K9YA Telegraph

Robert F. Heytow Memorial Radio Club

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Ozark Patrol Receiver

Regenerative Blast from the Past by David Cripe, NMØS, and 4SQRP

Philip Cala-Lazar, K9PL

In days of old when SWLs knew no code and pocketbooks quite restricted, They built their receivers in the regenerative mode and were soon Morse addicted.

K9PL

Reading the Ozark Patrol kit's (http://www.4sqrp.com/ozarkpatrol.php) description I was immediately reminded of Allied Radio's Knight Kit trio of simple regenerative receivers: Ocean Hopper, Space Spanner and Span Master. I still have my Span Master with its complement of 6BZ6 and 6AW8A tubes and tip pin headphone jacks. Nightly DXing with the torture devices known as Trimm headphones led to high-pitched ringing in the ears persisting for hours unto sleep. Despite that occupational hazard I was daily drawn to the wide world of signals that two-tuber offered.

"Soon Morse addicted"

From the Ozark Patrol 4SQRP Web site:

***Frequency Range**: 3.5-15 MHz in two bands*

***Sensitivity**: Yes!*

***Power Supply**: 6 x AA batteries*

***Audio Output**: A 2.6" speaker is included, as well as a jack for 1/8" stereo headphones*

The Ozark Patrol circuit is a two-band shortwave receiver, using only three NPN transistors in its circuit. It employs a reflexed regenerative detector to maximize gain from its simple design, followed by a two-transistor audio amp. It is capable of operating from a simple wire antenna.

This kit features a pre-drilled and silk-screened circuit board front panel with a total of 38 through-hole components mounted on pads etched on the opposite side. Component values and reference numbers are silk screened by each part location for fool-proof assembly. This style of PC board was invented in 2003 by our own Joe Porter, WØMQY, as an optional board for the NJQRP RF Sniffer, a field strength meter designed by Joe Everhart, N2CX. Since Joe lives in Pittsburg, KS, the board design was dubbed the "Pittsburg" style.

The kit's first run ran out of stock in 36 hours, so I missed that window of availability. Undismayed, I mail ordered my kit and a month later received one of the first of the second run.

Inventorying and sorting parts into an egg carton I was very pleased to find nothing missing. The 4SQRP Group's kitters are very professional about supplying complete kits. In the rare instance where a component is missing, their response to e-mails is rapid and the missing component quickly received.

It is a handsome looking piece of gear with its piano-black and silver front panel. All electronic components mount on the back of the front panel. The circuit includes only one toroid and its 20 turns are easily wound with 22 AWG magnet wire.

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Inside This Issue...

Philip Cala-Lazar, K9PL
Editor

Mike Dinelli, N9BOR
Layout

Dick Sylvan, W9CBT
Staff Cartoonist

Rod Newkirk, VA3ZBB (SK)
Contributing Editor
2004 - 2012

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

Hell: Been There, Done That, Love It!

Part III of III

Frank Dörenberg, F/N4SPP

Siemens Hell Model T empf 72 "GL"

Feld-Hell

Siemens-Halske developed a special Hellschreiber set for the *Wehrmacht*. It went into service in 1935 and was standard equipment of the German signal corps throughout WWII. It is a fully modular backpack ("Tornister") unit, with printer and keyboard-sender. This is the ubiquitous *Hell Feldfernschreiber* ("field teleprinter"), *Feld-Hell* for short. As the unit has a keyboard, the transmission speed is 2.5 chars/sec. It uses the standard 14x7 Hell font. An estimated 15,000 units were built, and some 200 may have survived to this day, some in the U.S. and Canada. I currently own three of these machines, and have 130 machines documented in a database.

