

## From the Gavel...



### When all you have is a transmitter...

I look at the world through different eyes than I did just a few years ago.

I'm not talking about the mundane changes in eyesight as I grow older, and ever more myopic.

Nor even the slightly more jaded, but ever-loving eyes, of a father; as his children try his patience.

But with \*radio\* eyes.

I notice antennas a lot more than I used to.

To be precise, I didn't really used to notice them at all, unless specifically pointed out to me, or those perhaps as obvious and large as the CFRB station in Clarkson.

Now my eyes tend to be attracted to them.

There are at least three Amateurs in my neighbourhood that I don't know; that someday I plan to knock on their door and introduce myself. Better stock up on some club brochures first, although I don't want to be mistaken for a gas-supply-company-shill.

One house has a VHF Boomer on a rotor, and the rest is just wire. No vertical adjust as far as I can tell, just normal rotator, so probably no EME - wonder how far they get with SSB?

Another house has a cubical quad. Looks like several bands nested in there, on nicely curved, probably fibreglass poles. Pretty, and pretty fragile-looking thing; but it has survived several windstorms, so must be pretty strong.

The last of the closest three has a massive trylon tower, with a large beam and vertical on top. And a lonely plastic owl. I wonder if the birds are still scared away after all these years.

Driving along other roads nearby, I see other antennas. Some likely amateur, others not as obvious. The little yagi on the power substation south of Queensway on Cawthra. The microwave dish near the railroad. The funny vertical in the junction area that I pass on the GO. Of course I do admire the size of the tower, and the VHF/UHF bay antenna at the CP yard we also pass through on the way downtown.

Then I read in QST, TCA and other places about people with restrictive covenants, who have come up with ever more devious places to hide their systems. Like the flagpole antenna - who is going to tell an American (or based on the Federal Conservative bill soon also Canadian) to remove his flag!

I thought loading up the eavestrough was just a rumour, but I have read about it in too many places, so I believe that at least a few people have tried it.

So even though I cannot see them, many of the houses in between those few I can see may well have a 'sky-hook' hidden!

For now, with my wire between two trees, I am jealous of some, but better off than others. I need to re-winterize my feed-line entry to the house, and prepare for the winds of winter, and hopefully with higher bands active, I can get some DX before the sun goes quiet again.

Hmm, the fence looks metallic. Wonder what its characteristic impedance is...?

Keep on radiating signals

Scott VA3NMI

### This Month

1. From the Gavel
2. Commentary
3. Club Calendar
4. The MARC DX Award Update
5. A Simple Solution To A Nagging Problem
5. Operating On The HF Bands: Part 2
6. Accuracy In Logging
7. A Simple DC Distribution Panel
10. RAC Application Form

### Sunday Brunch

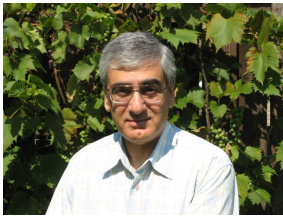
Sunday brunches are held on the first Sunday of each month. Time is 9:30AM at Symposium Restaurant, 6677 Meadowvale Town Centre Circle, Mississauga (at the corner of Winston Churchill Blvd and Battleford Rd). All are welcome to come out and have an opportunity to chat in an informal setting.

### Club Nets

**2 Metre Tuesday Night Phone Net** Join in on the chatter starting at 8:30PM every Tuesday on the club repeater. Hosted by various net controllers. 145.430MHz Tone 103.5 Minus (-) offset. Contact our VHF Net Manager, **Lorne (VE3CXT)**, if interested in becoming a net controller.

**75 Metre Sunday Night Net** Starts at 8:30PM every Sunday. Hosted by various net controllers. 3.775 MHz +/- QRM. Contact our HF Net Manager, **Michael (VE3TKI)**, if interested in becoming a net controller.

## Commentary



This November issue of *The Communicator* details some innovative ideas to help you in the Ham Shack.

However, it is November and in spite of the recent warm weather, Winter is fast approaching. The next few weeks will be our last chance to get that antenna work done before the snow flies.

Read the MARC DX Update to find out who received the MARC DX Award certificates this past month. The Mississauga Amateur Radio Club Awards rules and application forms are given on the MARC Web site ([http://www.marc.on.ca/marc/events/events\\_awards.asp](http://www.marc.on.ca/marc/events/events_awards.asp)) for those who may have missed the September issue.

