

K9YA Telegraph

Robert F. Heytow Memorial Radio Club

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Crosley

Book Review

Philip Cala-Lazar, K9PL

Crosley: Two Brothers and a Business Empire that Transformed a Nation

Any one of the Crosley brothers' many accomplishments would have marked them for inclusion in the American pantheon of industrialists and

entrepreneurs. The list of their ventures is long and varied, often dashing off into byways distant from their core businesses. Yet they found great success in nearly all their endeavors: radio, automobiles, aircraft, broadcasting, exercise machines, Cincinnati Reds ownership, industrial equipment, domestic and industrial appliances, watercraft and children's playthings.

Of these only the Crosley car may be regarded as a costly failure. However, in its time it was an innovative, efficient and inexpensive vehicle. Despite its ultimate demise, in new-car-scarce 1947, one of every three station wagons sold in the U.S. was a Crosley.

Genesis

The Crosley brothers, Powel, Jr. (1886-1961) and Lewis (1888-1978), made their earthly debuts in Cincinnati, Ohio, at the onset of its growth as an industrial powerhouse and rise to the sixth most populous American city.

Powel, Jr. intrigued by a steam-powered electrical generator in the basement of the theater his father managed, built a miniature version. His generator was water-powered, running off the family home's attic-mounted cistern; it powered some hall lighting and a toy train. In 1900 the brothers built an electric car to win a \$10 bet with their father.

Several years later Powel, Jr. raised \$10,000 (\$256,000 in 2013 dollars) and built the prototype for his Marathon Six motorcar, that venture, The Marathon Motor Car Company, was sunk by the Panic of 1907. That event haunted Powel, Jr. to the end of his life. It also marked the inception of his lifelong obsession to produce a basic, inexpensive automobile as remarkable and revolutionary as Henry Ford's Model T was two generations earlier. In retrospect, his many hugely successful enterprises were only stepping-stones to the realization of that dream.

Powel, Jr., the entrepreneur, and younger brother, Lewis, the pragmatic engineer, predicated their business empire on a simple credo—give the customer the product they want—cheaper than the competition.

Crosley Radio

In 1916 Powel, Jr. started a successful automotive accessories company. Lewis joined him following his WWI army service as they turned to another of the 20th century's big things—radio. In 1921, Powel, Jr., after seeing a simple radio priced at \$130 (\$1,690), knew he could do better, more cheaply, and immediately set about to produce it commercially.

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*"stepping-stones
to the... dream"*

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Hell: Been There, Done That, Love It!

Part II

Frank Dörenberg, F/N4SPP



1940s Hell Printer for News Agencies

(12"x8"x9.5", 14 lbs.)

So we now have a printer that has *very few* moving parts. Besides a small motor, it has a spindle, rollers for paper tape transportation and an electro-magnet with armature. Big deal!? You bet: it is small, simple, robust and inexpensive. Compare that to the competition at that time: regular teleprinters! “inexpensive” is of course relative: the 1937 Siemens list price of a Hell-printer was 1,275 *Reichsmark (RM)*, while skilled male factory

workers typically made no more than one *RM*/hour. But the printer is so simple, you can build your own. I have (1984), and so have many other others. Clearly, some electronic circuitry is required to drive the solenoid when a tone pulse is received. But this is basically just a simple diode-rectifier and an amplifier stage.

But hold on, Rudolf is not done yet! Both the sender and the printer have a motor, and there is no synchronization mechanism whatsoever. But the motor speeds are never 100% identical. So what happens? The Hell-system scans and prints the columns bottom-to-top. If the printer motor is *faster* than the motor of the sender, its spindle will *lead* the drum of the sender and prints too high in the column (or even at the bottom of the next column). In this case, the printed text is slanted upward, runs off the paper tape, and only part of it is legible:

HELLSCHREIBER THE LAZY DOG QUICK BROWN FOX 1234567890

Print-Out With Slant, Due To Speed Difference Between Sender And Printer

Even if the motors are somehow turning at exactly the same *speed*, they will still have a *phase* difference—a constant offset. The text will be printed horizontally, without slant, but with a vertical shift: the upper part of the text is printed below the lower part:

HELLSCHREIBER THE LAZY DOG QUICK BROWN FOX 1234567890
HELLSCHREIBER THE LAZY DOG QUICK BROWN FOX 1234567890

Print-Out With Vertical Shift, Due To Phase Difference, but Identical Speeds

Rudolf to the rescue: simply use a spindle with a thread that makes two full turns, instead of just one. Our little printer now simultaneously prints *two* identical lines of text at the same time, one above the other. So what, if the printed text is slanted or shifted: one of the printed lines is always perfectly readable. Pretty neat, eh? Yes, the paper has to be wider. The standard width is 15 mm ($\approx 5/8$ "). Note the font not only has a blank first and last column, but also a blank bottom and top row. The prior is for horizontal character spacing (within a line), the latter for vertical spacing between the two printed parallel lines of text.

HELLSCHREIBER THE LAZY DOG QUICK BROWN FOX 1234567890
HELLSCHREIBER THE LAZY DOG QUICK BROWN FOX 1234567890

Print-Out With 2-Turn Spindle - Readable Despite Slant

HELLSCHREIBER THE LAZY DOG QUICK BROWN FOX 1234567890
HELLSCHREIBER THE LAZY DOG QUICK BROWN FOX 1234567890

Print-Out With 2-Turn Spindle - Readable Despite Vertical Shift

This clever printer is stupid. It prints *all* the sufficiently strong signals it receives—be it intended pixels, noise or interference. It has no notion of fonts, bits, pixels, encoding, speed or synchronization. It does *no* decoding or interpretation, other than deciding “signal (not) present.” Signal distortion may add *unintended* pixels, and may cause omission of *intended* pixels. This only makes the printed text harder to read. But unlike teleprinters, a Hell-printer can never print a wrong character! The human reader, with its impressive pattern-recognition capability, can read messages that are well “down in the noise.”

THE TELEGRAPH SPEED THE LABOL
THE TELEGRAPH SPEED THE LABOL
THE TELEGRAPH SPEED THE LABOL

Print-Out of a Noisy Signal

“Hell” is basically a low-resolution direct-printing fax system. So it is also very suitable for pictographic written languages, for which regular teleprinters are



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not an option. It was used extensively by Chinese national news and weather agencies at least until the 1980s. Rather than a keyboard for text entry, text was hand-written on tape and passed through an optical scanner-sender. This approach was also adopted in tape facsimile Hellschreiber systems of RCA (1938), the U.S. Signal Corps in their BC-58-B of WWII (also built by RCA) and the Hell Company's ZETFAX system (early 1960s).

You may come across statements that the Brits were able to eavesdrop on Hell-broadcasts of the news agency of the Nazi regime, only because an enemy agent left a Hell-printer behind in London when the war broke out. This is pure propaganda. Well, the news agency rep may well have left behind a printer or two. But London-based Reuters news agency had daily worldwide Hell-casts from London since 1934/35, using British Post Office (BPO) shortwave transmitters. BPO itself owned Hellschreiber printers and built its own later in the war. At its annual meeting in 1935, INTERPOL, with British participation, adopted Hellschreiber for international police communications. The Hellschreiber system was used at British airports (weather service) at least as early as 1937. The British government officially approved the use of Hellschreiber at the 1938 International Radio-communications Conference in Cairo. And, in 1939, the British government issued reports on the use of Hellschreibers by the German and Italian consuls-general. Possibly, the British "intelligence" community and the BBC Monitoring Service just weren't aware.

Bandwidth

As stated above, Hell-transmission is based on simple on-off keying, and the standard Hell-font has 98 pixels per character. At 2.5 characters per second, the duration of a single pixel is $1,000 / (2.5 \times 98) = 4.08$ msec. Here is where Rudolf Hell used another clever trick: his font uses no *single* white or black pixels *within* a column, or at the transition from the top of one column to the bottom of the next one. In other words, in a pixel stream, there are always at least two black or white pixels in a row. No, this is *not* the same as a half-resolution font: one-pixel resolution is retained, because each cluster of two or more pixels can start at *any* pixel position! However, bandwidth is cut in half! With this so-called "two-pixel rule" the shortest pulse duration is $2 \times 4.08 = 8.16$ msec. As Hell-pixels are binary, the equivalent transmission speed is $1,000 / 8.16 = 122.5$ Baud, or 245 Baud at five characters/sec.

