



# The *ORC* Newsletter

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Volume XXXI

January, 2019

Number 1

## From the President

*de Kevin Steers (K9VIN)*



Still tinkering with my tower rotator project, but we won't get into that. What I will say is that my power of procrastination is outstanding, especially in this weather. Absolute embarrassment set in when I recently saw a photo of Gary K9DJT helping his friend Lyle in this weather, as he joked that "at least it wasn't snowing." I'll try to get better.

My recent struggles on the air have to do with the fact that I have a small collection of tuners, all of which are manual – and challenging. My bigger challenge was that my only manual tuner with "indexed" knobs doesn't tune 160M. No problem; I built an OCF Windom for 160 that really shouldn't need tuning, which is true, and does work, which gets me on the air with my small 500W amp. UNTIL frost or something else coats the wire. At least that is my hunch right now. I am now realizing why setting up your station three feet from the back wall so you can easily manage the tangle behind, is such a good idea. I guess I am now in the market for an auto tuner, but 160M is a requirement. Whatadayagot??

I hope some of you partook in Straight-Key Night, which apparently is the only night I am able to somewhat copy code. I still have some work to solidify my shack, before I am able to focus on the code.

My next project is to run RG-8 for my mobile rig, in hopes that it will improve the noise level of my current RF-58, which I know is of sketchy quality. Stay tuned for more trials and tribulations . . . maybe . . .

Cheers and 73,  
K9VIN  
Kevin

# DX'ing & Contesting

*De Gary Sutcliffe (W9XT)*



Welcome to 2019! 2018 was a year of moving further into the depths of the bottom of sun spot cycle 24. We didn't have any sunspots visible on 61% of the days last year and ended the second half of December with none. This means that the lower bands are going to be where the action is. Don't rule out the other bands though. On New Year's Day, I worked a number of stations in South America on 15 meters. They were all on FT8. This mode allows working stations much lower in the noise than is possible with SSB or even CW.

There was an upgrade to the WSJT-X suite of programs in December. WSJT covers a lot of modes including FT8 and WSPR. FT8 and MSK144 were upgraded in version 2, and the data formats are not compatible. If you were using the older version 1.9 for FT8, it was desupported on January 1. You won't find anyone to work. Upgrade now.

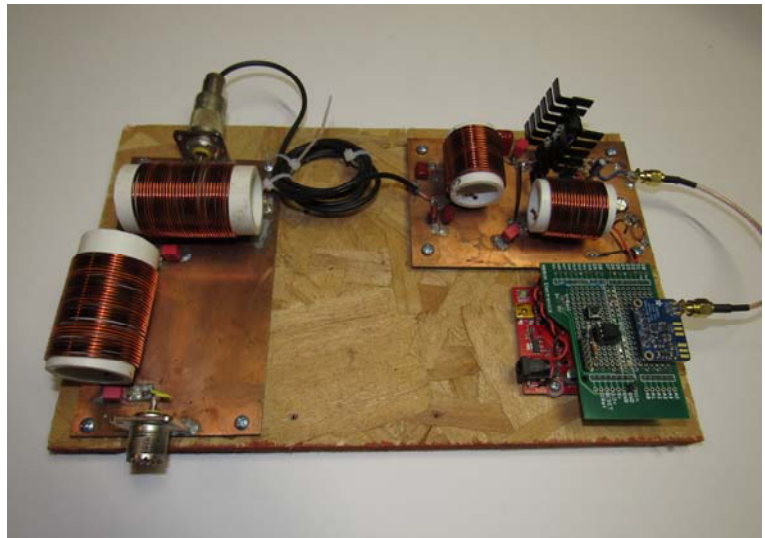
MSK144 was the other mode that got changed. It is used for meteor scatter. You can bounce 6M and 2M signals off the ionized gas that results when a small piece of rock enters the atmosphere. I had not worked any meteor scatter for a few years, and the Geminid meteor shower peaked in mid-December. I decided to give it a try. I used 6M and worked a station in MA. Just after completing that contact, I was called by and worked Joe Taylor, K1JT, who is the one who developed the WSJT modes. That was kind of cool.

Another digital mode I have been using is WSPR, another mode in the WSJT suite. It is a beacon mode and quite popular. Most of them are running low power, and you can tune to the proper frequency on a band and see who you can copy and where the band is open to. Like FT8, it can pull signals way out of the noise. You can see who is hearing who by going to the <http://wsprnet.org> web page. You can select a map for the band you are interested in and see who is currently on. When running WSPR, you have the option of sending the stations you hear to the web site. These also go into a searchable database.

My interest is on the new 630 meter band, at 476 KHz. Yes, that is KHz, not MHz. I have been interested in the band since it opened up in the fall of 2017. Because of the high noise level, practical antennas are inefficient, and at the FCC limit of 5 watts EIRP, signals are weak, and the digital modes are what most of the operators are using. WSPR beacons are on every night.

