Official Journal of
ARRL
The national association
for AMATEUR RADIO

QST

devoted entirely to
AMATEUR RADIO

January 2003

QST reviews

ICOM T90A Triband Handheld Transceiver

A Collins 75A-1 comes back around

The Tuna Tin Tube Transmitter

Vintage Amateur Radio

$4.99 U.S. $6.99 Can.
01
19260
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New IC-R5

Get winning performance with ICOM's new IC-R5. Crisp, clear audio. Super wide tuning range. A large, easy-to-read LCD display with the visual information you need – like operating status, signal strength, battery indicator, and alphanumeric naming for the 1250 memory channels (including 200 auto-write scan memories, and 25 scan edge pairs). Weather Alert keeps you informed of any weather emergencies. All in a compact, weather resistant package. ICOM. Setting a new standard in monitoring technology. See your authorized ICOM dealer today and join the winning team.

Winning Performance!

Wide Band Receive 495 kHz - 1309.995 MHz*

AM/FM/WFM. Preprogrammed TV and HOT 100 Shortwave memories. Listen to AM & FM broadcast radio stations, police, fire, military, aircraft, various amateur bands, and more.

Weather Alert A first in handheld receivers!

The weather alert function helps keep you informed of any weather emergencies, so you can respond fast. Great for when you're out in the field! (USA version only)

1250 Memory Channels With alphanumeric naming

1000 memory, 25 scan edge pairs, 200 auto-write scan memory channels (Max.100 x 18 banks). Quickly tune to your favorite frequencies!

download frequencies right from the web

www.icomreceivers.com

Large Backlit Display

Shows the receive frequency, battery indicator, relative signal strength, etc...

AM/FM/WFM

PC Programmable

Connect to your PC for programming & cloning

Optional software (CS-R5) & cable (OPC-474) are required. USB type cable (OPC-478U) is also available.

Rugged Construction

Weather resistant construction makes the 'R5 great for active outdoor operation

Large Function Keys

For user friendly operation

Internal Bar Antenna

For improved AM sensitivity

IC-R5. Join the winning team.

100 kHz - 1309.995 MHz* • 1250 Memory Channels with Alphanumeric Naming • CTCSS & DTCS Decoder • Weather Alert • External Power Terminal • Internal Bar Antenna • Ni-Cd Power • Weather Resistant Construction • Auto Squelch • PC Programmable (Optional Equip. Req.)

External DC Jack

For simultaneous charging and AC operation

Large Speaker

For crisp, clear audio

Small, Take-Anywhere Size

Dimensions: 2 1/4"W x 3 3/8"H x 1"D

Weight: 6 oz. approx.

The ICOM ADVANTAGE

Setting a new standard

www.icomamerica.com

ICOM

Happy New Year!
(it just got happier)

Icom's Holiday Sale Extended til January 31st!

Save $10 on Handheld including IC-R2, IC-R3, & IC-R10

Save $20 on IC-706MKIIG, IC-V8000, IC-2720H & IC-PCR1000

Save $30 on IC-2100H & IC-207H

Save $50 on IC-718, IC-910H, & IC-R75

Save $100 on IC-R8500

Save $200 on IC-746PRO & IC-756PROII

FREE

PS-125 with purchase of IC-756PROII
RMK-706 with purchase of IC-706MKIIG
UT-106 with purchase of IC-718 or IC-R75

Amateur & Receiver products only. This offer cannot be combined with any other special event coupon. See participating authorized ICOM dealer for details. Limit of 10 radios per person.

Happy New Year!

