

N4PC comes up with another winning wire antenna. All you need besides a few components are a couple of tall trees.

The H Double-Bay Antenna

BY PAUL CARR*, N4PC

“What in the world is that?” my neighbor asked. I smiled. “It’s my new 17 meter antenna,” I replied. “I’ve never seen anything like that before. Will it work?” he questioned. “Well, the computer program says that it will, and that program has never lied to me before. I’ll let you know by sundown.” He left shaking his head. Did it work? You bet it did, and here is how you can build one.

Design Philosophy

This antenna design is in response to calls I have received over the years. A common request is for a short antenna that will produce gain. I have been a fan of closed-loop antennas for many years, and I also know that two wavelengths of wire will produce gain if they are placed in the right configuration. I also wanted a horizontally polarized and 50 ohm feedpoint impedance. Could all these requirements be designed into a single antenna? Well, it was time for a computer study.

If we look at a folded dipole and examine the impedances at various points, we will find that the impedance varies from almost zero ohms at the narrow end to about 300 ohms if it is fed as a conventional folded dipole. If the folded dipole is reconfigured into a square, the impedance is about 125 ohms. (The single quad loop is an example of this.) Somewhere between these two extremes is a 50 ohm impedance.

I tried a rectangular configuration with the short side on the bottom. I found when the rectangle was twice as tall as it was wide, the feedpoint impedance was about 50 ohms. The computer program also showed about 1.8 dBd of free-space gain in this configuration. The next thing to do was to increase the gain and maintain the 50 ohm feedpoint impedance.

The solution was simple. I placed a second full-wave loop on top of the existing loop. It was necessary for the loops to share a common horizontal side in the center of the rectangle to maintain a proper phase relationship for the current. It was also necessary to decrease the length of the horizontal wires and increase the length of the vertical wires. When the final configuration was determined, the feedpoint impedance was about 50 ohms and the predicted free-space gain was about 4 dBd.

Predicted Results

I modeled the antenna with the top wire at 60 feet. The predicted pattern was the familiar figure 8 that we expect from a bi-directional

