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The

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# Messenger 2.0



Blackstone Valley Amateur Radio Club's Quarterly Newsletter

[W1DDD.org](http://W1DDD.org)

# BVARC WINTER FIELD DAY

BY KEN TRUDEL — N1RGK  
BVARC PRESIDENT



*Saturday, January 28, 2023*

Today started much like any other Saturday except this day was Winter Field Day! The long year's wait was over and now it's time to brave what Mother Nature wants to throw our way. But this year it was a totally different situation. Mother Nature was either on vacation or had today on auto-pilot because the day was relatively "warm," as winter days go, at an almost balmy 47 degrees. It was a bright sunny day and, best of all, it wasn't raining or snowing. By midday, if you were in the sun, you were quite comfortable. Except for an occasional gust of wind, it was the perfect day to be out and about setting up antennas and making contacts.

Many of the usual "diehards" arrived between 9:30 and 10:30 a.m. and began to setup the individual antennas, radios and all-important cook stove.

We ended up with three separate operating stations and one, in-the-truck mobile operation. Mike Kenney, K1ETA, made the first contact using QRP CW to France! We knew then and there that if he could make contact with France on less than 5 watts we had better make a few more using 100 watts within the USA.

Mickey Callahan's "Ham Radio A Go-Go" was up and running next and while he didn't make contact with any pilots on international flights this time, as he did on his first call at the Gaspee Days event, his station once again pulled in the contacts we needed, and all on battery power. Very impressive!

Mark Hofstra, KW1X, our Winter Field Day Committee chairman was the third station up and running and he was making contacts via CW. Later in the afternoon, Randy Thompson, K5ZD, arrived and worked both CW and SSB. The

*Continued On Next Page*

contacts were rolling in like gangbusters. One station after another were contacting Randy as they realized we were in Rhode Island and were operating Winter Field Day. It was quite impressive to watch Randy handle the traffic as fast as it was coming in. Nice to be on this end of a pile up for sure.

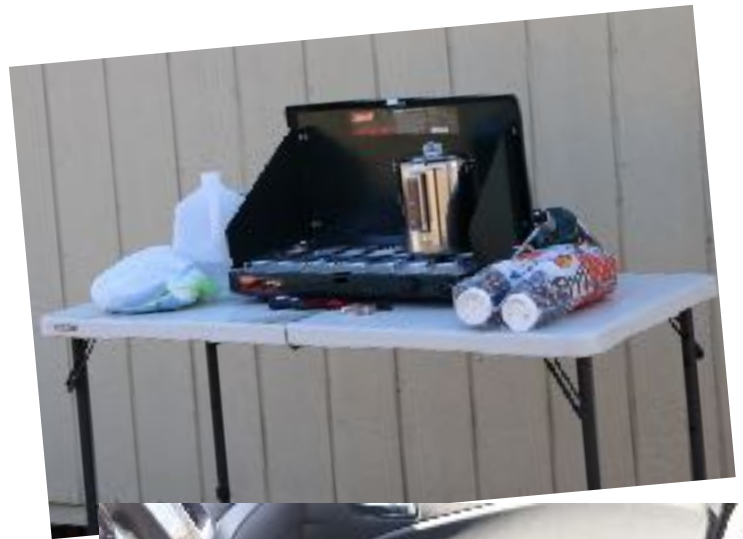
We had plenty to do and enjoyed coffee and hot chocolate made fresh on the propane stove that was setup at 10 a.m.

I was very happy to see others take the lead and operate the radios. One guest, Tommy Viscione, KC1QIF, from the Richmond area of RI came by to visit and, while he had never before operated or made a contact on HF, he stepped up and did a great job! He's now had his first few contacts under his belt! We hope that Tommy decides to join BVARC. We'd really enjoy helping him to become a General or Extra in the months ahead. While looking around and watching everyone having a good time, I reflected on the simple fact that this is a good thing we do every January and that this one is for the books. Absolutely perfect weather, great conversations with everyone, plenty to do, making contacts, teaching others, and hot chocolate to top it all off. What could be better than this!

Thank you to the Winter Field Day Committee for putting this all together and to all who arrived early in the day to help set it all up to make it happen.