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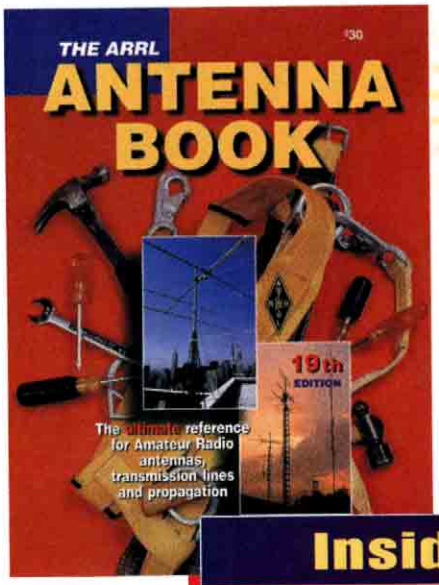
THE Antenna Reference Standard



19th edition!

THE ARRL ANTENNA BOOK

Over 40% New and Updated Antenna Theory, Design and Projects!

Antenna Supports chapter—Thoroughly rewritten. Get that monster antenna safely up your tower!

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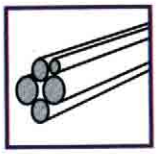
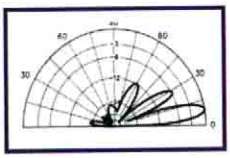
Multiband Antennas, Quad Array and **Long Wire and Traveling Wave** chapters—The power of computer modeling unlocks some performance surprises.

Broadband Antennas chapter—Years of material, finally tied together in one place.

Inside!


Antennas & Towers


Antenna Materials and Supports


Antenna Pattern Measurements


Transmission Lines


Signal Measurements

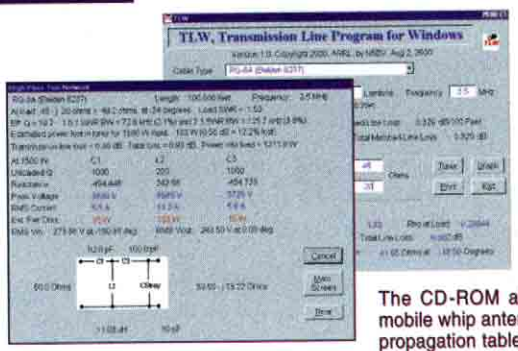

Mobile Systems

Direction Finding • Lightning Protection • Preamps • Tuners • Projects

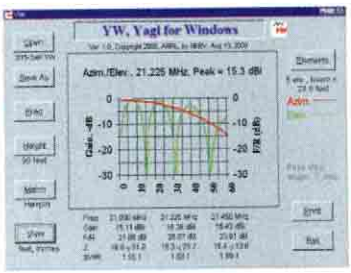
Software Included!

A CD-ROM included in the back of the book includes a wealth of software and data, including some new *Windows* programs:

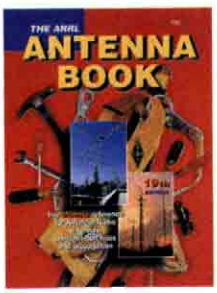
Transmission Line Program for Windows (TLW)
Analyze 32 standard types of coax or open-wire transmission lines, or "design your own" transmission line to analyze.



Yagi for Windows (YW).
Analyzes Yagis and displays front-to-rear ratio (or front-to-back) and SWR over a range of frequencies you specify.

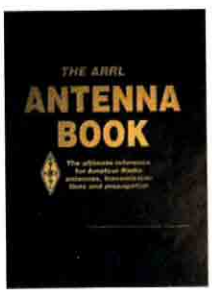


The CD-ROM also includes design and analysis software for Yagis, antenna tuners, mobile whip antennas, gamma matches, and log periodic dipole arrays. In addition, summary propagation tables are included for 155 different locations around the world for all months of the year and all levels of solar activity. **Use this data to tune in!**



The ARRL Antenna Book
Softcover.
ARRL Order No. 8047 ..... **$30**
plus shipping: $6 US (UPS).
$8.00 International (surface mail).

Sales Tax is required for shipments to CT, VA, CA and Canada.



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Features gold-embossed leather hardcover. Each book is serial-numbered, and printed in limited quantities. ARRL Order No. L804 ..... **$70**
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View, Search and Print from the entire 19th edition book! CD-ROM.
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plus shipping: $5 US (UPS). $7.00 International (surface mail).