Every couple of weeks I would let the rig monitor 630 meters overnight then query the WSPR database to see what stations I picked up. So far I have heard about 85 of them, mostly in the US and Canada. I have also picked up stations in Germany, France, Australia, Hawaii, and Grand Cayman. I only heard the first three countries once. Give it a try some night if your radio tunes below 500 KHz. Most modern rigs do, but some seem to be kind of deaf down there. Listening is fun, but I wanted to transmit and make contacts.

I made the first step with a home brew WSPR beacon transmitter with 12 watts output. The antenna is about 90' long in an inverted L configuration. A full-sized antenna for this band should be about 510' long, so this looked like a big capacitor to the transmitter. I made a big tunable inductor to load it to a 50 ohm antenna. It is not very efficient, and I estimate the effective radiated power to be about 100 milliwatts. Talk about QRP! You can read more about it all at my web site, [www.w9xt.com](http://www.w9xt.com).



**W9XT 630M WSPR Transmitter**

I got this going the last week or so of December. In the few nights I let it run, it was picked up by 75 stations (as reported to the WSPR server) in 28 states, two Canadian provinces and the Grand Caymans in the Caribbean. The next step is to get something running on a mode that I can make two-way QSOs. It would not be too hard to make the transmitter work on CW, but based on the signal reports I have been getting with WSPR, I doubt many stations would hear me. I have only heard a few stations on 630M CW, and those were big guns. Most of the QSOs are on JT9, another WSJT mode, which is designed for low frequency work. I'm not sure what my next step will be to achieve this.

There are a number of contests in January. Probably the biggest one is the CQ 160 CW Meter contest. It starts at 2200 UTC (4:00 PM local) on January 25 and runs for 48 hours. You can only operate 30 hours, but there won't be anyone on during the daytime anyway. We send a signal report and our state. DX stations send their CQ zone. Multipliers are US states, Canadian provinces, and countries. US stations are worth two points, other countries in North America are worth five points and contacts with other continents are worth ten points.

With the low sunspot counts, conditions can be really good. They were good in the ARRL 160 contest in December. The Stew Perry Top Band Distance Challenge was the last weekend of December. Conditions were a bit disturbed, and long distance contacts to Europe and other continents were way down, but there were plenty of US and VE stations to work. More info at <https://cq160.com/rules.htm>

The ARRL RTTY Roundup is the first weekend of January, starting at 1800 UTC (noon local) and running until 2359 UTC (6:00 PM) on Sunday with 30 hours maximum operating time. We send a signal report and state. DX countries send a signal report and serial number. Multipliers are states, Canadian provinces, and DX countries.

This year the rules changed to include FT8 and other digital modes. It will be interesting to see how that works out. On the one hand, you can work weaker stations on FT8, but on the other hand, QSOs take longer. You only get a multiplier once regardless of band. If you could get multiplier credit for a state or country on each band, it could be worthwhile being on FT8 on the higher bands just to work multipliers.

I am looking forward to seeing how the winning stations split between RTTY and FT8. Check the rules if you are thinking about operating this one. <http://www.arrl.org/rtty-roundup>

The ARRL VHF Contest January event starts at 1900 UTC (1:00 PM) Saturday, January 19 and runs until 0359 UTC Monday (9:59 PM Sunday local time). There are a lot of different categories, so check the web page at <http://www.arrl.org/january-vhf>. Send your grid square for the exchange. You can use a number of modes including CW, SSB, CW, and the various digital modes.

Two North American QSO Parties are this month. These are short, just 12 hours long (operate only 10) and start at 1800 UTC (noon local). Maximum power is 100 Watts. Being a domestic contest with a low power limit takes away a lot of the advantage of the big gun stations. CW is on January 12, and phone is January 19. Send your name and state. Rules are at <http://ncjweb.com/NAQP-Rules.pdf>.

Last month I mentioned the group planning on going to Bouvet. They have been in South Africa since October training and otherwise preparing for it. They just announced the ship they are going on. It sure looks awful small for that sort of trip. Dates still have not been announced.

January is pretty quiet on the DXpedition front. Most of the announced ones are single hams traveling. The biggest one is to Sierra Leone using the call 9LY1JM January 9-21. The group of European hams will have four stations running on all bands 160-10 meters. The announced modes are CW, SSB, RTTY, and FT8. Even with current conditions, this should be very workable from W9.

That wraps up this month on the air. What are your radio goals for 2019?

# THE COMPUTER CORNER

## No. 251: Lamp Safety

Stan Kaplan, WB9RQR 715 N. Dries Street Saukville, WI 53080-1664  
(262) 268-1949 [wb9rqr@att.net](mailto:wb9rqr@att.net)



Well, here is something new. This is similar to a safety notice I send to all my lamp customers (I re-wire/repair/rebuild lamps through a hardware store in Mequon). The article may give you something to think about, as well.

