines according to the article.

Heater Meals

As a part of a desperate search for a heating method for athletes at the Winter Games in Torino I stumbled into a really cool technology. The concept is

to simply dump a little packet of salt water into another bag with special heating units to generate heat for cooking/heating meals. I was looking for something that gets hotter than the typical iron-based units you can get from REI. You military guys are probably already very familiar with the idea because it's apparently used for MREs (meals ready to eat). These little units weigh only a few grams (including the water packets) and they can heat water to boiling in less than four minutes. The high temperature lasts about 30 minutes. Moreover, they cost less than a buck. I believe these could be an enormous help for remote work in Em-comm situations. I'm getting a bunch of units for my search and rescue pack. If you're interested in this idea you can learn more at: <http://www.heatermeals.com/heatermeals.html>.

Book Review – Emergency Power,

by Michael Bryce, WB8VGE (ARRL, \$19.95)

Wow, this has become one of my favorite books. For those of you interested in emergency power systems, but lack the technical knowledge – this is the book for you. This book was an absolute joy (except for one thing, see below), the author is funny and clearly expert at this area. His approach is both practical and thorough in terms of the technical background. Have you ever read quite a bit on a topic and then stumble into that book that just makes everything clearer – something like "Oh, that's what they were talking about." Whenever confronting reading or face-to-face inquiries on solar and other emergency power systems I have always

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MARC MEETING: February 15

Minutes

18 January 2006

Bill, KCØFNV

President Paul Moraine (NØPWM) called the monthly meeting to order at 7pm. Following introductions all around, the minutes of the last meeting were read. A motion to accept the minutes was made by Pat Kelly (KCØMIR), seconded by Jeff Smith (KBØYCI) and passed. Kudos were given to Tom Dawson (KCØNRZ) for a great communicator. Next the Treasurer's report was given by Dean Haskins (KAØPII). This was followed by a report on the next Ham Swap Meet, which will be on the 12th of February at the ARA. We will need three people to help with this swapmeet. Finally a report was given on Jake Jacobs (NØCYR), who has gone Silent Key. Jake had been a long time member of MARC.

Under Old Business, we discussed the new program for printing raffle

address labels and mailing labels. We need a printer for this purpose, which needs to be a dot matrix printer, capable of tractor fed, one up labels. A motion was made by Mike Allen (NØMIK) to purchase a printer. This motion was seconded by Roger Livingston (KCØVBK). However, it was determined that we might be able to get a printer for free. Wes Wilson (KØHBZ) next talked about the upcoming HamCon in Estes Park, on June 9 to 11. This will be held at the Holiday Inn. There will be wonderful prizes and cheap rooms. There is an early bird registration by March 1. Our club does the VE sessions and provides the Special Event Station for this event. They will need help with setup and take down of the Special Event Station.

Under New Business, Paul Moraine is working on Club Nametags. Bill Sands (KCØTIR) talked about a Special Event

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Mountain Amateur Radio Club
P.O. Box 1012
Woodland Park CO 80866

President:

Paul Moraine, NØPWM

Vice-President:

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Carol Wilson, KCØDTQ

Director:

Wes Wilson, KØHBZ

Past President:

Melinda Wright, KCØQQO

Meetings: 3rd Wednesdays
monthly except December - 7
pm Woodland Park Library
218 East Midland Ave
Woodland Park

MARC operated linked Teller
Connection repeater system on:
448.650- Tranquil Acres
146.820- Tranquil Acres
146.685- Badger Mountain
147.015+ Cripple Creek/Victor
447.475- Colo. Springs 107.2 Hz I/O

Membership is open to every-
one interested in Amateur
Radio pursuant to club
regulations.

Membership Dues:

\$20.00 Annually for Individual or
Family Membership
Membership includes full auto-
patch privileges.

VE Testing Session are
held on Odd numbered
months at the Woodland
Park Library. Testing starts at
10:00.

Please notify Wes, KØHBZ
at KØHBZ@arrl.net

MARC is an ARRL®
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Deadline for submissions is
14 days prior to meeting date.

Mountain Amateur Radio Club fully supports PPARES, CODRT and emergency communications

(Continued from page 2)

Station at the Olympic Training Center on February 11th. This will be in the Sports Science Lab from 9am to 4pm. The special event call sign will be KØO and there will be special QSL cards for the event.

We began our break at 7:45pm and ended at 8pm

Wes Wilson then gave a full presentation on the Hurricane Katrina DRT response effort.

