Scuttlebutt

August 2024 Issue 276

YCCC General Club Meeting
Northeast HamXposition, Room: Northborough, W7
Saturday, August 24th, 2024 – 3:00pm to 4:00pm
Best Western Royal Plaza Hotel & Trade Center,
181 Boston Post Road W, Marlborough, MA 01752

CAPTAIN'S LOG

Hi All,

I'm listening to some amazingly bad conditions during the WAE CW as I type this. I can hear our VP, K1XM sending dozens of CQs on 20M with no response during Sunday morning. 15M wasn't much better and 10M was silent. I've got a few Qs and love the QTC aspect, but not a serious effort here. Good luck to all the YCCC competitors out there who put in a serious effort.

I've been quite distracted from the hobby for the past few months but many of you have been carrying the YCCC flag. I have the plaque in hand for our Club Competition 1st place, North America region for the 2023 Oceania DX contest. This will be handed off to a YCCC member who submitted a score in both legs and is in attendance at the YCCC meeting on August 24, 2024, at the HamXposition.

We also took the 2024 CQ WPX North America Club Competition (2nd Worldwide). Our Scorekeeper, Mike NG1M conveys his analysis is that the big Multi-Multis powered us to our win this time around. Thanks to the team at K1LZ in both legs CW – 32.3M and SSB – 46.3M!

#	Club	Entries	Club Score	Region
1	YANKEE CLIPPER CONTEST CLUB	127	303,213,049	USA
2	POTOMAC VALLEY RADIO CLUB	108	271,200,102	USA
3	FRANKFORD RADIO CLUB	81	215,203,117	USA
4	NORTHERN CALIFORNIA CONTEST CLUB	69	146,722,334	USA

Take a look at the overall Club efforts, printed later in the newsletter. The Club website has been updated to reflect these recent wins, thanks, Mike!

(continued on page 4)

Yankee Clipper Contest Club	
President	Ken Caruso, WO1N President@YCCC.org
Vice President	Paul Young, K1XM K1XM@K1XM.org
Activities Manager	Rudy Bakalov, N2WQ Activities@YCCC.org
Secretary	Brian Szewczyk, NJ1F Secretary@YCCC.org
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W1 QSL Bureau Co-Managers	Eric Williams, KV1J Dennis Egan, W1UE W1QSL@W1QSL
New Members (603) 231-8965	Mark Pride, K1RX Members@yccc.org
Media Manager	Tom LeClerc, W1TJL Content@yccc.org

Ship’s Log **August, 2024** **Issue 276**

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Area Managers

ME		Mike Russo, K1EU	(207) 883-9524	k1eu@maine.rr.com
ENH/NEMA		Ken Caruso, WO1N	-------------------	wo1n@arrl.net
WNH/SVT		----------OPEN----------	-------------------	-------------------
SE MA (508)		Charlie Morrison, N1RR	(401) 742-7240	n1rr@n1rr.com
Boston (617/781)		Joe Fitzgerald, KM1P	(617) 325-6767	jfitzgerald@alum.wpi.edu
WMA (413)		Jeff Bail, NT1K	-------------------	nt1k@nt1k.com
CT (860)		----------OPEN----------	-------------------	-------------------
CT (203)		Mike Loukides, W1JQ	(203) 458-2545	MikeL@oreilly.com
RI (401)	(co-mgr)	Dave Neil, W2DAN	-------------------	w2dan@arrl.net
	(co-mgr)	Charlie Morrison, N1RR	(401) 742-7240	n1rr@n1rr.com
NNY		John Corini, KE1IH	-------------------	John.Corini@gmail.com
NYC/LI (718)		Tom Carrubba, KA2D	(631) 422-9594	ka2d@arrl.net
SNY/NJ/PA (914)		----------OPEN----------	-------------------	-------------------
NVT (802)		----------OPEN----------	-------------------	-------------------
QUEBEC		Guy Lemieux, VE2BWL	-------------------	guy@guylemieux.com
CAPE & ISLANDS		---------OPEN----------	-------------------	-------------------

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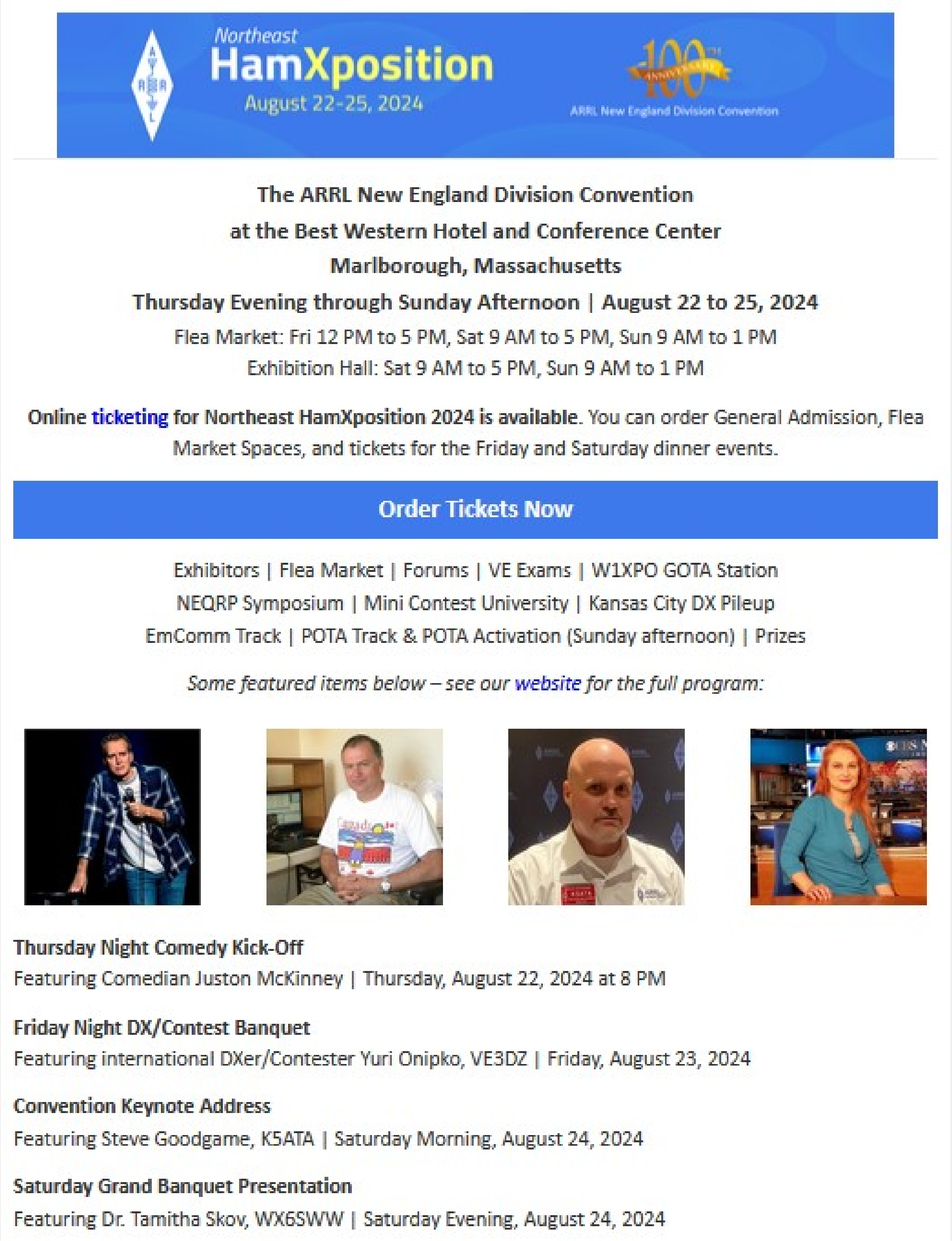