**The following is a list of all who attended Winter Field Day and signed in.**

Mickey Callahan, K1WMC	Dave Queenan, W1DAQ
Greg Gruenenfelder, KC1NTI	Ken Trudel, N1RGK
Marc Caouette, W1MCX	Mike Kenney, K1ETA
Bob Jones, WB1P	Jim Johnson, K1GND
Darrell Wood, Guest	Ed Fox, N1JIL
Lloyd Merrill, W1LBM	Mark Hofstra, KW1X
Tim Connell, WA1GLY	Judson Mitsock, W1JMZ
Peter Sichel, K1AV	Ron Blais, KB1RYT
Bruce Wood, W1BRU	Patty Vilnit, W1AUT
Ray Vilnit, KC1HQB	Pat Ryan, KC1EWI
Brenda Viscione, KC1RLD	Tommy Viscione, KC1QIF <small>Guest</small>
Al Meyer, KD2HDP	Bob Beaudet, W1YRC
Paul Fontana, KC1IEN	Randy Thompson, K5ZD







# COME ALL YE FAITHFULL

BY RAY VILNIT—KC1HQB

**BVARC held its annual Christmas Party on Saturday, Dec. 3, at Bella Restaurant in Glendale, RI.** Forty seven tickets were sold, and forty four members and guests attended the party. The general feedback from the attendees was that Bella once again did a nice job providing a great meal, service and venue.

Special thanks to members who donated gifts for the Christmas raffle, Matt Penttilla (NA1Q) for donating the cake, Bob Beaudet (W1YRC) for providing the audio equipment, and Judson Mitsock (W1JMZ) for providing the music and taking pictures.

Thanks to the members and families who attended.

The 2023 Christmas Party is scheduled for Saturday, Dec. 2, at Bella. We hope all can attend.



### ***The Christmas Party Committee includes:***

Bob Jones (WB1P),  
Ginny Jones (N1WWG),  
Patty Vilnit (W1AUT) and  
Ray Vilnit (KC1HQB).



# From our President

**Hello Fellow BVARC Members,**

## ***HAPPY NEW YEAR!***

Although it's been a month-and-a-half ago, I sincerely hope all BVARC members and your families enjoyed the holiday season. That certainly was the case for all those who attended our annual BVARC Christmas party! It was so great to see so many having a good time and meeting many of the spouses at this annual event. I'm sure the Christmas Party Committee would enjoy hearing from all that attended.

I'm writing this letter just one-day after receiving a negative test result for COVID 19. Back about nine days ago I felt absolutely lousy. My wife Carol didn't like what she saw and immediately tested me. Sure enough, I tested positive for COVID. My doctor prescribed Paxlovid, which is an antiviral therapy that consists of two separate medications packaged together and taken twice a day for five days. This is a strong medicine that made me very tired. But, in the end, it did its job and now I appear to be free of COVID after multiple tests.

Now that 2022 is in the rear view mirror, each committee chair has submitted their planning budgets for 2023. This would be the best time of year to engage with these committees and give them a hand to be sure we once again raise-the-bar in getting everyone's input into these events.

For example, in April BVARC has a ham radio demonstration that Mickey Callahan, K1WMC, is organizing at the Bellingham Library. Summer Field Day Committee will soon begin

their planning meetings. Mark Hofstra, KA1YQC, is the NEW committee chair for this major event and can use everyone's help in making 2023 Field Day the best we've ever had.

We also have Paul Fontana, KC1IEN, the NEW committee chair of the 2023 JOTA event. Talk with Paul at our next monthly meeting to see how you can help shape the life of a Scout with just a few hours of your time.

Also, Mickey Callahan has volunteered to lead a trip to the Marconi transatlantic site on the Cape and a visit to the local Chatham Marconi Maritime Museum. So please step up and give them all your input and help!

Last year we did a lot of activities. Some were well attended by the membership and others by just a small dedicated few. Regardless of the participation level, the question I struggle with is what is the right balance of activities? If you would please think about it, I would like your input.

As we conduct our annual officers and board of directors meetings your comments to these leaders are very important. It helps us to better understand how active you want BVARC to be and if we are missing the kinds of things you want to participate in. What I don't want to happen is to see or hear that we are not fulfilling your expectations and you get frustrated. So send us an email, call us on the phone, or talk with us at meetings. All we want is to hear from you to make BVARC even better in 2023!