Examine the plugs on the ends of all the 2-wire lamp cords in your home. All the plugs should be of the polarized type. Non-polarized plugs have two blades that are identical in size, as shown in the plug on the left, below. Polarized plugs have one blade that is wider than the other, as is shown at the end of the pointer line in the plug on the right.



It is important for all standard two-wire lamps to have polarized plugs installed, for safety. Why? Non-polarized plugs can be plugged into the wall outlet in two different ways, and this means that the hot wire may be connected to the lamp incorrectly. This may lead to the lamp being energized even when the lamp switch is off, and this can lead to possible shock, or even electrocution.

On the other hand, polarized plugs can only be plugged into the wall outlet one way. Assuming the lamp has been correctly wired and the wall outlet has been correctly wired, there is little chance of danger when a polarized plug is used on a lamp. (Of course, a frayed electrical cord can always lead to danger).

Each lamp repair I do finishes with careful continuity testing to ensure that the lamp is correctly wired. Interestingly, I have seen more than one instance when a brand-new lamp was wired incorrectly at the lamp factory, so don't assume a lamp is OK just because it is brand-new! If wired correctly, the black or hot lead in the wall (narrow slot in the wall socket) will supply the center conductor in the lamp socket. The white or neutral conductor in the wall (wider slot in the wall socket) will connect to the socket shell (the threaded part of the lamp receptacle that you screw the bulb into). The path from the white wire in the wall (the wider blade on the plug) should never be interrupted or broken. The path from the black wire in the wall (the narrow blade on the plug) is broken by the switch in the lamp socket or elsewhere on the lamp fixture.

This is the only safe arrangement for household lamps that plug into a wall socket, unless all exposed surfaces are made of plastic or other non-conducting materials.

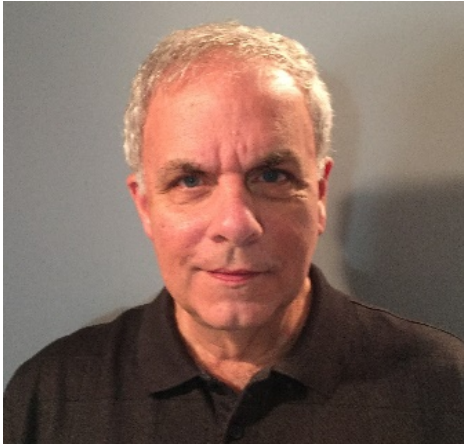
Another source of danger can be chandeliers. These fixtures are often permanently attached to wires in the ceiling and are controlled by a light switch on the wall. When one changes a light bulb in a chandelier, it is common for one to hold the chandelier with one hand to prevent swinging of the whole fixture while using the other hand to unscrew the faulty bulb and screw in the replacement. This is fine if one remembers to turn off the controlling switch on the wall before beginning to change the bulb, *and if the chandelier has been properly connected in the ceiling*. If the chandelier has been wired into the ceiling incorrectly, there is real danger of shock or even electrocution. Why? Assuming incorrect hookup in the ceiling, when the wall switch is on, the shell of the bulbs are energized. One hand holding the fixture to prevent swaying and the other hand unscrewing the bulb provides a perfect pathway across your chest and heart if you should contact the bulb's threaded shell while it is in contact with the socket. This is because code requires all hanging metal chandeliers to be separately grounded (the green wire in your ceiling). Thus, your left hand is holding a grounded metal fixture while your right hand accidentally contacts a live (hot) metal electrode, the shell on the bulb and fixture socket. This is a scenario for potential heart stoppage!

Things to do to avoid danger: 1. Always make sure the wall switch is off before changing bulbs. 2: Consider putting on rubber gloves (household dishwashing gloves would be fine) before changing a bulb. 3. Keep your bulb-changing hand away from all metal ... just handle the bulb by the glass.

Also on your list: Remember that polarized plugs are good. Non-polarized plugs are bad for most simple desk lamps used in houses. Indeed, very few appliances or lighting fixtures should be used with non-polarized plugs unless they have no exposed metal. Such non-polarized plugs were standard fare a handful of years ago, but no longer. The Electrical Code now takes this into consideration. Be safe!!!

# Vintage Amateur Radio

de Bill Shadid, W9MXQ



In the last two installments we talked about the entry into the compact desktop stations market by Heathkit. This was in competition with the Collins S-Line and KWM-2 series separates and transceivers. Those included the SB-300/SB-400 Series Receivers and Transmitters as well as the SB-100 Series Transceivers.

Heathkit followed earlier linear amplifiers<sup>1</sup>, the KL-1 and HA-10, with this series that included the SB-200 Series, the SB-220 Series, the HA-14, and the SB-230. We will talk about these SB Series amplifiers and the HA-14 in this article. The group of amplifiers here include Heathkit's most successful products.

