Official Publication of the
West Allis Radio Amateur Club

Hamtrix

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Volume 72, Issue 2 February , 2023

FEBRUARY CLUB HAPPENINGS

NUT NET
3.985mhz
Monday-Saturday
8:15am CT
NUT NET
Breakfast
8:30am fourth
Tuesday
of the month

Milwaukee-Florida Net
Every Day on 14.290 Mhz
7:00AM - 9:15AM ET
6:00AM - 8:00AM CT

Meeting
February 14,2023 7pm
New Berlin Community Center
14750 W. Cleveland Ave.
New Berlin, WI
Between Moorland and Sunnyslope
Presentations
Chuck Dellis W9WLX Wisconsin QSO Party

Premeeting dinner
New Berlin Ale House 5:15pm
16000 W. Cleveland Ave
West of Moorland Rd.

Wisconsin QSO Party
March 12, 2023 - 1800Z to 0100Z March 13
(1:00PM CDT to 8:00PM CDT on Sunday, March 12)
> First day of Daylight Saving Time <

2023 Dues due see page 6 for more details

Index

From the Presidents shack

I would like to touch upon two things this month.

March is Wi QSO Party month. An activity that has been sponsored for many years by the West Allis Radio Amateur Club. This is an activity that is a really nice introduction to many aspects of Amateur Radio. It is a perfect opportunity for us as Hams in Wisconsin to give others the world over to work us, the opportunity for us to work amongst ourselves, the opportunity for us to try new practices, modes etc. (QRP, new modes, portable, off grid, mobile). The QSO party also gives you the opportunity to get your feet wet in the world of contesting.

The QSO Party is schedule for Sunday March 12, 2023. Our very own Chuck Dellis W9WLX who has take the leadership role in putting the QSO party together will present his QSP Party presentation to us at the Club Meeting in February. He does a great job in outlining the Party and its ins and outs in fine detail.

Phil Tollefson, Club member of over 50 years left us on January 15, 2023 after ailing for a period of time. Phil was an active Ham Radio operator and server on the Board Directors of the Club till November of 2022. In the short time I knew Phil, I learned of his sense of humor, his sense of adventure and his knowledge of many things to do with engineering. As I learnt he was an engineer throughout his life. Of course, who can forget his impish smile and his crooked cane!
Phil, may you and Phyllis find no pain as you wander in joy, happiness and contentment in the Garden.
President Feroz WU9N

January minutes
WARAC Social – January 10, 2023
New Berlin Ale House.
16000 W. Cleveland Ave.
New Berlin, WI 53151
Attendance: 14
Respectfully Submitted
Bill Dargis KD9BJZ
Secretary WARAC, January 10, 2023 . _. _..

Barb Garnier KD9HPS sent this picture of Dave's WB9OWN new toy he got for Christmas. Maybe he will tell us about it at the meeting

February 2023 Update

WARAC's first ever balloon launch project is officially up and running. The official Aeronaut-Team consists of:

Bill Dargis, KD9BJZ - Programming Launch Specialist
Paul Sperbeck, W9PCS - Balloon Lift Wizard
Mike Johnson, WO9B - Solar Cell Crafter

By up and running, that is to say we've exchanged contact information. Now the fun begins. We've had one organization meeting and set a launch goal for the 4th of July!! We also divided up the work pie and generally remain super charged for success.

We will keep the club up to speed on our progress with monthly missives here in Hamtrix. So far we've at least got a few items under control. The necessary tracker has been obtained and W9PCS has placed an order for a handful of balloons. KD9BJZ is mucking around with the programming necessities and WO9B is getting really good at damaging unbelievably fragile solar cells. We call that progress.

Stay tuned. You can't have an adventure without adversary. We've only just begun.