During the 1950s, the Hell Company and Siemens-Halske developed a series of start-stop Hellschreibers, some with a keyboard, some printer only. These are the models Siemens-Hell 39, 40, 44, 72, and 73. Standard speed is 6.1 chars/sec, 300 Bd, and 1,000 or 3,000 Hz tones (ASK). The start-pulse is hidden in the blank first column of the font. With start-stop synchronization, the printer spindle only needs a one-turn thread and prints on narrow paper tape (9.5 mm, ≈3/8"). It may be counterintuitive, but Hell-literature generally refers to the start-stop machines as "asynchronous," and the original free-running machines as "synchronous" or "quasi-synchronous." The logic is probably that asynchronous operation requires a form of synchronization.

"A clever trick!"

Start-stop models were used extensively by the German State Railroads (*Reichsbahn* and later the *Bundesbahn*). The last known railroad Hell-grams are from 1995. A sheet printer (*Blattschreiber*), model 9Tempf1b "P", was developed in 1949. Its spindle has many ribs, and spans the width of the paper sheet, like the platen of a conventional typewriter. It is also a start-stop machine. However, it does not synchronize to the sender via an explicit start-pulse. Note that the top and bottom rows of the Hell-font are blank. A set of cam wheels and relays is used to detect the presence of pixels in these rows. This is then used to adjust the motor's speed. A clever trick!

The last Hellschreiber model is the Hell-80, developed for the German Army (*Bundeswehr*) around 1960. Some 225 units were in service until decommissioned in 1985, as they were incompatible with NATO teleprinter standards. This was the world's first solid-state teleprinter, and it has a magnetic-core font memory. It also has an integrated punch-tape reader, and supports both start-stop and synchronous Hell at five chars/sec. Telegraphy speed with its 7x9 pixel font is 315 Bd. Modulation is FSK with a 350 Hz shift.

Besides RCA and the BPO, quite a number of other companies developed and built Hellschreibers: *Teletype Corp.* (Model 17, 1938), *FIAT* in Italy (not the car manufacturer) made at least 50 units for Reuters, *EMA* in Switzerland (late 1940s), *Tokyo Tsushin Kogyo* (renamed Sony Corp. in 1958), *Toho Denki Kabushikigaisha* (became part of Matsushita in 1962), *Thomson* (France) made a solid-state Feld-Hell for the French military in the late 1950s (with GE 2N43 transistors) and *FACIT* (Sweden) during the early 1970s. Siemens in Hungary slightly modified the Feld-Hell for the Hungarian army in the early 1950s (with 6AU6 tubes instead of RV12P4000 *Wehrmacht* tubes). During the

Hell-80

Robert F. Heytow Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

mid-1950s, RFT in the German (not so) Democratic Republic (a.k.a. "East Germany") developed a start-stop Feld-Hell machine for the military police (KVP) and the National People's Army (NVA). It had 7SH7 and 6SJ7 tubes of local or Russian make and a speed of four chars/sec.

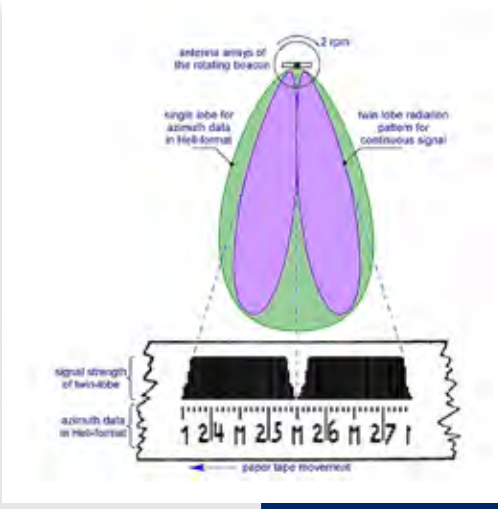
An interesting Hell-printer system was built for a radio-navigation system of the *Luftwaffe*. The ground station was a rotating-beacon of type FuSAn724/725, codename "Bernhard." It operated in the 30-33.1 MHz band with two 500 W or 5 kW transmitters. It had a massive antenna system: two broadside arrays of 4+4 vertical dipoles, and another array above it, with three dipoles and reflector screens. The radiation pattern of the lower array system had two lobes with a sharp null between them. It was used to transmit a constant tone. The upper array had a single lobe, aligned with the null of the lower system. It transmitted the momentary azimuth of the antenna system as a compass rose strip, in Hell-format. The complete system weighed about 250-thousand pounds and rotated twice a minute!