The meeting adjourned at 9:12pm

Communicator Article Submission Guidelines

Please follow these easy guidelines when you submit an article to be published in the communicator:

1. Submit article in either plain text or Word.
2. Do not indent your paragraphs
3. Use only one carriage return between paragraphs.
4. Please do not apply any formatting.
5. When using a Zero in a call sign please use the special slashed zero character "Ø" . To generate this character in Word do the following; with your caps lock on press <CTRL> + / + O. This is the letter O. Or the character can be selected from the Insert/Symbol menu.
6. Note the location in your document of any graphics using "<< Picture 1, caption >>" and include the graphics as an attachment in your message. You do not need to create a compact image unless required to email.
7. Please include Title followed by First and Call sign.
8. Trust that your submission is appreciated.

Bonding Mobile Installations

Alan Applegate, KØBG

(Reprinted from eHam with the permission of the author.)

High frequency mobile operation can be safe and fun if you take your time to install your equipment correctly. There is more to it than meets the eye, and I've done my best to cover them on my web site (<http://www.k0bg.com>). However, for some reason far too many amateurs leave out one of the most important aspects. That aspect is known as Bonding.



In simple terms, it is applying ground straps (left photo) to the various bolted on pieces of the vehicle to facilitate a contiguous RF ground potential between them. While most of the parts of a modern vehicle are securely fastened, and are more or less DC contiguous, they are not necessarily RF contiguous.

One very good example of this in the exhaust system. It is thermally and physically isolated from the body for obvious reasons. Typical of most of the bolted on parts of a vehicle, one end may indeed be DC grounded to the chassis, while the other end floats. This fact allows the exhaust system to act as an antenna, radiating all manner of ignition and electrical noise directly to your receiving antenna.

(Continued on page 4)

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I've introduced a term here that needs further explanation. The word contiguous means sharing a common border. In this context, we want each of the bolted on pieces to act as if they were one continuous structure. This is very important for several reasons.

The most important reason should be obvious, but in case it isn't; all manner of RFI and EMI, whether induced, radiated, coupled, or looped-in plague every single mobile operator. It makes little difference what vehicle you have, it's size, its engine type, or construction (frame vs. unibody); they all exhibit some level of what we call noise. Adequate bonding will significantly reduce these maladies.

Bonding alone, however, will not magically fix every single vehicle-generated noise we hear in our radios. That takes a lot more work and may involve adding split beads, installing larger sized DC wiring to our transceivers, and a host of others. Again, I do my best to cover these in the various articles on my web site.

There is one thing bonding does that isn't as evident as noise reduction, and that is its effect on antenna efficiency. It's prudent to think of the antenna and the vehicle as a system. It's analogous to a base station vertical and the ground plane under it, if any. The more radials we install (to a point) under a base vertical, the better it works. With respect to a vehicle vertical, the more bonding we do, the better it works.

Lets look at this another way. The body of any vehicle is a very poor ground plane. In fact, most of the effect is caused by the capacitive coupling between the various parts of the vehicle and the physical ground under the vehicle. The physical ground I'm referring to may be a driveway, roadway, dirt, gravel, or any other drivable surface. A surface, incidentally, we have no control over. Just like a base vertical with an inadequate number of radials, any vehicle has a lot of ground loss.

There are a number of technical publications which list the ground losses exhibited by vehicles. Apparently they all quote the same source as they are always listed as being between 10 ohms on 80 meters, to about 2 ohms on 10 meters. In reality, the figures are closer to 20 ohms to about 5 ohms, but may be more if there is excessive coupling between the vehicle's body and the antenna (example: antenna too close to the body like it would be when mounted on the back bumper of a van).

I don't want to offend the purists, so let me add this. Ground loss in this context is not just that induced between the body and the physical ground under it. I'm including coupling and stray losses because no matter what causes the loss, it reduces overall efficiency when the vehicle and the antenna are correctly viewed as a system.

My example about an antenna mounted on the back of a van points out one very important point; mounting position and/or height are not always ideal as often dictated by circumstances. Remotely tuned antennas are a good example, as their weight makes it very difficult to body mount them. In other words, we have to play the hand were dealt, and it isn't always aces.

The only way we can ante up the best signal, is to do as much bonding as we can, and avoid poor mounting techniques. One poor mounting technique which comes to mind is installing the antenna atop a long stalk, and then using all manner of ground straps down to the frame. While this may DC ground the antenna base, it is not a substitute for an adequate ground plane, any more than a ground rod is adequate for a base vertical.

This article isn't about proper mounting, per se, albeit an important attribute to efficiency. It is meant to point out how important bonding is to increasing efficiency and reducing noise.

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Here is a little experiment you can try. You'll need an MFJ 259B or similar antenna analyzer (owning one nowadays is as important as owning a good wattmeter and dummy load). Mount your antenna first, and then measure its input impedance on each of your favorite frequencies. Complete your bonding and measure it again. You'll notice the resonant frequency has lowered slightly, and the input impedance has dropped. Depending on how good an antenna you have, it is not uncommon to see a 25 percent drop in impedance. This occurs because the net ground losses decrease.

