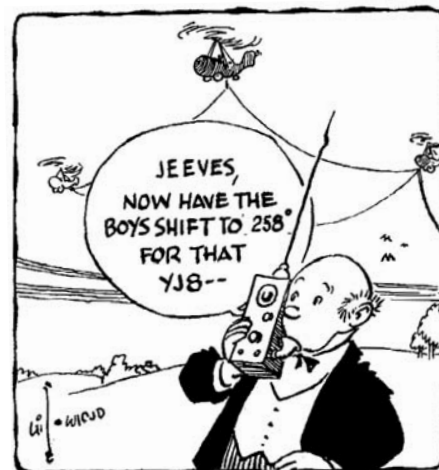


A Short History of the Handheld Transceiver



CARTOON BY PHIL GILDERSLEEVE, W1CJD
[FROM NOVEMBER 1948]

Although today you could say “They’re everywhere, they’re everywhere!” it wasn’t always so.

From its very beginning, Amateur Radio has been an invaluable part of both emergency and civil defense communications. *Fifty Years of A.R.R.L.* notes that as early as 1913, amateurs were involved in providing emergency communications following a severe windstorm in the Midwest. And the idea of all hams being equipped with portable rigs for national defense purposes had first been proposed in the pages of *QST* in a letter to the editor in the August 1916 issue. The editorial response noted that as hams, we “owe the country something and it should be a part of national preparedness for each one to consider how he might aid with his set.”¹

Bicycle Mobile

At the time, that “set” was almost always fixed in location. Spark gap equipment and the wavelengths used didn’t lend themselves easily to mobile and portable operation. It didn’t stop hams from trying, however. In the July 1916 *QST*, for example, the article “Portable Station SK” told of the trials and tribulations of operating a portable spark gap rig that was moved about (though not operated) on a bicycle. But the advent of vacuum tube technology and shorter wavelengths meant that, by the 1930s, portable rigs were becoming almost commonplace in *QST*. The October 1935 issue, for instance, showed a young George H. Nibbe, W9NUF, with his bicycle-mounted (and operated) 5 meter rig.

The ultimate in portable communications, however, would be a transceiver

that could be easily carried in the hand. The fantasy may have been the two-way radio comic book hero Dick Tracy wore on his wrist, but the reality would be a handheld device: the handie-talkie, or “handheld transceiver.” Easy to carry and easy to use, the handie-talkie would make its way to every corner of the world, and even into space when Owen Garriott, W5LFL, made history when he fired up a 2 meter handheld aboard the space shuttle *Columbia* in November and December 1983. It’s a story that starts more than 40 years earlier.

FEBRUARY 1942



Figure 1—This wartime photo shows a ham operating a 2½ meter handheld transceiver used for emergency communications.

Wartime Spawns Designs for Portable Radio

In an ironic twist, it was the suspension of Amateur Radio during World War II that gave what might have been the first big boost toward ham interest in and development of a truly handheld transceiver. WERS—the War Emergency Radio Service—focused on communications strictly for national defense purposes, and as more and more hams became involved, the pages of *QST* filled with articles on WERS activities, especially those related to mobile and portable construction and operation.

In what was the first article on civilian defense published in *QST* as the United States entered the war, a homebrew handheld 2½ meter transceiver built by the Westchester Amateur Radio Association was shown in action in the February 1942 issue, ideal for “when the operator might find it necessary to get...right into the scene of a disaster.”² While the work of the Westchester hams predated the start of WERS (which was officially activated in June of that year), the article was the first in *QST* to depict a handheld rig in action.

The cover of the April 1942 issue of *QST* showed a WERS participant scanning the skies with binoculars for enemy aircraft. Headphones cover his ears, and on his back is a pack from which an antenna protrudes. Inside the issue was a companion article with instructions on how to build a 2½ meter “walkie-talkie” for WERS use. Though the terms were sometimes used interchangeably, “walkie-talkies” (also known as “talkie-walkies” and even “talky-walkys”) were pack-carried radios, while “handie-talkies” (or “handy-talkys”) were true handheld units

From January 2005 *QST* © ARRL

¹Notes appear on page 50.