The airborne counterpart of type FuG120 (codename "Bernhardine") included a two-channel single-tape Hell-printer, type HS120 or PSch120. The upper track printed a bar graph of the twin-lobe signal's strength. This required special circuitry, synchronized to the printer spindle. This was patented in 1937 by Rudolf Hell. These days we would call that circuitry an analog, intersective pulse-width modulator. The null of the twin-lobe signal shows up as a "V" in the bar-graph strip. The bottom track of the printer shows the azimuth value during passage of the beacon's beam. The "V" points at the actual value of the aircraft's bearing with respect to the beacon. The compass rose is only printed once, so this printer channel has a spindle with a single-turn thread. In order to print horizontally, this spindle is synchronized to the degree tick-marks. The bar-graph spindle prints two bars per pixel column of the azimuth track.

Perfect For Amateur Radio

Hellschreiber is a simple and robust direct-printing system that was developed specifically to provide readable, error-free communication, even over low-quality radio and landline telephone links and in mobile applications. This made it particularly suitable for news agencies, banks, diplomatic and military communications (e.g., with crypto machines), and communication over high-voltage power-lines. Most of the world's news agencies used this system. Hellschreiber is perfect for amateur radio, in particular the classic & classy "Feld Hell" mode:

- **Robust**: signal characteristics are similar to that of high-speed CW "Morse." It is insensitive to interference and poor signal quality, due to: 1) high level of pixel redundancy, 2) use of a special Hell-font that maximizes legibility while minimizing misinterpretation, combined with 3) the human's excellent pattern recognition capability. It is insensitive to path delays (unlike RTTY, PSK, Throb, Domino, etc.). It is insensitive to polar flutter (40m - 160m bands), unlike PSK and other phase-modulated modes. Exact frequency tuning and drift are not critical at all–unlike PSK and many other modern digi-modes.



Concept of the Bernhard/ Bernhardine Navigation System (bearing 255° from station "M")

- **Pleasant character transmission rate**: 2.5 chars/sec corresponds to a decent average typing speed (30 wpm), suitable for real conversation QSOs. This is unlike fast digi-modes such as PSK (50 wpm), where basically only pre-programmed messages are exchanged—*how boring*!

> *"Perfect For Amateur Radio"*

- **Narrow bandwidth**: Feld-Hell qualifies as a "narrow bandwidth digital mode," as the required bandwidth–*with the original Hell-font*–is less than 500 Hz. So it may be used in "digital mode" band segments (IARU Region 1 & 2) and "narrow-band modes" segments (IARU Region 1); in Region 3, "narrow band" is 2 kHz. Technically, Hell is also permitted (but not recommended!) wherever image emissions are authorized (phone, fax, SSTV band segments). Hell is of course compatible with narrow CW IF-filters in the receiver. Yes, this is much wider than PSK31 (≈60 Hz at -26 dB, unless over-driven).

- **Low duty-cycle**: average is about 25% (min 6%, max 39%), which is easy on the transmitter–unlike RTTY and other 100% duty-cycle modes and PSK (>80%).

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Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

On Being W9BRD's Daughter

Part II: The Thermometer Caper

Amanda Newkirk, ex-WN9PMC

ARS W9BRD c. 2010

It is late summer and nearing dusk on Richmond Street, and the cicadas are singing their heads off high in the trees in the soft blue light. My father is in his ham shack in the basement of our old Chicago two-flat, window propped open to the fresh air of the warm summer night. Prince Albert pipe smoke puffing out the window, along with a sound I have heard my whole life and I carry with me still: the lovely tapping of Morse code wafting like a song my dad never tires hearing; the beeping pitch going from high to lower as he tunes the signal more perfectly: dah dit dah dit, dah dah dit dah. This is the music of CW, as soothing to me as a lullaby.