*Some supplementary software utilities included, for *Windows* and DOS only.

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QST 1/2003

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VHF/UHF And HF/VHF Mobile Antennas– Maximum Performance Without Compromise

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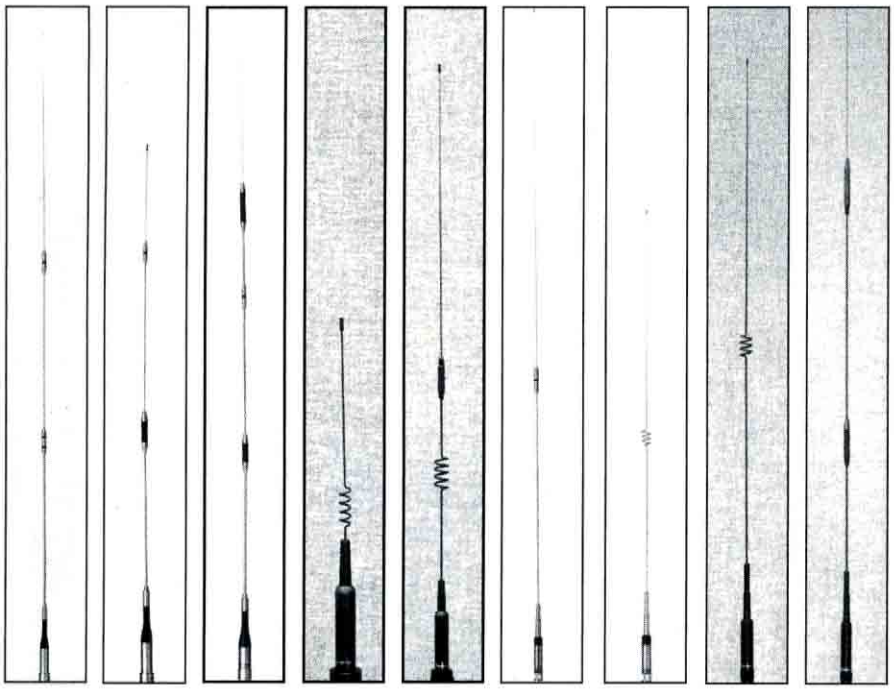

SG2000HD | SG7500A SG7500NMO | SG7900A | NR72BNMO | NR73BNMO | NR2C | NR770HA NR770HB | NR770HNMO NR770HBNMO | CR627B CR627BNMO

HV7A Mobile Antenna System

For New HF/VHF transceivers NEW!

(Such as: IC706 series and FT100)

Optional Loading Coils

HVC7	40m
HVC14	20m
HVC18	17m
HVC21	15m

Recommended Antenna Mounts: K400C or K600M

MX62M Duplexer

Specifications:
HF/6m & 2m/70cm bands
1.6-56 MHz LPF
76–470 MHz HPF
(76–120 receive only)
Watts: 600 P.E.P.
Loss: 0.2 dB LPF
0.3 dB HPF
Isol.: 50 dB

The NEW HV7A has 5 band capability: 70cm, 2m, 6m, and 2 HF bands through use of loading coils. Foldover feature allows for easy access into low overhead buildings. Ideal for users of IC706 series and FT100 radios.

Bands Supplied:	10m/6m/2m/70cm
Opt. Loading Coils:	40m/20m/17m/15m
Power, P.E.P.:	HF 120w/VHF 200w
Mount Connection:	UHF
Length:	54"
SWR:	1.5:1 nominal

MX62M

Use with HF/VHF mobile transceivers such as IC706 series, FT100, or combine 2m/70cm and HF rigs.

