



ARRL Periodicals Archive – Search Results

A membership benefit of ARRL and the ARRL Technical Information Service

ARRL Members: You may print a copy for personal use. Any other use of the information requires permission (see Copyright/Reprint Notice below).

Need a higher quality reprint or scan? Some of the scans contained within the periodical archive were produced with older imaging technology. If you require a higher quality reprint or scan, please contact the ARRL Technical Information Service for assistance. Photocopies are \$3 for ARRL members, \$5 for nonmembers. For members, TIS can send the photocopies immediately and include an invoice. Nonmembers must prepay. Details are available at www.arrl.org/tis or email photocopy@arrl.org.

QST on CD-ROM: Annual CD-ROMs are available for recent publication years. For details and ordering information, visit www.arrl.org/qst.

Non-Members: Get access to the ARRL Periodicals Archive when you join ARRL today at www.arrl.org/join. For a complete list of membership benefits, visit www.arrl.org/benefits.

Copyright/Reprint Notice

In general, all ARRL content is copyrighted. ARRL articles, pages, or documents--printed and online--are not in the public domain. Therefore, they may not be freely distributed or copied. Additionally, no part of this document may be copied, sold to third parties, or otherwise commercially exploited without the explicit prior written consent of ARRL. You cannot post this document to a Web site or otherwise distribute it to others through any electronic medium.

For permission to quote or reprint material from ARRL, send a request including the issue date, a description of the material requested, and a description of where you intend to use the reprinted material to the ARRL Editorial & Production Department: permission@arrl.org.

QST Issue: Dec 1985

Title: CW Shaper Update

Author: Eric Nichols, KL7AJ

[Click Here to Report a Problem with this File](#)



2009 ARRL Periodicals on CD-ROM

ARRL's popular journals are available on a compact, fully-searchable CD-ROM. Every word and photo published throughout 2009 is included!

- **QST** The official membership journal of ARRL
- **NCJ** National Contest Journal
- **QEX** Forum for Communications Experimenters

SEARCH the full text of every article by entering titles, call signs, names—almost any word. **SEE** every word, photo (including color images), drawing and table in technical and general-interest features, columns and product reviews, plus all advertisements. **PRINT** what you see, or copy it into other applications.

System Requirements: Microsoft Windows™ and Macintosh systems, using the industry standard Adobe® Acrobat® Reader® software. The Acrobat Reader is a free download at www.adobe.com.

2009 ARRL Periodicals on CD-ROM

ARRL Order No. 1486
Only \$24.95*

*plus shipping and handling

Additional sets available:

2008 Ed., ARRL Order No. 9406, \$24.95
2007 Ed., ARRL Order No. 1204, \$19.95
2006 Ed., ARRL Order No. 9841, \$19.95
2005 Ed., ARRL Order No. 9574, \$19.95
2004 Ed., ARRL Order No. 9396, \$19.95
2003 Ed., ARRL Order No. 9124, \$19.95
2002 Ed., ARRL Order No. 8802, \$19.95
2001 Ed., ARRL Order No. 8632, \$19.95



ARRL The national association for **AMATEUR RADIO™**

SHOP DIRECT or call for a dealer near you.
ONLINE WWW.ARRL.ORG/SHOP
ORDER TOLL-FREE 888/277-5289 (US)

Technical Correspondence

Conducted By Paul Pagel, N1FB
Senior Assistant Technical Editor

The publishers of QST assume no responsibility for statements made herein by correspondents.

HART'S LOOP ANTENNA

□ In their article describing the recent ARRL antenna-design contest, Hall and Schetgen stated that the gain of the loop antenna entered in the contest approaches that of a dipole.¹ In 'Technical Correspondence' for July, Ted Hart, W5QJR (who entered the loop in the contest), claims his loop has a gain figure that considerably exceeds that of a dipole.² However, Hart's claim is not valid, as I will explain.

Hart stated that in free space the patterns of the loop and dipole are the same. This is fundamentally true for the *shape*, or directivity of the patterns, but only if their electrical lengths are similar. As the lengths become very short, the patterns approach a cosine plot, and the familiar "figure 8" pattern becomes two circles tangent to each other. However, the *size* of the patterns will be the same (and thus the gain) only if the IR losses in the two antennas are also the same. Hart's claim is that the loop gain increases to 8.16 dB (6 dBd) when it is mounted close to perfect ground. This is a theoretical gain figure obtained from the vector addition of the fields associated with the direct and ground-reflected waves in the far field in the directions where the two fields are in phase (6 dB results from field doubling because of the addition of the two *equal* fields of the direct and ground-reflected waves when there is no loss of field because of ground absorption on reflection).

What Hart seems to have overlooked is that the ground affords the same gain treatment on reflection for the dipole as it does for the loop. So, if the free-space gains of the dipole and loop are identical, and if the two antennas are mounted so that their respective fields are oriented identically relative to ground, then their gains resulting from ground reflections are also identical. Thus, the loop gain is 0 dBd, not 6 dBd. Since Hart's loop is electrically short (except on the higher HF bands), however, its pattern approaches the cosine shape, with somewhat less gain than that of a half-wave dipole. Hall and Schetgen's statement that Hart's loop gain *approaches* that of a dipole is evidently correct.