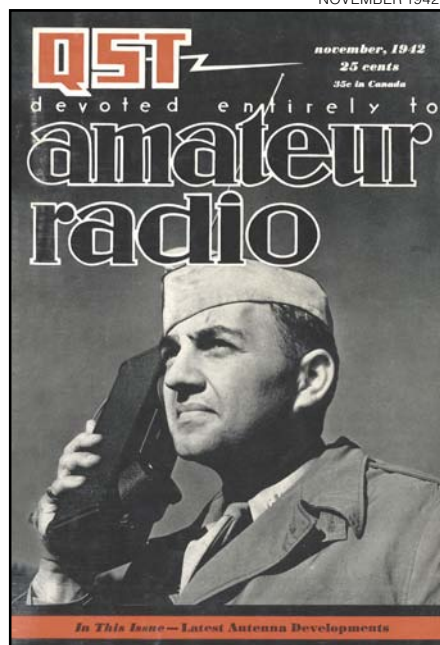


Figure 2—Cover photo of W9JGL (in uniform) operating "one of the Army's latest gadgets, the 'handie-talkie,' little brother of the walkie-talkie.

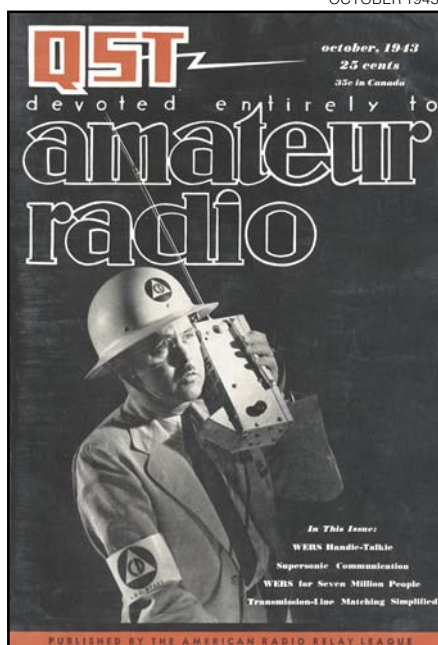


Figure 3—Cover image of a War Emergency Radio Service handie-talkie in use for civil defense—the "Handy Andy."



Figure 4—Advertisement by Harvey-Wells Communications showing their idea of postwar communications: a hunter using a handheld radio to call for emergency assistance.

of a more limited power and range than their larger cousins.

After that, numerous articles on walkie-talkies began to appear regularly in the pages of *QST*. The September 1944 issue carried an article profiling the Signal Corps and detailing the story of how the walkie-talkie was actually developed. Not surprisingly, an unnamed ham serving in the artillery was accorded full credit. According to the story, in 1932 he read VHF pioneer Ross Hull's articles in *QST* on a midget 5 meter transceiver,³ and proceeded to develop his own for military application. His work eventually caught the eye of Signal Corps engineers, and the first military walkie-talkie—the SCR-194—was eventually developed for field use.

The handie-talkie itself made its first cover appearance in November 1942, and in December of that same year, was featured as part of an article on the Signal Corps. "Smallest field unit of the Signal Corps," a photo caption read, "it is not much larger or heavier than a conventional handset." The SCR-536 was a waterproof 5 pound, 5 tube AM rig operating between 3.5 and 6 MHz that packed a mighty 20 mW of power and had a range of between 100 feet and a mile. It was the brainchild of Galvin Manufacturing, a company still around today. We know it now, however, as Motorola.

Motorola Announces the Handie-Talkie

The handie-talkie is often credited as

From January 2005 QST © ARRL



Figure 5—From an article on the Signal Corps, a photo of a sergeant using the Motorola SCR-536 Handie-Talkie in field conditions during a military training exercise.

the teenage invention of a Cleveland ham, Al Gross, W8PAL (now a SK). In 1938, only four years after getting his amateur ticket, Gross developed a small handheld transceiver that caught the attention of the OSS (the forerunner of today's CIA). But Galvin/Motorola was the company that made the handheld transceiver (Motorola would eventually copyright "Handie-Talkie") a reality. The SCR-536 was developed in 1940 by a team led by Don Mitchell, Galvin's chief engineer. By July 1941 it was in mass production, and at

war's end, 130,000 of them had been manufactured.

The SCR-536 got a lot of coverage in *QST*. While it made the cover of the November 1942 issue and was prominently featured in a Signal Corps advertisement therein, by early the following year it was being used to herald things to come. In an April 1943 advertisement for Tung-Sol radio tubes in *QST*, the short range handie-talkie was re-imagined for everyday non-military use. "Portable, personal two-way radio phones may

Announcing
HANDY-TALKY HT-144

A 1947 engineered transceiver for the 2 meter band.

