K9YA Telegraph

Robert F. Heytow Memorial Radio Club

Volume 12, Issue 1 January 2015

The 1941 Ham Radio-Red Cross Relay

Testing the System

Philip Cala-Lazar, K9PL

The government of the United States and the American people were actively preparing for war well before* its official declaration following Imperial Japan's attack on Pearl Harbor, 7 December 1941.

Organizations and individuals were proactively training and instituting protocols and procedures to serve in times of national emergency. Newspapers, newsreels and the daily drumbeat of war correspondents' radio broadcasts from already embattled regions confronted the American public with the realities facing them. On the home front the American public prepared for the inevitable.

"Get Ready Now"

In his March 1941 *QST* article, ARRL Communications Manager F. E. Handy, W1BDI, prompted hams to "Get Ready Now" for the upcoming Red Cross test.

Every amateur was asked:

1. To have his station ready.

2. To send a postal for emergency corps forms if not previously registered in the A.E.C.

3. To look in next QST *for the further announcement with the frequencies of these stations on the receiving end at Washington, St. Louis and San Francisco.*

4. To take part April 4th-6th.

The League expected great things, "This should be the biggest simultaneous test of amateur facilities of all times." Bolstering the amateur service in times of war and other national emergencies, "It is an opportunity to demonstrate amateur radio is more than a hobby." In addition, "It is a chance to perfect and demonstrate *your own* ability to handle actual message traffic in written recorded form and by radio."

CW Recommended

Mr. Handy recommended CW operation for this event with these caveats, "…the race is not all to the swift, but to the intelligent operator who adjusts his speed to the man he is working." And, "A steady 15 w.p.m.… will require fewer repeats and consequently be better all around than sloppier high speed operation."

"C.w. is recommended for recorded communications work, and written out delivered messages are what the Red Cross is looking for."

'Phone

Suggestions for 'phone operators, "…speak distinctly, grouping words by short phrases and sentences for clarity, emphasizing consonants like f, v, s, or z that might be lost or confused in a background." Like sending no faster than the receiving CW operator can copy—this–for the 'phone op, "Speed of speaking should be guided by the accurate 'writing down' speed of the receiving operator, who must *not* receipt until necessary fills have been got."

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Hell: Been There, Done That, Love It!

Part I

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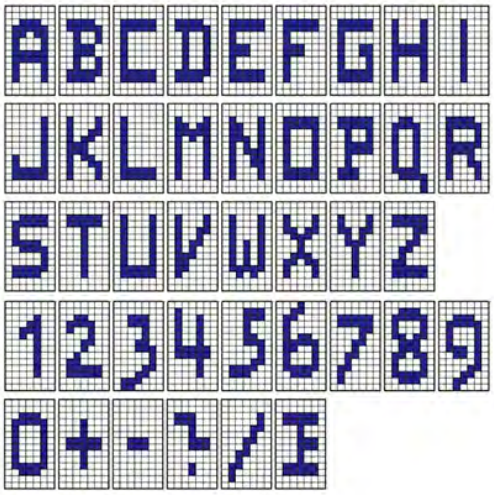


The 14x7 Hell Bitmap Font

Digital fonts date back to the advent of the PC in the early 1980s, or to the monochrome CRT monitors of the 1970s, right? Nope. The first digital typesetting machine was the 1966 *Digiset*. It was the first true revolution in the printed media world since Gutenberg's invention of movable type in the mid-1400s.

OK then, CRT terminals of early computers in the 1950s? Wrong again! The bit-map font goes back to the 1929 patent of German engineer Rudolf Hell (1901-2002)!

He dedicated his professional life to all technologies related to decomposing, processing and recomposing text and images for communication and press media. An avid inventor too, including the video camera tube (1925), fax technology and the aforementioned Digiset. As a pioneer of teleprinting, television, fax, scanner and printing technology, he is revered as "the Edison of the Graphics Industry," "Father of digital word processing," and "Engineer of the Century."