In 1992 my partner Karen and I bought an old Chicago two-flat with my father. He was turning 70 that year, still caretaking, without complaint, his older daughter Elizabeth, handicapped since birth. Despite his many challenges over a lifetime, he managed to keep his mostly sunny disposition intact. But my dear father was growing older, and it felt like it was time to have him nearer us, where I could keep a closer daughterly eye on him.

"the lovely tapping of Morse code"

W9BRD, excited by new prospects, was thrilled with the endless possibilities our ancient basement seemed to afford. Our house was built about the same year the Titanic went down, and it appeared that the succession of owners since then, each updating things piecemeal, felt compelled to keep every single bolt, hinge, nail, doorknob, leftover kitchen tile, gas valve, screw–in short, every blessed thing that had ever been used or bought for the building.

These had ended up in various caches in the old home's cellar: in great antique dressers, drawers so heavy with booty they could scarcely be pulled open; or in the big ole workbench, original to the house and seemingly built to withstand earthquakes. It was covered with the battle scars of a hundred years of countless projects–its homemade and impossibly deep drawers holding every size imaginable of files, mallets, hammers, wedges and early nails (not to mention a decades-old hidden bottle of port), most of these from the turn of the century and this just the beginning of a list that might have been an anthropologist's delight–had not W9BRD gotten there first!

I suspect my dad found his heaven, but he was playing it cool. One must be as nonchalant as possible, perhaps, while secretly, dreams of quiet pillaging and looting dance in one's head. In the meantime, he was happily setting up his ham shack from scratch for the first time in nearly thirty years.

There were two ancient and crudely constructed rooms in our basement, walls and doors made of wood and covered in a ghastly putty-like color that was no doubt the original oil paint.

The paint was tenacious to the point of probably being immune to a nuclear blast–such blast at that point being only an unfortunate twinkle in someone's baby blues. Amazingly untouched, these were the original coal storage bins constructed in the days when coal was the fuel of choice. Each house had a small metal door, like a mail chute, through which said coal could be shoveled–voilà–directly into these coal bins, one of which would (not so) shortly be used, and quite enthusiastically, by a certain W9BRD.

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

My dad loved telling everyone he was operating from an old coal bin. It did have its drawbacks, which had to be addressed. It was situated in the northeast corner of the basement, perfect for coal but not so kind to amateur radio operators. As the days grew shorter, my dad's new shack grew colder and colder. I bought my dad a small space heater but the real problem was that the room needed to be insulated to hold in any heat at all. We dragged our heels on this project until one autumn day, coming down to the basement to do laundry, I was shocked by my father's do-it-yourself contraption that Rube Goldberg himself would probably have run from–and what a sight it was.

My dad, wearying of waiting for a warmer environment, took things into his own hands and decided to experiment with raising the temperature in his shack himself. He fashioned a wire of some sort, a kind of clothesline-like thing that led from the furnace to his radio room. Hanging from this wire was a tunnel-like construction of overlapping brown paper bags that formed a rough tube-like thing that ended, along with the wire, at the entrance to my dad's shack. At the top of the open door to his shack he had suspended a huge, roaring box fan, breeze blowing his way, to which the end of his homespun duct was attached. By switching on the fan my father had great hopes that he had crafted enough of a homemade heating system to end his cold weather coal bin woes.

But it didn't work. Or did it? All it took was one look at this monstrosity for Karen and me, with the help of a friend, to begin the work of insulating shack de W9BRD, but fast! My dad may have thought that he had the last laugh on this one, except for the cagey thinking of Diane Flanagan, friend, fellow father-soother, and electrician extraordinaire. We were gathered in the basement while my dad was out, conferring about the ham shack remodeling. Diane was also rewiring the shack, giving my dad a surplus of outlets and enough power to apparently take over the world, should he so choose.