For an innovative idea for two rig two computer operators, read Ric East's, VA3XRE's, article *A Simple Solution to a Nagging Problem*. This article is sure to simplify your operating procedures.

Be sure to read, Michael Brickell's, VE3TKI's, article *Part 2 of Operating on the HF Bands*.

If you are plagued with too many wall warts powering you ham shack accessories, you may find the article on the easy to build *Simple DC Distribution Panel* just what you are looking for.

As with every issue, I am looking for new articles. Don't be shy. This is your newsletter.

The Communicator is one of MARC's methods for communicating information to club members and is your newsletter. Let me know what you would like the newsletter to be and what type of articles you would like it to include. I solicit your input on topics for articles i.e. antennas, kits you have built, great operating experiences, operating tips, book reviews, etc. for consideration by the technical committee.

Without your constant support in the form of ideas, suggestions and article submissions, we would not have such a fine newsletter month after month. I look forward to hearing from all you budding or aspiring authors. Your experience is what makes amateur radio what it is. Let's hear from you.

If you change your email address, please notify both myself and Rick Brown, VE3IMG, Membership manager, of the change.

I can be reached at any club meeting or via email at [va3tpv\[at\]rogers\[dot\]com](mailto:va3tpv[at]rogers[dot]com)

73, Ed Spingola (VA3TPV)

## Executive Directors

President	Scott Gregory, VA3NMI
1st Vice President:	David Shilling, VE3XDS
2nd Vice President:	Stephan Bejusca, VA3AR
Treasurer:	Jim Brampton, VE3JIW
Secretary:	Robert Emerson, VE3RHE
Past President:	Jeff Stewart, VA3WXM

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Education Manager	Earle Laycock, VE3XEL
House / Visitor Host Manager	Murray Yewer, VE3JMY
Newsletter Editor	Edward Spingola, VA3TPV
Net Managers HF Net	Michael Brickell, VE3TKI
VHF Net	Lorne Jackson, VE3CXT
Repeater Manager	David Shilling, VE3XDS
Assistant	Michael Brickell, VE3TKI
Assistant	John Lorenc (Sr), VA3XJL
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Assistant	Bob Hudson, VE3CWU
Assistant	Asim Zaidi, VE3XAP
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Assistant	Lorne Jackson, VE3CXT
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Legal Consultant	Lorne Jackson, VE3CXT
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Education Basic Course Prime	Earle Laycock, VE3XEL
Advanced Course Prime	Thomas Bernard, VA3TMB

## Audit Committee

Auditors Coordinator	Basil Burgess, VE3JEB
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## Public Service

ARES Emergency Coordinator	Dan Goodier, VE3NI
Assistant	Thomas Bernard, VA3TMB
Assistant	Michael Brickell, VE3TKI
Assistant	David Malar, VA3MLR
Assistant	Bob Boyer, VE3XBB
Assistant	John Duffy, VE3DRZ

CANWARN Manager	Peter Mosher, VA3PKM
Special Events / Walks Manager	Bob Boyer, VE3XBB

## Special Interest Groups

Contests Manager:	Asim Zaidi, VE3XAP
Assistant	Rick Brown, VE3IMG
QSL Manager	Michael Brickell, VE3TKI
Project Group:	Michael Brickell, VE3TKI

## CLUB CALENDAR FOR 2011 - 2012

### November, 2011

01 Tue VHF/UHF - 2 Meter Net  
03 Thu Exec Meeting  
05 Sat ARRL Sweepstakes CW  
06 Sun HF - 75/80 Meter Net  
06 Sun Sunday Brunch – Symposium Restaurant<sup>2</sup>  
07 Mon Basic Class 8  
08 Tue VHF/UHF - 2 Meter Net  
09 Wed Club Project Night<sup>5</sup>  
10 Thu Club Meeting -Speaker's Night<sup>1</sup>  
13 Sun HF - 75/80 Meter Net  
14 Mon Basic Class 9  
15 Tue VHF/UHF - 2 Meter Net  
17 Thu ARES Meeting<sup>4</sup>  
18 Fri ARRL Sweepstakes SSB Contest  
20 Sun HF - 75/80 Meter Net  
21 Mon Basic Class 10  
22 Tue VHF/UHF - 2 Meter Net  
23 Wed Club Project Night<sup>5</sup>  
24 Thu Club Meeting - Member's Night<sup>1</sup>  
25 Fri CQ WW DX Contest - CW  
27 Sun HF - 75/80 Meter Net  
28 Mon Basic Class 11  
29 Tue VHF/UHF - 2 Meter Net