73, Ken Trudel – N1RGK  
President & CEO, BVARC



# Snapshots

## A PEEK THROUGH THE BVARC ARCHIVES

Ray (KC1HQB) and Patty (W1AUT) Vilnit hold the certificates marking their inaugural visit last November to ARRL headquarters in Newington, Conn.



Ray is flanked by Joe Carcia (NJ1Q), left, ARRL manager and trustee, and volunteer Joe Poland III (N1EAI), who served as the Blackstone couple's tour guides.

Ray and Patty also wanted to locate the memorial brick bearing her dad's name, Norm Thibault, a silent key and charter BVARC member, along the Diamond Terrace walkway leading to ARRL headquarters. Next to Norman's brick is another dedicated to Ray St. Onge, also a silent key and BVARC member. Patty commended ARRL's hospitality during the couple's visit.



IN MEMORY OF  
NORM THIBAULT  
W1AUT

IN MEMORY OF  
RAY ST. ONGE  
W1HW

# SCOUTING FOR A RADIO MERIT BADGE

BY PAUL FONTANA—KC1IEN

Every fall Boy Scouts from all over the world connect over the airwaves and via the internet to participate in the annual Jamboree On The Air or JOTA, the largest Scouting event in the world.

On Oct. 16, 2022, the Narragansett Council, the local Boy Scout organization that represents RI and southeast MA, participated in JOTA for the first time. Two council-owned camps were activated, Camp Champlin in Cranston, RI, and Camp Norse in Plymouth, MA. Both camps were set up with multiple amateur radio stations and a classroom area for Scouts to earn the Radio Merit Badge. This event was led by John Vecoli, KC1KOO, of the Newport County Radio Club (NCRC). Many NCRC members volunteered in the event along with BVARC members Ken Trudel, N1RGK, BVARC president, and Paul Fontana, KC1IEN, who helped at camp Champlin.

Scouts were introduced to various Ham Radio disciplines and modes including, SSB, FM (over

VHF), DSTAR, APRS and FT8. At the end of the day, 32 Scouts successfully earned their radio merit badge. They had lots of fun communicating with Scouts



worldwide. They were very excited when a contact was made with another JOTA station in the Netherlands, PD1RVD.

Overall, the event was a complete success. Work has already started in planning next year's JOTA 2023. Stay tuned for more information as BVARC was asked to participate again. For more information about how BVARC will be involved in 2023, please speak with Paul Fontana, KC1IEN.

For more information, the ARRL write up of the event can be found at <https://nediv.arrl.org/2022/10/16/whats-your-dream-ri-ma-jota-a-success/>







# DXPEDITION TO BOUVET ISLAND, 3Y0J.

THAT'S 3 YANKEE ZERO JULIETTE.

BY BOB BEAUDET — W1YRC

Did you manage to get 3Y0J into your log? Some folks did but many did not even hear them. Bouvet Island, in the South Atlantic near Antarctica, is the second most wanted entity on the list of entities, second only to North Korea, P5. Thousands around the world were at their stations to make a quick contact and add Bouvet to their DXCC list of entities worked.

Don't feel too bad if you didn't get them. They were very hard to work and even harder simply to hear for an abundance of reasons.

High on the list of issues was what's called DQRM or deliberate QRM. Some people seem to find enjoyment in deliberately transmitting a blank carrier or a series of dashes or just about anything on top of 3Y0J while the DX station is transmitting. Why do they do that? I have no idea but I guess that some enjoy getting the attention that comes their way as a result of this attention, even if it's negative. Possibly they were ignored as a child and need to find attention as an adult. This unwanted QRM is disruptive of course and takes place on all modes.

The weather conditions on and around Bouvet are always extremely inhospitable. Winds are always from 30 to 50 mph, or more, and freezing

rain is in the air most of the time. Details are unknown at this time, but landing their Zodiac, carrying operators and equipment, on the beach was impossible. They were forced to off load 30 feet off shore at the only beach that could be found on the island. The rest of the shoreline is solid vertical rock and/or ice.

The operators had to push the floating water tight containers carrying equipment and provisions ahead of them while swimming in the surf to reach the beach. They wore watertight survival suits and to say landing was difficult is putting it mildly. The entire trip was miserable, yet the team somehow remained in good spirits.