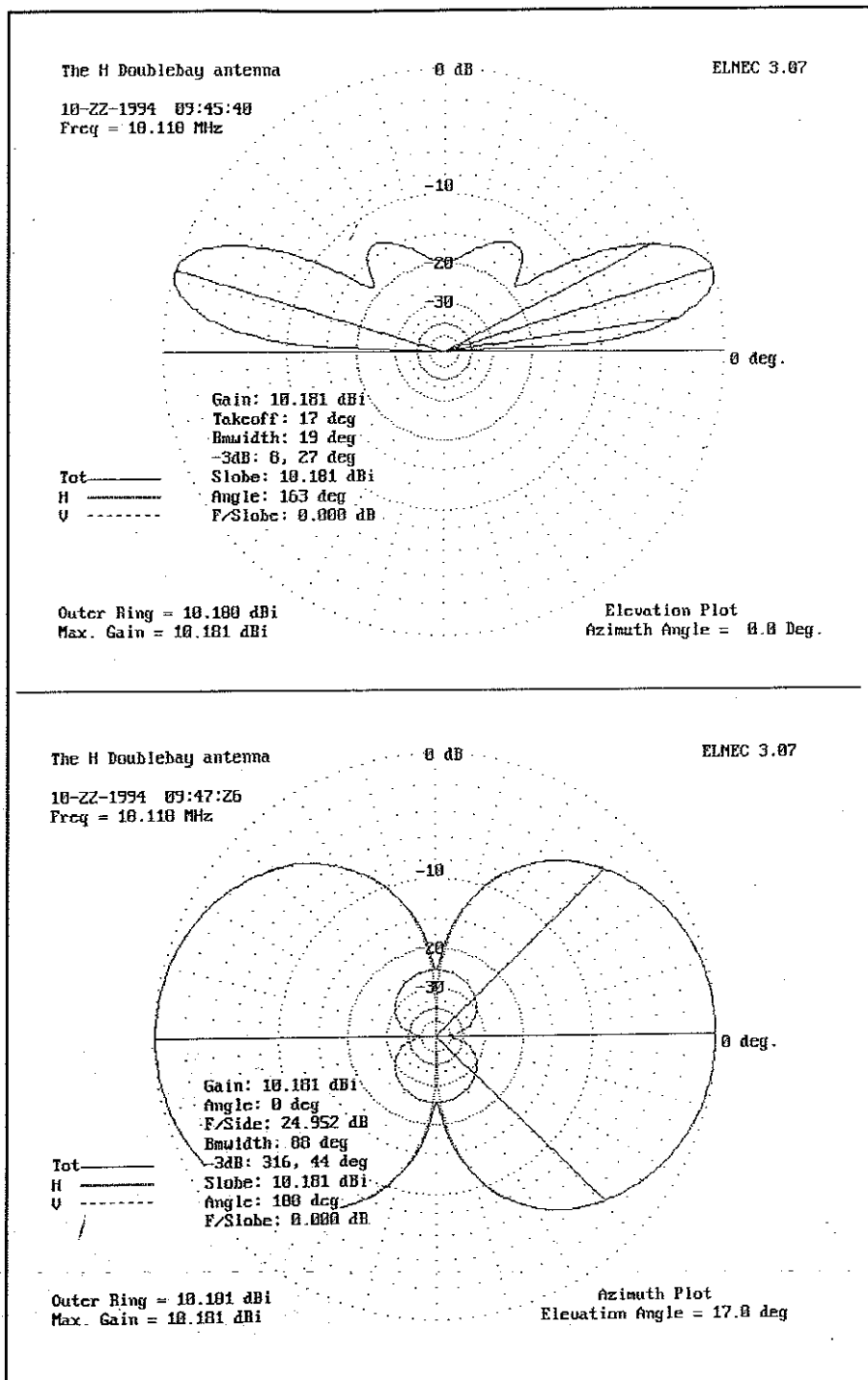


Fig. 1— (A) The vertical pattern for the H Double-Bay antenna. Notice that most of the energy stays low. (B) The horizontal pattern resembles the familiar figure-8.

*97 West Point Rd., Jacksonville, FL 36265

antenna (see fig. 1). At this height the vertical take-off angle is 17 degrees. It is also interesting to note that there is very little energy in the overhead component. The signal is pushed toward the horizon where it will do the most good.

Construction

Following are the details of construction should you decide to build your own.

Begin construction by cutting three pieces of pressure-treated wood into strips 3/4" x 1-1/2" x 6'6" (see fig. 2). These pieces of wood provide the necessary support for the horizontal wires (l). Next drill holes 2 inches from each end of the strips. This determines the final length of the horizontal wires, which is 6 ft. 2 in. The length of the horizontal wires ensures the feedpoint impedance is 50 ohms (fig. 2).

Now cut a single piece of wire to a length of 94 ft. This provides enough wire for the perimeter of the rectangle plus sufficient surplus length for final SWR adjustment. Fold the wire in half to locate the center of the wire. This allows you to locate the center of the wire in the center of the top horizontal spreader. Route the free ends of the wire through the pre-drilled holes in the horizontal spreaders. Align the center of the wire on the center of the top horizontal spreader and secure the wire to the spreader with tape or nylon cable ties so that it will stay in place during the remainder of the construction process.

Place the antenna on the ground and secure the top spreader by placing a couple of screwdrivers in the ground to act as stops so you can stretch the wire taut. Move the bottom spreader along the wire until the top wire and

the bottom wire of the rectangle are spaced 40 ft. 4 in. apart. This measurement is for 12-gauge bare wire, and if you are using something different, your final measurements will vary slightly. Again, I have included enough surplus wire for any necessary final adjustments. Secure the wire to the bottom spreader as you did to the top spreader. Check to see that the horizontal wires and the vertical wires are perpendicular by measuring the diagonals of the rectangle. If the diagonals are not equal, make the necessary adjustments.

Next measure down 20 ft. 2 in. on each vertical wire. This locates the attachment point for the center horizontal wire. Cut a length of wire 6 ft. 4 in. Position the middle wooden spreader so that it will be above the middle horizontal wire when the antenna is in final position. Solder the wire to the center of each vertical wire. The final horizontal length should be 6 ft. 2 in. Move the wooden spreader so that it will rest on top of the wire when the antenna is in its final position. Route the bottom horizontal wires toward the center of the bottom spreader and tape them in position for subsequent feedline attachment.