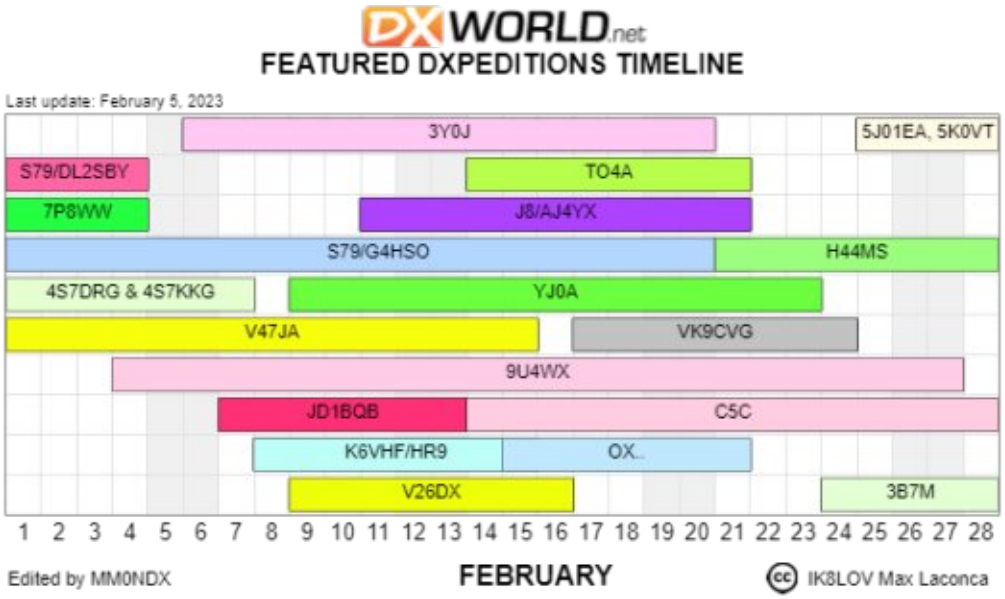
Big Al's CONTESTING & DXING

DX Update:

3Y0J – (Bouvet Island) The number 2 most sought after country has proven once again to be VERY difficult. The current DXpedition has run into some difficult condtions and probably will have to scale down their operations. As of writing this on February 6 they are trying to get the camp set up and 8 operators are using 2 K3's at 100W with wire antennas. Anyway, they are on the air. Wishing them luck and safety.

9U5R – (Burundi) Two man DXpedition until February 27.

FT8W- (Crozet Island) Thierry hopes to regain operating permission on a limited basis soon.



Contesting:

Check page 69 in the February 2023 QST.

For more contests check out:

https://www.contestcalendar.com/contestcal.html

Special Event Stations:

For special event station listings (there are many) check out:

https://www.425dxn.org/index.php?op=wcal

If you have further ideas or suggestions for this page please let WA9BZW (Al) know. wa9bzw@arrl.net

DIGITAL DIGEST

Feb 2023 * Hamtrix * By Michael Johnson, WO9B

Sound Modems

Being 2023, you'd think that our radios would all work nice with the plethora of digital modes. Going one step further, that sound cards are not buried in the bowels of all our radios is one of those head smacker thoughts. Certainly for FT8 (think Bouvet, Bouvet, Bouvet) on HF or D-Star/DMR/CF4M on VHF/UHF all the new radios have sound cards built in and at the ready with a USB or LAN cable. But for those of us without the latest and greatest hardware, those pesky stand alone sound modems are a must if we want to play in the digital sandbox.

My recent venture into VHF Winlink got me newly interested in the latest sound modem devices. My first thought was to use my trusty Signalink which I had plugged into my Yaesu FT-891 to provide me hours of FT-8 contacts over the past few years. Signalink has been around for years and is arguably the best known sound modem around. It's quality has taken hits over the years, but my experience has been generally very positive. One of the nice features, or so I thought, was the internal VOX PTT of the device, which made setup a breeze across a wide variety of radios. Unfortunately, the device, while certainly of workman quality for most HF applications, suffers a bit when pressed into duty for high speed work on VARA HF modes and for VHF speeds above 1200 baud. Additionally, they have gotten EXPENSIVE going for $130 new and all of $100 on the used market.

My needs being in the 9600 baud range, I started to look around at alternatives. I ended up purchasing two new (to me) devices that are making a splash in the market.

Master Communications DRA Series Sound Modems (http://www.masterscommunications.com/): The DRA, Digital Radio Adaptors, have made quite a splash in the high speed digital sound modem world. These have become the de facto standard for VARA Winlink (HF and VHF) operations. They offer exceptional flexibility for connections and unparalleled noise and sensitivity characteristics. PTT is accomplished via COM port. I am using the DRA-50 model which interfaces via USB and DIN6 to my computer and Yaesu VHF radio. The website has detailed information on specs, setup and optional accessories. The devices are available in kit form or fully assembled and tested. I bought the DRA-50 assembled, tested and with the optional metal enclosure for +/- $120. Installation on my FTM-6000 VHF/UHF radio was trivial and I was up and running in a matter of minutes. Master Communications is a one-man shop and they really delivered on the customer service aspect. This is excellent gear.