Allow me to change tracks here for a moment. I don't wish to get into a long-winded, technical discussion about mobile antenna input impedances, and what they consist of. If you really want to know about vertical antennas in general, <http://www.cebik.com> is a good site to peruse. A little closer to home, <http://www.w8ji.com> has several very good articles specifically about mobile antennas, and what makes them tick.

Both of the aforementioned sites contain antenna modeling data, which brings up another important point. Modeling a mobile antenna installation with [EZNEC](http://www.eznc.com), or similar program, is an extremely complex operation which requires field measurements to correct for preprogrammed assumptions with respect to ground losses within the vehicle's structure, and the vehicle's capacitive coupling to the ground surface under it. Move the vehicle to another spot 25 feet away, and all of the parameters change.

There is one aspect of mobile operation a modeling program will help you understand, and that is what importance coil Q factors play when the ground losses are high. One of Tom Rauch's, W8JI, articles addresses this very issue.

If you know how to use an antenna modeling program like EZNEC, here's a little game you can play. Design yourself two 10 foot long, 80 meter, center

loaded, mobile antennas. One with a coil Q of 50, the other one with a coil Q of 300. Now compare their efficiencies when mounted over a loss-less ground plane, one with 5 ohms of loss, and one with 20 ohms of loss. This little operation will exemplify why low loss mounting techniques, and proper bonding are so important.

The aforementioned exercise will also illustrate, albeit more subtly, why spending big bucks on a high Q antenna is a waste of resources if you're unwilling to improve the ground plane under it, be that by proper bonding, or an adequate numbers of radials as the case may be.

While a cheap, short, low Q (inefficient), and poorly mounted HF mobile antenna will garner contacts with or without any bonding, playing [Army](#) and being all you can be takes more time and effort.

Alan Applegate, KØBG

PS: My thanks to L. B. and Tom for their comments.

Addendum

One question which will undoubtedly arise from this article is what is the correct number bonding straps required? While the optimum number of radials for a base vertical is about 100 or so, the optimum number of bonding straps depends on the vehicle. While body on frame construction requires more than unibody construction, to suggest a specific number is a case of presumption as there are just too many variables.

The following suggestions are not necessarily in order of importance, nor are they the limit with respect to the total number. Just consider them a starting point: Exhaust system, at every joint and hanger; hood across both hinges, trunk across both hinges; doors; tail gate, lift gates etc., across each hinge; bumper backing plates; engine, 2 or

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been frustrated with the author's (or salesperson's) seeming intentional approach of trying to impress me with his/her knowledge of the area by drowning me in "it depends" presentations. No matter what I wanted to do, there was apparently no optimal solution and everything "depended" on something else that was somehow too much to be communicated in simple terms – not so with this book. This book can take the reader from ignorance to a position of building and servicing emergency power systems. There are still choices to be made, but you will be far better armed after reading this book. Below is the table of contents:

Keeping signals on the air

There's an introduction describing the "Great 2003 Blackout" and an emphasis on the idea that "No Single Solution is a Perfect Solution." The author gives a quick overview of emergency power systems and the idea that a single system will seldom be sufficient in an emergency, you need at least two. The author also begins the idea that he will pound home throughout the book – safety.

Hey, I am in the dark

Discusses various types of lighting and which ones work best in given situations and with given power assumptions.

Solar Power

This was my favorite chapter. I read voraciously, or should I say I read halves of books voraciously. The problem is that often the author can't hold my interest passed the first third of the book and I read a little further only to find out that the information is redundant, confusing, or simply not helpful. This book doesn't fall into that category. I've read it once and intend to read it again – cover to cover. The author describes different types of solar cells, efficiency, regulators, practical aspects of keeping solar panels working, trackers, and how to avoid getting ripped off.

Charge Controllers for Photovoltaic Systems

A relatively short chapter, but intense. Common misconceptions, design assumptions, and which types produce RFI are all covered.

Generators: Gas, Wind and Water

Gasoline generators get a fair amount of coverage, and are described as the most likely "Plan B" for power emergencies. Wind and water generators are also discussed with the benefits and liabilities described.

Load Sizing.

Answers the basic question – how much power is enough. This has a lot to do with batteries and how much storage capacity you need. I finally got it – the "it depends" part referred to above.

Holding Your Volts: Battery Systems and Storage

Very extensive chapter on different types of batteries and how they work.

Systems for Emergency Power

Covers a wide variety of power systems from briefcase-size portable battery systems to the huge ones that will take up most of your garage.

Inverters

Explains the differences between inverters, what they do, and recommendations on what type to use.

Safety

Excellent chapter. Well worth reading all by itself.

Emergency Practices

This chapter covers everything from food to guns. Yes, guns.

Appendices

Extensive appendices on wire sizing, Powerpole™ connectors, and a number of power control project articles from QST.