ARS W9BRD Under the Porch Additions

But Diane was eyeing the paper bag contraption. "He's going to burn the @#$%*&! house down!" she said, ripping down the offending bags emphatically, one by one. Then she went over to a thermometer hanging on the wall of my dad's shack. My dad had been painstakingly studying its temperature (variable readings in the middle 60s), copiously taking notes, and using these results to boost his case for faster ham shack insulation. Never mind that "no hurry, no hurry," he would always say, and quite innocently.

> *"Hi there, Mandabubble!"*

She peered at it, then suddenly BAM! She pounds her fist on the wall next to the guilty thermometer. The three of us watch as incredibly, the thermometer's casing with the numbers on it slips down a bit, leaving the glass mercury tube unmoved. But what happens is that, miraculously, the thermometer now reads 72 degrees!

The next day we began insulating my dad's shack. He came down cheerily as always, with his morning coffee. "Hi there, Mandabubble!" said he to me, beaming, and as always, checked the temperature of the thermometer on his wall. "It's feeling better in here already!" he exclaimed.

We couldn't have agreed more. ■

Robert F. Heytow Memorial Radio Club

www.k9ya.org

telegraph@k9ya.org

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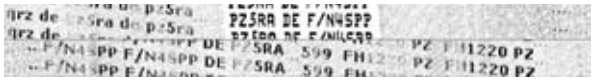
- **Simple**: there are no special requirements for transmitter or receiver. It can be used with a very simple CW transceiver. No modern digi-mode can do this! Printers can even be home-built. Original Feld-Hell machines are rare, but all it takes is a PC (need not be powerful), free software and a simple interface between the PC's soundcard and the transceiver!

Das Mädchen am „Hellschreiber"
Über den „Hellschreiber" werden auf funkentelegraphischem Wege die neuesten Nachrichten übermittelt. (Zeichnung: LZ.-Archiv)

WWII Hellschreiber Cartoon

The world's first Hellschreiber QSO took place in 1959 between Hans Horn, DL1GP, and DJ1GJ, with their Feld-Hell machines. They were part of a small group that obtained the first temporary experimental amateur permit for RTTY and Hell in Germany.

There was a Feld-Hell revival in the latter half of the 1970s after several publications in European amateur radio magazines, and eventually in the U.S. by Hans Evers, PAØCX/DJØSA, (ref. 1) who entrusted me with his Feld-Hell machine in 2008. The first Hell emulator-software was developed around 1980 by Klaas Robers, PAØKLS, for Apple][and by Sigfus Jonsson, LAØBX, for MS-DOS. Simple HAMCOM-style rig interfaces were used. Today, the PC's soundcard is used and there is quite a choice of Hell-capable software for Windows, Linux, Mac OS, etc. I still prefer the Hell-only freeware created by Nino Porcini, IZ8BLY. But multi-digi-mode freeware such as Fldigi, MultiPSK and DM780 are just as good. They all apply raised-cosine pulse shaping to minimize bandwidth, and most have a function for calibrating the soundcard's clock speed (practically all soundcards built into PCs and laptops need this). Mechanical Hell-printers are inherently binary (black & white pixels). Digitizing signals with a soundcard makes it possible to print grayscale pixels, and even color scale pixels on colored "paper" tape. This improves the readability, e.g., during fading.



Screen shot of a 2008 QSO on 20m between the author in France and PZ5RA in Surinam

Clearly, the on-off keying of Hell-pixels can also be used with modulation forms other than ASK. This has led to modern "software" variants: FSK-Hell, PSK-Hell, FM-Hell, Duplo-Hell, Concurrent Multi-Tone (C/MT), Sequential Multi-Tone (S/MT) and Slowfeld. The most recent addition to this list is CP-16 (16-tone C/MT), developed by the Chinese Radio Club in 2012. Only the old Apple and DOS software can key a CW transmitter directly, without a keying device to convert tone pulses back to "on-off" pulses.