Digirig (https://digirig.net/): This is a TINY digital sound modem designed to be highly portable and versatile. While it is not the industrial grade solution of the DRA-50, this device is amazing. I was looking for a way to connect my HT, as in BaoFeng, to my computer so that I could have a portable VHF Winlink client. I initially tried to use the Signalink, but was not able to get the PTT to function correctly. The Digirig installation was immediately successful. The device is packaged in an all metal enclosure with USB C and TRS connectors. They have a wide selection of interfacing cables to connect a ton of different radios. The feature that grabbed my

To sound pg 8

RENEWAL OF MEMBERSHIP

ALL MEMBERS WHO JOIN ED BEFORE October 1 ST
MUST RENEW THEIR MEMBERSHIP BY September 30 TH
******FILL IN ALL INFORMATION PLEASE******

NAME: _____ CALL SIGN: _____
(As you want it to appear on the roster)

ADDRESS: _____ LIC CLASS: _____

CITY: _____ LIC EXP: _____

STATE: _____ OCCUPATION: _____

ZI P CODE: _____ E-MAIL ADDRESS: _____

HOME PHONE: _____ WORK PHONE _____

CHECK HERE: _____ IF YOU WANT THE CLUB NEWSLETTER EMAILED TO YOU?
CHECK HERE: _____ If you are an ARRL member?

Would You Be Willing To Serve On A Committee? _____ Officer? _____

Club Activities You Would Like To Participate In?
Field Day_____ Programs _____ Swapfest _____ Hamtrix _____ Elmer Sunshine _____
Education Community Service _____ Public Relations _____ Scholarship _____
QSO Party_____

Class Of Membership: Full Associate New Renewal
Dues Paid: Full $15.00_____ Associate $10.00 _____ Family $18.00_____ Student
$10.00_____ Retired $10.00 _____

******FAMILY MEMBERSHIP ******
A family member ship includes the individual applying and all members of such person's immediate family residing in the same household who possess an Amateur Radio license.

NAME: _____ CALL SIGN: _____

LIC CLASS: _____ LIC EXP: _____

Date of Application _____ Amount Enclosed $_____

FOR WARAC OFFICE USE ONLY
Treasurer Received/ Date: _____
Sec. Add Roster/Date: _____

MAIL TO:
West Allis Radio Amateur Club, Inc.
P. O. Box 1072
Milwaukee, WI 53201

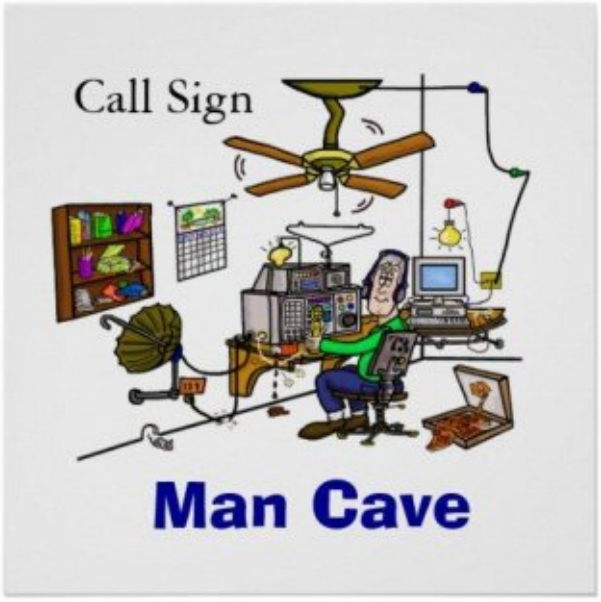
Click on form for a "PC editable membership application"
Use paypal waracpp@warac.org

non-life members dues are payable on November first, with a sixty day grace period, after which membership is considered lapsed. Dues paid ANYTIME during the club fiscal year applies to that year only. So for example if someone pays next July, that covers dues through October 31st only.

Paypal is preferred by selecting and **using the friends and family option.** Send to "West Allis Radio Amateur Club, Inc" Of course, this avoids the club being charged a transfer fee. Note that this option is only available using a direct transfer from a bank account and NOT using the "credit" option. However, any form of payment is welcome.

sound from pg 6

attention is that it uses RTS PTT which will allow fast modem exchanges demanded by VARA type interactions. Though I purchased this primarily for HT Winlink use, I plan to try this on my Kenwood TS-590SG for FSK RTTY contesting which requires a RTS keying interface. The device cost roughly $50 and the cables will set you back some additional. The connection and operating specs are all published so if you are cable fabrication adept, you can absolutely fashion your own.



2022 Challenge for our membership. Have someone you meet, Ham or Ham wannabe come to a meeting this year!

Nut Net Breakfast

Several years ago there was talk among Nut Net members that we should get to meet each other. A breakfast get together idea was started. It was open to all hams, XYL/partners and anyone who wanted to learn about amateur radio. Even visiting OM/XYL couples joined us.

So, on the fourth Tuesday each month at 8:30 am we meet at Gensis Restaurant, corner of HWY 100 and Beloit Road, Greenfield, WI. Looking forward to seeing you, mark your calendar.