In my case I supported my antenna with a rope bridle attached to the top spreader. I used a single loop in the bridle so the antenna could pivot about that point. This allows me to rotate the antenna (more about this later). I attached the bridle to the center of a rope and routed the ends of the rope over two convenient tree branches. I raised the antenna until it was a convenient height to reach from a step-ladder. I made the final adjustments by using an MFJ 259 SWR Analyzer. If you do not have such a piece of test equipment, attach a feedline and use your station equipment for final adjust-

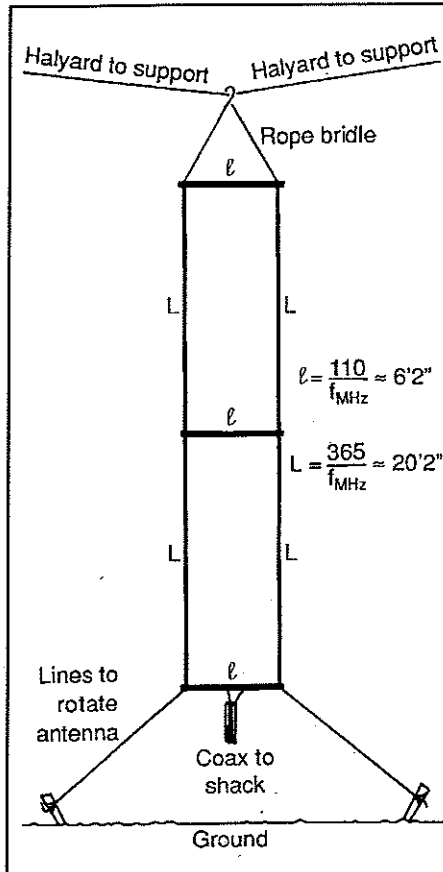


Fig. 2—Construction details for the H Double-Bay antenna.

TOLL FREE 1-800-666-0908 PRICING AND ORDERS ONLY

KENWOOD

TH-79AD & TH-79ADH Hi-Power Model
Dual Band HT \$4.99 Glove Leather Case

TH-22AT TH-28A
2m Handheld

TM-733A
Dual Band Mobile

TM-241A 50W, 2m Mobile

TS-850SAT TS-450SAT
All-Band HF Transceiver

TS-50S HF TS-60S 6 Meter

TM-742A/642A
Dual Band Mobile with Optional 3rd Band Module 6M/10M/220MHz/440MHz/1.2GHz

CALL FOR LATEST SPECIALS & COUPONS

ALL KENWOOD RADIOS & ACCESSORIES AT DISCOUNT PRICES

YAESU

FT-900AT

FT-8500
NEW HF MOBILE with Removable Front Panel & Built-in Antenna Tuner

DUAL BAND MOBILE Complete Control with FS-10 Mic, Remote LCD Display... Much More!

FT-51R FT-51RH High Power Model
New Dual Band HT with Windows

FT-2500 FT-530
2M Mobile, 50 Watt, Heavy Duty, Large LCD Display

FT-5100
Dual Band Mobile 50W VHF, 35W UHF

FT-840
All Band HF Transceivers At A Great Low Price!

FT-1000D/FT990

CALL FOR LATEST SPECIALS & COUPONS

ALL YAESU RADIOS & ACCESSORIES AT DISCOUNT PRICES

STANDARD

C508A
World's Smallest Dual Band HT

C5718DA
DUAL BAND MOBILE Complete Control Mic

C568A
Dual Band HT SPECIAL PRICING!

C158A
Call for Special Savings

C558A C228A C528A

C188A C288A

ALSO IN STOCK C1208DA

CALL FOR LATEST SPECIALS & COUPONS

ALL STANDARD RADIOS & ACCESSORIES AT DISCOUNT PRICES

NEW EQUIPMENT PRICING AND ORDERS 1-800-666-0908 • OUT OF STATE TECHNICAL, USED GEAR, INFO 203-666-6227 • 24HR FAX 203-667-3561

Hours:

M-F 10-6,
SAT. 10-4



LENTINI COMMUNICATIONS INC.

21 GARFIELD STREET, NEWINGTON, CT 06111



C.O.D.s Same Day
OK Shipping

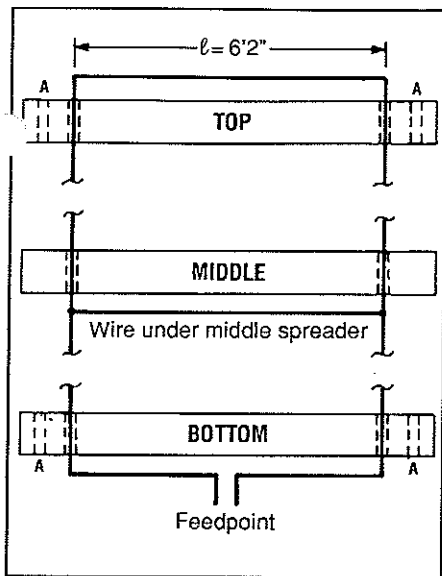


Fig. 3—Wire-stringing details.

ments. Final SWR should be very close to 1:1. After you are satisfied with your SWR results, lower the antenna and be sure everything is secure. Now attach a line of string to each end of the bottom horizontal spreader. This line should be long enough to reach the ground at an angle when the antenna is in its final position. By properly positioning the line and attaching it to a convenient point, you can rotate the antenna to give full compass coverage. (No extra charge for this rotor.) Believe me, the antenna is much easier to build and tune than it is to write about.

