



SUMMER 2017

N6BT: founder of Force 12, Inc., developer of the first trapless tri-banders, the C-3 and C-3S that changed the world of Yagis, then changing the world of verticals. N6BT has designed, built and shipped over 25,000 antennas and now brings you models that include ground-breaking technology for restricted locations, DXpeditions, portable and more. Author: Array of Light

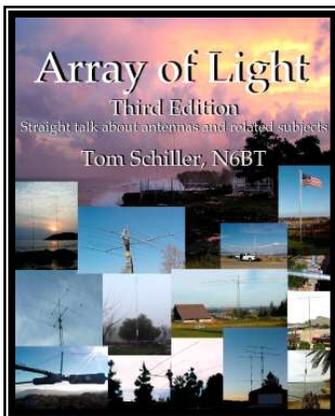
New Patent-Pending **GEN-7** vertical technology.

Celebrating 26 years

of developing and manufacturing new antenna designs like trapless tri-banders and vertical dipoles, improving the world of antennas and bringing you more enjoyment of radio.

Beginning Force 12, Inc. in 1991 and on to 2017 at Next Generation Antennas, n6bt.com

N6BT makes the best; others make comparisons



You need this book!



N6BT innovative antennas for restricted areas plus actual measurement of takeoff angles

Pink Flamingo - one of two yard-art style HF antennas that can operate 20 through 10 meters.

Photo is from APR[®] Antenna Pattern Research[®] using a high-tech drone system, initially measuring take-off angles of verticals and dipoles over flat and sloping ground, plus "verticals on the beach."

Web site: n6bt.com & nextgenerationantennas.com

e-mail: tom@n6bt.com

alternate e-mail canscan7@ yahoo.com

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Welcome to *n6bt.com* Next Generation Antennas™



Next Generation Antennas, *n6bt.com* and, of course, N6BT, are located in Kingman, Arizona.

The rainbow photo displays a unique proto-type. It is a rotatable vertical dipole array for 15 meters, patterned after the Team Vertical 2x2. It consists of (4) new EV 15-meter vertical dipoles. There are (2) pairs of 2-element parasitic arrays (driver/reflector) fed in phased broadside on an 18' boom. It was on the air a handful of hours in the 2016 CQWW CW and we worked 54 countries under fair to poor conditions, with openings being pretty short.

New Vertical Development

Our Antenna Pattern Research® continues with adding a second high-tech drone, as well as a FlexRadio 6700, FPV and cameras. These all are put to use in new product development, as we test designs in real time and can measure the differences. After many years, the resulting antenna is a new, Patent Pending vertical antenna.

The first product is the **EVN-40**; shown here with Dick, N6RC, who received serial #1. This is a 40-meter mono-bander and has been in use daily since December 2016 in various configurations. It was first used as a single, then in a 2x2 array, then in a 1x1 (a pair of them in phased broadside). The 1x1 and 2x2 were aimed at about 50° and also they had the reciprocal at 230° for long path. We got on for about 5 hours in the ARRL DX CW and worked 75 countries and since they went up last December, the country total



through May 2017 is over 120 with only operating in the early morning and sometimes evening. Actual field strength measurements have been made and this is truly a paradigm shift in vertical design.

To be accurate, this is the 7th generation of vertical antennas since I began building them at Force 12, Inc. in 1992. The preceding generations are:

- 1 - linear loaded, mostly on 80 and 160
- 2 - the ZR Z-axis radiator design
- 3 - the SVDA Switchable Vvertical Dipole Array series
- 4 - Sigma series ("I" or "H" as it is often called), especially the Sigma-5 that covered 20-10 and was relay switched
- 5 - Bravo series, beginning in 2010 which are mechanically and electrically improved Sigma-types
- 6 - the EV, or Evolution Verticals with no horizontal components, making them suitable for rotatable arrays
- 7 - GEN-7 the Patent Pending balanced current design that came from the EV series developments

Why is **GEN-7** a big step forward? **GEN-7** is a balanced current physically asymmetric vertical dipole. As such, there is no current/voltage imbalance as is always found in asymmetric verticals. This means the balun does not heat up during transmit, thereby omitting the need for an over-rated balun, or using a coaxial RF choke to handle the heat (and lost power).