"Engineer of the Century"

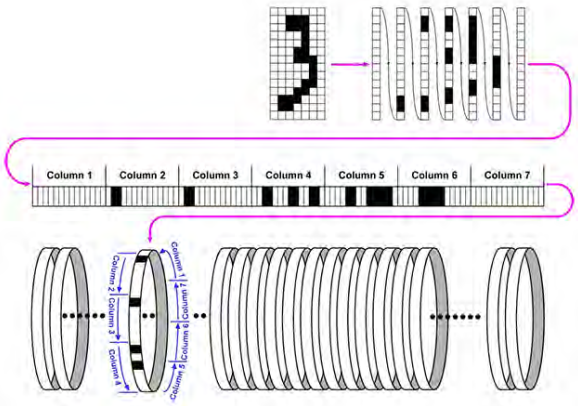
During the 1920s and 30s, teleprinters were rather complex machines (= $$$), and they were primarily used over dedicated subscriber lines (= $$$). Their operation is based on synchronization via start and stop bits, and the printers have to mechanically interpret the received bit patterns–typically a 5-bit Baudot code (ITA2). If the transmission channel (wired or wireless) has noise, fading, or multipath echoes, bits may be distorted. This causes incorrect characters to be printed, or characters to be omitted.

This is where Hell's 1929 invention comes in. He realized the above disadvantages of teleprinters are overcome by simply transmitting a line of text in the form of low-resolution fax. To make this work for keyboard-to-printer communication, he conceived the bitmap font. The font is created by rasterizing each character of the keyboard as a dot matrix with a fixed number of rows and columns. Initially the matrix size was 14x11 pixels, later 12x12, and then settled on 14x7.

For transmission, the matrix of each selected character is scanned, column-by-column. Black pixels are sent as a tone pulse ("mark" in teleprinter parlance), white pixels as "no tone" ("space"). To make this work with a keyboard sender, the rasterized font must somehow be stored. Hell used a mechanical memory. The matrix of each character is decomposed into pixel-columns that are lined up head-to-tail. The resulting pixel string is captured as a notched disk. The complete character set is then a stack of such disks. This is generally referred to as the "character drum."

In some of Hell's machines, the drum is smooth, and the pixels are represented by conductive metal patches. The 14x7 font has 14x7=98 pixels. The original character set counts 41 characters x 98 = 4,118 pixels. Such a 4-kilobit non-volatile ROM weighed about two pounds.

For each disk of the drum, there is a contact that can be actuated by the notches of that ring. The smooth drum uses slip-contacts. All contacts are connected in parallel. The characters to be transmitted are selected by pressing the corresponding key of the



Serialized Font-Columns Are Captured as Disks or Rings

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keyboard. In turn, this enables the contact of the associated disk or ring of the drum. To keep things mechanically very simple, the drum spins continuously. But wait! Transmission of each character must start with the first pixel of the first column, not somewhere in the middle. Indeed! Well, this makes the keyboard mechanism just a little more complicated: a cam on the drum's shaft enables and locks-out the keys, such that they can only be pressed just before the start of the first column.

Yes, this requires a particular typing technique that takes some getting used to. Standard speed for keyboard Hell-transmission is 2.5 characters/sec = 150 chars/min. Hence, the drum turns at 150 rpm. This is actually a quite comfortable typing speed, about 30 wpm. Transmission speed could be doubled (or more) by using a conventional keyboard tape-puncher and a punch-tape reader with a character-drum for conversion to pixel streams in Hell-format.

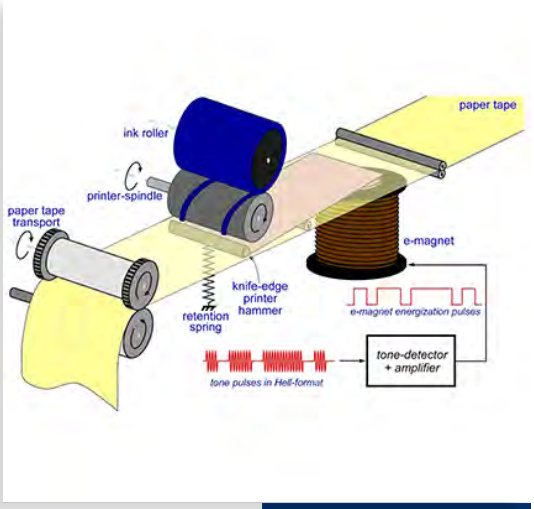
The character-drum sender's output is just a sequence of on-off keying. Like Morse code telegraphy, but just a *little* faster than the average "fist." The on-off signal was used to directly key a CW transmitter, or to key a tone oscillator (original standard: 900 Hz). The tone pulses were then sent via ordinary phone lines (no need for special teleprinter lines), power lines, or radio. All rather conventional.