Heathkit made its first entry into the desktop compact linear amplifier market in 1964 with the introduction of the very popular SB-200, pictured here:



**Heathkit SB-200 80-10 Meter Linear Amplifier**  
(W9MXQ Shack Photo)

The 1964 introduction of the SB-200, for a kit price of \$200.00, was a success from its first shipment. Many specifications of the SB-200 were perfectly matched to its prime competitor, the Collins 30L-1 Linear Amplifier. Physical dimensions were nearly the same. So, it was not unusual to see a fine Collins S-Line station with a 75S-3 Receiver and 32S-1 Transmitter mated to a Heathkit SB-200 Linear Amplifier.

Like the Collins 30L-1, the Heathkit SB-200 included an integral 120/240 VAC Power Supply that resided in the desktop cabinet with the RF components. This made for a compact and convenient installation.

Heathkit made one significant improvement in design of the SB-200 compared to the Collins 30L-1. That was the final amplifier tubes. The Collins 30L-1, used four of the then popular 811A Triodes with 65 watts of dissipation each. Heathkit chose the 572B/T-160L (572B) Triode. The 572B was just over double the plate dissipation of the 811A (160 watts vs. 65 watts, respectively). So, the Heathkit used two of the 572B Triodes compared with four of the 811A Triodes in the Collins 30L-1. The SB-200 had an advantage in dissipation over the Collins with a total of 320 watts of dissipation (2x 160 watts) vs. 260 watts dissipation (4x 65 watts) in the 30L-1. The SB-200 had a rated input of 1,200 watts PEP SSB and 1,000 watts CW. Nominal power output was

about 600 watts in either mode. The Collins 30L-1 has a 1,000-watt input specification in both SSB and CW with power output performance like the SB-200.

One year later, in 1965, Heathkit followed the SB-200 Linear Amplifier with a mobile version called the HA-14. The HA-14 was lower in power specifications, was significantly smaller, and lacked a cooling fan. So, the user had to be careful about running power too high. This is the HA-14 appearing in a modification article some years after its introduction:



**Heathkit HA-14 80-10 Meter Linear Amplifier**

The small HA-14, marketed as the “KW Kompact,” did not have quite the specifications of its big brother, the SB-200. The amplifier carried a 1,000-watt PEP SSB, 50% duty cycle power input rating. While they could be used for CW, they were not rated for that mode by Heathkit. The small size did not leave room for a power supply so two were offered: the HP-24 for AC operation and the HP-14 for DC operation in the car. Due to their limited duty cycle, many of these amplifiers ended up not functioning. Overall, they were not too popular and today are very rare, and even more so in good condition.

Heathkit was a subject to the RF power competition as was any manufacturer of the day, and, the SB-200 came up a bit short in the 2,000-watt PEP competition of the day. To meet the challenge of products like the floor mounted Collins 30S-1, Heathkit introduced the desktop SB-220 Linear Amplifier, with an integrated 120/240 VAC Power Supply in 1970.



**Heathkit SB-200 80-10 Meter Linear Amplifier**  
(W9MXQ Shack Photo)

The SB-220 used two of the relatively new, at the time, Eimac 3-500z Triodes with 500 watts, each, of plate dissipation. This allowed the amplifier to have an input power of 2,000 watts PEP SSB and 1,000 watts CW. For SSB, the output was generally in excess of 1,200 watts – double that of the lighter SB-200. Like the SB-200, the SB-220 offered a compact package that was same footprint as the SB-200, but taller.

Both the SB-200 and the SB-220 shared the feature of a tuned input that provided an approximately 50-ohm load to the exciter. These amplifiers were designed with the Heathkit SB-100 se-



ries transceivers and SB-300 receiver/SB-400 transmitter setups<sup>6</sup> in mind. However, they worked well with competitors' radios as well – and work well today with solid state radios requiring a consistent 50-ohm impedance load. Unlike a lot of tube transmitters and transceivers of the day, the Heathkit SB-Line transmitter circuits were designed with a narrow range pi-network output requiring a 50 to 75-ohm load. This was identical to the Collins S-Line and KWM-2<sup>5</sup> – but it was unlike National, Drake, Galaxy, some Hallicrafters<sup>7</sup>, and other equipment of the day. Today's solid-state equipment is generally specified as requiring a 2:1 SWR (25 to 100-ohm) load. As you can see, the Heathkit amplifiers were compatible with them all.

For your reference, here are interior pictures of the SB-200 and SB-220 Linear Amplifiers:



**Heathkit SB-200 Linear Amplifier**  
(W9MXQ Shack Photo)

It is a bit hard to see but note the graphite plates on the original Cetron brand 572B Triodes in this radio. You can just see the cooling fan under the two tubes, blowing air from the bottom of the chassis.



**Heathkit SB-220 Linear Amplifier**  
(W9MXQ Photo of a W9XT Amplifier)

The Eimac 3-500z Triodes here are cooled by the fan you can see toward the top left center of this picture. At the time this picture was taken these were the original Eimac tubes supplied by Heathkit.