Northeast
HamXposition
August 22-25, 2024

100th Anniversary
ARRL New England Division Convention

The ARRL New England Division Convention
at the Best Western Hotel and Conference Center
Marlborough, Massachusetts
Thursday Evening through Sunday Afternoon | August 22 to 25, 2024
Flea Market: Fri 12 PM to 5 PM, Sat 9 AM to 5 PM, Sun 9 AM to 1 PM
Exhibition Hall: Sat 9 AM to 5 PM, Sun 9 AM to 1 PM

Online ticketing for Northeast HamXposition 2024 is available. You can order General Admission, Flea Market Spaces, and tickets for the Friday and Saturday dinner events.

Order Tickets Now

Exhibitors | Flea Market | Forums | VE Exams | W1XPO GOTA Station
NEQRP Symposium | Mini Contest University | Kansas City DX Pileup
EmComm Track | POTA Track & POTA Activation (Sunday afternoon) | Prizes

Some featured items below – see our website for the full program:

Thursday Night Comedy Kick-Off
Featuring Comedian Juston McKinney | Thursday, August 22, 2024 at 8 PM

Friday Night DX/Contest Banquet
Featuring international DXer/Contester Yuri Onipko, VE3DZ | Friday, August 23, 2024

Convention Keynote Address
Featuring Steve Goodgame, K5ATA | Saturday Morning, August 24, 2024

Saturday Grand Banquet Presentation
Featuring Dr. Tamitha Skov, WX6SWW | Saturday Evening, August 24, 2024

(Captain's Log continued from page 1)

I would be remiss if I did not recognize the efforts of our past and current Treasurers in sorting out the PayPal transition. Turns out we were using an account created by long past Treasurer, K1EP. On going security restrictions implemented by PayPal over the years made it impossible to re-use our existing account. Bob, KQ2M spent many hours setting up the new account and after a bit of teething problems now several of us have tested it and find it in good operating order. Thank you, gents for all the effort!

Membership renewals are lagging this year. Please check the roster on the yccc.org website to see if you are current.

We continue to recruit for the open Club positions. Please volunteer. Progress has been made filling all Officer openings, but we do have some Area manager slots to be filled.

I hope to see you all at the Northeast HamXposition, August 22 – 25th, 2024.

73,
Ken - WO1N

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Open Positions in the YCCC

Ken – WO1N

Area Manager Openings (4)

Eastern CT Area (860)
Cape and Islands
Western NH / Southern Vermont
SNY/NJ/PA

The Area Manager role is described in Section 5 of the Club bylaws. "Area Managers shall be appointed for such areas deemed appropriate by the President. These Managers shall be responsible for serving the interests of members in their area, which may include assisting in antenna projects, helping procure transportation to Club meetings, and recruiting new members." In practical terms, Area managers are called upon to organize local area meetings, either live or Zoom, define resources within the area that can be called upon should Club members put out a call for assistance with antenna projects. Additionally, Area Managers do some recruiting at area get togethers (hamfests, flea markets etc.). Finally they are asked to report back on a regular basis to the Club as to activities within the area.

We are encouraging Area Managers to be a bit more active. We think it is a good approach to engage new members in developing a sense of belonging to the Club other than the few live meetings we have each year.

If you think you can fulfill any of these roles, please drop me a note at President@yccc.org

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CQ WPX CW - YCCC Line Scores – 2024