They operated on the floor, not having any tables or chairs. The operators' backs and legs will be aching for weeks, to say nothing of their frozen derrieres.

For reasons known only to the Almighty, I managed to work them twice on 17-meter CW. Why twice? I didn't hear them the first time that they sent me 599-73, so I continued calling. I apparently didn't hear them acknowledge my second attempt either. As I said earlier, most folks couldn't hear them at all and those who did had great difficulty.



Bouvet Island or Bouvetøya is a very large rock covered by a glacier, like a giant frosted cupcake.

The island measures only 49 square kilometers and is almost entirely covered by ice year-round.

This is summertime at Bouvet. Winter is even worse, if one can imagine that. Steep cliffs on all sides of the island make it extremely difficult to go

ashore. Olavtoppen, 780 meters above sea level, is the highest peak on the island. There is a small “beach” on the southeastern corner which the operators chose to use.

Once ashore, they determined that they could not safely climb to the top of the glacier so they set up camp just above the beach. They further determined that they could not erect the Hexbeam, so they put up a few 20-25 foot poles and strung a couple of inverted V dipoles on them. Only a small generator and two K3 transceivers came ashore, no amplifier, probably because of weight and size.

From their campsite, they had an unobstructed path to Europe and Japan but the



path to North America looked straight into the 200-foot tall granite face of the island. It made transmitting or receiving an RF signal to or from the U.S. nearly impossible. Previous DXpeditions set up on top of the glacier and had a clear path all around the compass.

This explains some of their statistical data which reports that 42% of their contacts were with Europe, 36% with Asia but only 14% were with North America. Overall, a total of only 17, 547 contacts were logged compared to 200,000 plus that were planned. They expected to have a dozen CW stations and using directional antennas from atop the glacier. That would have produced far different statistics.

Returning home, the operators will face some unpleasant questioning regarding why they did what they did. Many donated rather large sums of funding and expected to work a new one. Others will determine that they did the best job possible, given the compromised circumstances. The team is scheduled to be the principal speaker at the April Visalia DX Convention in Visalia, Calif. Your BVARC president and I plan to be there and will see it in person. It has been suggested that the Bouvet team should wear Kevlar jackets. Hopefully, that's an exaggeration but the discussion will surely be lively.

# HOMEBREW



## and gadgets

### LIGHTNING PROTECTION BASICS FOR THE HF STATION

BY WALT MAHONEY—KC1DON  
With spring (hopefully) just around the corner, late winter is a great time to evaluate our station's lightning protection arrangements prior to lightning season.

This short article is not a comprehensive review of the subject, but does suggest some basic protective measures we can all take. The suggestions are based on my experiences as an AM broadcast engineer, and later in my career with industrial plant control systems.

Two comprehensive resources for everyone's reference are Grounding and Bonding for the Radio Amateur (2nd Ed., ARRL), and a three part series Lightning Protection for the Amateur Radio Station Parts 1-3 published in QST June-August 2002. The later articles are available for free online at <http://www.arrl.org/lightning-protection>.

Lightning as a natural phenomenon is usually (~90% of the time) a downward negative electric discharge, with the earth as the anode. The length of the discharge is

usually one second or less, and the potential can vary between 40 and 120 kV. Once the arc is established, the rise time to peak current is about 0.3 seconds, during which time the peak current flow can be from 5 to over 200 kA.

If we consider the time integral of the lightning current over the entire flash duration, the energy released is something on the order of 10 billion watts. The key takeaway with this amount of energy is we don't need to take a direct hit to cause harm to people or damage equipment; a lightning strike will induce hazardous voltages in nearby conductors through induction or via any reasonably conductive material.

I am assuming that nobody will be operating their station when lightning is anywhere in the vicinity, and all equipment is de-energized and grounded per recommendations in the ARRL Handbook. Even in this condition, the two routes that damaging amounts of energy can be coupled to a transceiver are via the power supply and the antenna connections, with the antenna connection being far more vulnerable. These two routes require different protection strategies.

On the power input side, obviously the best protection

is to unplug the power supply from the branch circuit. I realize this isn't a practical solution for everyone, and we may not even be at our operating location when the storm arrives. The next best thing in this case is to use a quality surge protected power strip having an on/off switch. The quality and effectiveness of these surge protective devices (SPDs) vary greatly, and as always one "gets what they pay for." I



Figure 1: Ferrite Ring

recommend the Tripp Lite "Isobar" power strips. Look for units that are circuit breaker protected and provide a minimum of 900 joule protection, and be aware that some imported power strips offer zero surge protection beyond a simple fuse.