In practice, Hellschreiber on the bands is done almost exclusively in Feld-Hell mode and with less than 100 watts. During the 1970s there was some European activity on VHF with start-stop Hell-machines of type 72 "GL." Hell-activity has waxed and waned several times over the last 40 years. The original weekly Sunday Feld-Hell net on 80m in Europe is still going strong—since 1979—with net-lead Arthur Bauer, PAØAOB. He uses one of his Feld-Hell machines and a 1943 U-boat transmitter from the magnificent collection he manages near Amsterdam (ref. 2). That collection is also the venue where most Annual Hell Meetings have been held since 1977. There is also a European Hell-80 net in the 40m band on Mondays.

Is Hell activity concentrated in Europe? Hell no! The Feld Hell Club (ref. 3) now has nearly 5,000 members world-wide (I'm # 24). It holds a short contest every month, and has weekly nets on most bands (mostly U.S.-based). There is also an associated Yahoo Group (ref. 4). There are standard frequencies (ref. 3), and some traffic is coordinated via Internet "spotter" pages (e.g., ref. 5).

"Hell no!"

This article is a mere summary of all that is Hellschreiber. Want to know (much) more? I invite you to visit my dedicated Hellschreiber Website, see ref. 6. It has all the information available on this subject, including detailed descriptions, historical accounts, photos (including 3D), hundreds of documents, sound bites, videos, interfacing circuitry, etc.

I hope to see you in Hell soon! ■

References:

1. "**Hellschreiber** - a rediscovery", Hans Evers (PAØCX/DJØSA), Ham Radio, 12/1979, p. 28-32 (see documentation page of ref. 6)
2. www.cdvandt.org
3. www.feldhellclub.org
4. www.groups.yahoo.com/neo/groups/feldhell-club/info
5. www.hamspots.net/hell
6. www.hellschreiber.com

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

Ham Radio Advertisements

What That Verbiage Really Means

Rick Hiller, W5RH

We've all read through the marketing hype in those glossy ham radio ads in the monthly magazines or on the Web site of our favorite ham radio equipment vendor.

But what do those buzz words really mean? A few samples follow…

Foolproof Operation: There are no provisions for any adjustments.

Advanced Design: The advertising agency doesn't understand it at all.

Field Tested: The manufacturer has no test equipment.

Redesigned: The flaws have been fixed–we hope.

Years Of Development: They finally got one to work correctly.

High Reliability: They made it work long enough to ship it out.

Stealth: You can't see it. (You can't hear it either.)

Untuned Feeders: The losses are high.

Tuned Feeders: The losses are really high.

SWR: Only one S'wers.

Return Loss: Misplaced incident power.

Remote Tuning: Using an automatic matching network that has only a slight chance of getting it right.

Center Loaded: A Ham with a big gut.

Feedpoint: The mouth of a Ham with a big gut.

L Match: A tuner that doesn't know what the L it's doing.

Pi Network: Yahoo Group for bakers.

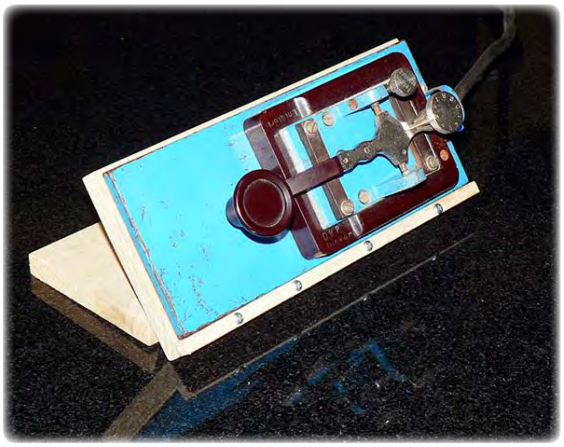
RIT/XIT: VFOs for your VFOs.

Mixer: A venue for dancing waves of different frequencies.

Software Defined Radio: A description of a transceiver, written in Word.