Hart also contends that with horizontal polarization there is little difference (in gain) between good ground and poor ground, and that with vertical polarization poor ground provides increased signal relative to good ground for elevation angles above 18°. His contention concerning horizontal polarization is overly simplistic and misleading, and that concerning vertical polarization is incorrect. With horizontal polarization the height of the antenna and the angle of incidence at the point of reflection are crucial to reflective gain. For heights less than 0.25λ , the gain

with real ground is degraded at all angles of incidence relative to that with perfectly conductive ground, because of direct absorption of energy from the induction field as it intersects the ground—the poorer the ground (and the lower the antenna), the greater the degradation. At heights of 0.25λ and greater, the reflective gain at high angles of incidence is also less with poor ground than with good ground because of the greater absorption. However, at heights greater than 0.25λ with low, grazing angles of incidence, there is some truth in Hart's statement that there is little difference in gain between good and poor ground. With vertical polarization, I can find no evidence in the professional literature to support Hart's contention that poor ground provides a greater signal than good ground at elevation angles greater than 18° (or for any elevation angle). On the contrary, the literature I've researched indicates just the opposite. Radiation patterns appearing in Jordan and Balmain are typical examples.³—Walt Maxwell, W2DU, ARRL TA, 243 N. Cranor Ave., Deland, FL 32720

³Jordan and Balmain, *Electromagnetic Waves and Radiation Systems* (Englewood Cliffs: Prentice-Hall, 1968), Figs. 16-3, -4, -7 and -8 through -11.

CW SHAPER UPDATE

□ It's relatively easy to adapt the CW Shaper for use with grid-block-keyed systems.⁴ All that is required is to use a positive-ground hookup as shown in Fig. 1(B). Connect the key ground as shown and use a PNP transistor for Q1. Q1 may be any small-signal transistor with a V_{ce0} greater than the grid-blocking voltage to be keyed. Note that the functions of the RELEASE and ATTACK potentiometers will be reversed.

I know of one individual who attempted to use the CW Shaper to key a transceiver with a built-in keyer. Such an arrangement will not work; the Shaper must be placed after the keyer—between the keyer output and the keyed line.—Eric P. Nichols, KL7AJ, P.O. Box 0, North Pole, AK 99705

SUPER-DUPER BUBBLE

□ I would like to suggest a more efficient bubble-sorting algorithm be used in place of the one offered by George Allison in his article, "Super Duper" (QST, September 1985). Mr. Allison's sort requires repetitive

⁴E. P. Nichols, "Try This Versatile CW Shaper," QST, December 1984, p. 29.

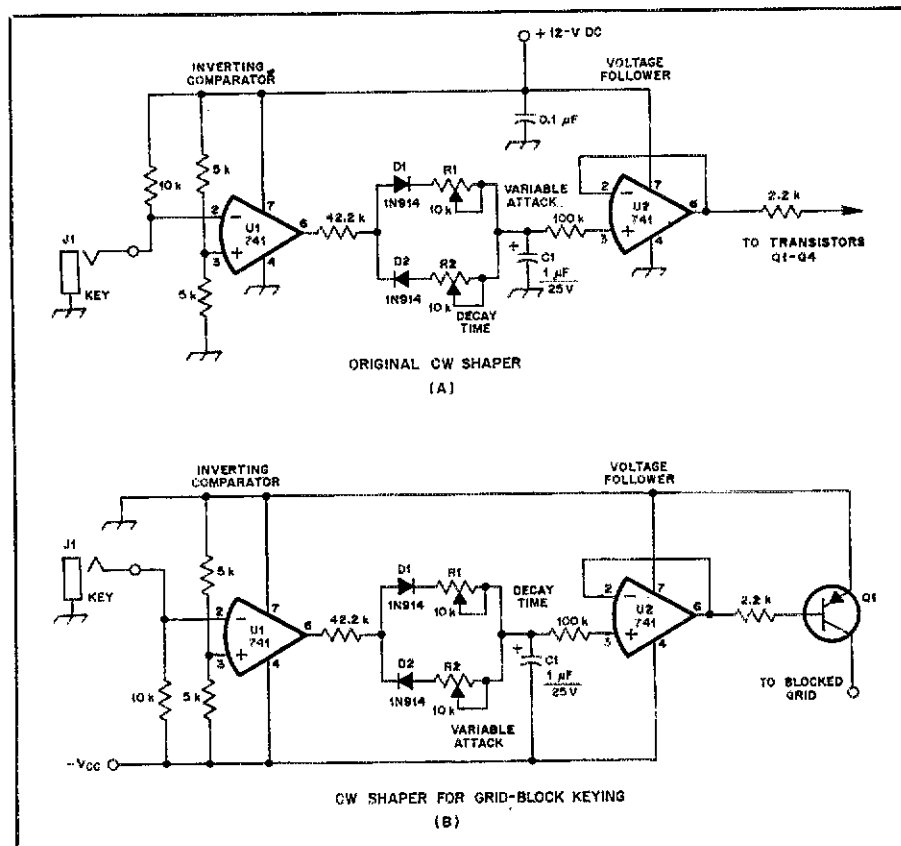


Fig. 1—The basic circuit of the original CW Shaper at A. At B, the CW Shaper configured for use with grid-block-keyed systems.

¹J. Hall and B. Schetgen, "Six Winners Emerge from the ARRL Antenna Competition," QST, February 1985, pp. 44-47.

²T. Hart, "The Loop Transmitting Antenna," Technical Correspondence, QST, July 1985, p. 42.