We have successfully built and shipped a 40/20 version of the **GEN-7**. A new 80/40 is presently using the motorized Tornado drive to move across 80 and 75 meters, plus covering all of 40. Other single-band and multi-band verticals using this Patent Pending technology are in proto-type stages.

Signature Series New SS-3SS

N6BT invented the trapless tri-bander, overlay and forward stagger, direct 50-ohm feed Yagis (1986), open and closed feed systems, pus more.

Many requests came in asking if I would make my original C-series, such as the C-3 and C-3E. After analyzing the old designs and applying new technology from 26 years of experience, we now have the "**Signature Series.**" Not many know, but the first year of Force 12, Inc., I signed each antenna with an engraver, which is why this re-make of my original antennas is called the "**Signature Series.**"

The **SS-3** and **SS-3e** are trapless tribanders and they came first. Now, there is the shorter 11.5' boom **SS-3S** and the **SS-3SS** using shortened 20-meter elements.

We also have a 2el40/2el30/2el20, plus a WARC for 17/12. N6BT is always customer-driven and an original tag line we had in the early 90's was, "For your needs and your dreams." It is still true.



Bravo Series

the popular single and multi-band vertical dipole leading the way since 2010

The first vertical dipoles were my **ZR** design at Force 12, Inc. in 1994. They were 98% efficient, but very difficult to manufacture. The **SVDA's** followed, then the **Sigma** series in 2000. Called the "I" or "H" style by others, the **Sigma** was also highly efficient, but needed mechanical and electrical improvements. A few more years, more Team Vertical DXpeditions, and the **Bravo** became the Next Generation of verticals.

The **Bravo** series has been popular for home, portable and DXpeditions. It is available in many configurations from single band to 5-bands, plus many models in remote, relay-switched models. Customer suggestions have made all models easier/faster to set-up and stronger.



Bravo-5K

Bravo-5K

\$229

20-17-15-12-10 mtrs
Quick band change
Full size on 15-12-10
>94% efficient
Full Power 13' tall, 7#
2-section tri-pod
3' sections

Bravo-5KS

\$259

2' section model of the Bravo 5K for traveling.

Bravo-5A

\$329

20-17-15-12-10 mtrs
remote-switched
>92% efficient
800 Watts 9' tall, 6.5#
2-section tri-pod
3' sections

Bravo-7K

\$349

40-30-20-17-15-12-10 mtrs
Fast manual band change
Full size on 20-17-15-12-10
>92% efficient
Full Power 18' tall, 13#
2-section tri-pod
3' sections

Bravo-7KS

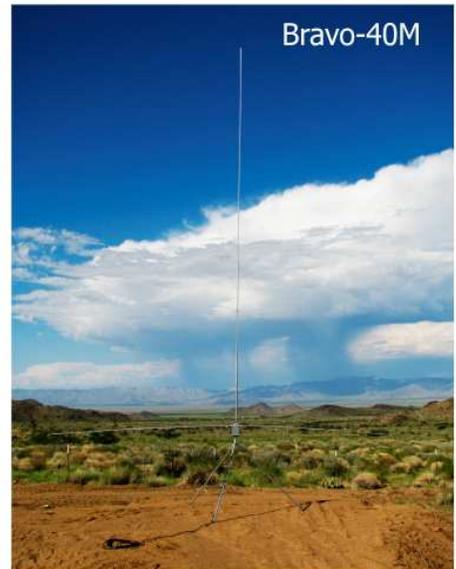
\$tba

2' section model of the Bravo 7K for traveling.