Our most common transceiver configuration now uses an outboard 14 VDC



power supply. Obtain a broadband ferrite ring and wind as many turns as can comfortably fit on the DC transceiver cable through the ferrite. It's important to wind the positive and negative conductors together (Figure 1), and locate the ferrite as close as possible to the transceiver.

Protecting the antenna connection is a little more challenging. As a kid I would unscrew the feedline PL-259 and stick it in a pickle jar, which sort of worked. In modern times we have coax antenna switches, and it goes without saying your transceiver should always be switched to a dummy load of an appropriate power rating when not in use. The dummy load is highly recommended to avoid transmitting into an open circuit when one inevitably forgets to throw the switch.

Some switch manufacturers such as Alpha-Delta and Daiwa also incorporate gas discharge tube (GDT) surge protection. Look for a switch that grounds all unused connections, and be sure to ground the switch body itself. 450-ohm ladder line can be protected by old-time knife switches, which are getting scarce. The second step is to add a GDT-type lightning arrestor which will shunt current to ground when the gas ionizes at a given voltage. As with SPDs, not all GDT arrestors are suitable for amateur use. Ideally, we want a device having a low let-through energy and minimal insertion losses. As part of my professional work with industrial radio modems, I found the Polyphaser IS-NEMP-series offers the happy combination of low VSWR from 1.8 MHz through low-band VHF and a very fast-acting GDT. The housing and connectors are built to mil-spec standards. Again, there are less expensive arrestors of dubious provenance available through online sources. I caution some of these will demonstrate much greater VSWR than is advertised.

## **DX QSL CARDS FORWARDING THROUGH THE ARRL OUTGOING BUREAU**

Sending your QSL to DX stations that you have worked is not expensive at all. In fact, it is free. Your membership in BVARC includes unlimited privileges to forward your QSL cards to DX stations through the QSL Bureau system.

Simply fill out your cards as you normally do, sort them alphabetically, numeral prefixes first and get them to Bob Beaudet, W1YRC. He will merge yours with the cards from other members, pay the fee to ARRL and get the cards to Rose-Anne Lawrence at the league who sorts them in preparation for mailing to more than 100 different countries. See an interesting and informative video at <http://www.arrl.org/qsl-service> .

Follow the sorting rules at the ARRL website, please print the DX station's call on the back of the card. That helps Rose-Anne quickly see it for pitching into the correct bin.

Mailing your card to the DX station you have worked can cost about \$1.25 for each ounce that the mailing envelope weighs. Using the bureau is much less expensive but also much slower. Using the bureau system, a card might take a year to reach the DX station.

Using the bureau is very useful in reply to high volume shipments of cards to you generated by making dozens/hundreds/thousands of contacts in DX contests. Of course, you should never use the bureau to send for a card that represents a new entity for you. Spend the direct mailing amount for that.

The bureau only serves international cards. You cannot send domestic cards to U.S. stations via the bureau. When you have your stack of DX cards ready, get them to Bob any way you can. Exchange at a club meeting or Consortium is the best and least expensive way. In the mean while, go work more DX. The bands are in very good condition.

# Across THE Spectrum

## **BVARC FIELD DAY**

June 25 and 26, on the grounds of the Scituate Senior Center, Route 102, Scituate. Set up day, Friday June 24, noon

## **GASPEE DAYS**

June 12-11am-4pm Pawtuxet Park, Narragansett Parkway, Cranston, RI (Set-up 9AM)

## **NORTHEAST HAMXPOSITION 2022**

August 26 - 27 - 28 at the Best Western Royal Plaza in Marlborough, MA.

## **BVARC SIMPLEX NET**

Every Wednesday at 7 p.m. on 146.565.

## **RI SWAP AND SELL NET**

Net: Saturdays 9 a.m. on the NB1RI repeaters

Website: [RISWAP.NET](http://RISWAP.NET)

A place where RI amateur radio operators can swap and sell items free!The net runs on Saturday mornings at 9 a.m. on the NB1RI network.