Callsign	Category	Score	QSO	Mult	OpTime	Operators	OverlayCat
K1LZ	MULTI-TWO	32328432	7092	1548	48	K1LZ K1ZM K3JO KE1J LU8EOT LU9ESD LZ5DB (5/7)	
AK1W	SINGLE-OP HIGH ALL	13859433	3665	1253	35.9	K5ZD	
K1ZZ	SINGLE-OP HIGH ALL	10621515	2909	1173	35.9		
KQ2M	SINGLE-OP HIGH ALL	9464793	3111	1007	36		
WC1M	SINGLE-OP HIGH ALL	8536671	2816	1053	35.9		
NQ2F	MULTI-MULTI	7245567	2661	987	38.7	KD2RD N2ADC NQ2F WB2TQE	
WK1O	SINGLE-OP HIGH ALL	5904304	2163	952	35.3		
KQ1F	SINGLE-OP LOW ALL	5427491	2077	839	35.8	K1XM	
NQ1DX	MULTI-SINGLE HIGH	5355336	1997	889	39.7	K1EP K2LE K2TR NE1L W1VE	
K1AR	SINGLE-OP HIGH ALL	5017860	2052	914	29.6		
VX3A	MULTI-SINGLE LOW	4923737	1807	887	42.7	N2WQ W1UE	
WK1Q	SINGLE-OP HIGH ALL	4856820	1736	915	35.8	K1MK @K1TTT	
AK1MD	SINGLE-OP HIGH ALL	3200126	1556	718	36.5		
KA1IS	SINGLE-OP HIGH 40M	3169170	1110	690	26.1		
N9NC	SINGLE-OP HIGH ALL	3114676	1372	797	18.8		
NM2A	SINGLE-OP LOW ALL	3027044	1578	724	32.4		TB-WIRES
NC1CC	MULTI-SINGLE LOW	2968930	1490	718	37.8	K1SX N1RR NC1VR WA1BXY	
K1TR	SINGLE-OP LOW ALL	2492739	1318	639	22.4		
NB1N	SINGLE-OP HIGH ALL	2447338	1291	641	22.7		
CK2Z	SINGLE-OP LOW ALL	1504790	967	581	27.9	VA2CZ	
N1DC	SINGLE-OP LOW ALL	1176708	884	494	22.9		CLASSIC
K1TZQ	SINGLE-OP HIGH ALL	1157282	759	482	18.7		TB-WIRES
NG1R	SINGLE-OP LOW 20M	818981	802	509	21.9	W1QK	CLASSIC
K1KI	SINGLE-OP HIGH 40M	801830	493	362	5.8		
W1FJ	SINGLE-OP QRP ALL	800481	685	381	16.2		TB-WIRES
W1FM	MULTI-MULTI	738734	678	431	13.1	N1SOH W1FM	
ZF1MA	SINGLE-OP HIGH ALL	729027	671	403	5.4	NN1C	YOUTH
K1ESE	SINGLE-OP HIGH ALL	611100	490	450	12.2		
AJ1AJ	SINGLE-OP HIGH ALL	576800	565	400	13		
KB1W	SINGLE-OP HIGH ALL	561792	547	384	8.2		
K1JB	SINGLE-OP HIGH 15M	534230	514	410	8.4		
N2YL	SINGLE-OP HIGH ALL	481536	521	342	6.7	W2CS	TB-WIRES
W1WEF	SINGLE-OP HIGH ALL	461812	508	332	7.4		TB-WIRES
WX7T	SINGLE-OP HIGH ALL	447200	486	344	5	K1RM	CLASSIC
W3SM	SINGLE-OP HIGH ALL	443625	486	325	20.4		
KG1V	SINGLE-OP LOW ALL	433455	578	355	23.1		
N1QY	SINGLE-OP LOW ALL	402800	475	304	16.9		TB-WIRES
K1MD	SINGLE-OP LOW ALL	398748	467	329	16.8		CLASSIC
WB2NVR	SINGLE-OP LOW ALL	352674	471	311	21.4		CLASSIC

CQ WPX CW - YCCC Line Scores – 2024

Callsign	Category	Score	QSO	Mult	OpTime	Operators	OverlayCat
N1NQD	SINGLE-OP LOW ALL	326040	429	285	35.8		
KW1X	SINGLE-OP LOW ALL	293895	403	311	8.2		TB-WIRES
VA2UR	SINGLE-OP HIGH ALL	290672	386	296	8.2		
VA2EBI	SINGLE-OP HIGH ALL	279279	345	273	7		
KI1U	SINGLE-OP LOW ALL	254664	366	262	12.7		
W1KM	SINGLE-OP HIGH ALL	247800	263	210	3.2		
AE1T	SINGLE-OP HIGH ALL	225420	345	260	4.5		
KO1H	SINGLE-OP QRP ALL	210627	379	261	15.3		
W1GD	SINGLE-OP HIGH 15M	203264	280	256	6.9		
K1TH	SINGLE-OP HIGH ALL	202349	300	211	5.2		
W1DYJ	SINGLE-OP LOW ALL	167580	264	228	16.1		
NZ1U	SINGLE-OP HIGH ALL	157195	254	211	4.8	W1UJ	
N4ADC	MULTI-SINGLE HIGH	140600	257	185	6.4	N4ADC W1CSM	
KZ1M	SINGLE-OP LOW ALL	128952	252	199	4.6	W1EQ	TB-WIRES
KS1J	SINGLE-OP LOW ALL	110445	201	199	4.9		
K1BZ	SINGLE-OP HIGH ALL	103950	196	175	6		
W1TO	SINGLE-OP HIGH ALL	99400	203	175	4.4		TB-WIRES
W1MJ	SINGLE-OP LOW ALL	95928	229	168	6.2		
AG1C	MULTI-SINGLE HIGH	51216	142	132	5.7	AG1C K1RDD	
KE1IH	SINGLE-OP HIGH ALL	49404	157	138	5.4		
WF1OC	SINGLE-OP HIGH ALL	49152	140	128	2.1	W1RM	
NI1Q	SINGLE-OP LOW ALL	48678	148	133	8.2		TB-WIRES
KA2KON	SINGLE-OP LOW ALL	41745	124	115	6.4		
N1EN	SINGLE-OP LOW ALL	40440	125	120	2.3		TB-WIRES
W1OHM	SINGLE-OP HIGH ALL	38372	123	106	10.4		CLASSIC
K1MT	SINGLE-OP HIGH ALL	28000	119	100	6.5		
N2ZA	SINGLE-OP HIGH ALL	15554	78	77	1.8		TB-WIRES
N1MGO	SINGLE-OP HIGH ALL	14499	91	81	2.7		
W2TT	SINGLE-OP LOW ALL	11340	65	63	2.8		
WV1M	SINGLE-OP LOW ALL	8792	58	56	2.4		
KA2D	SINGLE-OP LOW ALL	5084	44	41	2.1		TB-WIRES
N1JI	SINGLE-OP QRP 20M	253	11	11	0.4		
KM3T	CHECKLOG	0	0	0	0		
WT1M	CHECKLOG	0	0	0	0	K1RX	

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CQ WPX SSB – YCCC Line Scores - 2024