Bravo-7KR

\$489

40-30-20 mtrs
Remote control w/12VDC relays
Full coverage and pre-tuned
Default band is 40 mtrs
21' tall, section tri-pod
3' sections



Bravo-40M

Bravo-40M

\$389

Single band for 40 meters
23' tall, 2-section tri-pod
>200 kHz 2:1 bandwidth
92% efficient, 12#
Excellent for 2el parasitic and driven arrays
Full power, 1:1 balun required

SBVA

2-element

Switchable

Bravo Vertical Dipole Arrays

For all SBVA arrays, please zip off an e-mail to: tom@n6bt.com

.....Single Band Bravo Vertical Dipoles.....

Model	Coverage	Height	Resonators	Efficiency	Price	Guys Rqd	HD Avail
80M	80/75	32'+base	2x18'	86%	\$489	1	Y
40M	40	23'+base	2x12'	92%	\$389	1	Y
20M	20	23'+base	2x10'	98%	\$249	opt	Y
15M	15	17'+base	2x8.5'	99%	\$149	N	Y
10M	10	12'+base	2x6.8'	99%	\$129	N	Y

The New Evolution Vertical™

The innovative solution for those who want gain and directivity without a tower.

Making a gain antenna that doesn't require a tower usually falls into the area of switched vertical arrays, like a 4-square. Some of the problems are the radial field and the phasing/switching system. We started with 20 meters.

The most straightforward approach was to put together a 2-element vertical array. The Bravo series would be excellent, except for the horizontal resonators made it awkward and potentially a safety issue. The key was to eliminate the horizontal components in the elements. After a year's work, the result is the new Evolution Vertical™. In an attempt to describe it in a few words (like in a patent), it is a radical-ratio asymmetric vertical dipole. The feed point is also right where you want it – at boom level.

The first rotatable vertical beam was a 20-meter 2-element. I'll have to admit that after using these 2-element arrays for years on beaches with Team Vertical, it felt strange to have one that could rotate. This was really breaking new ground and when it was rotated for the first time, it was amazing. This 2-element 20-meter is called the **EVA-220**, for Evolution Vertical™ Array.



EVA-220 with optional 4-spoke base



EVA-220

2el 20m rotatable vertical beam is \$489
 Single lobe, 4.1-4.4dBi at 19° over 125kHz bandwidth
 RBN-verified 8-13dB F/B over ground 120° 1/2 power beam-width
 Vertical above boom is 17' (1/4 λ) 21' overall height, 9' boom, 20#
 Tuned for CW, >250kHz 2:1 VSWR >1kw, use RF choke, or 1:1 balun

EV-5K
20-17-15-12-10 mtrs
 Internal balun
 SO-239 coax connector
 One jumper band change
 ~14' tall and 9#, 1kw cw
EV-5K is \$249

EV-5R is \$359
 Remote Control model of EV-5K
 Tri-pod on the left, or the
EV-5RM mast mount on right



The FP1, "Flower Power" sun flower yard sculpture

Designed for restricted housing areas, balconies, decks and decoration.

The FP1 is a welded aluminum sculpture with a vertical radiator is just over 5' high. The lower leaves are about 32" off the ground, for a total height of ~ 7'6".



The leaves and flower provide capacitive loading and the FP1 self-resonates at the high end of 15 meters. It is loaded to 17 and 20 meters using inductive loading. Relay control or manual band change. Coax and control lines go down from the box and can be underground.

EVA-52K and EVA-52R 5-band, 2element rotatable vertical beams

Photo is from 2014 CQWW CW
 Portable operation

EVA-52K, manual band change
EVA-52K is \$629

EVA-52R is remote-control
 6-conductor control line
EVA-52R is \$789

20, 17, 15, 12 and 10 meters.
 9' boom. Internal balun,
 SO-239 coax connector.
 500 watts
 (reduce for RTTY).

Similar performance to EVA-220,
 verified using the RBN.