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Although I am clearly impressed with this wonderful book, there was one aspect that was extremely irritating. The person who edited the book for grammar, spelling and sentence structure, should be strung up. These copy errors were so annoying that I began highlighting them – they average at least one per page. However, don't let that dissuade you from getting this book. Mine is already dog-eared and highlighted so much I may need to buy a clean copy to reread. This is perhaps the single best book I've read on ham radio stuff in recent months.

In Closing

The biggest news for me was passing my Extra Class test. This test is quite a bit more difficult, both in terms of understanding and memorization than the General Class test. It's an interesting aspect of ham radio that although I can pass tests, I still feel like a complete beginner. I started studying in November (via Gordon West's book and audio course), and took the test yesterday (28 January) at the Park County Radio Club VE session. Finally, got to meet Padre (WØWPD) and some of the members of the PCRC. I'd never been in that region before – very pretty drive and wonderful people. I rewarded myself for passing with a Cushcraft R8 vertical antenna from HRO based on Wes and Dean's recommendations. Now I can't wait for some nice weather to put it up. I'm planning to hide it in the backyard among the pine tress – not optimal, but I'm trying to think of the neighbors.

73.

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Jess Miley, KØTAA

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more (in addition to the factory installed ones); transmission, 2 or more; pickup beds, 1 on each corner; body on frame construction requires 1 across every rubber isolation point; radiator; and no doubt a few dozen more.

Another question sure to crop up is; what constitutes a correctly mounted HF mobile antenna when efficiency is the first priority? The answer to this question is easily deduced if you use a base station vertical as an example. You wouldn't mount your base vertical 6 inches away from your metal storage shed atop of 3 foot ground rod unless you're totally oblivious. Then why would you mount your HF mobile antenna in a similar fashion?



The real answer is a little more complex than the aforementioned would imply. Height restrictions (both real and legislated), the type and weight of the antenna, its over all length, and your view toward drilling holes in the body of your vehicle are all considerations. I drill lots of holes, as the left photo illustrates (there are close up views on my web site, and on [HiQ's](#) web site). In any case, keep these ideals in mind: Place the antenna as high as local conditions and length allow; with as little of the mast and coil

(especially the coil) shadowed by the vehicle's sheet metal as possible; preferably body mounted (requires drilling holes) rather than using frame extensions or trailer hitch type mounts; and with safety the top priority. The latter negates the use of any temporary mounting arrangement, especially a mag mount!

Home Station Power Failover

Tomas KCØNRZ

For emergency communication, keeping you home system on the air can be critical. For this you will need a backup power source, preferably with automated failover. Discussed here is a simple, relay based system that is easy to build and low cost. Combine this system with a good deep cycle 12 volt battery and you will be able to keep your station on the air for hours during a power failure.

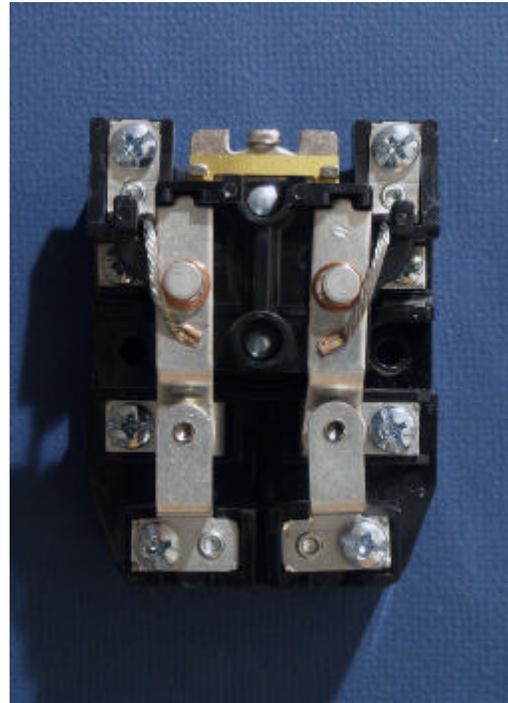
This 12 volt system can be used power radios, TNC, laptop-(no battery installed), weather station as well as other 12-volt electronics. When you experience a power failure, this system will keep all your systems on-line even without the computer crashing. All the components utilized are available at both your local auto parts store and electronics supply house.

Relay

The key element in this system is the relay. Utilizing a DPDT motor start relay provides a good continuous-duty relay that has large contacts. Continuous duty is *critical* because the relay will remain energized as long as house current



is supplied to it, in most cases 24 hours a day. The large contacts will prevent the contacts from welding shut when the closed under load as well as enhance long term reliability.



Battery

For the battery, most deep cycle gel cell batteries will work fine. A deep cycle battery is important for this type of application. Normal automotive batteries will not hold up well to continuous charge and discharge cycles. Utilizing a 120 amp hour marine battery will provide enough power for most users. The battery size that you choose will determine how long your system will stay on the air in the event of a power failure. Gel cell batteries will normally not vent gas, however during heavy charge cycles they may generate enough gas that they need to vent. Due to the potential off gassing and its explosive nature you may want to locate your battery outside and away from your station.