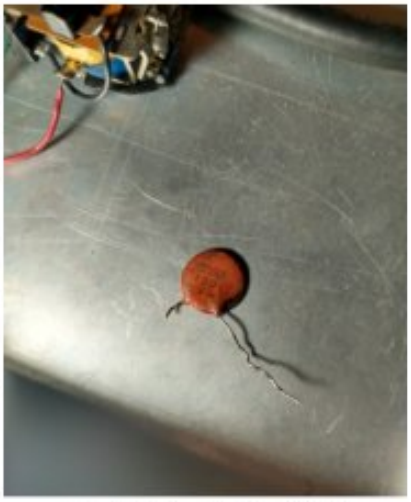
Phil, W9NAW

some design decisions. But why remove all these components just to ground the grids? I'll let W8JI explain, because I can't:

> *"The grid not only shields the input from direct RF feedback from the anode, it is also a good shield to prevent or minimize the anode voltage that might appear on the cathode during tube arcs. Floating the grid above ground is bad for RF, and bad for arc protection."*
>
> *-W8JI, https://new.w8ji.com/grounded-grid-amplifiers/*

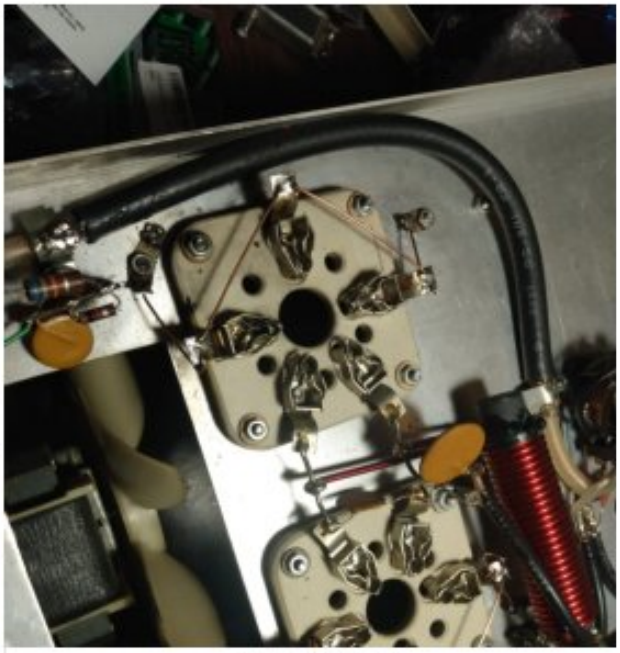
Stock grid circuitry

Grid circuitry removed



Untrimmed capacitor leads

Ready for grounding



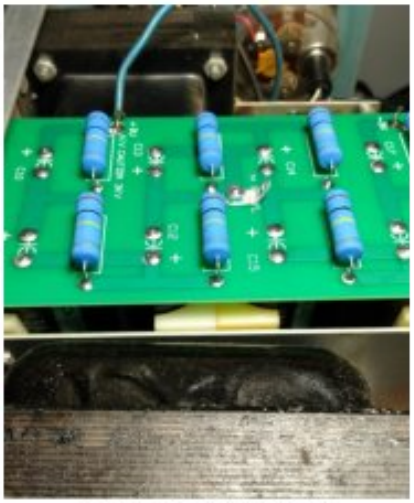
Grids grounded

Whoever built this SB-220 back in the 1970s did a good job. In fact, they did such a good job that I used almost an entire spool of solder wick getting the grid circuitry removed from the terminals and ground lugs. Not a single component lead had been clipped after soldering. Instead, the lead was wrapped around the terminal, up to 3 times, and completely covered with solder. The desoldering and removal process took well over an hour, and the grounding process took about 10 minutes. I used the same 18 gauge solid copper wire for grounding that I used to build the new parasitic suppressors for the tubes.

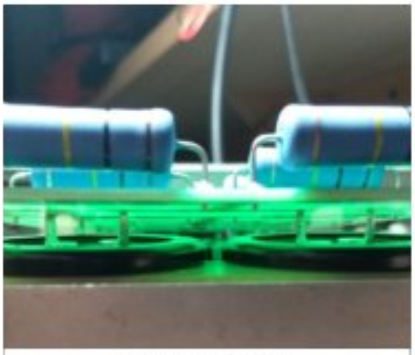
It was time to start putting the amplifier back together. I had built the new Harbach boards as soon as they arrived so they would be ready whenever I needed them. First to go in was the filter board. This board utilized the original plastic capacitor spacers. At first I tried to install the board using only 4 of the spacers, but I was not satisfied with this because the capacitors seemed to stress their connections to the board under their own weight (the board mounts vertically). I decided it was best to use all of the spacers, which took more time to shoehorn into the enclosure, but all the capacitors are securely in place and will not stress their solder joints. I left some space between the bottom of the capacitors and the board itself during its assembly to allow for better airflow and cooling.