"This is pure propaganda."

Using FCC and ITU definitions, the "necessary bandwidth" for CW telegraphy is Baud rate $\times K$, where $K = 3$ for transmission paths without fading. That is $122.5 \times 3 = 367$ Hz for Hell at 2.5 chars/sec. For an on-off keyed tone-modulated carrier (AM), this bandwidth goes up to (Baud rate $\times K$) + (2 \times tone frequency). With the standard 900 Hz tone, this is 2,177 Hz. However, with tone-pulses via SSB, the signal spectrum (and bandwidth) is basically the same as that of CW. Note that "necessary bandwidth" is absolutely not the same as "occupied bandwidth"!

Improper pulse shaping and over-modulation can cause an actual bandwidth of many kHz. But this is not particular to "Hell." The Nyquist minimum bandwidth for 2.5 chars/sec Hell-signals is $2 \times 122.5 = 245$ Hz. This theoretical bandwidth cannot be achieved with mechanical senders. But it can be approximated by shaping the rectangular pulses with a raised-cosine or Gaussian filter, electronically or in software. Note that after extensive tests in 1934/35, the Hellschreiber manufacturer (Siemens & Halske), Cable & Wireless Co. and the *Reichspostzentralamt* (central office of the German national postal authority) together, recommended filtering the modulation (i.e., at the transmitter) with a low-pass corner frequency of 0.6 times the "Hell"

Baud rate. They also recommended against widening this to more than 0.8 times the Baud rate. The 0.8 factor is also supported by Shannon's theorem (and the Hartley-Shannon law) regarding the maximum data rate for "near error-free" communication across a bandwidth-limited channel. My own experience is that with the $0.8 \times 122.5 = 100$ Hz limitation and a clean channel, the resulting print-out is, indeed, quite legible.

Note the above bandwidth calculations go out the window when non-Hell fonts are used. This is easy to do with today's amateur radio digi-mode software that lets you use any "cute" PC font you want (and lower case). Do not do this! The Hell-font is optimized for legibility and minimum bandwidth. ■



One of the Author's
Feld-Hell Machines



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The “Goldilocks” Radio

Paul W. Ross, W3FIS



Jetstream JT270M

To paraphrase that children’s story about Goldilocks and the three bears, the raid by Goldilocks on the kitchen and the porridge comes to mind—too cold, too hot, and “just right,” and she ate the whole bowl. Well, this applies to ham radio as well. I think I have explored almost every variety of VHF/UHF radio format to come down the pike, from the “cigarette pack”-size Baofeng UV-3R to my Alinco DR-605 I have been using for a base station.

Really little radios like the UV-3R are great for travel—if you are in a metropolitan area, their two-watt output and small antenna are more than sufficient. You are not going to lug the 50-watt Alinco around on an outing either, and it is likely to live in the pickup truck or on the desk in the home QTH. Getting the required current from a storage battery for that radio for field use is going to require a rather heavy and hardly “luggable” one!

I have been searching for a replacement for my trusty Alinco—not that it doesn’t work well, but I wanted a more up-to-date radio, and something that could be used for Field Days, ECOM, automobile-based outings and, in a pinch, might fit in my suitcase for travel.

If you have been following various ham radio news groups and blogs another Chinese radio has come on the market as the Leixen VV-898 or the Jetstream JT270M. They are identical, except for the printing on the nameplate. This radio is definitely in the “Goldilocks” category. Not too small and not too big, but “just right.”

Well, for \$139.95 shipped, with programming cable, what did I have to lose? With the miracle of the Internet, I had mine in three days. This sucker is *small!* It measures about 3 1/2” x 5” x 1 3/4”. Included is a nice

DTMF microphone, USB to modular microphone plug programming cable (you *really* need this!), power cord (the usual “T” connector), a mounting bracket for mobile use, a microphone clip, a quite readable instruction manual, and a small CD containing the programming software and driver for the cable. This is clearly *not* a repackaged HT, but a re-purposed commercial mobile radio with a plethora of programmable options.