SPECIAL FEATURES:

- Factory pre-tuned/no adjustment
- Highest Performance antennas
- NMO and UHF (PO) base styles
- 24 Kt gold plated connector pin
- No grounding required unless noted
- Fold-over feature on most models

FOLD-OVER

Patented One-Touch Fold-over Feature
(Not available on NR72BNMO, NR73BNMO, & NR770SA.)

MODEL	BAND (MHz)	WATTS	CONN.	HT. IN.	ELEMENT PHASING
NR72BNMO*6	2m/70cm	100	NMO	13.8	1/4λ, 1/2λ
NR73BNMO	2m/70cm	100	NMO	33.5	1/2λ, 1-5/8λ
NR770HA7	2m/70cm	200	UHF	40.2	1/2λ, 2-5/8λ
NR770HNMO8	2m/70cm	200	NMO	38.2	1/2λ, 2-5/8λ
NR770RA	2m/70cm	200	UHF	38.6	1/2λ, 2-5/8λ
SG7000A*6	2m/70cm	100	UHF	18.5	1/4λ, 6/8λ
SG7500A	2m/70cm	150	UHF	40.6	1/2λ, 2-5/8λ
SG7500NMO	2m/70cm	150	NMO	41.0	1/2λ, 2-5/8λ
SG7900A*	2m/70cm	150	UHF	62.2	7/8λ, 3-5/8λ

MODEL	BAND (MHz)	WATTS	CONN.	HT. IN.	ELEMENT PHASING
NR2C	2m	150	UHF	55.5	1/2λ+1/4λ
SG2000HD*	2m	250	UHF	62.6	1/2λ+3/8λ
SG6000NMO*6,9	6m	150	NMO	39	1/4λ
CR224A*6	2m/1-1/4m	150	UHF	68.5	7/8λ, 2-5/8λ
CR320A*6	2m/1-1/4m 70cm	200 100/200	UHF	37.4	1/4λ, 1/2λ 2-5/8λ
CR627B*6,9	6m/2m/	120	UHF	60	1/4λ, 1/2+1/4λ/
CR627BNMO*6,9	70cm	120	NMO	60	2-5/8λ

1/4λ rated in dBi.

* Not recommended for Magnet Mount
6 Grounding required.
7 NR770HB same specifications but in black finish.
8 NR770HBNMO same specifications but in black finish.
9 52-54MHz only

www.rfparts.com/diamond

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QST

January 2003 ♦ Volume 87 Number 1

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See page 15 for detailed contact information.

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Technical

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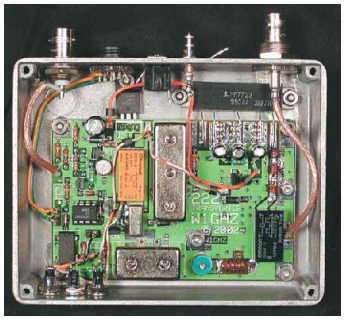

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News and Features

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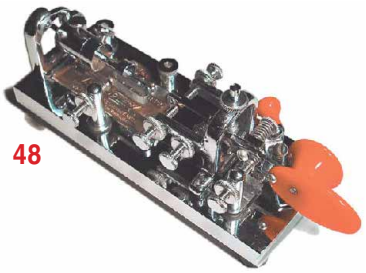
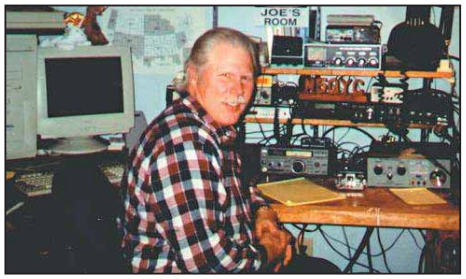
QST Workbench





Operating

Departments

Our Cover
You don't have to have a ham license dated 1932 on your shack wall to appreciate the warm glow of a tube transmitter or the workmanship of a classic bug. This issue features several articles and columns on old-time ham radio, including the story of a very special Collins 75A-1 receiver and the T5—8 W from a tuna tin. (Large photo courtesy Joel Thurtell, K8PSV.)