Harbach RM-220 rectifier and meter board

Harbach ES4SB220 filter board



Installed with 4 spacers



Gap for airflow

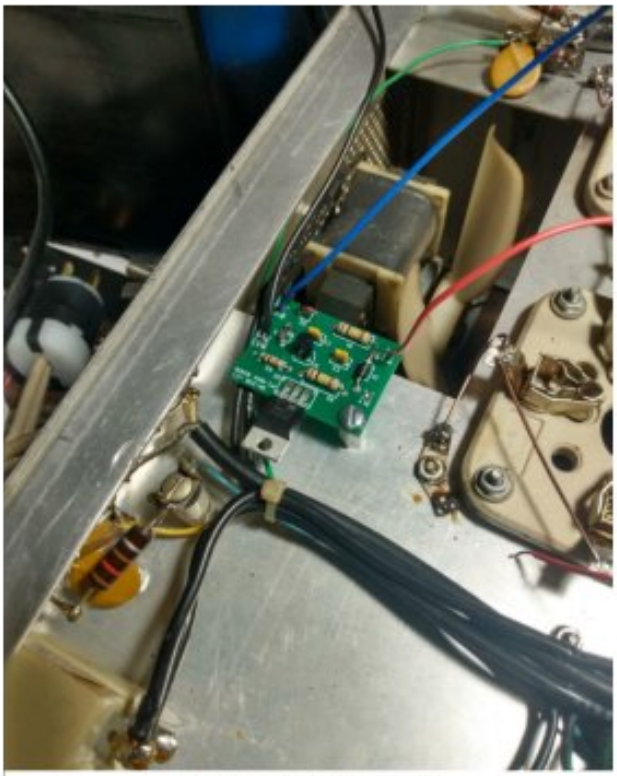
Power board installation

Glitch resistor (wired incorrectly)

Installation of the power board is pretty straightforward and simple because all wire leads to and from the high voltage transformer and the meters were all their original colors, so it was a matter of stepping down a checklist to connect these leads to the new board. I also installed a 150 ohm 25w "glitch resistor" on the HV connection to the tubes, which is an additional protection in case of filament to grid shorts. You might notice that this is wired improperly in the photo. I also noticed this, thankfully. The error was quickly resolved and the board was wired correctly before faceplate reinstallation.

Once again, it was time to flip the amplifier over, this time to install the soft key and soft start boards. There were several things that had to happen in a specific order for this to be successful. First, I had to get the boards mounted in place. Second, I had to replace the original AC circuit breakers with modern replacements. Third, all of these pieces had to be correctly wired to each other. Little did I know that I was signing myself up for an entire day of work for this part of the job.

First was the mounting of the soft key board. This was the easiest step, a mounting lug was provided and there was an unused chassis mounting bolt under the fan dedicated to this. So I mounted the soft key board and soldered the leads to their corresponding terminals, not knowing I'd be undoing this as part of the soft start board installation. Always read the full documentation before soldering.

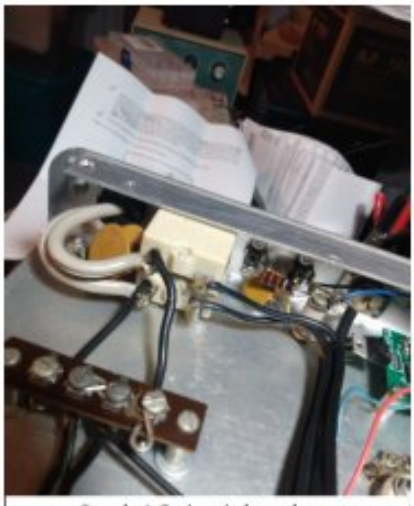


Soft key board mounted

Soft key board wired

Next was removal of the original AC circuit breakers. This was as frustrating as the removal of the grid circuitry, for the exact same reasons. Lots of solder was used in the original construction, and two capacitor leads were securely wrapped around the solder lugs. All of this, in a more confined space than the tube grid circuitry. Lots of big words were uttered.


Stock AC circuit breakers

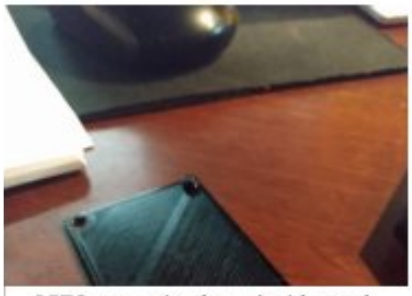

Stock AC circuit breakers


Breakers removed

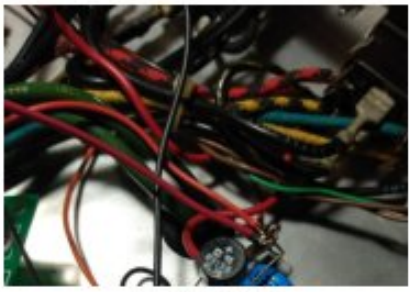
It was at this point that I ran into a new challenge. While the Harbach soft key board came with a lug to mount the board to the amplifier chassis, the Harbach soft start board did not, and I didn't have anything similar to mount it. So I would have to find another solution.