Callsign	Category	Score	QSO	Mult	OpTime	Operators	OverlayCat
K1LZ	MULTI-TWO	46327820	9217	1796	48	K1LZ KE1J K3JO KC1TEK LU9ESD	
V47T	MULTI-SINGLE HIGH	31789908	7312	1593	48	N2NT HA1AG K5ZD (1/3)	
KQ2M	SINGLE-OP HIGH ALL	16034141	4487	1327	36		
NE1C	MULTI-MULTI	13241371	4209	1339	34	K1NZ KX1X NT1K WW1X K1TTT @K1TTT	
WK1O	SINGLE-OP HIGH ALL	8466768	2807	1128	35.6		
WC1M	SINGLE-OP HIGH ALL	7741363	2452	1127	35.8		
CJ2Z	SINGLE-OP LOW ALL	4529430	1738	885	32.8	VA2CZ	
AK1MD	SINGLE-OP HIGH ALL	4457624	1994	904	34.5		
KR5X	SINGLE-OP LOW ALL	4434676	2029	874	24.2	K1BX	CLASSIC
KQ1F	SINGLE-OP LOW ALL	4315185	1760	855	35.9	K1XM	
K1AR	SINGLE-OP HIGH ALL	3008675	1561	797	17.1		
NG1M	SINGLE-OP HIGH ALL	2269552	1362	664	18.9		CLASSIC
K1JB	SINGLE-OP HIGH ALL	1994445	1102	705	16.9		
KA1ZD	SINGLE-OP HIGH 10M	1650600	990	630	17.3		
N1NQD	SINGLE-OP LOW ALL	1643150	1041	590	35.8		
NM1JY	MULTI-MULTI	1484142	989	597	8.8	K1RX KC1RWR KC1SDD	
KM3T	SINGLE-OP HIGH ALL	1387536	891	548	7.3		
WX7AA	SINGLE-OP HIGH ALL	1343409	878	569	14.7		
N1RP	SINGLE-OP HIGH ALL	1053171	762	511	15.1		
KE1IH	SINGLE-OP HIGH ALL	1050926	822	479	13.2		
AA1ON	SINGLE-OP LOW ALL	996496	742	488	13		CLASSIC
NQ1DX	MULTI-TWO	9891600	3236	1200	43.7	K1EP K2TR K2LE KL7SB W1VE (4/5)	
KW1X	SINGLE-OP LOW ALL	967758	742	473	15		TB-WIRES
AC1EV	SINGLE-OP HIGH ALL	959974	742	509	16		TB-WIRES
N2ZA	SINGLE-OP HIGH ALL	881280	776	480	20.1		
W1FM	MULTI-TWO	777668	680	433	18.8	W1FM N1SOH	
NQ2F	MULTI-MULTI	6781654	2836	1097	36.5	KD2RD N2ADC NQ2F KN4BBO WB2TQE (2/5)	
VA2EBI	SINGLE-OP HIGH ALL	669760	515	416	12.5		
W1JSR	MULTI-SINGLE LOW	622683	632	387	32	W1JSR W1KAT	
KI1P	SINGLE-OP LOW ALL	606158	773	406	22.7		TB-WIRES
NI1Q	SINGLE-OP LOW ALL	546879	525	433	21.3		
AG1C	MULTI-SINGLE HIGH	517980	558	356	20	AG1C W1OMG	
KC1QEM	SINGLE-OP LOW ALL	494394	560	393	27.4		TB-WIRES
KB1W	SINGLE-OP HIGH ALL	460989	546	391	7.5		
K1DG	SINGLE-OP HIGH ALL	446250	504	350	5.2		
W1WEF	SINGLE-OP HIGH ALL	432160	508	365	7.9		CLASSIC
W1CU	SINGLE-OP HIGH ALL	403191	442	327	12.6		
W1GD	SINGLE-OP HIGH ALL	392298	419	302	6.6		
W1DYJ	SINGLE-OP LOW ALL	355813	426	307	13.8		
W1JGM	SINGLE-OP LOW ALL	341440	449	320	20		

CQ WPX SSB – YCCC Line Scores - 2024

Callsign	Category	Score	QSO	Mult	OpTime	Operators	OverlayCat
WB2NVR	SINGLE-OP LOW ALL	330395	441	299	18		
N1IBM	SINGLE-OP HIGH ALL	293832	356	318	9		TB-WIRES
N1DC	SINGLE-OP LOW ALL	244890	364	270	9		CLASSIC
K1BZ	SINGLE-OP HIGH ALL	241920	345	270	8.4		
KS1J	SINGLE-OP LOW ALL	201804	289	251	5.3		
WO1N	SINGLE-OP LOW ALL	144612	253	206	6.2		
KA2KON	SINGLE-OP LOW 15M	128754	226	207	5.3		
N9NC	SINGLE-OP HIGH 10M	122337	223	197	6.3		
K1TH	SINGLE-OP HIGH ALL	103581	210	153	2.9		
W1OHM	SINGLE-OP HIGH ALL	99345	230	179	14.4		CLASSIC
NG1R	SINGLE-OP LOW 10M	89425	192	175	5.5		
K1VUT	SINGLE-OP LOW 10M	87723	203	171	7.9		
K1TR	SINGLE-OP LOW 15M	56927	161	151	4.4		
KG1V	SINGLE-OP LOW ALL	48008	161	136	5.9		
KG1E	SINGLE-OP LOW 15M	47082	147	133	3.5		
VA2UR	SINGLE-OP HIGH ALL	43218	136	126	3.3		
KM1W	SINGLE-OP HIGH ALL	40800	128	120	2.4	W1UE	
AG2K	SINGLE-OP HIGH ALL	40470	119	95	3.9		
KI1G	SINGLE-OP LOW ALL	31720	115	104	1.8		
AE1P	SINGLE-OP HIGH 15M	31300	110	100	0.7		
KV1W	SINGLE-OP LOW ALL	30600	116	102	5		
N1KM	SINGLE-OP HIGH ALL	30160	104	104	4.1		TB-WIRES
W1NU	SINGLE-OP LOW ALL	27740	110	95	3.7		CLASSIC
K1ZM	SINGLE-OP HIGH 160M	25026	138	97	11.8		
N1KWF	SINGLE-OP HIGH 10M	18568	93	88	2.5		
NF1G	SINGLE-OP HIGH ALL	13440	72	70	4.4		
W1MJ	SINGLE-OP LOW ALL	7008	54	48	2.5		CLASSIC
N1QY	SINGLE-OP LOW ALL	1850	26	25	1.7		TB-WIRES
K1TW	SINGLE-OP HIGH ALL	1300	25	25	1.7		
K1ZZ	CHECKLOG	0	0	0	0		
N1EN	CHECKLOG	0	0	0	0		

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Mean Well ENP-360-12 - The Best Power Supply?