### December, 2011

01 Thu Exec Meeting  
02 Fri ARRL 160M Contest  
04 Sun HF - 75/80 Meter Net  
04 Sun Sunday Brunch – Symposium Restaurant<sup>2</sup>  
05 Mon Basic Class 12  
06 Tue VHF/UHF - 2 Meter Net  
08 Thu Club Meeting -Speaker's Night<sup>1</sup>  
09 Fri 10 ARRL 10M Contest  
11 Sun HF - 75/80 Meter Net  
12 Mon Basic Class 13  
13 Tue VHF/UHF - 2 Meter Net  
15 Thu ARES Meeting<sup>4</sup>  
16 Fri RAC Winter Contest  
18 Sun HF - 75/80 Meter Net  
20 Tue VHF/UHF - 2 Meter Net  
22 Thu Club Meeting - Member's Night<sup>1</sup>  
25 Sun HF - 75/80 Meter Net  
27 Tue VHF/UHF - 2 Meter Net

### January 2012

01 Sun HF - 75/80 Meter Net  
02 Mon Advanced Class 1  
03 Tue VHF/UHF - 2 Meter Net  
05 Thu Exec Meeting  
08 Sun HF - 75/80 Meter Net  
09 Mon Advanced Class 2  
09 Mon CW Class 1  
10 Tue VHF/UHF - 2 Meter Net  
12 Thu Club Meeting - Speaker's Night  
15 Sun HF - 75/80 Meter Net  
16 Mon Advanced Class 3  
16 Mon CW Class 2  
17 Tue VHF/UHF - 2 Meter Net  
19 Thu ARES Meeting  
22 Sun HF - 75/80 Meter Net  
23 Mon Advanced Class 4  
23 Mon CW Class 3  
24 Tue VHF/UHF - 2 Meter Net  
26 Thu Club Meeting - Speaker's Night  
29 Sun HF - 75/80 Meter Net  
30 Mon Advanced Class 5  
30 Mon CW Class 4  
31 Tue VHF/UHF - 2 Meter Net

### February, 2012

02 Thu Exec Meeting  
05 Sun HF - 75/80 Meter Net  
05 Sun Sunday Brunch – Symposium Restaurant<sup>2</sup>  
06 Mon Advanced Class 6  
06 Mon CW Class 5  
07 Tue VHF/UHF - 2 Meter Net  
09 Thu Club Meeting - Speaker's Night  
12 Sun HF - 75/80 Meter Net  
13 Mon Advanced Class 7  
13 Mon CW Class 6  
14 Tue VHF/UHF - 2 Meter Net  
16 Thu ARES Meeting  
17 Fri ARRL International DX Contest - CW  
19 Sun HF - 75/80 Meter Net  
20 Mon Advanced Class 8  
20 Mon CW Class 7  
21 Tue VHF/UHF - 2 Meter Net  
26 Sun HF - 75/80 Meter Net  
27 Mon Advanced Class 9  
27 Mon CW Class 8

### NOTES

1. Meetings start 7:30PM at St. Thomas A Becket Church Hall, 3535 South Common Court unless otherwise noted.
2. Brunch is at 9:30AM unless otherwise noted.
3. Classes are from 7:00PM - 9:00PM at Meals On Wheels at 2445 Dunwin Drive, Mississauga, ON.
4. ARES Meetings start at 7:30PM at the Red Cross, Ontario Zone Office (OZONE), 5700 Cancross Court, Mississauga, ON. ARES Meetings for Oct. and Nov. 2011 will be at Meals On Wheels at 2445 Dunwin Drive, Mississauga, ON.
5. Project Night starts at 7:30pm at the VE3MIS Club Station, Danmax Electronics, Unit 2, 2377 Anson Drive, Mississauga, ON.

Visit our website: <http://www.marc.on.ca> for any updates of the calendar.

## *The MARC DX Award Update*

*By Ed Spingola, VA3TPV*



**Photo 1: Ed Spingola, VA3TPV and Michael Brickell, VE3TKI, with their MARC DX Award certificates.**

After a very successful program in the 2010-2011 MARC club year, the MARC DX Award is back again for the 2010 – 2012 club year.