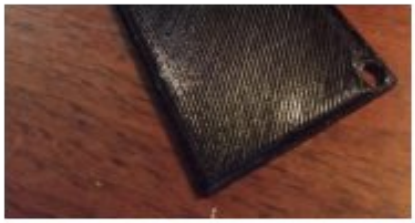
There is an "unused" bolt and nut between the AC terminal strip and the strip that connects to the 120v transformer, which is used to hold the capacitor bank in place. This is a suitable location for the soft start board, but it's the only mounting point. Could I mount the board at only one point, and still prevent the board from moving around or shorting on the chassis?

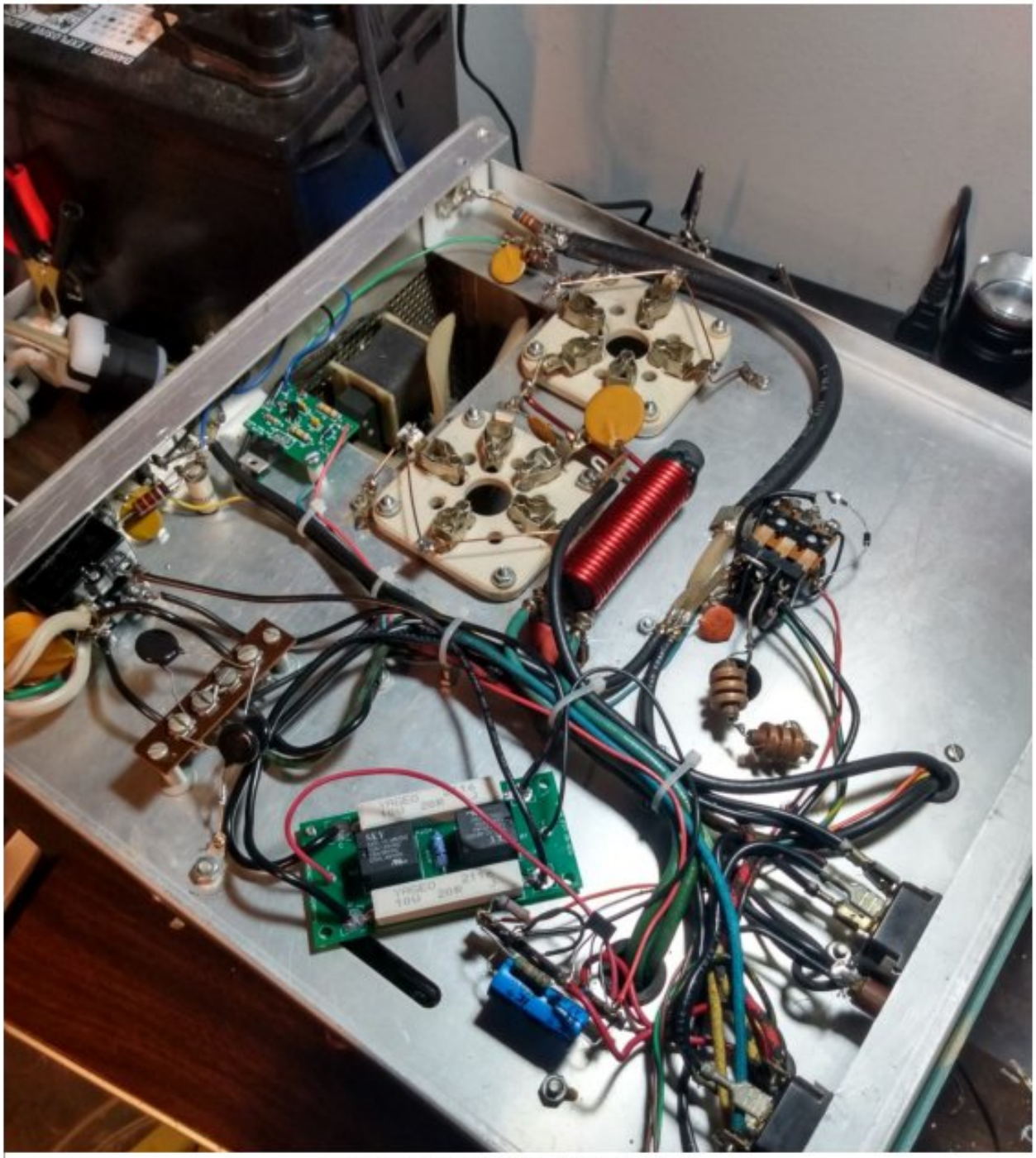
I measured the dimensions of the board and location of its mounting holes, designed a 1mm thick platform in Tinkercad, and 3d printed it using PETG. The platform has a notch on one of the corners that fits into an existing slot on the SB-220 chassis. One hole in the platform is for the mounting screw/bolt, another hole for a zip tie to hold the board in place over its platform, and the notch fits into the slot in the chassis, using the tension of the wires to the AC breakers keep the soft start board in place. It's securely mounted and the remaining connections are ready to be wired up. Two diodes were wired in series on the transmit relay at this point as well.