**Front Panel is at the bottom of the picture. Both pictures are truncated just a small amount. The perforated RF Shield cover is removed on both amplifiers to view the final amplifier tubes and pi-network circuitry in both pictures.**

The above SB-200 picture shows a retro-fit capacitor and diode board (lower right-hand corner of the picture) that is from Harbach Electronics<sup>2</sup>. See below for further details. Also, this SB-200 is an SBW-200, meaning it was wired at the factory. For a time, Heathkit made assembled radios available to the customer base. These are extremely rare as the practice did not last for very long as an option. In addition, back in those days, individuals offered a service of assembling Heathkits for a fee. Many, but not all, of these small service businesses were run by Heathkit employees.

At this point, it is proper to mention that in 1978, Heathkit began to market the SB-200 and SB-220 Linear Amplifiers in compliance with FCC regulations requiring all such linear amplifiers to be unable to operate on the 10-meter band or frequencies close to that band. Read that as unable to operate on the Citizens Band (CB). CB had become a lawless mob on the spectrum, causing problems for the United States in international treaties handling frequency coordination – not to mention interference to other services. Starting in 1978, the SB-200 became the SB-201 and the SB-220 became the SB-221. It was legal, however, to offer kits for amateur operators to modify their radios and activate 10-meters in their SB-201 and SB-221 amplifiers. In the scheme of things, most of the manufacturers offered retro-fit kits requiring varied levels of technical skill

to implement. The conversion of the SB-201 and SB-221 was complicated and involved some serious modification of the radio. As a result, few were done. Making the changes today is difficult, if not impossible, due to required parts. A point to remember is that a SB-201 or SB-221 found not including 10-meters can be a buy – they are worth less on the used market.

In terms of finding a used SB-200/201 or SB-220/221, they are plentiful. But, be careful of some concerns. Early SB-220 amplifiers had a serious problem with their bias cutoff Zener diode and they would fail, causing the failure of the 3-500z final amplifier tubes. Checking the status of all diodes and capacitors in any used SB-200/201 or SB-220/221 is a good idea. Finding a Zener diode defect in a SB-220 in the field would be rare.

The input coil/capacitor assemblies (one for each band) can drift off resonance over time. Checking the SWR in line with the input of the amplifier is a good idea – with adjustment of the slugs in the coils in these tuned circuits. Generally, the process to confirm that the circuits are operating correctly is to watch SWR while adjusting the cores of the individual coils.

A word about third party improvements for the used SB-200/201 and SB-220/221 is in order. One company I am familiar with in this area is Harbach Electronics<sup>2</sup>. My personal SB-200 (also applicable to the SB-201) has the following Harbach modifications installed:

- PM-200 Power Supply Replacement Circuit Board
  - Replaces the diodes and electrolytic capacitors in the power supply
- SS-201-240 Soft Start Module
  - Slows the start-up process when turning on AC Power. This is the version for use on 240 VAC power. If using 120 VAC AC Power, there is a SS-201-120 version of this Module.
- SK-201-240 Soft Key Module
  - Allows the use of modern radio switching of the transmit/receive function of the amplifier. Isolates the switching from the high voltage bias circuit in the amplifier.
- BRK-200 Replacement Circuit Breakers
  - Replaces defective OEM circuit breakers that have become defective.

I recommend the above items as replacements in a SB-200 or SB-201 that would be found today. Harbach also supplies a replacement cooling fan and a replacement T/R relay if needed.

Harbach Electronics<sup>2</sup> has a similar line of replacement and upgrade parts for the SB-220/221 Linear Amplifier. If you find and acquire an SB-220 or SB-221, I recommend a similar approach to what I added to my SB-200.

One third party retro-fit company focusing on the SB-200/201 and SB-220/221 amplifiers is King Conversions<sup>3</sup>. They specialize in converting any amplifier to single band six-meter operation. They make this conversion to a wide range of amplifiers but seem to specialize in the Heathkit SB-220 and SB-221. These King Conversion amplifiers are frequently seen for sale at hamfests. King typically modifies and returns an amplifier that you first send to them. However, they sometimes have inventory of amplifiers already converted.

So, we have discussed the very popular SB-200 and SB-201 – the most popular Heathkit ever made up to the time of the end of SB-201 production. We have also covered the little brother of the SB-200, the somewhat limited production HA-14 “KW Compact.” And, we have discussed the also very popular SB-220 and SB-221, close to legal limit, models. There was yet another amplifier design based on the SB-200. That was the SB-230, introduced in 1974 and marketed with the SB-104 and SB-104A Solid State Transceivers<sup>1</sup>. The colors of the SB-104 and SB-104A

and their accessories kept to the green on green of the initial SB-Line. However, they had more squared edges and some additional black trim not found on the original radios. Here is the SB-230 Linear Amplifier:



**Heathkit SB-230 80-10 Meter Linear Amplifier**  
(K9DTC Photo)



**SB-230 Interior – RF Compartment only.**

Note the tube at the rear and the visible white colored interface between the tube anode and the heatsink, through the rear panel. Above the tube, on the heatsink, see the heat sensor used to reduce power if the heatsink became too hot.  
(PE1GVK Photo)

The SB-230 used a similar circuit and power supply to the SB-200 and shared its physical size. The final amplifier tube was an Eimac 8873 triode that came in three forms. The 8873 used in the SB-230 was heat sink cooled. In operation, the SB-230 was eerily silent with no fan or any other noise. However, one difference between the SB-200 and the SB-230 was that the 572B (in the SB-200) was a directly heated cathode tube while the 8873 (in the SB-230) was an indirectly heated cathode tube. This changed the circuitry in the way RF was delivered. Both amplifiers were grounded-grid but the RF feed was different. If you have questions on this difference, please contact me.