In the month of October, there were three recipients of the MARC DX Award. Photo 1 shows Ed Spingola, VA3TPV, and Michael Brickell, VE3TKI, with their awards for 50 and 25 entities respectively at the October 13<sup>th</sup> club meeting. Michael, came back at the October 27<sup>th</sup> meeting to receive an endorsement for 50 entities.

The third recipient of month, shown in Photo 2, for the MARC DX Award, is Robert Emerson, VE3RHE, who submitted a log with 18 entities. Good job to Robert.



**Photo 2: Robert Emerson, VE3RHE, receiving the MARC DX Award from Ed Spingola, VA3TPV.**

The contest season is upon us and the challenge is on to see who will achieve the #2 award. So get DXing and submit to me your logs. See page 4 of this newsletter for the MARC DX Award rules.

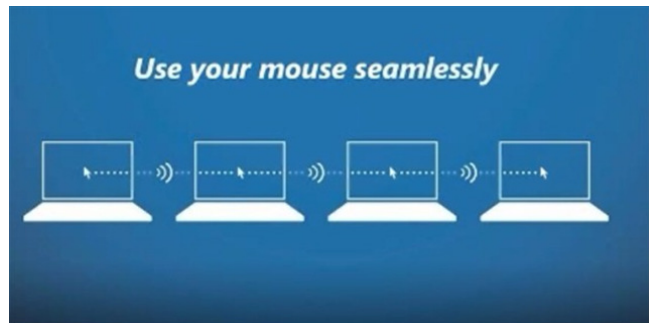
73 and Good DX.

**Experience the thrill of amateur radio.  
Don't Just Listen  
Try Calling CQ.**



## A Simple Solution To A Nagging Problem

By Ric East, VA3XRE



I have 2 rigs HF rigs in my shack hooked to 2 antennas. Because I enjoy the digital modes I also have two old P.C.'s This setup allows me to control both rigs as well as use DM 80 from Ham Radio Deluxe for the digital modes.

But here is the problem...

I often use both rigs and their associated PCs at the same time in order to use two different bands. If you have ever used two PC's at the same time you will know the problem you can have if you use the wrong mouse or try to input data with the wrong keyboard.

The usual solution to this problem is to use a KVM switch (Keyboard, Video, Mouse) to control the two PC's. This switch allows the user to switch select which PC he wants to control with the Keyboard and Mouse. This is a good but relatively expensive hardware solution.

I recently discovered a MUCH better software solution. Microsoft has recently established what they call their "Software Garage" to encourage software writers to created

unique free software. The first example of this software is a program called "Mouse without Borders". After a brief download and even shorter installation you will be able to control two 2 PCs with one mouse and keyboard !! You can also drag and drop files from one PC to the other. These files will be found in a desktop cabinet called "Mouse without borders".

To use the product you need 2 or more computers on the same network. They can be wired or wireless. Next you download a very small program to what will be your primary PC. After loading it will give you a screen with two codes, you do nothing more on this PC. You now download the same program to the second PC and copy the codes shown on the first PC to the spaces provided in the second and push Enter.

Within seconds you will be controlling both PC's with one mouse and keyboard !!!

If you have a need to control two ( and up to 4 from what the information says) PCs with one mouse and Keyboard this is your solution.. You should be aware if you want to control 3 PC's for instance you must move the mouse from the PC1 to PC2 To PC3. You cannot jump from PC 1 To PC3 !!!

I think you will find that simply controlling 2 PC's will give you all the flexibility you need !!!!!

Finally if you turn off any of the PC's this will NOT affect the operation of the one you want to use. You will simply need to use that PC's original mouse and keyboard.

You can download the program and a short video demo from:

<http://blogs.technet.com/b/next/archive/2011/09/09/microsoft-garage-download-mouse-without-borders.aspx>

Enjoy !!

Ric, VA3XRE.

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## Operating On The HF Bands: Part 2

By Michael Brickell, VE3TKI

The first article in this series, in the September 2011 Communicator, covered some introductory material. This article deals with some facets of basic operation on the HF bands.

### Callsigns:

Your callsign, is, of course, what identifies you to other hams on the air. It's important therefore to give your callsign accurately and clearly. Using standard phonetics (as opposed to a home-grown set of personal phonetics) is the easiest way to make sure that the operator at the other end of your qso gets your call correct. This is because everyone knows (or should know) the standard phonetics. Just stating the letters of your call can leave a lot of room for confusion, and possibly will result in someone not

copying it correctly. The consequence could be that you do not get an important QSL card you need for a DX award.