US & Possessions: Membership in the ARRL, including a one year subscription to *QST*, is available to individuals at $39. Age 65 and over, with proof of age, $34. Licensed radio amateurs age 21 and under and the eldest licensee in the household may qualify for the rate of $20. Life Membership, including a subscription to *QST* is available at $975.* Age 65 and over, $850.* Membership and *QST* cannot be separated. Fifty percent of dues is allocated to *QST*, the balance for membership. Subscription rate for libraries and institutions is $39 per year. Single copies $5.

International
To compensate for additional postage for mailing outside the US, the following rates apply:
Canada: Membership in the ARRL, including a one year subscription to *QST*, $49, payable in US funds. Life Membership, including a subscription to *QST* is available at $1225.* Subscription rate for libraries and institutions is $49 per year.
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*Payment arrangements available. Please write for details.

Membership without *QST* is available to the immediate family of a member living at the same address, and to anyone who is legally blind, for $8 per year.

Foreign remittances should be by international postal or express money order or bank draft negotiable in the US and for an equivalent amount in US funds.

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hy-gain Rotators

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Hy-Gain rotators are the first choice of hams around the world!

Hy-Gain's world famous Bell Shaped Rotator™ design is the standard that other rotators are measured against.

Its bell construction gives you total weather protection for super reliable operation. Its super heavy duty steel gear drive gives you years of superior and trouble-free performance. Many Hy-Gain rotators still provide excellent service after over 25 years of outstanding performance.

The last thing you want to fall apart is your rotator that's mounted on the top of your tower. You won't make any compromises when you buy and install high quality Hy-Gain rotators.

And we're the only manufacturer to offer a full line of rotators that are completely MADE IN THE USA.

HAM-IV, $559.95. *The heavy duty Ham-IV is the most popular rotator in the world!* It is designed for medium size antenna arrays up to 15 square feet wind load area when mounted in-tower, or 7.5 square feet when mast mounted with an optional lower mast bracket. New alloy ring gear gives extra strength up to 100,000 PSI for maximum reliability. New low temperature grease permits normal operation down to -30 degrees Fahrenheit. New wire-wound potentiometer gives reliable and precision directional indication, new ferrite beads reduce RF susceptibility, new Cinch plug connector plus 8-pin plug at control box (no screwdriver needed). Dual 98 ball bearing race for load bearing strength. Strong electric locking steel wedge brake prevents wind induced antenna movement. Easy-to-use Control Box has illuminated directional meter with North or South center of rotation scale, separate snap-action brake and rotation switches. Uses low voltage control for safe operation. Accepts masts up to $2^{1}/_{16}$ inches diameter. Rotator size is $13^{1}/_{2}$Hx8D inches.

T-2X, $649.95. *Extra heavy duty Tailtwister antenna rotator!* For large antennas up to 20 square feet wind load when mounted in-tower, or 10 square feet when mast mounted with optional support bracket. Triple 138 ball bearing race, strong electric locking steel wedge brake. Control Box has an illuminated directional indicator with North or South center of rotation scale, separate snap-action brake and rotation control switches. Accepts masts up to $2^{1}/_{16}$ inches diameter. Rotator size is $14^{1}/_{16}$Hx$9^{3}/_{16}$D in.

CD-45II, $389.95. *Medium duty antenna rotator.* Handles antenna arrays up to 8.5 square feet windload area when mounted in-tower, or 5 square feet when mast mounted with supplied lower support. Dual 48 ball bearing race, disc brake system. Control Box has an illuminated directional indicator with North or South center of rotation scale, separate snap-action brake and rotation control switches with disc brake release. Accepts mast sizes up to $2^{1}/_{8}$ diameter. Includes light duty lower mast support, Rotator size is $17^{3}/_{8}$Hx8 D inches.