## **SKYWARN:**

Every Wednesday at 7 p.m. on the NB1RI repeater network.

Website: <http://www.wx1box.org>

## **RI ARES NETS**

Repeater net every Tuesday 7 p.m. on the W1RIA repeater network.

VHF Simplex is held every second and fourth Tuesday on 147.420 starting at 7:45 p.m. The HF net is held every first and third Tuesday of the month at 7:45 p.m. on 3.980 MHz +/- 5 KHz

Website: [www.riares.org](http://www.riares.org)

**ARRL audio news** can be heard each Sunday at 8 a.m. on Woonsocket radio station WOON 1240 AM and 99.5 FM.

## **RADIO EXAM SESSION DATES**

**LOCATION:** our Saviours Parish,  
500 Smithfield Road,  
Woonsocket, RI 02895

**TIME:** Sessions Start at 9:00 A.M.

**Here Are the Dates for 2023:**

January 14, 2023

March 11, 2023

May 13, 2023

August 12, 2023

October 14, 2023

December 9, 2023

For information, please contact Bob Jones, WB1P at 401-333-47 or [bgjones49@verizon.net](mailto:bgjones49@verizon.net)

**Or on the Website at:**

[HTTP://WWW.W1DDD.ORG/EXAMS.HTML](http://WWW.W1DDD.ORG/EXAMS.HTML)



**HAWKS ON AN ANTENNA  
SUBMITTED BY BOB BEAUDET**



# JOIN US AT THE LIBRARY

The Blackstone Valley Amateur Radio Club will conduct an amateur radio demonstration Sat., April 29, from 10 a.m. to 3 p.m. at the Bellingham Public Library, 100 Blackstone St. The club will operate two radio stations outside the library as an introduction to ham radio.

An indoor display will feature the history of ham radio, its purpose, the benefits of the ham radio hobby and the public service hams render during national emergencies and natural disasters. Some vintage radio

equipment will be displayed as well as a continuous Morse code demonstration.

Experienced hams will be present to welcome visitors, explain the day's proceedings and answer questions regarding their hobby. The demo is in conjunction with National Library Week.

Questions may be directed to Mickey Callahan, K1WMC, at [mickc@comcast.net](mailto:mickc@comcast.net)



## Welcome Aboard

BVARC has welcomed several new members to its roster since the last newsletter. If you meet them at club meetings or functions, please say hello.

*Don Pillsbury (KC1MPO)*

*Al Goncalves (KC1RZH)*

*Frederick Pocai AA1LL)*

*Andrew Raspallo (KC1REO)*

*The Messenger*<sup>20</sup>

*The Messenger Is Produced  
3 Issues a Year  
End of February,  
Beginning of June,  
And Beginning of November*

*Editorial Contributions  
Are Done by our Members*

*Edited by Ronald Blais*

*Produced by Teri Diiorio*

# “OH! the Humanity”

BY JIM JOHNSON –K1GND

Those were the words used by radio announcer Herb Morrison on the fateful day May 6, 1937 in Manchester, N.J. (Naval Air Station Lakehurst). A huge crowd had gathered at the air station anticipating the arrival of the 804-long Hindenburgh zeppelin filled with flammable hydrogen gas.

The airship belonged to the German NAZI party and was prohibited from using helium because of the U.S. restrictions placed on the sale of that particular gas. The weather that early evening was windy and partly overcast. There were reports of lightning in the landing area.

Because of the weather, the approach of the Hindenburg was delayed by several hours from completing its scheduled landing. The airship was a “lighter than air” type and a ground crew was required to secure the ship using drop lines and pulling the ship to a tower. To facilitate the landing, water (ballast) was released causing the ground surrounding the tower to have a perfect ground connection for accumulated static electricity.

No one is absolutely sure if the following massive explosion and fire (the airship was incinerated in seconds), that took the lives of 36 people and injured 62 passengers and ground crew, was caused by a hydrogen

leak, a bomb or the result of poor weather conditions.

A Naval investigative board published an accident report which did not positively identify the cause of the crash.

*NOTE: The Hindenburg passed over Providence on its approach to N.J.*

Now for how this terrible event is of interest to the ham radio operator. The airship had a radio room above the control cabin and was fully equipped with radio teletype, CW and voice stations. The radios were built by the Telefunken company and consisted of the following:

The long-wave transmitter for 575 and 2700 meters.