In a pileup situation, where there may be hundreds of hams calling a dx station simultaneously, you often hear callers to a dx station giving only partial calls, i.e., "TKI", instead of "VE3TKI" in the hope of getting a response sooner than someone else. In fact, this is counterproductive for everyone concerned, because, if the dx station does acknowledge a partial call, he has to ask a second time for the full call as well, thus wasting time. This is the reason that you sometimes hear dx station saying "full calls only".

If you are going to operate on the hf bands, you need to be familiar with the international prefix blocks, in which callsign prefix blocks are assigned by the ITU to each dx entity. For example, all US calls must begin with A, N, K or W. A link to the complete list of the ITU allocations is: <http://life.itu.ch/radioclub/rr/ap42.htm>.

## Before Transmitting:

In order to protect your equipment, you need to be sure it is set up properly. Proper setup involves, among other things, the following:

- Setting the correct mode
- Setting levels (microphone gain, compression), filters, attenuation, rf power level, digital signal processor controls etc. properly as per the manual

As well, you must ensure that your transmitter is properly tuned up. You should always tune up into a dummy load using low power if possible. If you must tune up on the air, don't tune up on a frequency someone is using!

The reason for taking care in set up is to avoid possibly transmitting a distorted signal, and also, to make sure you are in fact transmitting at all.

## Making Contacts:

You can make a contact by either responding to someone else's CQ call, or by calling CQ yourself.

Suppose you are responding to G4XYZ, who you hear calling CQ. The first thing to do is to tune your radio to his frequency. For SSB this amounts to getting an undistorted intelligible voice out of the radio, and for cw it involves zero beating the cqr. Once this is done you would respond, preferably using phonetics for the calls, "G4XYZ this is VE3TKI, over" (in cw, "G4XYZ de VE3TKI k"). The reason for the "over" is to indicate you are turning the qso back to him (there are no courtesy tones on hf!) By convention, the other person's call is always given first. If there is fading you could give his call and yours twice.

If you are calling cq, pick a clear frequency in the proper part of the band plan. To make sure it is clear, listen first and then ask if the frequency is clear (in cw, QRL?, and if someone has the frequency the response could be "R", "C", or "Y"). If after waiting for an answer, you hear nothing, you are good to go.

Then you would call "CQ CQ this is VE3TKI VE3TKI".

If there is no response after a few seconds, try again. As an alternative you can indicate where you want to talk to, as in "CQ Europe, CQ Europe, this is VE3TKI". In cw the call would be "CQ CQ de VE3TKI VE3TKI k".

## Carrying on a QSO

In general you should keep each transmission short, as propagation conditions can change quickly. You should always give your full call at the end of a turnover, and you must ID every 30 minutes to be legal.

Pretty well any topic is ok, using common sense to keep away from controversial topics. Note that no commercial use of the ham bands is allowed.

It's important to give accurate signal reports. A report saying "you are 59+++ , what was your call again?" is somewhat unhelpful.

## Signal Reports:

The RST system is used to exchange signal reports:

- Readability: 1 to 5, 1 = unreadable; 5 = perfectly readable
- Signal Strength: 1 to 9, 1 = faint signal, barely perceptible; 9 = very strong signal. Usually the rig S meter reading is used for this.
- Tone: 1 to 9, 1 = very rough e.g., 60 cycle hum; 9 = perfect tone, no ripple at all. The tone reading is rarely an issue with modern transceivers.

## CW Zero Beating:

Zero beating for cw is a technique used to match your transmitter frequency to that of the other station. The traditional way to do this is while listening to the cw signal, tune up in frequency until the signal just disappears, then tune down by your side tone oscillator frequency (typically 600 Hz). If you rig has a spotting function, turn it on and adjust your frequency until the signal and the tone of the spotting oscillator match. As a final check, turn on cw narrow filtering if you have it. If you have tuned correctly, you will still hear the cw signal

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## Accuracy In Logging

By Michael Brickell, VE3TKI

The certificate requests for the September 17, Halton County Railway Museum, special event have been coming in since late September. I recently mailed 9 certificates, representing about 10% of the contacts made. In looking over the log while processing these requests, I noticed a fair number of errors in the log. Some of these were pretty obvious, such as callsigns beginning with the letter "Q", which is not used in the callsign blocks currently allocated.