The New Evolution Vertical™



EV-43R

40-30 mtrs relay control

~19.5' tall radiator
 >24' overall
 Straight base or tri-pod
 17#, 1kw cw

EV-43R \$499
 (also available in 2-ele rotatable)

EV-42R

40-20 mtrs relay control

~19.5' tall radiator
 >24' overall
 Straight base or tri-pod
 17#, 1kw cw

EV-42R \$499
 (also available in 2-ele rotatable)

EV-432

40-30-20 mtrs

~17' tall radiator
 22' overall
 3-section tri-pod legs
 or
 straight base post
 Quick band change
 13#, 1kw cw

Straight Base mount

Tri-pod mount

EV-432 \$389

(also available in 2-ele rotatable)



EVN-40*

New, taller 40-meter vertical dipole, Field-test proven, Patent Pending design

Approximately 27' overall height with air-core, copper inductors and an internal dual-core ferrite balun. Tri-pod included and can be for permanent or portable operation.

Can be phased or used in parasitic arrays.

Excellent DX performer.
 EVN-40* \$629



GEN-7*

The new EVN-40 is using GEN-7* technology.

Several more GEN-7* verticals are in proto-type stage.

All of our research is to bring you the best possible antenna.

We utilize drones to give real-time testing of both patterns and also comparisons of various designs.

GEN-7* is the direct result of these efforts.

*Patent Pending

Yagis and Dipoles

The second page of this brochure included some history, with a few highlights from the development of my original Force 12 product line and then on to this current line. Both electrical and mechanical modeling has been used since day one, back in 1991, and the relationship of the computer to real-life performance is known. One item not mentioned is that we had strategically located test sites in North America, South America and the Caribbean with experienced operators to feed back information on antenna performance. An interesting observation is that to date, you will find that all the new antennas being built follow the groundbreaking designs from my original line.

A comment on gain, F/B and VSWR – it is enjoyable to tweak the computer models; however, the practical side of antennas includes trade-offs. Often, the F/B ratio is elevated too high, when it is gain and operational bandwidth that most often “do the work.” Ever heard someone say, “My great F/B got me through that big pile-up”? Probably not...

Our vast experience allows us to literally build any antenna imaginable. The listing below is a select group of antennas that will meet the majority of needs. If you want something else, just ask.

Gain specification is practical and to a full size dipole at the same height. Since some others use dBi (to the theoretical isotropic source, increases gain number by 2.14), it is also included. F/R is typical to the 2 rear quadrants, not to a point at exactly 180°.

DXr antennas are Yagis and dipoles: the Yagis are all multi-band and selective feed systems for a single feed line, or multiple. They follow my long-established overlay designs and are built to last even longer with such improvements. The DXr series will meet all of your needs for multi-band Yagis. Rated for >90mph; higher survival ratings on request. Feature 120° riveting and 5KW power and my original tapering schedule for elements that “surf” the wind.