Paul Young, K1XM

I have been using radios with 13.8Volt power supplies since I bought an IC-735 as a travel radio in 1989.

I prefer switching supplies because of their lighter weight. My first power supply was the internal supply from an IC-741. It was great until it blew up on Kosrae, V63 in 1998. Since then, I've used a variety of power supplies. I once forgot to switch a power supply to the 220V position. Unfortunately, this happened in Tanzania. Fortunately, they are used for HF radio there and I was able to buy one and have someone bring it out to the middle of the Serengeti for me.

I've never been really happy with the power supplies sold to hams. Perhaps this is because in my day job I worked with servers and storage arrays. The power supplies for these have 110-220V universal input, power factor correction, quiet fans, n+1 redundancy, and remote sensing and management. They are more efficient than ham radio supplies. And they are designed for 100% duty cycle.

I saw an article online about modifying a server power supply for ham radio use and decided to try it. So I bought one on eBay. The company sent me a different model than what I had ordered. But I was able to figure out how to modify it. It worked very well. But those power supplies are designed for 12Volts. Ham gear is designed for 13.8Volts. My modification allowed me to get to almost 13.8Volts but there is an overvoltage circuit which would kick in if I went further. I might have been able to defeat that but the output capacitors on the supply are rated for 15Volts and I didn't want to get too close to the limit.

I continued using the server power supply for one radio and a Samlex SEC 1235 for the other. But I was going to be a WRTC competitor and I wanted something better, preferably high efficiency and without a 110/220Volt switch. The only one I could find on the market was the Samlex SEC-1235-P-M. It has power factor correction and higher efficiency. Note that the Samlex 1235 and 1235-P series have similar numbers but only the P and P-M have these capabilities. I bought one and used it at home for a while. It worked well but it seemed the fan was either off or on and noisy. I brought it to Italy and used it at WRTC. But I knew it wasn't my ultimate solution.

While I was at WRTC I had lunch with Adi, S55O/W1ADI. I mentioned this to him and he suggested I look at power supplies made by Mean Well. He routinely uses these commercially and suggested a few models.

When I returned home, I looked at the Mean Well products and discovered they had one which was especially interesting. It had 110-220 universal input, power factor correction, and high efficiency. The efficiency is high enough that it doesn't need or have a fan. So, it is quiet and doesn't collect dust. It is the ENP-360-12.

Mean Well is a Taiwanese company, known in the industry for their high quality. Ham radio dealers don't carry them, but DigiKey and Mouser do. I bought one from Mouser. The power supply has a switch and an LED on the front panel. It does not come with a power cord but it uses a standard EIA IEC connector. I have plenty of those.

I wired it into my station, replacing the server power supply. Everything worked. I loaned it to K3JO who checked the noise output and found it to be acceptable.

I decided to replace the other power supply too. I looked online and found that TRC Electronics had the lowest price. Some places showed a lower price but had a tariff surcharge. I ordered one and got a phone call from a sales rep. Apparently, they sell mostly to companies and wanted to know if they could help me with my product design. The rep was amused when I said I needed one for my amateur radio station but was happy to ship it to me.

I've run them in a couple contests. I usually operate barefoot so my radios are run at 100 watts output. So far, they have been flawless.

The price of the Mean Well power supply is very competitive with brands which are better known to hams. I believe the DuraComm LPX-25 is the same power supply as the Mean Well ENP-360-12. People familiar with commercial two-way radio might be more familiar with DuraComm. But it is more expensive with the DuraComm name on it.

I am no longer looking for power supplies for my home station.

For more information on the Mean Well ENP-360-12 power supply:

Specifications and Data Sheet is available at:

https://www.meanwell.com/webapp/product/search.aspx?prod=ENP-360

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Historical Solar Data Source

This site has detailed solar data back to 1932.

The site is updated daily.

https://kp.gfz-potsdam.de/app/files/Kp_ap_Ap_SN_F107_since_1932.txt

(Tnx to Ray, NM2O)

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LOST CREW (Silent Keys)

John E. Kaufmann – W1FV – Maynard, MA – 1952 – July, 2024

John E. Kaufmann, W1FV ex- WA1CQW from Maynard, Massachusetts passed away at the age of 72 after a brief illness, he was an active Radio Amateur, active DXer and Contester.

John was a life-long New Englander, born in Connecticut. A long-time member (since 1981) of the YCCC, John was a reliable source of helpful, technical guidance within the club, as well as within the broader amateur radio community. He was an extremely accomplished Electrical Engineer with an undergraduate degree from MIT (where he was also a track star) and PhD from Cornell University. In addition to ham radio, John enjoyed a wide variety of hobbies and interests: car racing; cycling; music; and a champion of Alzheimer's research, a disease that claimed his mother, Mimi.

John was an expert in low band propagation. He was a member of many YCCC multi-op teams, including the KC1XX contesting team for nearly 30 years. The KC1XX team is heartbroken over his loss.

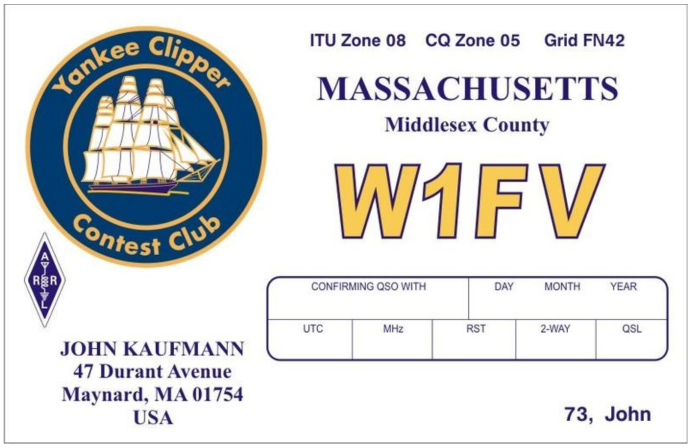
In addition to his ham radio and professional accomplishments, John was known for his warm, unassuming nature, and a shining example of a kind and caring person.

He is already missed.