Key Atilt

Don Shelton, K5OK



I found a Junkers key and was very glad to have a nice straight key again after many years of using bugs and iambic keyers. Well, I found that after 50 years I have a stiff wrist, or glass fist. Explaining this to a guy at work, he mentioned a keyboard he had to solve a similar problem. As we talked, I noticed as I rotated my hand, the wrist would tighten up first on one side then, as I rotated, the other side would tighten up. But, at about a 45-degree tilt everything was loose. So I built a stand that is angled at 45 degrees and I seat the key on it. To make it right- or left-handed, just turn the key around. It seems to work pretty well for me. I don't have the same fist I had at 19, but not bad for an old guy.

A Winning Formula…

Like what you're reading in this month's *K9YA Telegraph*? If so, you're in good company, as amateur radio operators in more than 100 countries agree with you. Know what else? Hams just like you write the *K9YA Telegraph*. Hams participating in the enthralling lifestyle that is the amateur radio experience.

These operators want to read your story. Evidenced by your feedback and our expanding worldwide subscriber base we know we've hit on a winning formula:

YOU + K9YA Telegraph = A Great Read

But without your side of the equation, it just doesn't add up.

Not sure of your writing skills? No problem, the *Telegraph's* staff will edit your manuscript. The important thing is to share your story. Remember: "A good story is a terrible thing to go untold."

http://www.k9ya.org/write_for_us.htm

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Robert F. Heytow Memorial Radio Club

www.k9ya.org

telegraph@k9ya.org

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A supplied pine board supports the front panel, the six AA-cell battery holder and Fahnestock clips for antenna and ground. Decorate the board as you choose. I chose to stain it and finish with two coats of polyurethane gloss varnish applied with a foam brush. As completed it does honor to the "inexpensive receiver kits from Radio Shack, Knight or Allied" it was "designed to pay homage to…."

Tips

Be sure to download the latest versions of the Ozark Patrol assembly manual and Bill of Materials. The manual I used was dated 7-22-14. The second run uses one gimmick capacitor–two in the first run. The capacitor complement between runs differs slightly.

Pittsburg style construction, after a bit of practice, proceeded quickly. Bending the component leads, only a slight bend is needed, into a shallow "W" became reflexive after the first couple of resistors.

Audio transformer (T1) mounting tabs are bent out to facilitate soldering to the provided pads. I lightly sanded the mounting tabs as they were at first reluctant to take solder.

T1's primary leads are soldered to the two pads provided on the Primary side of the transformer outline; the right lead soldered to the pad marked "+9v".

The manual omits the step of soldering T1's leads to the speaker.

The two straps (center, one above the other) remaining on C1, the polyvaricon, are soldered to the GND pad closest to the breadboard.

C9 is the darker blue of the two blue capacitors (C9 and C11).

The kit with its low parts count and laborsaving construction method assembled quickly, about four hours, and worked from first switch on.

Listening

Contingent on propagation, evenings spent monitoring with the receiver hooked to one leg of my low 80-meter dipole and the shack ground returns excellent results. Amateur 80- and 40-meter CW and SSB signals are easily heard. On the upper band powerful signals from a multiplicity of domestic and DX SW broadcasters and many commercial and governmental digital signals need only minimal volume settings.

Slight hand capacitance was noted in proximity to the front panel. Stability is good requiring only an occasional touch up. The fine old juggling act of tweaking the tuning, regeneration and bandspread knobs quickly becomes second nature and enhances the vintage radio ambiance.

The two-transistor amplifier drives the built-in speaker with operating-desk-to-ear amplitude, but headphones greatly improve the experience by enhancing volume, intelligibility and listening comfort.

The Ozark Patrol kit is the perfect choice for those in the mood to relive a bit of their youth and for those wishing to share the fun and wonder of old time radio technology with the young. ■

Subscribe to the friendly Ozark Patrol Yahoo! Group for all the latest news and views:

https://groups.yahoo.com/neo/groups/ozarkpatrol/info

Ham Lingo

DICK SYLVAN, W9CBT

"CALL-SIGN"

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org