Charger

The 12 volt charger should be a simple inexpensive trickle charger. The charger can staying connected to the battery at all times will keep the battery topped of and will recharge it at a slow rate in the event that the system is used. If you have to operate off the

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battery for an extended time you may



want to disconnect it from you system and recharge using a regular 12 volt charger for a faster charge.

Power Supply

The radio power supply utilized does not need to have any special characteristics. In most cases you will already have a supply that you are currently using for your home station.

Power Distribution

For power distribution, as recommended by many ARES organizations, using an Anderson Powerpole base Rig Runner will allow easy hookup and re-configuration. By having all the 12 volt connections to the relay system made using Powerpoles you will easily be able to remove it from service should you have problems.

Parts List:

Relay: NTE R04-3A30-120 or ECG RLY1244, 120 Volt Continuous duty coil, DPDT 30 amp contacts (available at most electronics supply stores)

Enclosure: Utilize a metal enclosure. The 120 volt service should be grounded to the enclosure to eliminate the risk of the enclosure becoming energized. Using a metal enclosure will also provide some level of shielding.

Battery: 12 Volt 120 Amp Hour Deep Cycle or one of you choice. Should utilize a Gel cell to help reduce off gas-

sing.

Battery Charger: 1.5 Amp Trickle Charger (EverStart Model WM-1-12A available at Wal-Mart)

Wire: 8 to 12 Gauge Black/Red zip cord. You should utilize the same size or larger that is currently used to connect you system to you power supply. (Wire size will be dictated by your power requirements, but remember bigger is always better) The following chart can be utilized to size your wire.

Wire Sizing Chart For 12 Volt Systems

	Wire Gauge					
Am	14	12	10	8	6	4
10	11	17	27	43	68	108
15	7	11	18	28	45	72
20	—	8	13	21	34	54
25	—	—	11	17	27	43
30	—	—	9	14	23	36
35	—	—	—	12	19	31
40	—	—	—	—	17	27
45	—	—	—	—	15	24
50	—	—	—	—	14	22

Maximum one-way distance (feet) for 5% voltage loss in 12 volt systems. Wire Size (AWG) Chart indicated distance of wire run.

Fuse: 1 - 5 Amp for 120 volt Relay connections, 3 for 12 volt connection; power supply, battery, and power out. (Fuse size will be dictated by your systems requirements)

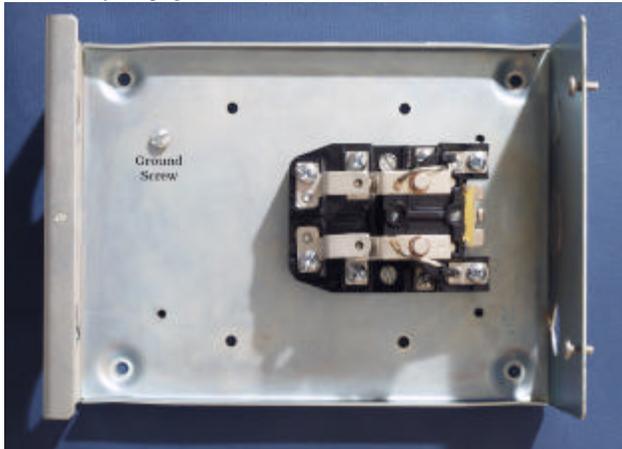
Building it

Construction is pretty basic and can be accomplished with the following steps:

1. Mount relay in enclosure
2. Connect a 3-wire 120 Volt cord

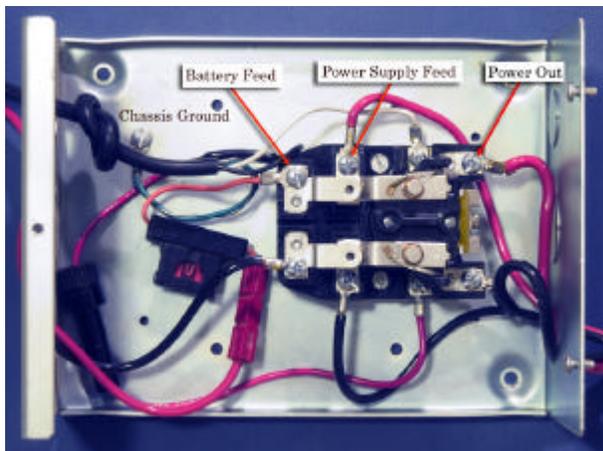
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to relay grounding the enclosure. Be sure to knot the cord to prevent stress on the hookups.

(NOTE: Be sure that none of the wires interfere with the operation of the relay.)