PETG mounting board with notch


Soft start board installed


Boards wired



Boards and breakers installed and wired

Finally the day has arrived, it's time to put the tubes back in their sockets and complete the SB-220 restoration. At this point it was almost three months to the day since I brought it home. Taking care to not get fingerprints all over the tubes or damage them in any way, they were inserted into their sockets, new lugs screwed to the anode caps, and the newly built parasitic suppressors were soldered into place.

I am not confident enough in my abilities to not kill myself with high voltage, so I decided it was best to put the amplifier back into its enclosure before powering it on. This also meant that in the event that something was wrong, I'd have to disassemble it again to get back into it. Being frustrated is better than being dead, so I spent about an hour putting the top cover back on and doing the required yoga to get the chassis back into its enclosure. It wouldn't be so difficult if it wasn't for the fact that the chassis weighs about 50lbs and has to float at precisely the correct position within the enclosure for the 4 plastic feet to screw perfectly into their threaded holes. I do not look forward to doing this again.

I ran a 240v extension cord from the outlet at my operating position over to the workbench. Then I spent 15 minutes pondering before hitting the switch. Would it turn on? Would it stay on? How much smoke would it give up? How loud would the tube explosion be? How do I explain it to the fire department? I finally grew a pair and hit the switch, and much to my surprise, the fan spun up, the meters lit, and the HV meter shot up to 3100v. Success!


Tubes and suppressors installed


3100v

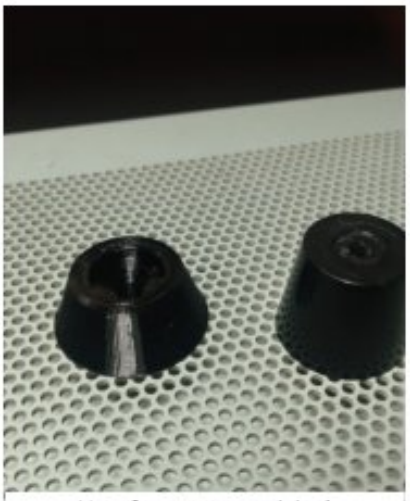

Comforting glow of 2x 3-500ZG

More Modifications

This is the end, right? Not quite. I noticed after screwing the feet into the bottom of the enclosure that the screws protruded below the feet and scratched the surface of my workbench. Also, these feet were a little high

and I was concerned about the amp fitting into my radio rack with enough room for my tuner above it. So I decided to fire up the 3d printer again and give the SB-220 some new shoes. I printed 2cm high feet out of PETG that allowed the screw heads to recess into them. I also sourced 4 new screws from the hardware store that were 1/2" shorter (cost: $0.04 USD), so the shorter feet would not cause the screws to protrude into the electrical components of the amplifier and cause an unexpected short. The amp sits like a lowrider, with just enough space below for adequate ventilation.

Original feet



New foot next to original

New shoes

One modification that I wanted to do with this SB-220 was a standby switch. I operate a completely manually tuned shack, so there are times when I want to put 5w into an antenna to find a good tune, and that means having the amplifier out of the antenna system. Despite the 3-500ZG tube being "instant-on" and capable of being switched on and off repeatedly, I wanted to avoid the unnecessary stresses on the other components that come with these repeated power surges.

My original plan was to utilize the CW/SSB switch for an old-school standby switch and fan speed mod. A little history, condensed: This switch is a throwback to the days when the FCC required 1KW max input power on radio amplifiers for some reason (this was before my time so I'm murky on the details). These days this sort of thing isn't required, and we are perfectly fine using the 2KW input that the SSB position on this switch provides. However, since I upgraded the keying circuit with the Harbach soft key mod, I wasn't comfortable with the amount of modification I would have to do in order to get low voltage keying and the 120VDC of the fan circuit to coexist. I also could have added a toggle switch to the faceplate of the amplifier, but I wasn't comfortable drilling new holes in what is a nice original faceplate.