The short-wave transmitter for 17 to 70 meters.

The receivers and transmitters employ the same antenna, equipped with an automatic device (today's ATU) which switched over when the operator speaks into the microphone.

The radios switched back to the receiving mode when the operator stopped speaking. The antenna (a two-wire antenna) was 120 meters in length and was controlled by a “pay in and pay out motor”). The antenna





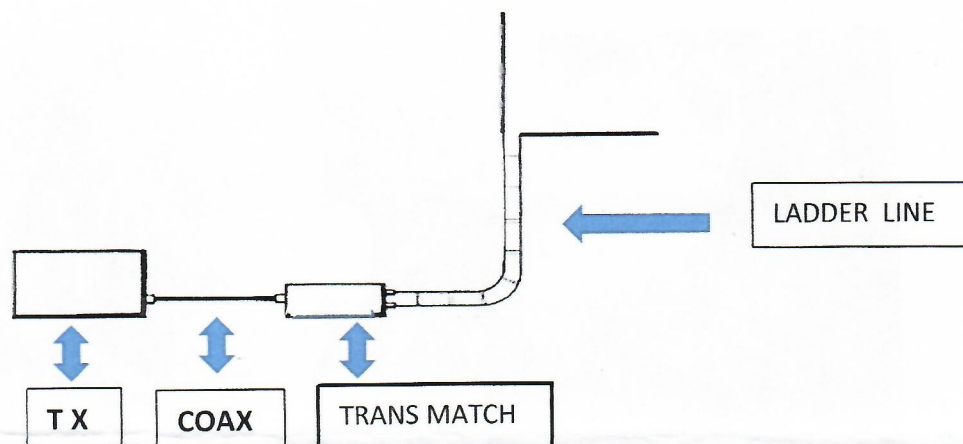
THIS PHOTO BY UNKNOWN AUTHOR IS LICENSED UNDER CC BY-NC-ND

was a quarter wave trailing wire, which was reeled out to the required length for the frequency in use.

This type of antenna is in existence today and is known as the zeppelin antenna named after the airship inventor and was