I fitted a cigar lighter plug to the end of the cable, as this is my “house standard” for QRP rigs, hooked up the microphone and patched the output to my Arrow “J” pole in the attic (HOA restrictions, unfortunately). The software loaded easily, though since I run Windows 8.1, I had to “up” the privileges to enable parameter saving when exiting the program. Also, since the USB interface uses the Prolific chip, I needed to have the proper drivers in place. With Windows implementations prior to Windows 8, this is not an issue, but with Window 8.1, you might need to specifically select an earlier driver. If I can track down an FTDI based programming cable, things might be easier.

Programming the radio is about as one might expect—key in the repeater’s frequencies; PL tone, if needed; and optionally set up and enable a label for the screen. The programming software

allows setting additional parameters, such as push buttons and a few other things. It is my understanding this radio will be added to the CHIRP software-supported radios at some point. However, the provided software works quite nicely.

Now, for the moment of truth! On the air to my local repeater (about 15 miles away) for an “air check.” I got an immediate and quite positive response! We have a real winner here. Another quarter of an hour was needed to load the rest of our local repeaters, the fire and police repeaters, and since we live on the Atlantic coast, Coast Guard channels 16 and 22A. I also loaded the NOAA weather channels. For other than the local repeaters, I set the “transmit inhibit”

“Now, for the moment of truth!”

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Looking for H.P.M.

Bob Cashdollar, NR8U

When Fritz Tender, WD8E, and I were discussing going to Hartford, Connecticut for the American Radio Relay League's Centennial Celebration I casually mentioned that I knew where Hiram Percy Maxim was buried. I sort of fudged it a bit by saying it was kind of on our way to Hartford.

Many years ago I had discovered the Find-A-Grave® site on the Internet. Looking up Maxim, I discovered he was buried in Rose Hill Cemetery in Hagerstown, Maryland. When Fritz looked it up on the map he was a bit skeptical as to how Hagerstown was on the way to Hartford from the central Ohio area.

My dazzling wit and logic convinced him we could use it as break and have lunch there on our way to Hartford. So, on the appointed day, off we went.

We made it to Hagerstown and immediately got lost in the city. Stopping at a gas station/repair shop I went in and asked where the cemetery was located.

Three guys standing in the repair bay immediately got into a discussion on the best way to get to the cemetery. Eventually they came to a conclusion and gave me directions.

As it turned out, they were dead on. Following their directions we came to the entrance to Rose Hill Cemetery. On another Web site I had found the GPS coordinates to Maxim's final resting place; or so I thought.

Using the coordinates we did a couple of turns around the immaculately groomed cemetery. If we had blindly followed the coordinates we would have ended up in the middle of a very busy street bordering the cemetery.

On our way in a lady was standing in the middle of the road. We found out she was directing traffic to a funeral service. She asked if we needed any help or directions.

We thanked her, but thought we, as men, "Don't need any directions." After making several circuits of the cemetery we decided to find the lady and ask for directions.

When we told her who were looking for she asked us to wait a minute and disappeared into the cemetery office. She came back and gave us a map of the cemetery and pointed out where Maxim was buried. In a later phone conversation, I asked her how she knew where Maxim was buried. She replied they get quite a number of visitors looking for his final resting place.

We went to the area she pointed out, drove up and down the road and finally decided to stop and get out. As it turned out, we had parked almost directly in front of Maxim's resting place. Hamilton is the name on the step at the front of the large plot.

Hiram Percy Maxim is buried in the family plot of his wife, Josephine (Hamilton) Maxim. The site is rather large with no headstones, but rather a very large sculptured memorial located in its middle. A plaque set into the ground designates Maxim's place. The Antietam Radio Association of Hagerstown put the plaque there.