(Tnx to dxnews.com and the YCCC Reflector)

Recent picture of John, W1FV at his modest home station in Maynard, MA. You can make out several parts of his story right in this picture. *Low-Band DXing*, a cherished book written by ON4UN, one of his peers in the world of low-band antenna design and operating. Awards from CQ and ARRL adorning his wall recognizing his achievements in contesting. Circuit diagram of his latest receive 4-square design on the monitor. And the radio tuned to 40m cw. *(Jim, K1IR)*

John, W1FV working on re-tuning KC1XX's Hurricane Hill 160 vertical array in Fall, 2023. *(Ken, WO1N)*



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73, John

Reprinted from YCCC Scuttlebutt #60, November 1985 pp. 4-5.

Vertical Antennas for the Low Bands Part I

John Kaufmann, W1FV

Two years ago, motivated by a move to a new location. I began exploring the potential of vertical antennas for use on the low frequencies (80 and 160 meters). In the course of designing and building my present vertical system, 1 have learned a lot about what it takes to make these antennas work and I would like to share some of that knowledge here. In Part 1. I will confine the discussion to single-element verticals. Part II (to appear in a future issue) will deal with design and operation of multi-element phased vertical arrays.

Why vertical antennas?

It is well documented that vertical antennas concentrate most of their radiation at low angles which is exactly what is desired for DX work. This also proves advantageous in receiving in that high-angle stateside interference is reduced considerably - as much as 20 to 30 dB compared to a horizontal dipole. Furthermore, with a phased array, very large attenuation of signals from unwanted directions is possible. To achieve low-angle radiation from horizontal antennas requires antenna heights of a half wavelength or more. which creates obvious challenges on 80 and 160 meters.

Siting considerations

Verticals should be kept away from other large vertical structures such as towers. particularly those which are likely to be resonant at the operating wave length. Trees are not a problem except as a possible physical obstruction in erecting the antenna. While locating in a region of high ground conductivity (such as salt water) is preferred, don't be discouraged if your QTH is not the ideal. I have achieved considerable success from a geographically mediocre location, Also, if installing a single-element vertical is the immediate objective, keep in mind the possibility and the space requirements for expanding to multiple elements (as I did).

Vertical size

Generally, one thinks of verticals as being a quarter wave in height, but this does not have to be the case. The principle advantage of the quarter-wave vertical is that is looks approximately resonant at the desired operating frequency. This makes the job of impedance matching easier but otherwise offers no theoretical performance advantage over other heights. Increasing the height to 5/8 wavelengths provides an additional 3 dB gain, but such dimensions are impractical for most of us at the low frequencies. What can be very attractive for 80 and 160 meters from a practical standpoint is the use of short verticals (less than a quarter wavelength). It appears not to be well known in the amateur community that the theoretical gain of a very short vertical (even approaching zero length) is only a fraction of a dB less than that of a quarter wave vertical. This fact may seem contrary to intuition, but has been well known in the engineering field for many years. (see Refs. 1 and 2). Therefore. there is no reason, in principle, to use a vertical as large as a quarter wave in the hopes of extracting more gain. Of course, there are practical considerations to be taken into account, namely that short antennas will exhibit lower radiation resistance and considerable capacitive reactance at the drive point, making matching somewhat more involved, and the SWR operating bandwidth will be less than for larger antennas (the shorter the antenna, the smaller the bandwidth). More importantly, though, the lower radiation resistance makes it imperative that a low-loss ground radial system be employed to attain efficient operation. The radiation resistance depends partly on the method of loading used to resonate the antenna - capacitive "top hat" loading provides the highest radiation resistance and thus the highest efficiency. while base-coil loading techniques give the lowest radiation resistance and poorest efficiency. (See the following section on radial systems and ground loss for further discussion). Also, top loading gives the largest operating bandwidth. Jerry Sevick, W2FMI, demonstrated in the 1970's that practical short verticals can be highly effective. His series of articles in QST (Refs. 3 - 5) makes very interesting reading and is highly recommended for those who wish to get more deeply into the subject. My first try at a vertical was a top-loaded 38·footer on 80 meters (with about 80 quarter-wave radials). With this antenna, I was able to place first in the 80-meter single-band category in the 1983 CQWW and the 1984 ARRL DX CW contests. Over the winter of '83/’84, it was quite satisfying to be able to work DX such as VU2, 4S7, YB0, UM8, UH8, long and short path JA' s, etc., that no one else even seemed to be able to hear. At this moment I am experimenting with 60-foot verticals on 160 and am very encouraged by the initial DX results.

Ground Radial Systems

Without a doubt. the ground radial system is the single most important determinant of how the vertical will perform. If there is any secret to getting verticals to work, this is it. A ground rod simply won't do for a ground system unless you are fortunate enough to live over salt water. To be a bit more quantitative about the subject, consider the following expression for antenna radiation efficiency (fraction of power actually radiated versus that delivered to the antenna):

$$\text{Radiation efficiency ''' } R_{rad}/(R_{rad} + R_G + R_C)$$

where R_{rad} is the antenna radiation resistance. R_G is the ground loss resistance, and R_C represents circuit loses in any matching network components, all in units of ohms. If R_G and R_C can be made to approach zero, then the efficiency approaches unity, i.e., 100 percent. Also, if the various losses are fixed, then raising the antenna radiation resistance, by top-loading instead of base-coil loading, for example, improves the efficiency. Now consider the following practical example of an eighth-wave vertical with a radiation resistance of 7 ohms, a ground loss of 20 ohms, and a matching network loss of 2 ohms (all typical of a simple installation). The efficiency, compared to the ideal, is only 24 percent. Most of the power is lost in heating up the ground. It is the poor efficiency of verticals when installed with a lossy ground system that probably accounts for the relatively unfavorable reputation of vertical antennas. at least in amateur circles. The point of installing ground radials is to drive R_G to zero to get the efficiency up.

The message is clear - put down lots of radial wire if you want the antenna to work. My current 3-element 80-meter array has consumed about 15,000 feet in radial wire. Installing this much wire was very tedious and time-consuming but eventually the job got done and was well worth it.