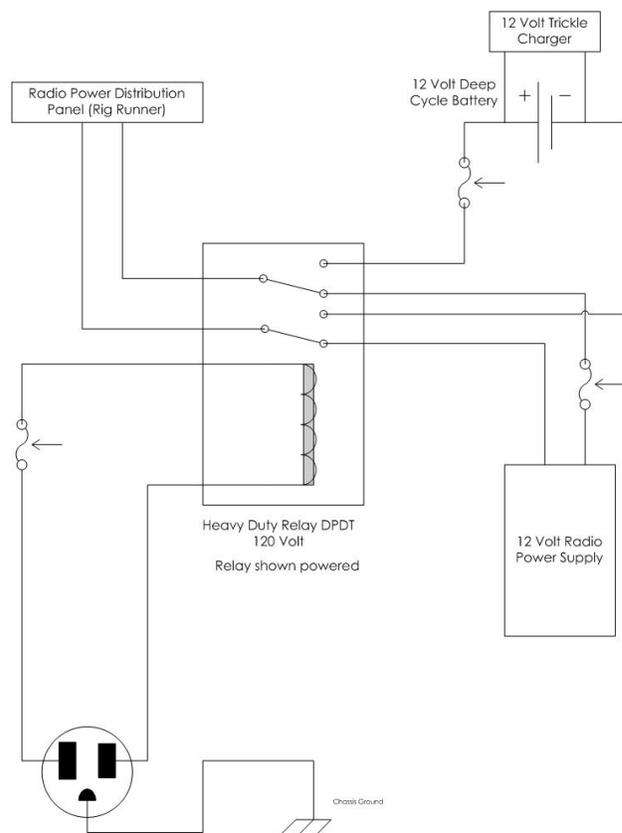


3. Wire the battery feed line to the relay contacts that are open when the relay is energized. Be sure to place a fuse inline, a shorted battery can explode. (NOTE: All positive 12 volt connections will be on one side of the relay and the negative 12 volt connections will be on the other side.)
4. Wire Power supply feed line to relay contacts that are closed when the relay is energized. Again be sure the power supply is fused. (NOTE: Be sure that you wire the polarity cor-

rectly on ALL connections)

5. Wire you power distribution panel to the common side of the relay contacts. If you are utilizing a distribution panel with built in fuses you will not need to fuse this line, other wise be sure to add another inline fuse.
6. Prior to hooking up any 12 volt components check the function of the relay by plugging the 120 volt line into the wall.
7. Double check the polarity on ALL 12 volt connections.
8. Hook up Battery and Power supply to the relay and again check the polarity and voltage on the power out wires using a volt meter with the relay in both the energized and none energized states

Once satisfied with the system hook up the battery to the charger and connect to your radio equipment and you are off and running.



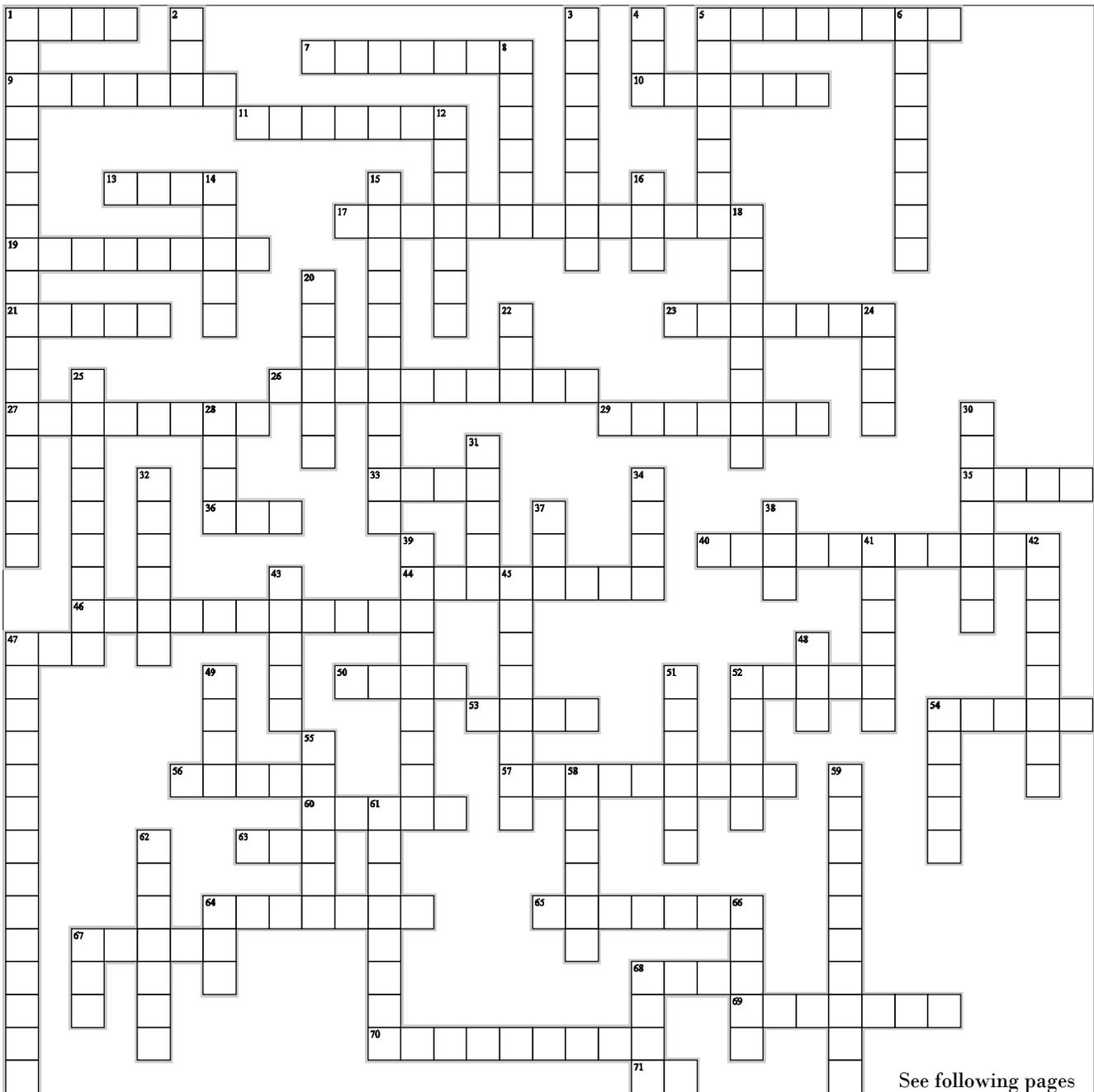
Hamcon 2006 -- ARRL Rocky Mountain Division Convention
June 9-11, Estes Park, Colorado www.hamconcolorado.org