As we stood at the grave marker I felt a bit of a wave come over me. I was actually looking at the final resting place of the man who had done so much for amateur radio. We took some pictures and before we left Fritz got out a portable GPS handheld and stood almost on the plaque and took a reading. The coordinates Fritz recorded were:

N39.37'.40"

W77.43'.28"

So, if you go and still can't find Maxim, just ask Debbie the lady in the cemetery office. She knows where the body is buried. ■



Bob, NR8U, Kneeling by Maxim's Grave Marker

"Just ask Debbie"



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K9YA Telegraph Holiday Pizza Bash



(L to R) Dave, NE9H; Gil, K9WDY; Dick, W9CBT; Don, K7CS



(L to R) Army, W9FO; Steve, KC9RGT; Steve, N9WAT; Mike, N9BOR

Continuous Waves

Arnold CW Timm

World War 2 at the Pier,
Korean/Nam gunboat;
Left behind Novice gear,
Mom/Dad 'n my Pea coat!

Glancing back off a wave
Troop ship out at Sea;
It's funny what we save,
Morse code in memory?

We can only wave so long
Our arms get lacksadaisy;
But our Lady lingers on,
Picture her real hazy?

Typing up number group,
One long 'n too short;
Landline wire HQ loop,
"Attack-attack-abort!"

Army Air Force Navy no,
Communications Nil,
Atmospherics maybe so,
I have to take a Pill!



Glass Insulator for Vertical Antenna

Morse Quips DICK SYLVAN, WACBT

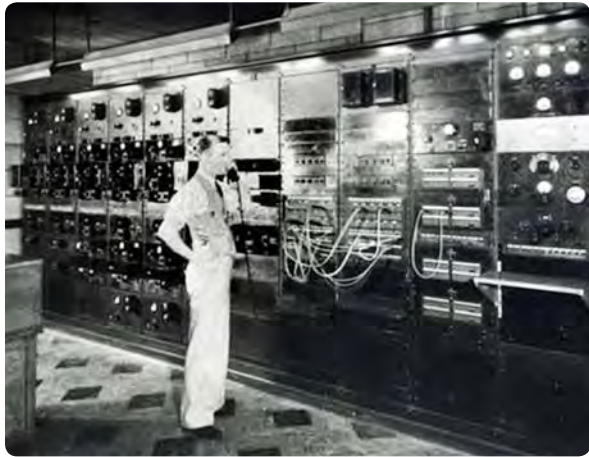
HAMMY VALENTINE'S DAY



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The brothers employed hams to assist in the design and production of their new line of radio gear and to build the early WLW transmitters. In 1921 Dorman Israel, ex-8ANC, (later at Emerson Radio and Phonograph Corp.) and Elmer Hentz (later with Eureka Radio Co.) co-developed Crosley's first receiver, the Harko and cooperated with others in the design of later, more complex receivers.



WLW c. 1931

What good is a broadcast band receiver if there is nothing to hear? Early on the Crosleys recognized that a powerful, easy to hear, station offering a variety of programming would attract a large audience and increase Harko sales. Thus radio station WLW was conceived. From nascent 20-watt station 8XAA*[†], in 1921, arose power-house station WLW, incrementally growing from 50 watts in 1922 to 50,000 watts in 1928 and, for a time, thanks to a special six-month renewable experimental permit, 1934-1938, 500 kW.

As Crosley and WLW grew to dominate the airwaves we catch glimpses of Edwin Armstrong, David Sarnoff and Lee De Forest locked in their hard-fought patent wars. We also catch a passing view of the development of, and licensing battles over, vacuum tubes and regenerative, Neutrodyne and superheterodyne receiver circuits. The years-long battles over interference and frequency allocations are discussed in some detail.

*“foreshadowed
news by Internet”*

Among the dozens of varieties of Crosley receivers produced for more than a quarter of a century are its first, in 1921, the Harko, a crystal set, sold at \$9 (\$117) leading to the Crosley Pup, a single-tube receiver sold in 1925 for \$9.75 (\$130), all the way to the unwieldy-named and sized, WLW Model Super-Power Radio Receiver that boasted 37 tubes, six speakers and an output of 75 watts. Announced in 1936, it was priced at \$1,500 (\$25,200). Claimed to be the world's most powerful radio, it was designed as a fitting complement to the company that operated the world's then most powerful, 500-kW, transmitter. It also met the challenge of Zenith Corporation's Stratosphere receiver equipped with a mere 25 tubes, three speakers and 50 watts output. The Stratosphere cost \$750 (\$12,700).