- Attractive grey hammered baked-on enamel or wrinkle finishes.
- Completely telescoping antenna actuates on-off switch.
- Press-to-talk single hand control.
- Economy with efficiency; B battery lasts 75 hrs. reception 45 hrs. trans. A battery 10 hrs. Rapid change thru snap bottom. 6C4 and 1S4 tubes.
- 10 $\frac{3}{4}$ x 2 $\frac{3}{4}$ x 2 $\frac{3}{4}$ " wgt. 4 lbs. with batts.

HT-144—less tubes & batts. \$31.50

A batts. \$.50, set
B batt. 1.75, set
2 tubes 2.49, set

Immediate Delivery!

RADIO TRANSCEIVER LABORATORIES
116-23 Jamaica Avenue Richmond Hill 18, N. Y.



Figure 6—Postwar advertisement showing 2 meter handheld receiver: "A 1947 engineered transceiver for the 2 meter band."

become a reality," the advertisement read. "Where electronics will take us no one can tell."

The Amateur Radio community had a pretty good idea. In October 1943, *QST* featured the "Handy Andy" 112 MHz handie-talkie for WERS use based on circuit designs featured in previous issues. At 4½ pounds, it was slightly lighter than the SCR-536, but its batteries had to be carried separately ("maybe the YL's or XYL's handbag would fill the need," the article suggested). The February 1944 issue featured "A WERS Handie-Talkie for \$1538.77" with a promised range of 10 to 12 miles (the astronomical price tag was a tongue-in-cheek estimate based on the man-hours of a "skilled worker without union card"—the actual rig could be built for less than \$25), and in the same issue an advertisement by Harvey-Wells Communications showed how it envisaged the future of handheld communications, depicting hunters using a handie-talkie to call for emergency assistance.

Civil Defense becomes a Priority

Following the end of the war, advertisements for commercially manufactured 144 MHz handie-talkies began appearing regularly in the pages of *QST*. In October 1947, Raytheon proudly announced the new Motorola FM handie-talkie (that was actually carried over the shoulder and had a telephone-style handset), an 8½ pound rig with a 2 mile range that used 16 of its subminiature vacuum tubes. Handie-talkie articles and designs contin-

ued to appear sporadically in *QST*, like a 10 meter rig described in the July 1949 issue, but again the technological limitations of vacuum tubes and the power supplies they needed had an inevitable effect on amateur development of handheld communications.

With the Korean War and the Cold War heating up in the early 1950s, civil defense again became a national priority. Hams, long a vital part of emergency communications with ARES (the Amateur Radio Emergency Service), again led the way in 1952 with involvement in RACES, the Radio Amateur Civil Emergency Service, and the handheld once again emerged as an invaluable tool.

While advertisers had been promoting their portable transceivers as aids in civil defense (in some of its advertising, Hallicrafters made its point by depicting a nuclear explosion devastating a city), it



Figure 7—Photo accompanying an article on the construction of a 220 MHz handheld radio for civil defense use.

A Transistor Handitalky for Ten Meters

Crystal-Controlled Transmitter and Super-regenerative Receiver

From the beginning, transistors have held out the promise of a handie-talkie transmitter-receiver without a bulky battery supply. Here's one in the flesh, capable of working over a distance of several miles, at least, in the 28-Mc. band.

THE TRANSISTOR is one of the most fascinating developments applicable to ham radio since Morse, Yagi and Ede first started putting parabolic hunk into radio gear instead of taking

Built on a 4 x 5-inch plastic base, the unit with its cover is approximately 1½ inches high. No external tuning controls are included because receiving is normally done on the crystal-controlled transmitting frequency. In this view the receiver is at the left end of the front panel. The crystal oscillator is immediately behind it and the transmitter v.f.o. amplifier is at the right rear. The audio amplifier is on a small plate below the send-receive switch at the right side of the panel. The microphone and its transformer are fastened in the circular hole in the cover.

BY E. G. VON WALD,* W4YOT

* 7 South Dixie Highway, Lake Worth, Florida.