Others were not so obvious, such as the call W9APE incorrectly entered as WA9APE. The latter error came to light when a certificate request for W9APE came in, and the call was not in the log. This necessitated a manual check of the log to see if an error had been made.

Asim, VE3XAP, recently circulated an interesting summary of the results for VE3MIS/VC3Z for the 2010 CQWW WPX contest. These are shown below, and demonstrate the effect logging errors can have on standings in a contest.

CQ WW WPX SSB contest 2010 - operated VC3Z @ VE3MIS

\*\*\*\*\* Summary \*\*\*\*\*

- 1804 Claimed QSO before checking (does not include duplicates)
  - 1658 Final QSO after checking reductions
  - 5862 Claimed QSO points
  - 5266 Final QSO points
  - 963 Claimed mults
  - 902 Final mults
  - 5645106 Claimed score
  - 4749932 Final score
- 15.9% Score reduction

- 1 (0.1%) duplicates (without penalty)
- 24 (1.3%) calls copied incorrectly
- 40 (2.2%) exchanges copied incorrectly
- 9 (0.5%) not in log
- 73 (4.0%) band change violations
- 9 (0.5%) calls unique to this log only (not removed)

Asim made a couple of points in his email: We had a 15.9% score reduction due to errors, and because of excessive band changes, our contest category changed from Multi-Single (multi-operator, single transmitter) to a Multi-Multi (multi-operator multiple transmitter).

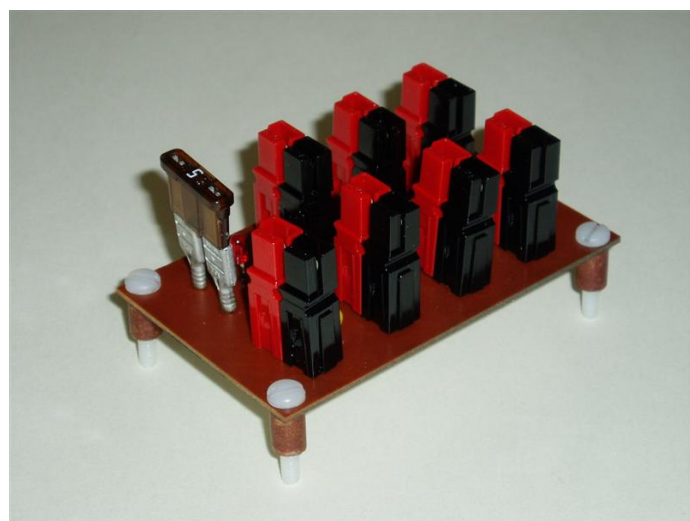
So it is important to be careful when logging and operating in special events and contests.

## A Simple DC Distribution Panel

By Ed Spingola, VA3TPV

*Necessity is the mother of invention (Author unknown).*

A DC distribution panel can be a useful accessory in the Ham shack. If your power needs are somewhat modest, such as powering ancillary equipment i.e. antenna tuner lamp(s), DSP filter, IMD Meter, etc. which usually a power by the ubiquitous low power wall wart, a DC Distribution panel may serve your needs. The DC distribution panel described in this article permits you to get rid of those wall warts and at the same time free up some AC receptacle positions.



**Photo 1: DC Distribution Panel**

The panel is constructed using a PCB with an input fuse, a nominal 5 amperes, for powering the six DC output ports.

A larger fuse up to 10 amperes could be used depending upon your power needs. A red LED indicates a fuse blown condition.

Anderson Powerpoles, by Anderson Power Products<sup>4</sup>, are used as the input and output connectors making a neat package.

### Parts List

Anderson Powerpoles

7 - AND-1327FP, Red Housing

7 - AND-1327G6FP, Black Housing

14 - AND-1332 15A terminal contact for #16-22 AWG wire

1 - Fuse Holder for ATC or ATO type fuses (Homebrew, See text)

1 - 5 Ampere ATC/ATO Automotive type fuse (ATC-5)

7 - 0.01 ufd 50v ceramic capacitors

1 - Red LED T-3 size

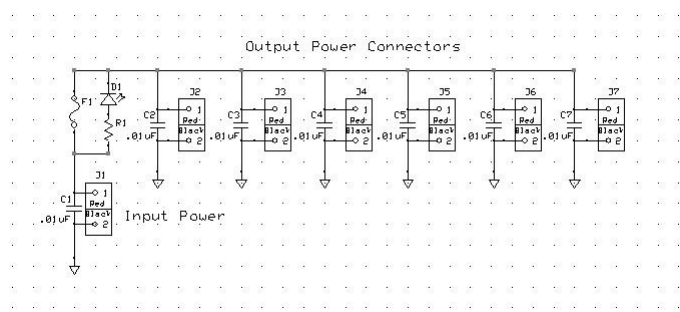
1 - 1k5 ohm ¼ watt Resistor

2 - Solder Spade Lugs

1 - Single Sided Copper Clad Board.