Have fun, learn cool stuff about the convention and other things, and maybe win a prize!!!

Visit www.hamconcolorado.org for the clues, do your best, then turn in your completed crossword puzzle to the registration desk at the convention no later than Saturday, June 10, 2006 at Noon. All turned-in crossword puzzles will be eligible for a special prize drawing beginning on Sunday, June 11 at Noon. Winner must be present to win! Email Steve Williams, k0srw@arrl.net with any questions.

Name: _____ Call sign (if any): _____

Phone number: _____ Email address: _____



See following pages for questions.

Created with EclipseCrossword - www.eclipsecrossword.com

Across

1. First name of the ARRL Colorado Section Manager
5. Lots of technical and operating _____ will be conducted
7. Besides Colorado, another state in the ARRL Rocky Mountain Division
9. Fred MacMurray TV show, also our T-shirt and coffee mug vendor's company name (leave out the spaces)
10. Drawings for these will be held at every technical session and forum
11. National _____ System
13. What is The Sign Man of Baton Rouge's first name?
17. Last name of FCC Special Counsel and Convention Banquet speaker
19. In what city does the Denver Radio Club meet?
21. Call sign of the man in charge of the convention talk-in station
23. The Loveland Repeater Association meets monthly in this town
26. N5ZGT's last name
27. If you sign up for it, who can attend the Sunday Morning breakfast at the convention?
29. One of the major radio manufacturers to attend the convention
33. Call sign of the convention chairman
35. The major prize drawings are at _____ on Sunday!
36. If you register by March 1st, you can attend the convention for only ___ dollars!
40. If you operate W1AW/0 at the convention, you'll receive a beautiful Operator's _____
44. A technology that allows licensed Amateur Radio stations to communicate with one another over the Internet, using voice-over-IP (VoIP) technology
46. AMSAT is the Amateur Radio Satellite _____
47. John, N5EHP will be attending with which company?
50. Besides Colorado, another state in the ARRL Rocky Mountain Division
52. Last name of ARRL co-founder with Hiram Percy Maxim
53. W1AW normally resides in this grid square
54. DTRS stands for Digital _____ Radio Service

55. Where Clarence Tuska's granddaughter is a physics professor
57. Dick _____ is professionally producing our convention program book
60. NCG Company is the maker of _____ antennas
63. Large animals that can often be seen wandering around in and near Estes Park
64. A hot car, or the town where Clear Signal Products, Inc. is located
65. Looking for a small animal or a hidden transmitter
67. Rob Roller, N7LV represents this organization on the Hamcon committee
68. ARRL COO's Call sign
69. Estes Park, our 2006 convention site, is located in this Colorado county
70. What position does Ann Trudeau hold with the Colorado YLs?
71. Long distance

Down

1. What company does KB6WHT own? (leave out the spaces)
2. The Estes Park Holiday _____ is the site of Hamcon 2006
3. Hamcity.com's slogan is "_____ communications warehouse"
4. Low power
5. A new, very unconventional, amateur radio satellite
6. Rocky Mountain _____ Park is just outside Estes Park
8. The only casino to donate a prize to Hamcon 2006
12. What company manufactured the 75S-3 receiver?
14. HamTestOnline's slogan is "The Software that _____ you."
15. Rocky Mountain National Park straddles this divide
16. First name of ARRL Technical Coordinator for the Colorado Section
18. Last name of the ARRL's 14th president
20. You can register for the convention by mail or _____
22. Can individuals donate new prizes or money to the convention?