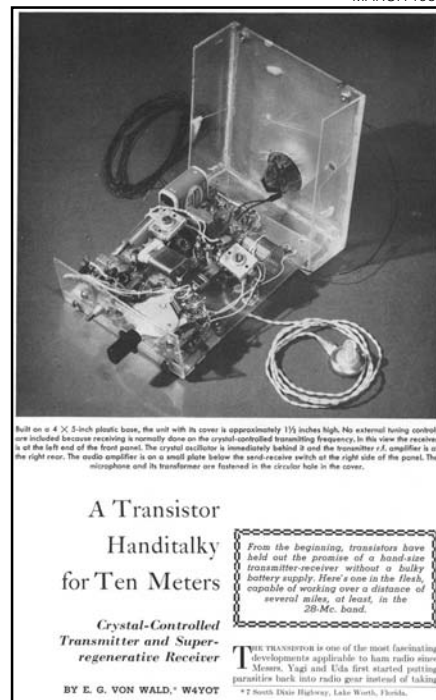


Figure 8—Photograph accompanying first article on constructing transistorized handie-talkie.

was in the January and February 1953 issues of *QST* that hams showed how it could be done. Two articles profiled the work of Detroit area amateurs as they pooled their talents and efforts to mass-produce crystal controlled handie-talkies for all their members. "Despite obvious range limitations," the article stated, "it was decided that compact stations carried by hand have a definite role to play in a well-rounded emergency communications program."⁴

The Transistor

But the demands and limitations of vacuum tube technology hadn't changed, and wouldn't until the transistor made its appearance as an affordable piece of technology in the mid-1950s. The first article for a transistorized "handitalky" published in *QST* appeared in the March 1958 issue. It was a crystal-controlled 10 meter rig with a range of several miles that the author wrote could "hardly be considered anything approaching the ultimate in miniaturizing." But at only 4x5x1½ inches in size, and requiring only a single small 9 V battery, it was a far cry from the large and heavy vacuum tube handhelds of the time. Manufacturers followed where the hams had lead, and in November 1960, *QST* would review the Heathkit GW-30 Ten-Meter handheld transceiver, a tiny four-transistor rig with a limited range of at most a mile, saying that it "certainly would come in handy for CD [Civil Defense] work." Size had at last been con-

MAY 1964

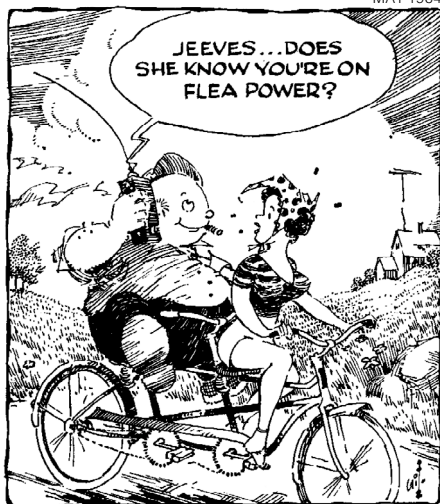


Figure 9—Another Jeeves cartoon by Phil Gildersleeve, W1CJD, this one showing a handheld in mobile use.

MAY 1971

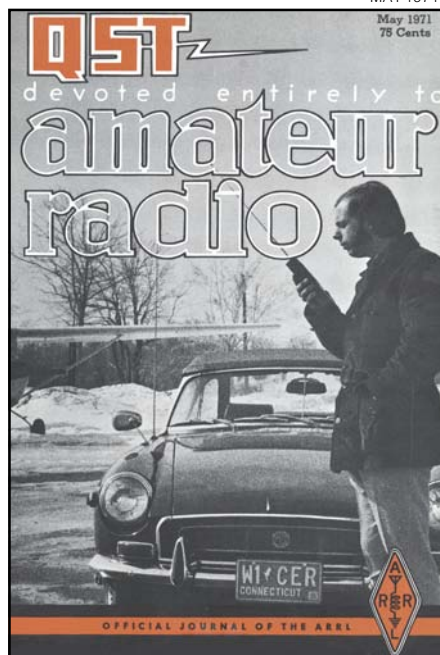


Figure 10—Cover photograph of a ham demonstrating how to use a 2 meter FM handheld receiver to monitor a repeater.

quered. Now, to be *truly* useful for emergency and civil defense purposes, the limited range of handhelds would need to be dealt with.

Repeaters

Though we think of repeaters as an innovation of the mid-twentieth century, it is a concept actually as old as Amateur Radio itself. The ARRL had been formed in 1914 with the express purpose of organizing amateur stations to relay—or repeat—messages beyond their individual ranges (it's the American Radio Relay League, let's remember). The same con-

cept was employed in the early years of VHF experimentation.⁵

The first true automated repeater came on the air in 1957 when Art Gentry, W6MEP (SK), put a 2 meter AM repeater atop a mountain in Los Angeles (to deal with the logging requirements of the era's regulations, Gentry used a reel-to-reel tape recorder, a technique that would be required of all repeater operators until the FCC changed the regulations in 1972).⁶ Repeaters would change Amateur Radio forever, in the process transforming the handheld into something more than just a mere novelty. It was all tied in to the needs of civil defense and emergency communications, and it took the devastation of a major hurricane to make it abundantly clear.