Model	Band	Tot ele	Pwr	Boom	Gain		Typical F/R	Typical VSWR	Open Space	Wind-load	Turn Radius	PRICE
					dBd	dBi						
DXr-3M	20	4	5kw	7.5'	4.2dBd	6.3dBi	12	<1.6	68" (5' 8")	3.9	19.3'	\$489
	15				2.4	4.5	3	<2				
	10				1.3	3.4	7	<1.6				
DXr-3MX	20	5	5kw	7.5'	4.2dBd	6.3dBi	12	<1.6	68" (3' 4")	3.9	19.3'	\$549
	15				4.2	4.5	14	<1.9				
	10				1.3	3.4	7	<1.6				
DXr-3	20	6	5kw	11.7'	4.4dBd	6.5dBi	17	<1.4	55" (4' 7")	5.1	19.5'	\$749
	15				4.2	6.3	18	<1.9				
	10				4.5	6.6	17	<1.6				
DXr-3se 24' 20m elements	20	6	5kw	11.7'	4.1dBd	6.2dBi	18	<1.4	55" (4' 7")	4.6	13.6'	\$829
	15				4.2	6.3	18	<1.9				
	10				4.5	6.6	17	<1.6				
DXr-4	20	8	5kw	11.7'	4.5dBd	6.6dBi	17	<1.4	43" (3' 7")	5.8	19.5'	\$889
	15				4.4	6.5	18	<1.9				
	10				4.4	6.5	16	<1.6				
	6				4.2	6.3	18	<1.3				
DXr-5	20	9	5kw	15.5'	4.5dBd	6.6dBi	18	<1.4	57" (4' 9")	8.2	19.5'	\$1,149
	17				4.2	6.3	16	<1.9				
	15				4.6	6.7	16	<1.9				
	12				4.2	6.3	17	<1.9				
	10				4.4	6.5	22	<1.6				
DXr-6 Std on 6 is 2 ele, can be more	20	11	5kw	16'	4.5dBd	6.6dBi	18	<1.4	57" (4' 9")	8.5	19.5'	\$1,289
	17				4.2	6.3	16	<1.9				
	15				4.6	6.7	16	<1.9				
	12				4.2	6.3	18	<1.9				
	10				4.4	6.5	22	<1.6				
	6				4.3	6.4	16	<1.3				
DXr-29	20	14	5kw	29'	6.1dBd	8.3dBi	24	<1.8	42" (3' 6")	10.7	22.8'	\$1,989
	15				7.1	9.2	20	<1.7				
	10				6.1	8.2	22	<1.6				
DXU-32	40	2el 3el	5kw	28'	4.3dBd	10.6dBi	>17	~150kHz	>70" (5' 10")	8.5	24'	\$1,995
	20				5.7	13.6	>25	<1.7				
DXU-32S DXU-22	DXU-32S is a 20' boom of the DXU-32 DXU-22 is a 20' with 2el on 40 and 2el on 20						Specifications and pricing available on request					

Yagis and Dipoles

The products below are dipoles and Yagis for 30 and 40 meters. Combinations for 30 and 40 are per customer request – just **ask and we will make it for you**. Relay switching for covering several segments is also available.

30 and 40 Meters

Model	Bands	Tot ele	Pwr	Boom	Gain		Typical F/R	Typical VSWR	Element Length	Wind-load	Turn Radius	PRICE
					dBd	dBi						
DXr-130	30	1	3kw	n/a	-0.2dBd	1.9dBi	n/a	190kHz <2:1	23'	1.7	12'	\$389
DXr-230	30	2	3kw	12'	4.1dBd	6.3dBi	20pk	200kHz <2:1	23'	3.6	14'	\$895
DXr-140	40	1	3kw	n/a	-0.2dBd	1.9dBi	n/a	130kHz <2:1	39.5'	1.9	20'	\$449
DXr-240	40	2	3kw	18'	4.1dBd	6.3dBi	20pk	140kHz <2:1	39.5'	3.9	22'	\$1,149
DXr-240N	40	2	5kw	24'	4.5dBd	6.7dBi	20pk	240kHz <2:1	58'	8.0	32'	call
NVIS-40	40	1	3kw	n/a	-0.3dBd	1.8dBi	n/a	30kHz <2:1	23'	1.7	12'	call

The following Yagis are single band models and all are direct 50-ohm feed. This makes the feed point the simplest of all, as there is no matching device. The first Yagi like this was built back in 1988 as part of an on-going test. It proved to be an excellent antenna and after beginning Force 12, Inc., the first 50-ohm Yagi in production was the 6el 20 on a 44' boom in 1993. Many followed, including the incredible 6el and 8el 10's, plus the big 7el 15. [Array of Light](#) has pages of 50-ohm Yagis. The models below are based on those designs and have all been in production.