If you are handy with tools you could build a nice looking case for this project.

A schematic for the 6 Position DC Distribution panel is shown in Figure 1 with the accompanying parts layout shown in Figure 2. The pcb layout is shown, not to scale, in Figure 3.



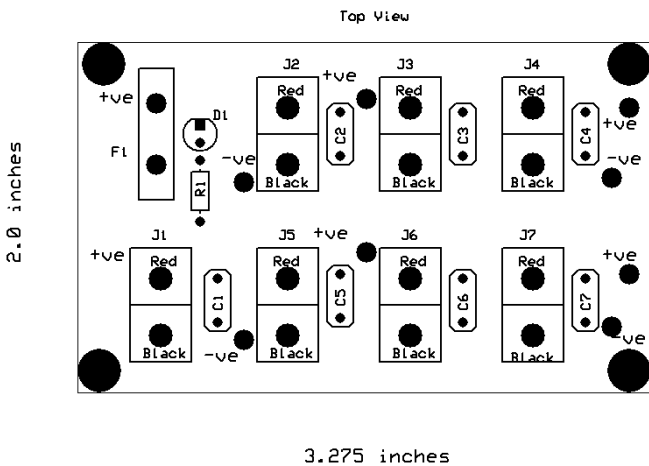
**Figure 1: DC Distribution Panel Schematic**

1 ounce copper per square foot. The copper on 1 ounce boards is 1.34 mil thick (0.0341 mm, 34.1 microns).

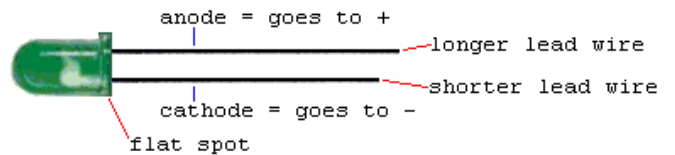
Rather than buying a commercial fuse holder for an ATC type fuse, a fuse holder was made from two spade lug connectors. The ATC type fuse fits snugly into the spade lug connectors. The pin spacing on the spade lugs was approximately 0.350 inches.

Note that the pin spacing on the Anderson Power Poles is 0.3 inches with the Powerpole housings interlocked in a side-by-side configuration. Pay particular attention to the orientation of the red and black Powerpole connectors. The orientation shown in photo 1 is the standard orientation for this type of connector.

The LED D1 is used to indicate a fuse blown condition.

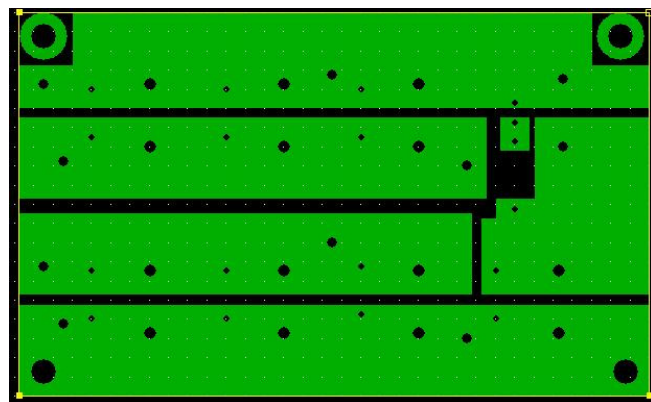


**Figure 2: DC Distribution Panel Parts Layout**



**Figure 4: LED Polarity**

LEDs emit light when they are forward biased. When assembling the components on the pcb note that the flat spot (next to the shortest lead) on the LED indicates the cathode or negative side of the LED. The longest lead on the LED is the anode or the positive lead of the LED. The path to the negative voltage rail is completed by the load. Therefore at least one load must be connected to the pcb for the LED to light when the fuse is blown.



**Figure 3: PCB layout**

The pcb was laid out using the Express PCB software, with the intent of producing an etched the pcb. However, the lay out is so simple that you could cut away the copper to form the blank spaces with an X-Acto or other sharp utility knife. Another approach would be to use copper tape for the traces.