Powel Crosley, Jr.

In 1930 Crosley followed Motorola in offering a car radio, the Roamio from \$37.50-\$75 (\$523-\$1,050). The Roamio, in addition to the car's six-volt battery, required installation of three supplemental batteries, the tuning head, receiver, audio amplifier and speaker. “[T]he antenna wire was carefully looped and placed either on the car roof or just underneath it.”

Introduced in 1939 was the Crosley Reado radio-FAX and printer priced at \$79.95 each (\$1,340).

This development foreshadowed news by Internet with immediacy of text and graphics sent to subscribers as events transpired. During the period the Reado was produced the FCC permitted a number of broadcast band and other stations to transmit radio-FAX signals during their off-hours. At WLW it was set between “midnight and five in the morning.”

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Crosley's radio tube supplier, Ken-Rad (Kentucky Electrical Lamp Co.), also manufactured the powerful lamps that illuminated the Cincinnati Red's Crosley Field for the first ever major league baseball night game held May 24, 1935.

During WWII another amateur associated with the Crosley firm was prominent physicist Merle A. Tuve, 9NB. Tuve's complex, miniaturized and shock-hardened proximity fuze was manufactured under extreme security measures, first by Crosley and later by other wartime conversion manufacturers.



1948 Crosley Station Wagon

Finally, in 1945, so as to devote resources to the production of the Crosley car and its variants, the Crosley Corp. and WLW were sold to AVCO. Thus ending the Crosley brothers' participation in the manufacturing empire they founded and, eventually, the Crosley car's costly demise.

Conclusion

This is an epic American tale—of two brothers' inventive and marketing genius from the opening years of the twentieth century to the 1950s. However, a nagging and troublesome question persists, why are they so little known and honored today?

*8CR, Crosley Mfg. Co., 5723 Davey Ave., Cincinnati, Ohio is cited by some sources

†8XAA, Crosley Manufacturing Co., Blue Rock St., Cincinnati, Ohio

<http://www.youtube.com/watch?v=DzKxVLGsA28>

Crosley: Two Brothers and a Business Empire that Transformed a Nation, Rusty McClure with David Stern and Michael A. Banks, Clerisy Press, Cincinnati, Ohio, 2008, ISBN-13: 978-1-57860-322-0 ■

parameter so I wouldn't accidentally key up on a public service frequency. Also, since the NOAA weather channels transmit continuously, I opted to drop them from the "scan" list, but left them stored.

Current draw on transmit is about 1.8 amperes on the 10 Watt setting (there is a 4 watt setting as well), so this is well within what I would want to do on a field or portable operation with a 5 Ah SLA gel cell. There is an aftermarket power supply available for the radio that would be good for base station operation. For the time being, I am simply using a small 3.5 amp supply, equipped with a cigar lighter jack, I use for QRP rigs.

Just for fun, I fitted a right-angle BNC female to UHF male adapter to the back of the radio and plugged in my Diamond RH77CA whip, which I have been using for field work with my Yaesu FT-817ND. Obviously, this is not as good as the "J" pole antenna, but for field operations, it should be sufficient. I could only hit the closer repeaters with this arrangement.

The microphone is a DTMF unit. If the DTMF function is not selected (all sorts of interesting stuff in the internal menus!), then some microphone buttons serve as channel up/down and volume up/down, among other things.

An interesting feature is its internal clock. It sets automatically from your computer when using the programming software. A "button" memory battery retains the time. As might be expected from a Chinese radio, there is an FM radio for your listening pleasure; it mutes when a signal is received from whatever channel you have selected.

All in all, it is a great radio for the money and definitely clears up some space on my crowded desk. ■

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*.

Evidenced by your feedback 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.

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



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