For more of the detail on the SB-230 final amplifier tube series, the 8874 variant of the tube design series was axial cooled (like a 4CX250B), and the 8875 was transverse cooled (air blown sideways across the tube). The three tubes could dissipate 200, 400, and 300 watts respectively. Given that the similarly rated amplifiers using four 811A tubes could dissipate 260 watts; this 200-watt dissipation of the 8873 in the SB-230 was acceptable with a reasonable duty cycle.

The SB-230 had downside issues. One was the mounting of the tube against the heat sink used a very toxic ceramic compound that was extremely dangerous if broken or chipped in any way. This was unlikely but a bit scary at the same time. Also, the heat sink on the back of the amplifi-

er could become very, very hot and dangerous to touch. The SB-230 stayed on the market until 1978 when the SB-200 and SB-220 had to be upgraded to remove 10 meters. The SB-230 was not redesigned – likely due to limited market. The transceivers it matched, the SB-104 and the SB-104A, went on until 1982 – likely using the SB-201 or SB-221 as their matching linear amplifier.

As a collector of a lot of Heathkit equipment it is rare that I avoid one of their products. The SB-230 and its perhaps easy to mitigate foibles is one of those. I have always avoided opportunities to acquire one – most recently within the past two years. Also, the tube never reached critical marketing success and was discontinued after few manufacturers installed them in their products. Today, only “guaranteed, used” 8873 tubes for \$395.00<sup>4</sup> seem to be available. The 8874 is also sold only as “guaranteed, used” at a cost of \$425.00<sup>4</sup>. The 8874, installed as a pair, was used in a Henry Tempo linear amplifier with a rated input of 2,000 watts PEP SSB. The 8875 tube is completely unavailable and to my knowledge was not used in ham radio and perhaps nowhere else.

We have covered six of the eleven HF linear amplifiers made by Heathkit. Next installment will cover three more. One of them was a reincarnation of the SB-220/221, the second was just “kind of a Heathkit,” and the third had a build volume of only ten units. Stay tuned!!

Special thanks go to Bob, W9DYQ for his proof reading. I appreciate that you read my articles. Remember that I am open to questions and comments at my email address, [W9MXQ@TWC.com](mailto:W9MXQ@TWC.com).

## **W9MXQ**

### **Notes and References:**

<sup>1</sup>Subject of a future article.

<sup>2</sup>Harbach Electronics <https://harbachelectronics.com/>

<sup>3</sup>King Conversions <http://qroking.com/>

<sup>4</sup>Surplus Sales of Nebraska <http://www.surplussales.com>

<sup>5</sup>As I write these articles, you will find that I often mention the KWM-2 separately, as if not a part of the Collins S-Line equipment. The KWM-2 is part of the Collins S-Line but nomenclature can be confusing.

<sup>6</sup>Not to be forgotten, and the subject of a future article, were the Heathkit HW-100 and HW-101 Transceivers – they were compatible with the amplifiers in this article.

<sup>7</sup>Hallicrafters had a varied concept on their tank circuits. Many of their radios were reliant on 50-ohm antenna or load impedance. However, later models had a more broad-range tank circuit.

# Project of the Month<sup>©</sup>

de Gary Drasch, K9DJT



As I often do, I was having lunch with my good friend Lyle, WE9R, at the Dockside Deli in Port Washington. We were talking about various radio clubs and our participation. I mentioned I was interested in writing another column for the Ozaukee Radio Club newsletter, but was struggling with the subject matter. He immediately responded saying, “The project of the month.” I said, “Perfect!” As you can tell, there wasn’t a whole lot of brainstorming involved. “The Project of the Month” was it! The following week, I hooked up with three characters from the Ozaukee Club for lunch at the Crave in Mequon. In the order of trouble, it was Tom,

W9IPR; Bill, W9MXQ; and Rick, AB9XI. I brought up the idea of the *Project of the Month*, and everyone agreed I should do it. Hence, the first installment.