Now, how do we print the received stream of tone pulses? This is where Rudolf Hell came up with a very simple, clever and elegant solution. Remember that: 1) the characters are transmitted as if scanning the consecutive columns of their bit-map, and 2) the character-drum spins continuously. This is the same as a continuous column-scanning process, where once in a while a character is scanned-in. So the printer should also mimic a continuous scanning motion. Have a look at a simple one-turn spindle from the side. As it turns continuously, the thread is a point that moves with a constant speed, parallel to the axis of rotation. And then starts all over again. Exactly what we need! This method was already used in helix-printers of the 1860s.

Hell Printer Spindle

"But wait!"

The two-turn spindle has to turn at 150 chars/min x 7 columns/char x 1 rev/column = 1,050 rpm. The Hell-spindle shown below has another little trick. Look closely: the spindle does not have a single thread that makes two turns. Instead, it has two entwined threads so that each makes only one turn. The two threads are shifted 180° around the circumference of the spindle hub. The printed pattern is exactly the same, but the spindle only has to turn at half the speed: 525 rpm (or 300 x 7 / 2 = 1,050 rpm in a 5 char/sec printer).



Hellschreiber Printer Concept

We have to print onto something. Text is written and printed as a line of characters, so let's print onto a paper tape. The spindle has to move relative to the tape. The easiest way to do this is by moving the tape past the spindle at a constant speed. We'll borrow an off-the-shelf solution from 19th century Morse "tickers." The spindle has to print pixel columns across the paper tape, so it has to be installed across that tape, and just above it. A felt roller, impregnated with ink, rests on top of the turning spindle. It keeps the spindle's thread covered with ink.

Finally, we take a fast electromechanical relay (≈1 msec), and place it underneath the paper tape. The relay's armature has a hammer blade at its tip. The blade is aligned with the spindle's shaft. It barely touches the paper tape from below. As soon as, and as long as, the solenoid is energized, the armature pushes the paper tape against the inked spindle. This causes the spindle to print a dot or line segment across the paper tape, thereby reconstructing the characters' bit-map, column by column.

Such a printer is called a *Typenbildfernschreiber* ("System Hell") or *Hellschreiber* for short. Literally, it just means "Hell-system character-image telegraph" and "Hell-printer," after its creator. Contrary to what you may find in several popular publications in the English language, "Hellschreiber" does not mean "Bright(ly) Writer" and is not a pun on Rudolf's last name. Through the mid-1900s, it was customary to attach the name of the inventor to the name of the product or system (at least in Germany). ■

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Linux Redux - The "Perfect Storm"

Paul W. Ross, W3FIS

Somebody once said that if computer operating systems were like automobiles, then the Linux cars would stop periodically, the drivers would jump out, take their cars apart and swap parts. I am beginning to think this is true. Now, what is up with Linux, an operating system that is free, and has a reputation for terrifying the novice user?

Well, I have had a confluence of things recently concerning my computers. A "perfect storm," if you wish. That movie still gives me nightmares....

My old Dell desktop machine seemed to be losing its mind—it would forget it had a CD/DVD drive. This is not good, if you want to "burn" backup disks or load software from CD. A couple of painful rebuilds/restoration of the Windows XP operating system (I *told* you it was old!) would work for a couple of weeks, then die on me again. Clearly, this computer needed to go to recycling before it left me in the lurch.

"Bite the bullet!"

Speed No More

My trusty travel Acer Aspire One laptop was getting slower and slower with every new "update"of Windows XP. In addition, Microsoft informed me they would no longer support Windows XP. Since Windows is the "low hanging fruit" for hackers and other bad people, it looked like I would be wise to see if there was some other operating system that might work better and be less vulnerable.

There was an interesting article in *QST* about resurrecting old computers with Linux. Best of all, detailed directions and caveats were provided for the "newbie" Linux user. Better yet, I have a grandson who is a computer science major who could bail me out if I really got stuck. However, Google is your friend when it comes to getting information about sorting out problems with computers.

Since I really need to get some work done from time to time, I opted to get myself a nice new shiny Windows 8.1 laptop. The differences between Windows XP and Windows 8.1, and whipping it into shape is another story for another time. The major problem I ran into with Windows 8.1 was the inability to run some old software at all, or perhaps needing to run in "compatibility"mode. Those problems were quickly solved.