A few tips: (1) Large-gauge wire isn't necessary for radials since they won't be carrying much current if many radials are employed. I use number 22 gauge. (2) Insulated wire will do just fine, and, in fact, is probably preferrable to bare wire since it will resist corrosion much better. Don't use noninsulated steel wire. i.e. electric-fence wire, as it will corrode away very quickly. (3) Don't bother burying the radials unless they present a physical nuisance. There is nothing to be gained performance-wise. In fact. burying them too deeply can decouple the radial system from the antenna because of the intervening presence of the earth. If the radials are to be installed in one's yard, as mine are, the grass should be cut as short as possible. and the radials laid flush with the surface of the ground. In time the grass will grow around the wires and conceal them. I was fortunate enough to be able to get the radials in before I even had a lawn since I had just moved into a new home. Now, not a single radial is visible in the lawn, even inches from the base of each vertical. There is no problem mowing the grass or carrying on other activities in the yard. (4) How many radials are required? There is no single correct answer for all situations. The higher one 's ground conductivity. the fewer radials that are needed. Commercial broadcast standards call for 120 radials a half-wavelength long. This may seem like overkill but I would consider 40 quarter-wave radials to be the minimum number for a serious installation in an average environment for a quarter-wave vertical (and more for shorter systems). Furthermore, as I will discuss in Part II, the need for a low-loss radial system is more vital, in many cases, to multi element phased arrays than for single-element systems. (5) As for radial length. there is no critical length except that the longer the better. They don't need to be all the same length. Stretch them out where the space permits. My radials range in length from 30 feet to 130 feet because of the dimensions of my property. Generally speaking, however, if all the radials must be short (say, 0.1 wavelength or less), it turns out that a few radials are almost as good as many radials. Large numbers of radials are used to best advantage if they can be made as long as a quarter to a half wave long. References 5, 6 and 7 contain a thorough discussion of radial systems.

In Part II, I will discuss the promises and problems of vertical phased arrays, based on my experience in designing and building such systems. Stay tuned.

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Reprinted from YCCC Scuttlebutt #62, March 1986 pp 13-16

Vertical Antennas for the Low Bands
Part II

John Kaufmann, W1FV

Part I of this series discussed the design and operation of single-element vertical antennas for use on the low bands (80 and 160 meters]. In Part II, we tackle the problem of designing phased-vertical arrays, showing why it will usually done incorrectly and what it takes to do it right.

Why Phased Vertical Arrays

Phased-vertical arrays have the same desirable operational characteristics as single-element verticals in DX work, with the obvious additional advantages of gain and directivity. A properly designed array is capable of providing deep nulls in the radiation pattern. When my 80-meter array is switched on Europe, stateside interference off the back of the array drops by as much as 20 to 30dB. Furthermore, there is a significant reduction in pickup of atmospheric and man-made noise by virtue of this same directivity. With the flip of a switch, I often find a stateside rag-chew can be replaced by a DX station on the same frequency. The instantaneous direction-switching capability is also an asset to the contester.

From a practical viewpoint, the construction and maintenance of vertical antennas can be considerably easier than for some of the monster antennas used on the bands today.

However, proper design of phased-vertical arrays is not as simple as is commonly believed and here we will discuss why.

Design Overview

The principles of phased-array operation are straight-forward. Using a two-element vertical array as a design example here, the object is to drive each element with currents of the proper relative amplitude and phase to achieve the desired directivity and/or gain. If the currents in each element are of equal amplitude and are in phase, then broadside bi-directional operation is obtained. On the other hand, uni-directional end-fire operation results by altering the phase in one element so as to cancel radiation in one direction.

The amount of gain depends upon the element spacing and the phase difference of the currents in each element. Maximum forward gain does not usually coincide with maximum front-to-back. However, phased arrays are usually designed for the best front-to-back because enhancement in receiving capability usually outweighs the small additional gain obtained in a maximum-gain design. The largest gain for a two-element system - over 5 dB - occurs in end-fire operation with very close element spacing, but the drive-point impedances are very low, making the actual array performance very dependent upon loss resistance (particularly ground loss) in the system.

The objective in a phased- array design is to deliver current, of the correct amplitude and phase to each element, and to minimize system losses, principally ground loss. For most of the commonly used array configurations, the currents in each element should have equal amplitudes, although there are some exceptions in systems with larger numbers of elements.

Mutual Coupling

The design problem becomes complicated by the well-known phenomenon of mutual coupling between elements in an array. Briefly, the amplitude and phase of the current flowing in one element is affected by the currents flowing in other elements of the array. Changing the parameters of the current in one element causes the amplitudes and phases of current in all the other elements to also be altered. As a result, the drive-point impedance of each element will not only be different than its natural self-resonance (nominally 36 ohms or so for quarter-wave verticals with zero loss resistance), but will depend specifically on what currents are flowing in the other elements. Generally speaking, mutual coupling increases as the element-to-element spacing is decreased.

The following effects can occur: (1) The impedance of each element can differ substantially from its self-impedance. In my 80-meter array, which uses eighth-wave element spacing, impedances under 10 ohms occur in phased operation, along with significant amounts of capacitive or inductive reactance. (2) The impedances can differ from element to element. This is a natural consequence of mutual coupling - the differing current phases between elements causes the effects of mutual coupling to differ in terms of the drive-point impedances resulting at each element. (3) Close-spaced arrays are attractive because of their physically compact dimensions and, as indicated above, their high theoretical gain. However, in practice, strong mutual coupling makes them very sensitive to mistuning and other effects.

The theory of mutual coupling and how to design phased arrays in the presence of this effect were worked out in the 1930’s for application in the AM broadcast industry. Basically, proper design procedure calls for calculating the impedances of each element, taking the mutual coupling into account in the desired configuration, and designing an electrical network to drive currents of the proper amplitudes and phases into these impedances. Further discussions on this subject follow below.

Why Conventional Phasing Lines Don't Work

It has been common practice in amateur phased-array design to employ phasing lines, usually made of coaxial cable. However, these lines almost never produce the desired current phase or amplitudes, and the reason is mutual coupling.

As a result, with incorrect drive conditions, there is a degradation in both the forward gain and the front-to-back performance of an array. It is hard to generalize on how much loss results because the effects can vary widely, depending upon the particular parameters of a given installation. Usually the front-to-back is more sensitive to current-drive errors than forward gain.

The key fact, usually overlooked in many designs, is that a transmission line must be terminated in an impedance equal to its characteristic impedance in order to produce a phase shift at the load which corresponds to the electrical length of the line. There are some exceptions to the rule - for example, a half wave line always produces a 180-degree phase shift, regardless of termination impedance, and there are some other instances which do not usually occur in practice.