The PCB used was a 1/16th inch Single Sided Copper Clad Board for mechanical rigidity. The MG Chemicals Cat# 509 is an example of an FR4 flame retardant laminate with

If you not have a wire crimper for the Anderson Powerpole terminals you can solder these connections. The AND-1332 15A terminal contact although designed for #16 – 22 AWG wire will also accept a #14AWG solid copper wire. Tin the wire before insertion into the terminal. When soldering the contact pins, be careful not to use too much solder. Keep the solder inside, where the wire goes. If a blob of solder gets on the outside of the connector body you may have trouble putting the contact into the housing. If you get solder on the contact surface area the Powerpole will not make a good contact.

#14AWG solid copper wire has a nominal diameter of 0.0641 inches. A #51 drill (0.0670 inches). A 5/64 (0.0781 inches would also be suitable.) inch drill.

The pcb is a single sided board. Therefore you will need two jumpers, one red and one black to connect races on the pcb. Use the black wire to interconnect the power input –ve trace at the bottom of the pcb with the –ve trace for the upper set of PowerPoles. Similarly, use the red wire to interconnect the +ve trace coming from the fuse to the +ve trace from the lower set of PowerPoles.



## Current Capacity

The pcb material used for this project has a layer of 1 ounce per square foot of copper. Considering the width of the copper traces on this pcb, the current carrying capacity is well in excess of the 6 ampere fuse. For more information on the current carrying capacity of copper traces see references 6 and 7 at the end of this article.

## Making Your Own PCB

The PCB design was laid out using the Express PCB<sup>1</sup> software, a free software program for PCB design. The software files for this project are available from the author for anyone wishing to duplicate this design or to use it as a basis for their own requirements.

The toner transfer method<sup>9</sup> makes a very useable pcb. This method is simple and easy to do at home provided that you have access to a laser printer and are able to borrow a clothes iron for the laser toner transfer to the pcb. The laser toner makes a very good etch resist. Any imperfections in transferring the laser toner to the pcb may be touched up with an ordinary Sharpie Permanent Marker.

## Commercial Products

If you do not feel comfortable building your own DC Distribution Panel, West Mountain Radio has a line of RIGrunner products designed to distribute 12 VDC power in your station environment. The RIGrunner products have various features with multiple individually fused DC outlets which is good when you want to power multiple rigs from a common DC source i.e. power supply or battery system. However, the RIGrunner is a bit of an expensive solution when your power needs are somewhat modest such as powering ancillary equipment i.e. antenna tuner lamp(s), which usually can be power by the ubiquitous low power wall wart.

The Simple DC Distribution Panel may not be exactly what you are looking for, but hopefully it will stimulate you with your own design. If you do not need 6 output positions or if you require more output positions, then adjust the size of your project accordingly.

This article has enough information for you to construct your own power distribution panel. If you have any questions, please contact the author via email: va3tpv (at) rogers (dot) com.

I hope that you have found this article interesting.

## References:

- 1) Express PCB, <http://www.expresspcb.com/>
- 2) MG Chemicals, <http://www.mgchemicals.com/>
- 3) West Mountain radio, <http://www.westmountainradio.com/content.php?page=RIGrunner>
- 4) Anderson Power Products, <http://www.andersonpower.com/>
- 5) Powerpole General Assembly Instructions, <http://www.powerwerx.com/assembly.asp>
- 6) Practical Electronics/PCB Layout/Trace Current Capacity, <http://www.armisteadtechnologies.com/trace.shtml>
- 7) ANSI IPC-2221A PCB Trace Width Calculator, <http://www.desmith.net/NMDS/Electronics/TraceWidth.html>
- 8) Mil Spec Std 275 – Trace Current Carrying Capacity of Copper, <http://www.armisteadtechnologies.com/trace.shtml>
- 9) <http://www.riccibitti.com/pcb/pcb.htm>

## MARC Repeaters

**VHF Repeater at 145.430 MHz (-600 kHz) (CTCSS Tone 103.5Hz)**

**UHF Repeater operating on 444.575 MHz (+5.0MHz) (CTCSS Tone 103.5Hz)**

**6M Repeater operating on 53.250 MHz (-1.0MHz) (No CTCSS Tone)**

**All repeaters except 6M use a CTCSS tone squelch of 103.5Hz**

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