## Heil Headphone Impedance Matching Box

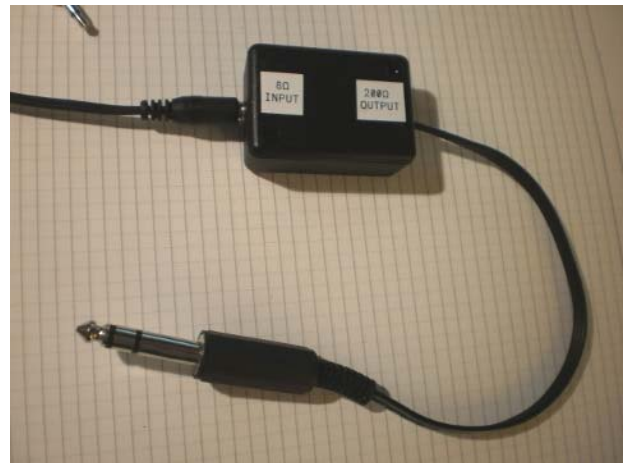
I took this project on back in 2013. I built it to address a low volume problem using Heil headphones on an FT-2000. The headphone volume was low compared to using the speaker. Meaning I had to crank up the volume when using the headphones, and then getting blasted by the speaker when I pulled the headphone plug.

It turned out to be an impedance mismatch. The FT-2000 uses a LM4881 headphone amplifier chip which likes 8 ohm impedance. The following is the power output vs. impedance table of the LM4881:

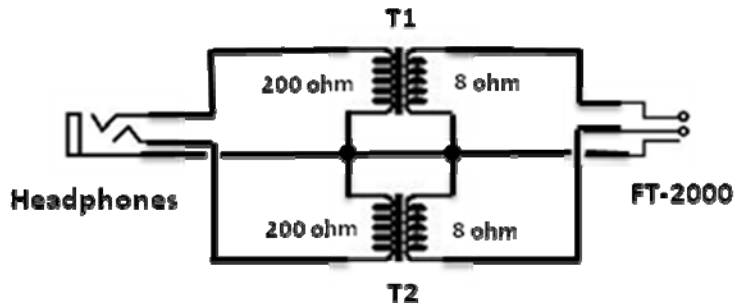
8 ohms – 200 mW  
16 ohms – 150 mW  
32 ohms- 85 mW

I opened up the Heil headphones and found each speaker to have 200 ohm impedance (not 32 ohms). I didn’t bother to calculate the power output for a 200 ohm match but believe it would be even lower.

The solution I came up with was to purchase a pair of audio transformers having a 200 ohm primary and an 8 ohm secondary (Mouser #42TL004-RC, \$1.94 each). I was able to fit them into a small plastic box (Mouser #546-1551GBK) with a cable out to a ¼” stereo phone plug and a 1/8” stereo jack to accommodate the headphones. Because of the small space, I used a hot-



glue gun to mount the transformers and input jacks. The output cable is restrained using a cable tie.



The upshot of all this is that it WORKS! I can now plug in my headphones without having to turn up the volume—and there is much more power available if I need it.

❖ I placed a pdf file on the Yahoo FT-2000 Fox Tango Users Group in June of 2013.

I now run an Elecraft K3 at my home QTH and continue to use this device just because I know the headphones are properly matched to the radio.

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My goal is to make this everyone's column. Share your projects with the club. You may write up your own description of what you did, or call me and explain the project and I'll write it up. Of course, pictures are must. Anything relating to ham radio is welcome. Have you built a kit, homebrewed an accessory, reconfigured your operating table, solved an RFI problem, or installed a new or additional antenna? Give me a call at 262-707-4279. I look forward to hearing from you.

73, Gary  
K9DJT

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## UPCOMING EVENTS

### Membership Meeting – January 9, 2019

Nominations are needed for the January officer elections. Be sure to pay your \$15 dues and attend the January meeting and cast your vote.

Ken Boston would like anyone who is interested in serving on the board to contact him at 262-352-0658 or email him at [kboston6@wi.rr.com](mailto:kboston6@wi.rr.com).

Ken is particularly looking for a new 1st VP or 2nd VP, and maybe a new president (if I cannot manage to convince Pat W9JI to serve).

Thanks,  
Ken B, W9GA

# ORC Monthly Program

February 13<sup>th</sup> - Gary Drash K9DJT - Multimeter Safety

## Volunteers Needed for Monthly Programs

The monthly program is the highlight of the Ozaukee Radio Club meeting. We are fortunate to have a number of very talented people in our club, many of whom have shared their knowledge through a presentation. Share your expertise and experience with the club. Programs can be on any topic that is ham radio related. Contact Pat Volkmann W9JI at w9ji@arrl.net to discuss your idea for a program.

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## Ozaukee Radio Club

### December 12, 2018 Meeting Minutes

Ben Evans (K9UZ), Secretary



President Kevin Steers (K9VIN) called the meeting to order at 7:32 PM. All the attendees introduced themselves.

#### **Announcements, Show-and-Tell, Bragging Rights:**

Gary (N9UUR): Since getting his general class license recently, he has worked all states on HF.

Tom T. (KC9ONY): Mason Thill (KD9MBI) is a new ham.