AR-40, $289.95. *Lightweight antenna rotator.* Handles smaller ham antennas and large TV/FM antennas up to 3.0 square feet windload area when mounted in-tower, or 1.5 square feet when mast mounted using the supplied lower support bracket. Dual 12 ball bearing race, disc brake system. Silent, automatic control box -- just dial and touch for desired direction. Accepts mast sizes up to $2^{1}/_{8}$ diameter. Includes light duty mast support. Rotator size is $17^{3}/_{8}$Hx8D inches.

Call your dealer for your best price!

Rotator Specifications	T2X	HAM-IV	CD-45II	AR-40
Wind Load capacity (inside tower)	20 sq. ft.	15 sq. ft.	8.5 sq. ft.	3.0 sq. ft.
Wind Load (with mast adapter)	10 sq. ft.	7.5 sq. ft.	5.0 sq. ft.	1.5 sq. ft.
Turning Power (in pounds)	1000	800	600	350
Brake Power (in pounds)	9000	5000	800	450
Brake Construction	Electric wedge	Electric wedge	Disc brake	Disc brake
Bearing Assembly/How many	Tripl race/138	Dual Race/96	Dual race/48	Dual race/12
Mounting Hardware	Clamp plate	Clamp plate	Clamp plate	Clamp plate
Control Cable Conductors	8	8	8	5
Shipping Weight (pounds)	28	24	22	14
Effective Moment (in tower)	3400 ft/lbs.	2800 ft/lbs.	1200 ft/lbs.	300 ft/lbs.

HAM IV

$559.95
Suggested Retail

T-2X

$649.95
Suggested Retail

CD-45II

$389.95
Suggested Retail

AR-40

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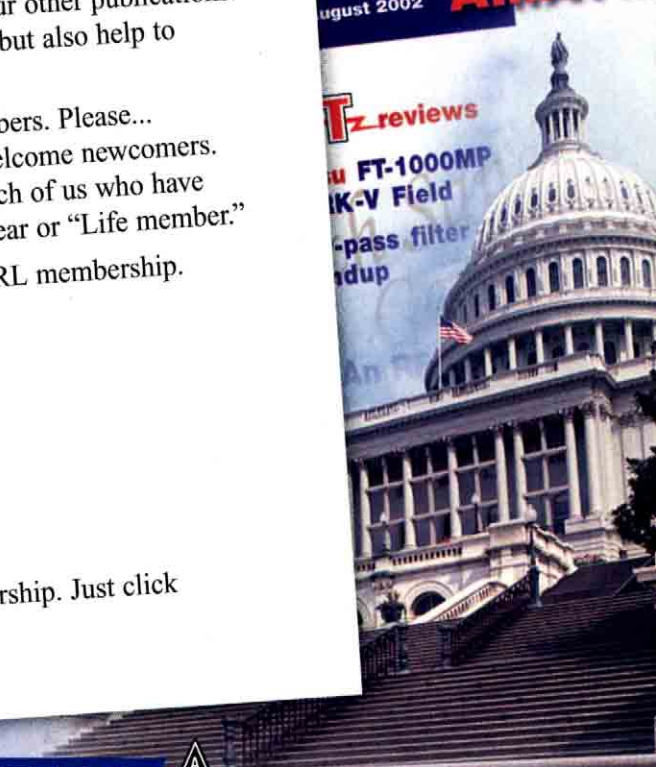

From the desk of ARRL President Jim Haynie W5JBP

To All ARRL members:

I'm writing to personally thank each of you for the many achievements you've made possible for ARRL.

As Amateur Radio operators and ARRL members, you are part of the most generous and dedicated group of volunteers to be found anywhere. It is inspiring to be associated with so many who give freely of their time and talents to help others, whether it's an emergency or helping a newcomer find his or her way in this exciting radio service.

Your reputation for helping in times of national crisis was the benchmark under which ARRL sought and received a substantial grant from the federal government. Already, this grant has enabled ARRL to train hundreds of radio amateurs in emergency communications. These skills help make our nation and homeland security even stronger.