The gain is provided in two (2) ways: at 1 wavelength above real ground as you might get on a computer model and also in free space, both in dBd and dBi. The F/R is the average to the two rear quadrants and the VSWR is across the band. Normally, the VSWR response across the band is pretty flat and so are the gain and F/R

Single-band 50-ohm Yagis

Model	Band	# ele	Pwr	Boom	Gain @ 1λ	Gain		F/R	Band VSWR	Wind load	Price
					dBi	dBd	dBi				
D-220s	20	2	5kw	7.7'	12.3dBi	4.1dBd	6.3dBi	11-15	1.4-1.9	2.5	\$449
D-220	20	2	5kw	11.4'	12.6	4.4	6.6	13-15	1.1-1.4	2.6	\$489
D-320	20	3	5kw	17'	13.2	5.1	7.2	20-23	1.1-1.3	3.7	\$649
D-420	20	4	5kw	24'	13.7	5.7	7.8	25-30	1.1-1.3	5.1	\$799
D-217	17	2	5kw	7.5'	12.1	4.3	6.4	15-16	1.2	2.1	\$379
D-317s	17	3	5kw	11.4'	12.7	4.7	6.8	21-22	1.2	2.8	\$529
D-317	17	3	5kw	13.8'	13.1	5.1	7.2	20-23	1.2	2.9	\$595
D-417	17	4	5kw	17.8'	13.5	5.5	7.6	23-25	1.2	4.2	\$729
D-215	15	2	5kw	5.8'	11.9	3.7	5.8	11-12	1.3	2.1	\$339
D-315	15	3	5kw	11.4'	12.9	5.1	7.2	20-22	1.3	2.7	\$549
D-415	15	4	5kw	15.8'	13.4	5.4	7.5	23-25	1.3	3.9	\$695
D-212	12	2	5kw	5.8'	12.0	4.0	6.1	14-15	1.2	2.1	\$295
D-312s	12	3	5kw	7.5'	12.8	4.8	6.9	17-20	1.2	2.8	\$389
D-312	12	3	5kw	11.8'	13.1	5.1	7.2	23-24	1.2	2.9	\$439
D-412	12	4	5kw	15.5'	13.8	5.9	8.0	24-25	1.2	3.6	\$549
D-210	10	2	5kw	5.8'	12.2	4.2	6.3	14-16	1.4	1.4	\$279
D-310	10	3	5kw	7.5'	12.8	4.8	6.9	20-21	1.3	1.9	\$398
D-310x	10	3	5kw	11.4'	13.1	5.1	7.2	23-24	1.2	2.0	\$479
D-410	10	4	5kw	15.5'	13.9	6.0	8.1	24-25	1.4	2.3	\$549
D-206	6	2	5kw	3.5'	12.5	4.4	6.5	14-16	1.5	1.4	\$189
D-306	6	3	5kw	5.9'	12.9	4.9	7.0	21-22	1.3	1.6	\$249
D-406	6	4	5kw	8.8'	13.9	6.0	8.1	21-22	1.4	1.9	\$319
D-606	6	6	5kw	13.5'	15.7	7.9	10.0	24-252	1.3	2.1	\$395

Signature Series Yagis



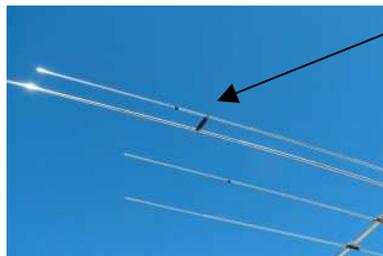
2016 is 25 years since I began Force 12, Inc. and came out with designs such as the trapless tribanders that changed the world of antennas. The original was the C-3 and it was later enhanced with the addition of a reflector for 10 meters, making the C-3E. Both of these antennas are the first ones in the Signature Series - the next generation of "the old" and the old "C" is now an "SS", making the new SS-3 and SS-3e. We also have the SS-3S (old C-3S) and the SS-3SS, the old C-3SS.

Improvements include a superior feed system utilizing both closed and open feed styles. The SS uses parallel drive between 10 and 20, then open sleeve to 15 from 20. The feed point is 10 and the old second 10 driver has been reset to a second 10-meter director for added gain and higher F/B. The spacings and tuning have also been advanced. Mechanically, the Signature Series is more robust with a standard rating of 95mph, instead of the old 80mph.