Instead, I would turn my keying cable into a standby switch. I wouldn't get any fan speed modifications, but I would get standby operation. My original plan was to scavenge the required RCA connectors from an obsolete piece of consumer electronics, but the salvaged parts weren't chassis mount connectors so I ended up scrapping that idea. Friend and neighbor Craig KC3MGN was nice enough to donate a pair of RCA chassis mount connectors to my project. I mounted these to a project box with a racing toggle switch, bonded the negative connections together, and ran the center conductor through the switch. With this box wired to the amplifier and the switch in the OFF position, keying up my radio would not key up the amplifier, leaving it in an on-but-standby state. With the red cover lifted and the switch in the ON (or GO BABY GO) position, the

amplifier would key up as normal. I mounted the box to the side of the SB-220 with a strip of velcro, so there is no permanent defacement of the amp or enclosure.

Donor electronics

GO BABY GO switch

Mounted to SB-220

At home in the rack

The Heathkit SB-220 is still being tested, but it does put out a solid 1300+ watts on 40 and 80 meters, where it will be used the most. I have to do some antenna maintenance before I am comfortable attempting full power tests on the other bands, but early tests inspire confidence on 20, 15, and 10 meters.

Lessons Learned

This project took almost exactly 3 months to the day from picking up the amplifier to getting it on the air. After the cost of the amplifier, the Harbach kits, and several orders from Mouser, I believe I am in to the project for just under $1,000. I would do it all over again, if I were to find another SB-220 in the same or comparable condition.

Things I learned during this project:

Tube gear is resilient and can clearly take a lot of abuse. Even with the clear evidence of mistreatment and damage to some passive components, the rest of the amplifier was no worse for the wear.

Point-to-point wiring is so simple that you can work on it if you know how to flow solder. Don't be intimidated by tube amplifiers, they are pretty simple and the schematics are easily digested if you know the basics.

Carefully inspect each and every circuit in your amplifier before you order parts from Mouser, otherwise you'll spend about $35 in extra shipping charges because you had to order two capacitors five separate times over the course of the restoration.

And finally, if you find an old beat up tube amplifier for a good price, take it home and restore it before somebody else does.

Tags: heathkit sb220 restoration

From the Editor

As mentioned in other places in the newsletter next month is our annual WI QSO party. It is a low stress 7 hour contest that the club has sponsored for many years.

I got involved when I joined the club and found out it existed. I started out using my QRP rig on SSB and was still able to make contacts. It's true! Other operators will work with you to get your info. Even I found it fun to do.

My next stage, which I'm still in, was going portable/mobile and operating from different counties in the state.. That made for a fun 7 hours followed by a stop at the B0sch in Hales Corners to finish the day.

The latest mobile set up which has worked well is a screw driver antenna with a hundred watt transceiver. It is operated from the backseat. Presently we are running CW only. We'll see how the team does this year. The rule to our operation is keep it fun.

Another thought (more for over all operation than the QSO party) is making antennas robust. By that I mean easy to get back on the air when something breaks.

A work story: The FAA has Remote Center Air/Ground (RCAG) which we called rag sites. They exist so the controllers at the Chicago Center can contact high altitude aircraft flying over and to the mid-west. We have 4.5 channels at our site. Each channel composed of a VHF and UHF frequency with main and backup transmitters and receivers. These were supported with four windmill style towers with coax going to each of the many antenna mounts on each tower When I took it over almost all the antennas were in use with only a few spares.

I came up with different plan. I put up more antennas and using the spare coax we had going to the towers. It also involved changing what frequencies were on some of the towers.. Of course all the work made you wonder if a tower would ever totally go out. Well they were doing some work on the grounds of the site and one of the pieces of equipment cut all the coax going to one tower. I took the call when that came in. I was able to get the site backup in less then half a hour with out having to climb one tower. Looked like a hero. Hi HI

The point of this when you install antennas keep in mind you may need to fix it when it breaks so ask your self what can I do to make that easy. Both now and later when climbing towers may not be on your list of thing to do.

I'm open to thoughts on this. Some of my thoughts ……..
If your income can handle it tilt down and telescoping towers bring the antennas to you rather then you going to it.

The line you use to string up your wire antennas, bring it down to the ground. Maybe even put some weight on the antenna side so you can retrieve the rope without having to throw it back up there!
Just some random thoughts

Let me know yours
Frank KA9FZR

CW Practice

One of the best and maybe the only way to get better at CW is practice. Having someone else who also wants to practice also helps. Just makes it more fun.

The West Allis Radio Club is going to try to help. We are running a CW practice net on Monday at 8pm The repeater is 147.045+ 127.3 the CW portion is on HF

Mike WO9B has been joining me and setting up some practice but we are open for suggestions on where to go with this. Come join us.

Officers and Board
President
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