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24. W1AW/0 will operate from this grid square, June 9-11, 2006

25. Besides Colorado, another state in the ARRL Rocky Mountain Division (leave out the space)

28. Call sign of the Pikes Peak Amateur Radio Association president

30. Country from which the longest distance convention prize was donated

31. Early-bird registration is just \$10 if received before _____ (month) 1st

32. Alpha Radio Products is a sponsor of the 2006 DXpedition to _____ (no spaces) Island

34. _____ is the Call sign of the Boulder Amateur Radio Club

37. Internet technology that often causes significant interference on the amateur bands

38. Atmospheric noise

39. What company makes the T8 antenna?

41. The day you should at Hamcon 2006 to avoid missing spectacular speakers and great fun

42. Volunteer _____ Session for license tests

43. Last name of the ARRL's 1st president

45. Musically, Heil Sound's Bob Heil K9EID is an accomplished _____

47. Where on the internet can you find out all the latest convention details? www._____.org

48. Harold Kramer is the publisher of _____ Magazine

49. Amateur Radio Emergency Service

51. Estes Park is a great place for a _____ vacation

52. Number of speakers on Friday night

54. Tucson Amateur Packet Radio is headquartered in this state

55. One method of transmitting and receiving voice, video or other information which can be expressed in digital form, using radio frequency communications equipment

58. What word is represented by the "X" in this URL?

www.hamconcolorado.org/2006_X_registration.pdf

59. What hotel is offering us VERY special convention rates?

61. What time is the Wouff Hong ceremony on Saturday?

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2006—Upcoming Events

(All MARC Meeting and VE Sessions are held at the Woodland Park Library)

(All PCRC Meetings and VE Sessions are held at Saint Mary's, in Bailey)

Date/Time	Event
Wed, 15 Feb, 1900	MARC Meeting
Sat, 25 Feb, 1400	PCRC Meeting
Sat, 04 Mar, 1000	MARC VE Session
Wed, 15 Mar, 1900	MARC Meeting
Sat, Mar 25, 1230 VE, 1400 Meeting	PCRC VE Session and Meeting
Wed, 19 Apr, 1900	MARC Meeting
Sat, 1 Apr	Longmont ARC Swapfest
Sat, 22 Apr, 1400	PCRC Meeting
Sat, 06 May, 1000	MARC VE Session
Wed, 17 May, 1900	MARC Meeting
Sat, 27 May, 1230 VE, 1400 Meeting	PCRC VE Session and Meeting
Jun 10-11	HAMCON
Wed, 21 Jun, 1900	MARC Meeting
Sat, Jun 24, 1400	PCRC Meeting
Jun 24-25	Field Day
Sat, 01 Jul, 1000	MARC VE Session
Sat, Jul 9, 0800—1300	PPRAA Megafest
Wed, 19 Jul, 1900	MARC Meeting
Sat Jul 22, 1230 VE, 1400 Meeting	PCRC VE Session and Meeting
Wed, 16 Aug, 1900	MARC Meeting Program: Nomination of Officers for 2007
Sat Aug. 26, 1400	PCRC Meeting
Sat, 02 Sep, 1000	MARC VE Session
Wed, 20 Sep, 1900	MARC Meeting Program: Election of Officers for 2007
Sat, Sep. 23, 1230 VE, 1400 Meeting	PCRC VE Session and Meeting
Wed, 18 Oct at 1900	MARC Meeting Program: Establish Date and Time of Christmas Party
Sat, Oct. 28 1400	PCRC meeting
Sat, 04 Nov, 1000	MARC VE Session

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62. ARES District 6 in Colorado includes Park, _____ and Lake Counties

64. The last date to reserve special room rates at the Holiday in is _____ (month) 19, 2006

66. Your club can have an exhibit _____ at the convention

67. Early-bird registrants get one of these FREE

68. First name of the author of "Ham Radio for Dummies"

NOTICE

A reminder to all to wear name tags with call sign to **all** club functions. A club function could be quite intimidating to newcomers to the hobby and the name tags would help alleviate that.

NEW MEMBERS

Phil Leach KK0PL Extra

Deb Leach KK0DEB Technician

Elliot Linke KB0RFC Technician

First Class Mail

Mountain Amateur Radio Club
P. O. Box 1012
Woodland Park, CO 80866