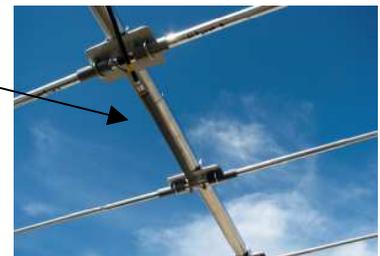
Boom Joints



Feed System



spacers
&
parallel drive



**Stronger
Element Mounting**



SS-3 20-15-10 mtr trapless tribander 7 ele
@ 70' gain F/B VSWR
20 mtrs 12.7dBi 15dB <1.3:1 (14-14.35)
15 mtrs 12.7dBi 19dB <1.3:1 (21-21.45)
10 mtrs 12.6dBi 20dB <1.5:1 (28-29.5)
18' boom, 5KW, 5.9sqft, 40#, 95mph
50-ohm feed through 1:1 balun

\$1049

SS-3S 20-15-10 mtr trapless tribander 6 elements

@ 70' gain F/B VSWR
20 mtrs 12.5dBi 15dB <1.3:1 (14-14.35)
15 mtrs 12.7dBi 17dB <1.3:1 (21-21.45)
10 mtrs 12.4dBi >15dB <1.5:1 (28-29.5)
11.5' boom, 5KW, 5.2sqft, 33#, 95mph
50-ohm feed through 1:1 balun

\$949

SS-3e 20-15-10 mtr trapless tribander 8 ele

@ 70' gain F/B VSWR
20 mtrs 12.7dBi 15dB <1.3:1 (14-14.35)
15 mtrs 12.8dBi 19dB <1.3:1 (21-21.45)
10 mtrs 13.5dBi >26dB <1.5:1 (28-29.5)
18' boom, 5KW, 6.3sqft, 43#, 95mph
50-ohm feed through 1:1 balun

\$1149



Q-Series Yagis and Dipoles

2-ele Yagi

- 5 Bands
- 16' elements
- 9' boom
- 3' sections
- 18# and 2 sqft

NO WAIT
band changing
and bi-directional
relay switched



Q-52

20-17-15-12-10

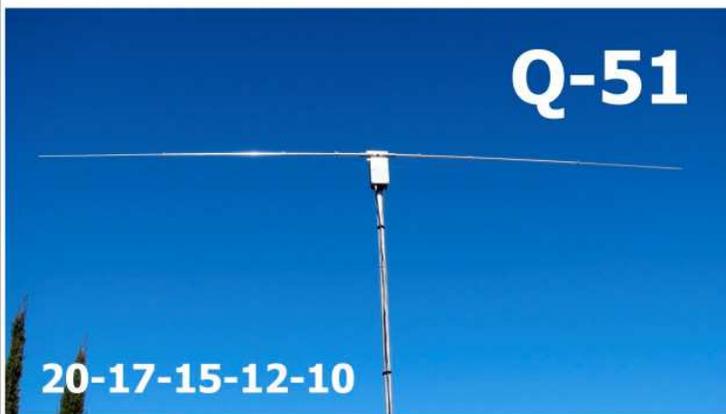
NEW - pre-wired cabling
NEW - boom-to-mast plate
w/polycarbonate center wire box

Fast assembly:

- 1) slide boom sections together
- 2) add boom-to-mast plate
- 3) extend & insert elements
- 4) connect your control cable & coax

\$689

Pre-tuned at 25' SO-239 coax connector 100mph 600w ssb



Q-51

20-17-15-12-10

Rotatable Dipole

5 Bands, only 16' long

relay switched
fast, easy assembly
pre-tuned at 25'
1 sqft, 8#, SO-239 connector
100mph and 600w ssb