We're delighted with the many supporters who are working to bring regulatory help and relief in important areas concerning antenna restrictions and spectrum defense.

Thanks to your membership, ARRL is able to call upon the talents of a staff whose collective skills far exceed the sum of their individual parts. Their dedication helps make every membership dollar count. They are working with each of us to make a difference in Amateur Radio–making it better, every day.

Thanks also for supporting the businesses advertised in *QST* and our other publications. They not only deliver the state-of-the-art in manufactured equipment, but also help to supplement the cost of valued membership services.

As President, I'm grateful for every single one of our ARRL members. Please... continue to give of your unique skills, your talents, and your time. Welcome newcomers. Give a gift of ARRL membership, encouraging others to join with each of us who have found an important place within this organization. Become a multi-year or "Life member."

Thank you for involvement, for your friendship, and for your ARRL membership. We appreciate your support.

Jim Haynie, W5JBP
ARRL President

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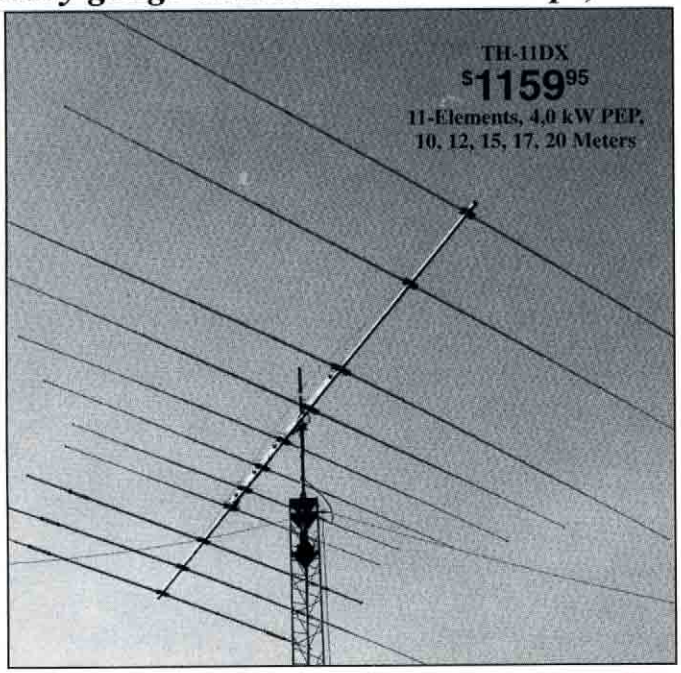
...are stronger, lighter, have less wind surface and last years longer.

Why? Hy-Gain uses durable *tooled* components -- massive boom-to-mast bracket, heavy gauge element-to-boom clamps, thick-wall swaged tubing -- virtually no failures!



TH-11DX, $1159.95. 11-element, 4.0 kW PEP, 10,12,15,17,20M

The choice of top DXers.

With 11-elements, excellent gain and 5-bands, the super rugged TH-11DX is *the "Big Daddy" of all HF beams!*

Handles 2000 Watts continuous, 4000 Watts PEP.

Every part is selected for durability and ruggedness for years of trouble-free service.

Features a low loss log-periodic driven array on all bands with monoband reflectors, BN-4000 high power balun, corrosion resistant wire boom support, hot dipped galvanized and stainless steel parts.

Stainless steel hardware and clamps are used on all electrical connections.

TH-7DX, $869.95. 7-element, 1.5 kW PEP, 10,15,20 Meters

7-Elements gives you the *highest average gain* of any Hy-Gain tri-bander!

Dual driven for broadband operation without compromising gain. SWR less than 2:1 on *all* bands.

Uniquely combining monoband and trapped parasitic elements give you an excellent F/B ratio.

Includes *Hy-Gain's* diecast aluminum, rugged boom-to-mast clamp, heavy gauge element-to-boom brackets, BN-86 balun. For high power, upgrade to BN-4000.