Tom R. (W9IPR): Got his digital FT-8 working.

Pat (W9JI): Be aware that a new software update version 2.0 is out for FT-8. The new version is not backwards-compatible with the old one.

Fred (W9KEY): Bought a new amplifier and matching tuner.

Kevin (K9VIN): Announcement from Art Davidson (AC9CD) who was not at the meeting – There are upcoming FEMA ICS instruction courses to be given by Wisconsin ARES/RACES Southeast District for certification and credentialing for Wisconsin ARES/RACES. The instruction will take place at the New Berlin City Hall Common Council Chamber. The first course, ICS 700, will be on January 19, 2019 from 0900 to 1200. Meetings for three subsequent courses will take place over the following three months at the same times, the specific dates to be announced. Attendance limited to 40 students. Contact Art for further information.

Bill S. (W9MXQ) pointed out that you have to RSVP to be accepted into the class.

#### **Program:**

Scott Ruesch (W9JU) gave a presentation about the Salvation Army Team Emergency Radio Network (SATERN), which is a network of amateur radio operators who handle emergency communications traffic and generally support emergency services response. Scott is the SATERN coordinator for Wisconsin and Upper Michigan. He talked about what SATERN does and also spoke about SATERN's participation in the Patriot North simulated emergency response exercise held at Fort McCoy and Volk Field last summer.

**50/50 Drawing:**

Jay Bares (KB9JNJ) was the winner of the 50/50 drawing.

**Auction:**

Stan (WB9RQR) conducted the auction. Many items were sold, including a container of tubes, a power supply, an SWR/power meter, a Dell Inspiron 530 desktop computer with Linux Mint installed, and a Pyramid PA amplifier.

**Officer Reports:**

Kevin S. (K9VIN) President – Elections are next month. To vote, you need to be up to date on member dues.

Pat V. (W9JI), 1st VP – No report.

Tom T. (KC9ONY), Repeater VP – There's a minor issue with the 97 repeater. Something is sporadically keying up the repeater for six seconds. Will work through it. Documents were received from WAR, requesting verification of the information regarding the repeater. The notice contains an error which Tom and Nels (WA9JOB) will work to correct.

Ben E. (K9UZ), Secretary – The minutes from the November meeting were distributed by email to members. Motion to accept the minutes was made by Stan (WB9RQR), seconded by Bill S. (W9MXQ) and approved by the members.

Treasurer's Report – Treasurer Robert (K4WTH) could not attend the meeting. The profit and loss report for November was emailed to the members. A motion to accept the Treasurer's report was made by Stan (WB9RQR), seconded by Bill S. (W9MXQ) and passed by the members.

**Committee Reports:**

There were no committee reports.

**Old Business:**

Tom T. (KC9ONY): Suggested to Kristian (KC9TFP) to get the spring swapfest up on the ARRL website. Also need copies of the flyer to pass out at the Waukesha swapfest. The flyer is available for downloading from the ORC website.

**New Business:**

There was no new business.

**Adjournment:**

A motion to adjourn was made by Kristian (KC9TFP), seconded by Bill S. (W9MXQ) and approved by the members. The meeting was adjourned at 9:00 PM.

**Attendance:**

There were 37 members and three guests present at the meeting.

A copy of the attendance sheet is available upon request in PDF format. Please contact Ben Evans via email at [ben@evansengsolutions.com](mailto:ben@evansengsolutions.com) for a copy.

Respectfully submitted,



B. Benjamin Evans, K9UZ  
Secretary



## ORC Meeting Agenda

January 9, 2019

- I. 7:00 – 7:30 PM – Network & Rag Chew
- II. Call to Order & Introductions
- III. Announcements, Bragging Rights, Show & Tell, Upcoming Events, etc.
- IV. Officer Elections – Ken Boston (W9GA)
- V. Fellowship Break
- VI. 50/50 Drawing – Kristian Moberg (KC9TFP)
- VII. Auction – Stan Kaplan (WB9RQR)
- VIII. President's Update – Kevin Steers (K9VIN)
- IX. 1<sup>st</sup> VP Report – Pat Volkmann (W9JR)

- X. Repeater VP Report – Tom Trethewey, (KC9ONY)
- XI. Secretary's Report – Ben Evans (K9UZ)
- XII. Treasurer's Report – Robert Escola (K4WTH)
- XIII. Committee Reports
  - A. Spring Swapfest
  - B. Other
- XIV. OLD BUSINESS
  - A. Field Day Tent
- XV. NEW BUSINESS
- XVI. Adjournment to ?

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### The ORC Newsletter

465 Beechwood Drive  
Cedarburg WI\* 53012

### First Class

#### Next ORC Meeting:

Grafton Multipurpose Senior Center  
1665 7<sup>th</sup> Avenue, Grafton, WI  
Wednesday, Jan. 9<sup>th</sup>, 2019  
7:00 PM – Doors Open  
7:30 PM – Meeting Begins