Alternate Materials

I used wooden spreaders because they were available. I see no reason why you could not use 1 inch schedule-40 PVC plastic water pipe. A single 20 foot length would provide the necessary material for the spreaders.

Just a word about the wire type. The amount of wire required will depend on gauge, and it will also depend on whether the wire is insulated. If the wire is insulated, less wire will be required due to the capacity effect of the material. You can adjust the loop to resonance by changing the amount of wire in the bottom section of the loop. I don't think the performance will be adversely affected.

Preliminary Results

I could tell that my rig was happy because it was looking into a 50 ohm load. But so what? It would be happy looking into a 50 ohm resistor. How does it work? I must say that I have been pleasantly surprised. The antenna gives a good account of itself. I must admit, I was surprised when I broke a pileup and worked Zimbabwe on the second call. By the way, my report was 57 and I was running 100 watts output. Yes, it works!

Afterthoughts

Perhaps the antenna is a bit of a novelty, but I

don't think so. Maybe you can think of another way to use it. For example, there is no reason why the antenna could not be fed from the top if you happen to be a person who lives in a high-rise apartment and needs a stealth antenna. Just try to keep the antenna as far away from the metal structures as possible. Don't be afraid to dream up new applications for the antenna.

If you are thinking about using this design on other bands, the bandwidth between the 2:1 SWR points seems to be about 1.3%. This probably is due to the long rectangular configuration. This should present no problems on

17 and 12 meters, but if you intend to use it on 15 and 10 meters, you should keep these limitations in mind.

Acknowledgments

I would like to thank my friend Lew McCoy, W1ICP, for naming the antenna for me. He is always ready with sound advice and plenty of encouragement.

If there are questions I have not answered, feel free to call me in the evenings at 205-435-3642. Try this little antenna. I think you will be pleasantly surprised. ■

24 HOUR SHIPPING

ELENCO • HITACHI • B&K PRODUCTS
GUARANTEED LOWEST PRICES

TO ORDER
 CALL TOLL FREE
 1-800-292-7711
 1-800-445-3201 (Can.)

AFFORDABLE - HIGH QUALITY
2 YEAR WARRANTY

STANDARD SERIES
 S-1325 25MHz \$325
 S-1340 40MHz \$495
 S-1365 60MHz \$849

Features:

- High Luminance 6" CRT
- 1mV Sensitivity
- X-Y Operation
- Voltage, Time, + Frequency differences displayed on CRT thru the use of cursors (S-1365 only)
- Plus much, much more

ELENCO OSCILLOSCOPES

DELUXE SERIES
 S-1330 25MHz \$449
 S-1345 40MHz \$575
 S-1360 60MHz \$775

Features:

- Delayed Sweep
- Automatic Beam Finder
- 2 Axis Modulation
- Built-in Component Test
- Plus all the features of the "affordable" series

Hitachi Compact Series Scopes

V-212 - 20MHz Dual Trace	\$449
V-525 - 50MHz, Cursors	\$1,069
V-523 - 50MHz, Delayed Sweep	\$995
V-522 - 50MHz, DC Offset	\$975
V-422 - 40MHz, DC Offset	\$849
V-222 - 20MHz, DC Offset	\$695
V-660 - 60MHz, Dual Trace	\$1,375
V-665A - 60MHz, DT, w/cursor	\$1,449
V-1060 - 100MHz, Dual Trace	\$1,549
V-1065A - 100MHz, DT, w/cursor	\$1,695
V-1085 - 100MHz, QT, w/cursor	\$2,125

Digital Multimeter
EDM-938
\$175.00

Almost every feature available
Bargain of the decade

Digital Multimeter
CM-1560B
\$59.95

DC, AC volts
DC, AC amps
Large 1" LCD display

Digital Capacitance Meter
CM-1555
\$49.95

Measures capacitors from .1pf to 20,000pf
3-1/2 Digit LCD readout with unit indicator

Digital LCR Meter
LCR-680
\$79.95

3-1/2 Digit LCD Display
Inductance 1µH to 200H
Resistance .1Ω to 20MΩ
Capacitance .1pf to 200µF