\$289

Web site: n6bt.com

e-mail: tom@n6bt.com

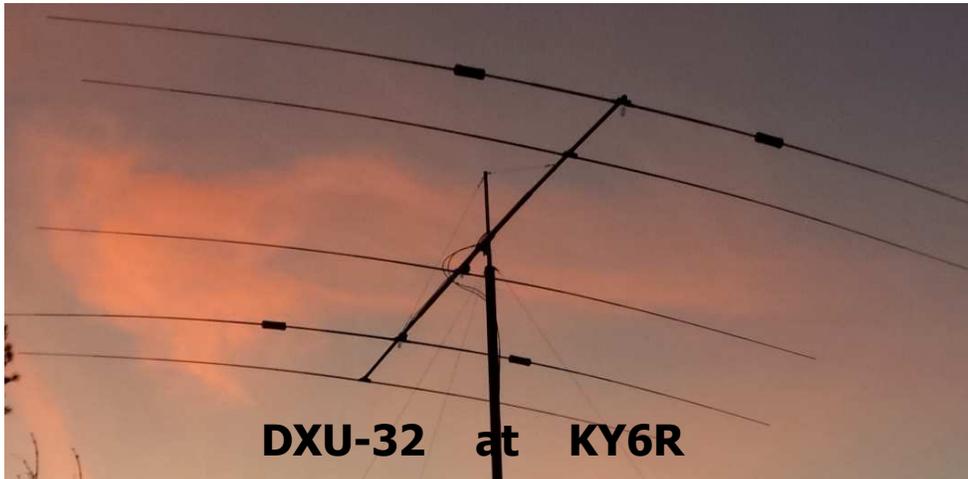
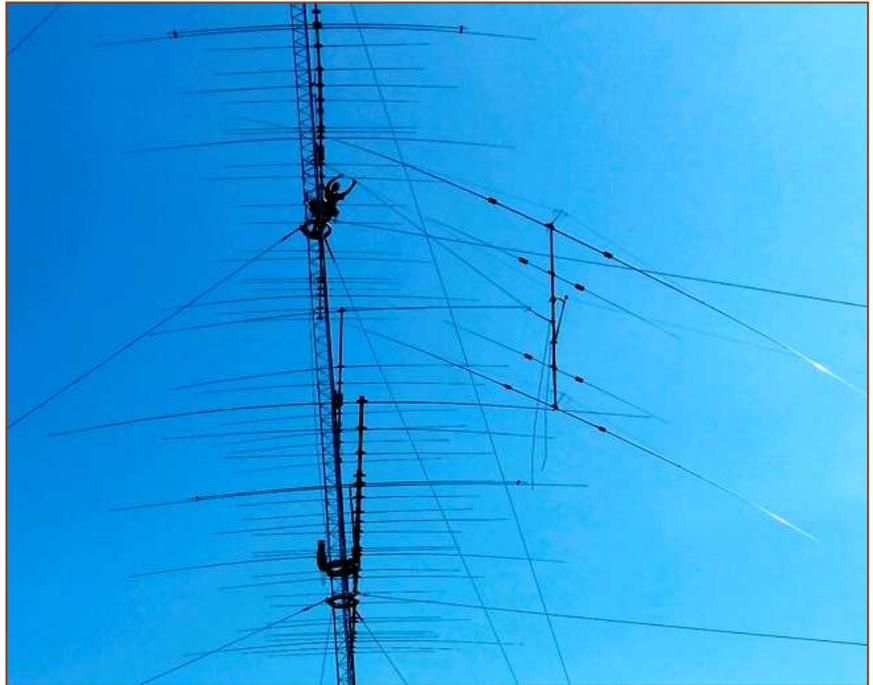
alt e-mail: canscan7@yahoo.com

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**DXr-230240N
at KOMD**

24' Boom 2el 30, 2el 40
new 58' 40 mtr elements
Separate feed lines
5KW, 100MPH

**Tower is rotating 140'
3-stack of my C-49XR's
2-stack of 2el40
3el17/4el12
2el30**



DXU-32 at KY6R

28' Boom 3el 20, 2el 40
Separate feed lines
5KW, 100MPH

One of many to meet "Your needs and your dreams"

You need this book →



email to: tom@n6bt.com