Therefore, a 50-ohm coaxial delay line should be terminated in a 50-ohm antenna to produce the desired phasing. At this point it is tempting to think that the solution is to first individually match each element of the array to 50 ohms and then connect the phasing lines. However, the proceeding discussion on mutual coupling shows why this won't work: a single element which is matched to 50 ohms while the other elements are not driven will almost certainly not look like 50 ohms when the elements are driven in array operation.

A Design Solution

As we discussed, the theory of phased-array antennas was developed years ago. The only problem is that because the theory is rather mathematical, it has not found its way into the amateur literature until recently. In 1983-1984, *Ham Radio* magazine ran a series of articles by K2BT on phased-vertical arrays (Ref. 1). In my opinion, these articles provide the most accurate and comprehensive treatment of the subject available in any amateur journal or handbook. Some recent work by W7EL (Ref. 2) also treats the subject, but does not appear to be widely available. The K2BT series should be required reading for any amateur attempting to design and construct a vertical phased array. It is rather technical but does provide a complete procedure for designing an array. My 80-meter array was designed in accordance with the principles given in the articles and it worked the first time it was fired up. A complete discussion of the material is beyond the scope of this article, but I will try to summarize the main results here.

First an array configuration (number of elements, the overall geometry, etc.) must be selected. Guidelines for this selection can be found in the articles. Then a series of impedance measurements are made on each vertical in the array. The results are used to calculate the mutual coupling and, in turn, the actual drive-point impedances which will result in phased operation. Knowing the element impedances, a phasing network which uses L-C (inductor and capacitor) elements can be designed to drive the elements with the correct currents. Unfortunately, the impedance measurements require the use of a laboratory-grade impedance bridge, which is an instrument not usually available to the average amateur. Commonly used inexpensive noise bridges do not have the required accuracy in most situations. Also, the mutual coupling and L-C network calculations can involve a lot of tedious math, which is better left to a computer.

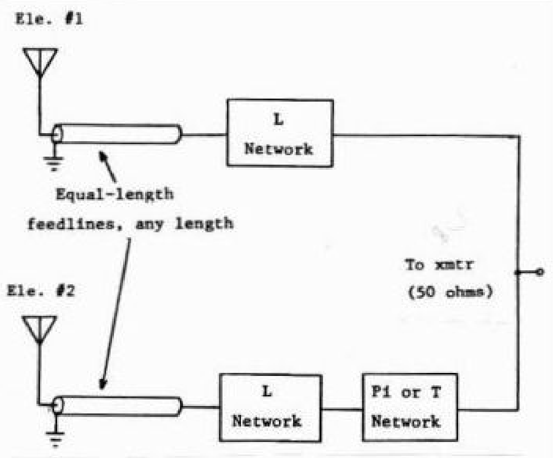

Fig. 1 Two-Element Phased Array Design

The topology of the resulting system (using a 2-element array as an example) is shown in Figure 1. Note that the elements are all fed through equal-length coaxial lines. No phasing lines are used since the phasing is achieved in the L-C networks. These networks are comprised of simple L and pi (or T) type networks which accomplish the following functions: (1) the impedances at the inputs of each coax feed er are transformed by the L networks to a value which insures that the antenna currents divide in the correct ratio for each element, (2) the pi (or T) networks provide the phase correction to achieve the proper relative current phasing in the elements, and (3) these same networks also provide a 50-ohm match to the transmitter end of the system.

For those who do not want to get involved in extensive measurements and calculations, K2BT has provided a number of complete designs of 2, 3, and 4 element phased-vertical arrays in the articles. These designs are based on textbook theory and in practice, real antennas in non-ideal environments may not confirm exactly to the theoretical results. None the less, using one of these design examples may be a good starting point for building a working system, provided one is careful about the construction and is willing to do some fine-tuning of the final product to optimize performance.

Radial Systems *for Phased-Vertical Arrays*

Part I of this Series discussed the importance of a low-loss ground radial system for vertical antennas, Efficient antenna operation will result only when enough radials have been installed to drive the ground-loss resistance to a value which is much smaller than the radiation resistance of the individual elements. These same principles apply to phased-vertical arrays. However, as indicated above, the effects of mutual coupling in a phased array can cause the impedances to differ substantially from that of a single vertical. Hypothetically, if the radiation resistance of each array element in phased-array operation are around 10 ohms (as they are in my system) and 10 ohms of ground loss exists at each element, the overall system radiation efficiency (calculated from the expression given in Part I of this series) is only 50%. An effective gain reduction of 3dB results for this array. On the other hand, a 10-ohm ground loss with a single-element vertical (which has a 36-ohm radiation resistance] results, in nearly 80% efficiency. These numbers point to the important conclusion that low-loss radial systems can be more vital to efficient operation of phased arrays (particularly close-spaced arrays) than for a single-element system. That is why I do not consider the use of over 100 radials per element in my close-spaced array to be overkill.

Finally, since a radial system is required under each element of an array, the question arises as to what to do with the radials where they overlap each other. Figure 2 gives the answer for the 2-element example. A bus wire is laid between the elements. The radial wires from the adjoining element are not allowed to overlap, but are electrically fastened to the bus wire.

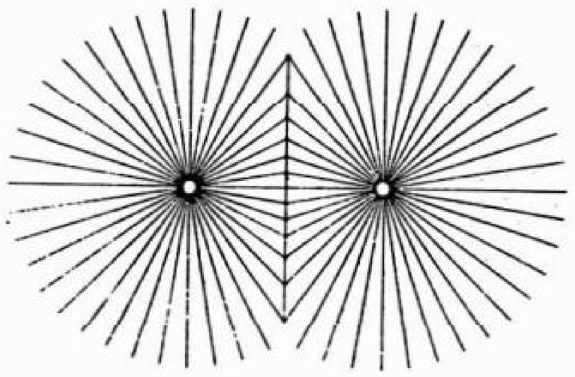

Fig. 2 Radial System for Phased Array

In conclusion, it should be apparent that properly designing a vertical phased-array can be more complicated than is usually realized because of widespread misconceptions about phased-array design, and, in particular, about use of phasing lines. (Unfortunately, the amateur literature, until recently, has tended to contribute to the misinformation). Because it is impossible to completely cover the subject in this short series of Scuttlebutt articles, serious would-be array designers should consult the references given in the two articles of this series.

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