I use the Acer netbook extensively for presentations, travel and Field Day operations, so a conversion to Linux seemed reasonable. Installing and setting up Linux is a quite straighforward process. The more recent iterations of Linux provide a quite familiar GUI –Graphical User Interface. It has a "personality" very similar to Windows or Apple. All you have to do—*really*—is to:

"Burn" an ISO (disk image) of a distribution of Linux. I chose the Debian version, as I had used it on a small, all-on-one-board computer called a "Raspberry Pi," which I had been doing some experimental work with. If your computer doesn't support burning an ISO image, there are lots of free software packages out there for doing it. You can get blank CDs or DVDs at the grocery store or any office supply house.

Read the Manual

Get a decent book on Linux—*Linux for Dummies* or the like will suffice. Online tutorials are also to be found.

"Bite the bullet" and really decide that you aren't going to pay tribute to Microsoft–backup any data files and prepare to convert your old clunker to Linux. The old machine must be capable of boot-

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The Marine Corps Marching Band Changed My Life

Kenneth D. Moak, Sr., KM8AM

Cleaning the shack the other day, an old friend took me back 44 years to 1970 in Albany, N.Y. The friend was my SounDesign model 2439, "Four Band" transistor radio.

Dad said I started taking things apart when I was four—toys, clocks, and my tricycle. At seven, I had 20 random speakers in my room switchable in banks from an old wooden box. What's impedance matching? As I got older, my "engineering" projects got more involved and dangerous. I used to plead with Dad to take me to the Lafayette Radio store for parts.

On one visit, I spotted this radio that said "MB" for Marine Band and told my dad we could listen to the United States Marine Marching Band if he bought this radio. Fate smiled that day, and he let us bring it home. For days on end until the wee hours of the morning I searched, but to no avail. From 2.5 to 6.5 MC, the U.S. Marine Band could not be found.

WA3PUN

One night, before bed, I was straining to find the Marine Band when the noise broke, and I heard a voice: "W3CIC, this is WA3PUN in Harrisburg." What was this? Not the Marine Band, but two guys talking. For the rest of the night I listened and finally heard WA3PUN say: "If there are any shortwave listeners out there, please drop me a card." Well I did, and that started my ham radio adventure. I had found AM on the "Marine Band!"

> *"This was cool"*

It was some time later that I couldn't find Ed, WA3PUN, and Larry, W3CIC, on the air. All I could here was this jumbled mush on the band. I had heard it before, but passed it by to find the AMers. So, while looking for Ed, I turned on my six-transistor AM radio sitting next to the SounDesign to listen to the ball game. While listening to both radios, and tuning around, suddenly the jumbled mush turned to a real voice! I found out later that I discovered the Beat Frequency Oscillator (BFO). This was cool.

Over the years, Ed and Larry set me up with local hams including my Elmer, Bill, WA2URP. They found me a mint Hammarlund HQ-100, took me to hamfests, and gave me volumes of radio books to read. At 19, I enlisted in the USAF as an airborne radio/radar maintainer. Later, the USAF sent me to Purdue University for electrical engineering and a commission as a new lieutenant.

SounDesign 2439
Transistor Radio

Lifelong Ham(s)

Here we are 44 years and 10 USAF moves later building my wife's multi-multi contest station having both retired. Karen, KM8Q, has been a ham for 36 of our 37 years of marriage. Both our sons, USAF Academy graduates, are hams and currently on active duty. Our entire life evolved from a search for the Marine Marching Band and a chance encounter with some AM operators.

Ironically, while surrounded by the latest technology, out popped the SounDesign and Hammarlund HQ-100 from a pile of gear. I think we'll add it to our vintage AM station….

Of the group, only Ed, WA3PUN, is still alive and on the air. We'll be meeting on AM together in a few weeks when he gets his antennas back up in the air. ■

Ed, WA3PUN, became a silent key on November 30, 2014.

Great Caesar's Ghost!

Budding Jimmy Olsens and Lois Lanes needed.

The Daily Planet, aka, *K9YA Telegraph*, seeks articles. See your words and photos disseminated worldwide! Cub reporter? No problem, your copy will be emendated by the *K9YA Telegraph*'s team of professional editors.

Stop the presses!

http://k9ya.org/write_for_us.htm

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ing from a CD/DVD drive. Press the F12 (usually) function key during boot up and set the boot parameters accordingly. Unless the computer is *really* old, you should be able to do this. In fact, it is often the default setting, as this is what is done when you run a "restore" disk on a malfunctioning Windows system.