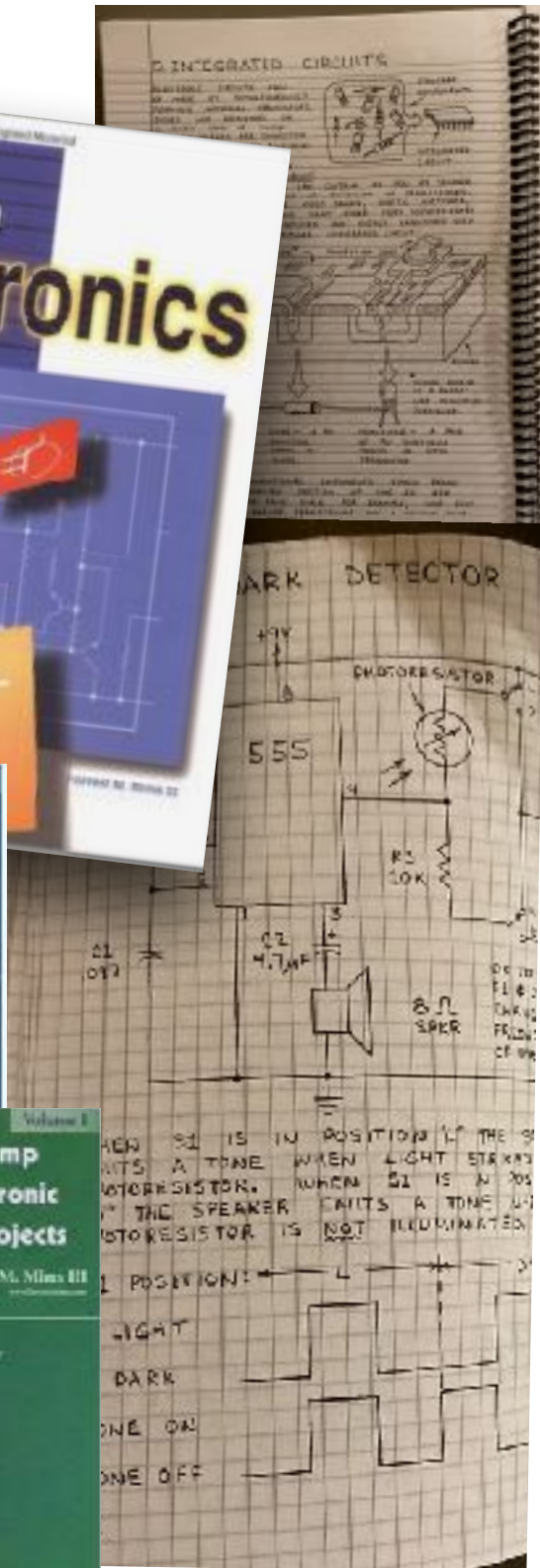
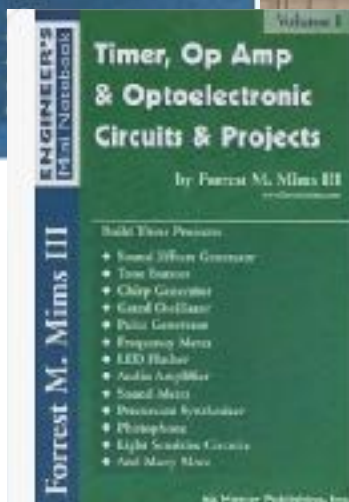
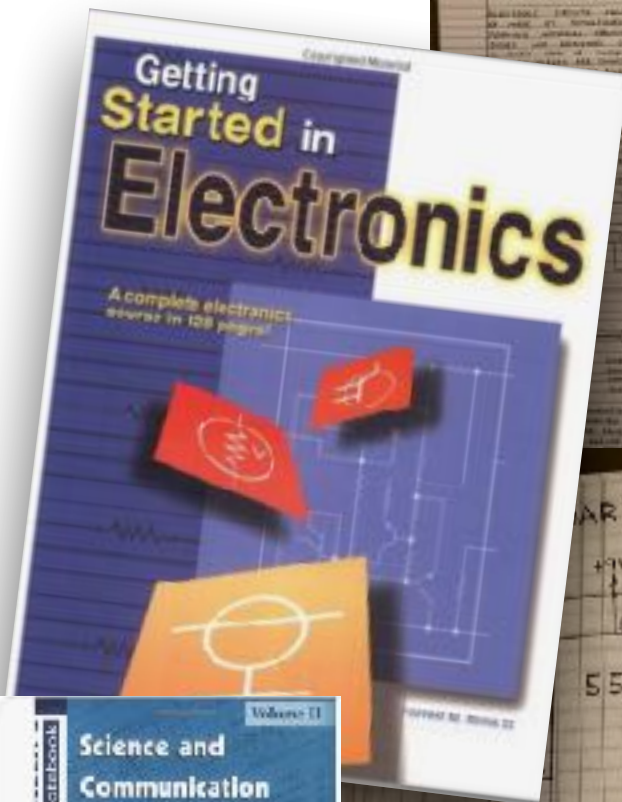
patented by German engineer Hans Beggerow. Hams know the antenna as the “zepp” or the “double zepp”.

And now you know the history of how the zepp antenna became another tool for ham radio operators.



# A Radio Shack Come Back

BY MATT PENTTILA – NA1Q



Do you remember walking into the parts section of Radio Shack and seeing these little booklets under the title "Engineer's Mini Notebook" by Forest Mims III?

Well I found out that W5YI Group has put out five books which incorporate all the Radio Shack books, which are available online, and, even with inflation, are still reasonably priced between \$12.95 to \$19.95.

Starting with "Getting Started In Electronics," which now is spiral bound, to the three compendiums, "Timers, Op Amp, and Optoelectronic Circuits," "Science and Communication Circuits and Projects," and "Electronic Formulas and Circuits," these are all tried and true electronic circuits and explanations of how and why they do what they do, as written by Forrest Mims III. They have stood the test of time and each circuit was built and tested four times before being put in the books.

Included in this book is the handwritten text and drawings, no computer typing in the text. Definitely old school.

So for a trip down memory lane or a useful reference, these books are something to add to the shack bookshelf, alongside the holy ham shack books known as the ARRL Handbook, ARRL Operating Manual and ARRL Antenna Book.

73 Matt NA1Q