On Sunday, August 17, 1969, Hurricane Camille struck the coastlines of Mississippi and Louisiana. By the time it was all over, hundreds of people were dead and injured, entire communities in those two states had been flattened, and severe flooding had affected Virginia as the hurricane moved across the country and blew back out to sea. As with virtually every other emergency since the inception of Amateur Radio, hams were on the scene providing critical communications assistance. As it would turn out, Hurricane Camille was the first real test of repeaters and handhelds as emergency tools, and they both passed with flying colors.⁷

Just a month before Camille wreaked its havoc, *QST* editorialized on the rising interest among hams in FM, repeaters and the potent combination of the two. "Added stimulus for the mobiling f.m.er," the editorial stated, "has been provided by the repeater." The first article on an FM "handy-talky" (actually a hand-carried transceiver equipped with telephone-style handset) had appeared in the June 1962 *QST*, and while amateur interest in the FM handhelds resulted in numerous articles in the magazine (as well as instructions on converting CB handhelds to amateur wavelengths), it wouldn't be until June 1971 that *QST* would be able to review a commercially manufactured amateur FM handheld, the Johnson 540.

Only a month earlier, the *QST* cover showed a ham using a handheld FM receiver to monitor activity on a local repeater. Advertisements for (and reviews of) commercially manufactured FM handhelds began to fill the pages of *QST*. "A smooth-operating handheld transceiver will justify the seemingly outlandish price tag associated with most such units," said a March 1973 review of a Standard FM 2 meter handheld, "when used effectively in just one civil emergency of consequence!"

Truer words were seldom spoken.

Notes

¹E. Felix, "Portable Radio Sets," *QST*, Aug 1916, p 219.

²S. G. Taylor, "Westchester County's Hams are Prepared," *QST*, Feb 1942, p 34.


³The reference might have been to Ross Hull's article, "Featherweight Sets for the Ultra-High Frequencies," *QST*, Sep 1933, pp 27-31.

⁴"Here's How!"—Detroit, *QST*, Jan 1953, p 38.

⁵T. F. Cushing, "First Boston—New York 56-Mc. Relay," *QST*, Jul 1934, pp 14, 72.

⁶See B. Pasternak, "Once Upon a California Hilltop," *QST*, Mar 2004, pp 52-55.

⁷For the full story of Amateur Radio's role in Hurricane Camille, see G. Hart and B. Reichert, "Camille Communique," *QST*, Jan 1970, pp 56-64.

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FEEDBACK

◇ A couple of errors crept into "A 12 V dc Boost Regulator for Battery Operation" [Nov 2004, p 37]. The schematic (Figure 2, p 38) shows a solid line drawn from the right side of R7 to ground. That is incorrect; a capacitor, C14 (220 μ F, 16 V) should take its place, with the negative side connected to ground. The ARRLWeb reference schematic is correct (www.arrrl.org/files/qst-binaries/boost_reg.zip). Also, the SCR in the crowbar circuit (Figure 5, p 40) is drawn backward; the anode and cathode should be reversed—the gate lead is correct.

◇ In "A 10/17 Meter Hanging Loop Antenna" [Oct 2004, p 42], the materials list (Table 1) should show the 14 gauge wire quantity as 100 feet, not 65 feet. You'll need at least 91 feet of wire to build the antenna.—*tnx W4VFC*

◇ A cautionary note if you're trying to run the Microsoft software development tools referenced in "Programming for the Pocket PC" [Dec 2004, p 38]. Various operating systems, including Windows XP, require you to be logged on as an "Administrator" to successfully run the tools.—*tnx K1EHW*

◇ Clarification: 2005 ARRL Handbook Editor Dana Reed, W1LC, was quoted in "ARRL in Action" [Nov 2004, p 13] as saying, "Every chapter was updated... [from the 2004 edition]." In fact, *many* chapters were updated, and nearly all were revised in compiling the new *Handbook*.

STRAYS



I would like to get in touch with...

◇ anyone who can provide some assistance to a blind ham.—John Peoples, K3FLY, Broomall, Pennsylvania; john.peoples@verizon.net