Boot up with that nice ISO disk you created. I picked the Debian version of Linux that would load applications off of the Internet so I would get the most recent stuff. Simply follow the on-screen instructions to pick your location (country, language), set up a name and system password or two and let nature take its course. During the process, the installer probes for hardware, such as a WiFI card and connection and prompts you to establish a connection to your network. If you haven't done this before, then get some help from a friend, Google the issue, or see your friendly IT person.

Hold On!

About an hour later, I found I had a computer that runs like the proverbial "scared cat," versus something that acted as if it were slogging through mud up to its waist!

Somebody is sure to ask, "Now, smart guy, what software can I run?" If you have some special Windows package, such as an accounting package or graphics package, you are going to have to stick to your Windows environment. However, there are Microsoft Windows "clones" of such things as:

Open Office

Microsoft Office suite clone—usually derived from Open Office. These can read and create Windows compatible files. I was especially concerned about Power Point files, as I use the netbook for presentations for local amateur radio clubs, but like to create them on the new Windows laptop, as it has a bigger screen. No problem there.

Mail handling and browser. All sorts of choices here. I did have to manually set up the mail handler, as it was not like Thunderbird that automatically queried a database to get the right parameters. Your e-mail provider usually has the critical information on their web site.

Ham Apps

At least two good ham programs—FLDIGI for digital modes and CHIRP to program your HTs. There is a minor quirk with CHIRP–you need permission to access the serial ports—see the CHIRP Web site for the details. Once this is done, you can then also use FLDIGI for radio frequency and mode control.

There are lots of useful utilities like a note taker, calendar and address book. As to whether they are capable of transferring data from your old system, I can't say, but a tool known as a "CSV" file is most likely what you will need to know about. Maybe it is time to purge the number of pizza parlors you frequented in college....

"Support," you say—no problem there. My refurbished computer "calls home" periodically for any updates and fixes. There is a nice "app" loader that gives access to a plethora of applications. You are limited only by your disk space and your patience to explore them.

Oh, yes, the price is right—free. ■

Ham Quips

DICK SYLVAN, W9CBT

"SATAN, THIS KEY ISN'T FLAMEPROOF!"

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"[P]ut that transmitter on a c.w. frequency where full advantage of crystal filter selectivity can put you through *any* kind of a mess. No harm in warming up the basic code ability everybody has for this worthy purpose of getting the traffic through, too." Sage advice now as then, though fewer can rely on "the basic code ability everybody has."

Inaugural Parade

In a prelude to the April event, amateur radio operators assisted the American Red Cross at President Roosevelt's third inauguration (29 January). There, hams were deployed to handle emergency communications and they performed admirably. The Red Cross "modeled their usual First Aid Service at public parades along the lines of a complete disaster."

Ten field tents, *cum* first aid stations, were erected between the White House and the Capitol. These first aid stations were equipped with 2½-meter band gear netted on 114 megacycles as the group's transmitting frequency. Thanks to this exercise "…235 persons were treated along the inaugural parade route… fifty… sent to the hospital in ambulances."

The Red Cross Relay

April 1941 and American hams under the auspices of the ARRL prepared to relay 3,700 messages from local Red Cross chapters across the country to three designated receiving stations. Those stations were located in San Francisco, St. Louis and Washington, D.C. Over a period of three days, April 4, 5 and 6, participants relayed messages limited to 15 words.

"Sage advice now as then…"

Times-Mirror, (Warren, Pa.),
April 1, 1941
Local Amateur Radio Men are Aiding in Test

This article outlined the event and provided local color:

Locally there are five radio amateurs who are active in the emergency corps, headed by Harold Passenger emergency coordinator of Warren County.

The local group is ready to do its part to make the drill a success. In addition to the emergency preparedness the amateurs have organized traffic net works with trunk lines leading to all parts of the United States. These nets handle messages between radio amateurs and their friends. Henry O. Walker owner and operator of station W3TOJ is route manager for western Pennsylvania. Harold Passenger emergency coordinator for Warren County is the owner and operator of station W8HKU and is a member of the western Pennsylvania traffic net. It is hoped that some messages may be handled between relatives or friends of the draftees who are now or will be in military service. Only such messages as would ordinarily not he sent by commercial lines are acceptable. Anyone interested should get in touch with one of the above named amateurs.