Sweep/Function Generator
with Freq. Counter
\$239

Elenco GF-6026
Sine, Square, Triangle, Pulse, Ramp
2 to 2MHz, Freq Counter -10MHz

3-3/4 Digit Multimeter
BK-390
\$139.00

0.1% DCV acy
Analog bar graph
Automanual ranging
4,000 count LCD display
Capacitance meas.
Temperature probe

Digital Multimeter Kit
with Training Course
By Elenco
M-2655K
\$49.95

Full function 34 Ranges
Extra large display • Ideal school project
M-2661 (Assembled) \$55.00

Frequency Counter
F-1225
\$225.00

8 Digit LED display
Wide measuring range
High sensitivity
Data hold function
Input impedance 1MΩ or 50Ω
10:1 Input attenuation function

FLUKE MULTIMETERS
(All Models Available Call)

Scopemeters	70 Series
Model 93	\$1,225.00
Model 95	\$1,549.00
Model 97	\$1,795.00
10 Series	Model 771 \$149.00
Model 10	\$82.95
Model 12	\$84.95
80 Series	Model 781 \$175.00
Model 87	\$289.00

Triple Power Supply
XP-620
By Elenco
\$75.00

3 fully regulated supplies: 1.5-15V @ 1A, 1.5 to -15V @ 1A or (0-30V @ 1A) and 5V @ 3A. Kit XP-620K \$49.95

Quad Power Supply
XP-881
By Elenco
\$79.95

Four supplies in one unit: 2.20V @ 2.5A, 5V @ 3A, -5V @ 3A and 12V @ 1A. All regulated and short protected

High Current DC Power Supply
BK-1686
\$169.95

3 to 14 VDC Output
12A @ 13.8V
(less current at lower voltages)
For servicing high power car stereos, converters, ham radios, etc.
Connect 2 or more in parallel or series

Wide Band Signal Generators

SG-9000	\$124.95
RF Frequency 100K-450MHz AM modulation of 10KHz Variable	
RF output	
SG-9500 150MHz built-in counter	\$239

FM Receiver Kit & Training Course
\$44.95 AR2N6 built

Ideal training aid for beginners. Makes it fun and easy to learn about amateur radio.
Covers both 2 meter (144-148MHz) and 6 meter (50-54MHz) FM.
Dual conversion superheterodyne

60 Hertz EMF Probe
MP-1
\$89.95

Works with any DMM

ISOTIP #7980
\$24.95

Two tools in one!
Perfect, portable tool for hobbyists and technicians

Telephone Kit
PT-223K
\$14.95

Available Assembled PT-223 \$15.95

Function Generator
Blox #9600
By Elenco
\$29.95

Kit \$26.95
Sine, Triangle, Square wave

Learn to Build and Program Computers
with this Kit
\$129.00

MM-9000 By Elenco

From scratch you build a complete system. Our Micro-Master trainer teaches you to write into RAMs, ROMs and run a 8085 microprocessor, which uses similar machine language as IBM PC.

Electronic Tool Kit
TK-1000
\$39.95

A professional organizer tool kit at affordable prices. Includes 25 high quality tools in a high impact carrying case which includes a pocket for meter.

Digital/Analog Trainer
Complete Mini-Lab For Building, Testing, Prototyping Analog and Digital Circuits

XK-550	\$169.95
Kit XK-550K	\$139.95

Elenco's trainer is designed for school projects, with 5 built-in power supplies. Includes a function generator with continuously variable, sine, triangular, square wave forms. All power supplies are regulated and protected against shorts. The case can include a full line of tools and meter of your choice.

Transistor Radio Kits
with Training Course

AM/FM Radio Model AM-FM-108	\$29.95
AM Radio Kit Model AM-550	\$19.95

Telephone Line Analyzer
Kit TT-490K \$19.95
Assembled TT-400 \$26.95

WE WILL NOT BE UNDERSOLD
UPS SHIPPING: 48 STATES 5% OTHERS CALL
IL RES add 7.75% TAX
PROBES RICL ALL SCOPES & METERS

C & S SALES INC.
150 W. Carpenter Avenue, Wheeling, IL 60090
FAX: 708-520-0085 • (708) 541-0710

15 DAY MONEY BACK GUARANTEE
FULL FACTORY WARRANTY
WRITE FOR FREE CATALOG
PRICES SUBJECT TO CHANGE

CIRCLE 26 ON READER SERVICE CARD

ly You Saw It In CQ

September 1995 • CQ • 31