Pres. Franklin D. Roosevelt's Oath of Office

The Daily Illini, (Champaign-Urbana),
April 3, 1941
'Hams' will Drill Relay of Radio Messages

In Illinois' twin cities of Champaign-Urbana, Len Matheny, W9RLU, "local official of the American Radio Relay league [sic]" led the "Red Cross amateur communications test…." "The test is to perfect the ability of the amateur operator in serving the Red Cross at any time in the event of flood, earthquake, hurricane, or any catastrophe."

The Odessa American, (Odessa, Texas),
April 6, 1941
Bill Fizer Takes Part in Red Cross Radio Practice Drill of "Ham" Operators

An amateur station operator here, Bill Fizer, cooperated Friday night in a radio practice drill between local chapters of the American Red Cross and headquarter offices in Washington, D.C., St. Louis and San Francisco.

Fizer's message, assigned him by Mrs. R. T. Waddell, chairman of the local Red Cross chapter, was one of 3,700 separate radio messages [this figure likely quoted from a press release, as the final number was markedly fewer, see below] *which floated over the airways Friday night designated as the greatest radio practice drill ever undertaken.*

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The test, sponsored by the American Radio Relay League, is dedicated to perfecting the ability of the institution of amateur radio to serve the Red Cross at any time, in event of flood, earthquake, hurricane, fire or defense emergency, which might face part or all of the United States.

Amateurs throughout the nation participated Friday night, answering radio calls of "CQ Washington," "CQ St. Louis," and "CQ San Francisco" to take the message traffic and relay it to its destination by radio. Fizer sent his message of 15 words through to his destination, St. Louis, passing it on through other "ham" stations along the way.

QST, May 1941

"**Operating News**," F.E. Handy, W1BDI

Mr. Handy celebrated the recent Red Cross test. It scored new registrations to the ARRL Emergency Corps–bringing the total number of members to 2,931 and 621 Emergency Coordinators.

QST, October 1941

"The ARRL-Red Cross Preparedness Test"

October *QST* offered a review of "The ARRL-Red Cross Preparedness Test."

A total of 1,829 messages passed: San Francisco, 219; St. Louis, 745; and Washington, D.C., 865. "Twenty-five stations accounted for *865* messages…." Messages were received from more than 1,700 chapters. Participants received souvenir acknowledgements from the American Red Cross. Fewer than the 3,700 messages anticipated, but proof the system worked.

A letter from Norman H. Davis, Chairman, Red Cross to George W. Bailey, W1KH, ARRL president, mentioned the messages' contents "indicated the attendance of more than 3000 delegates at our National Convention and, needless to say, this advance information was of great value to us in our planning for what proved to be our largest convention with a total attendance of more than 5000…."

This national event was one of many where the amateur radio service alone, or with other entities, prepared for a war that would rudely announce itself that Sunday morning in December 1941. ■

Afterword

Poughkeepsie New Yorker, September 6, 1941
Red Cross Chapter, 'Hams' Cooperate

Building on shared events earlier that year, the national headquarters of the American Red Cross advised its Dutchess County (New York) chapter "that its evacuation day drill [2,000 "simulated refugees"] scheduled for Tuesday will serve as a basis for further coordination between the Red Cross and amateur radio operators throughout the country." Further, it was stated that the Red Cross "has contacted the Federal Communications commission [sic] and negotiations are under way making the national Red Cross the sponsoring agent for amateur radio operation in case of disaster anywhere in the country."

"The local set-up has opened the eyes of the commission to the great possibilities available through the already established services of these amateur operators." Continuing, "the 'hams' services will be an 'important adjunct to standard commercial service now available,'"

* *K9YA Telegraph*, "Ham Radio on the Home Front," Sept. 2006; "Prelude to War," July 2009; "Our Radio Amateurs," Oct. 2013; "Kay Kibling, W2HXQ, & Ruth Nichols," Jan. 2014; "U.S. Antarctic Service Expedition," July, August, Sept. 2014.

W8HKU QSL card image courtesy of http://www.oldqslcards.com/

W1BDI QSL card image courtesy of K8CX Ham Gallery

References

The Daily Illini, (Champaign-Urbana), April 3, 1941

The Odessa American, (Odessa, Texas), April 6, 1941

Poughkeepsie New Yorker, September 6, 1941

Times-Mirror, (Warren, Pa.), April 1, 1941

QST, March, April, May, October, November 1941

A Social History: The World of Ham Radio, 1901-1950, Richard A. Bartlett, 2007, McFarland & Company, Inc., Jefferson, N.C., e-ISBN: 978-1-4766-1260-7

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