TH-5MK2, $759.95. 5-element, 1.5 kW PEP, 10,15,20 Meters

The broadband *five element* TH5-MK2 gives you outstanding gain.

Separate air dielectric *Hy-Q* traps let you adjust for maximum F/B ratio on each band.

Also standard is *Hy-Gain's* exclusive *BetaMATCH™*, stainless steel hardware and compression clamps and BN-86 balun.

TH-3MK4, $469.95. 3-element, 1.5 kW PEP, 10,15,20 Meters

The super popular TH-3MK4 gives you the *most gain for your money* in a full-power, full-size durable Hy-Gain tri-bander!

You get an impressive average gain and a whopping average front-to-back ratio. Handles a full 1500 Watts PEP. 95 MPH wind survival.

Fits on average size lot with room to spare -- turning radius is just 15.3 feet. Four piece boom is ideal for DXpeditions. Rotates with CD-45II or HAM-IV rotator.

Features *Hy-Gain BetaMatch™* for DC ground, full power *Hy-Q™* traps, rugged boom-to-mast bracket and mounts on standard 2"O.D. mast. Stainless steel hardware. BN-86 balun recommended.

TH-2MK3, $369.95. 2-element, 1.5 kW PEP, 10,15,20 Meters

The 2-element TH-2MK3 is Hy-Gain's *most economical* full power (1.5kW PEP) full size tri-bander.

For just $339.95 you can greatly increase your effective radiated power and hear far better!

Ruggedly constructed, top-performing, compact 6 foot boom, tight 14.3 foot turning radius. Installs almost anywhere. Rotate with CD-45II or HAM-IV. BN-86 balun recommened.

EXP-14, $599.95. 4-element, 1.5 kW PEP, 10,15,20 Meters

Revolutionary 4-element compact tri-bander *lets you add 40 or 30 Meters!* Has 14 foot boom and tight 17.25 feet turning radius. Fits on roof tri-pod, mast or medium duty tower.

Hy-Gain's *patented* broadbanding *Para Sleeve* gives you less than 2:1 VSWR. 1.5kW PEP.

BetaMATCH™ provides DC ground to eliminate static. Includes BN-86 balun. Easily assembled.

Truly *competitive against giant tri-banders at half the cost!*

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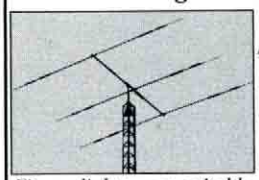
Compact 3-element 10, 15, 20 Meter Tri-Bander

For limited space . . . Installs anywhere . . . 14.75 ft turning radius . . . weighs 21 lbs . . . Rotate with CD-45II, HAM-IV



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Tooled manufacturing gives you *Hy-Gain* durability with 80 MPH wind survival.

Model No.	No. of elements	avg Gain dBd	avg F/B dB	MaxPwr watts PEP	Bands Covered	Wind sq.ft. area	Wind (mph) Survival	Boom (feet)	Longest Elem. (ft)	Turning radius(ft)	Weight (lbs.)	Mast dia O.D.(in.)	Recom. Rotator	Retail Price
TH-11DX	11	*For Gain and F/B ratio--See...*		4000	10,12,15,17,20	12.5	100	24	37	22	88	1.9-2.5	T2X	$1159.95
TH-7DX	**7**			**1500**	**10, 15, 20**	**9.4**	**100**	**24**	**31**	**20**	**75**	**1.5-2.5**	**HAM-IV**	**$869.95**
TH-5MK2	5	• www.hy-gain.com		1500	10, 15, 20	7.4	100	19	31.5	18.42	57	1.5-2.5	HAM-IV	$759.95
TH-3MK4	**3**	• Hy-Gain catalog		**1500**	**10, 15, 20**	**4.6**	**95**	**14**	**27.42**	**15.33**	**35**	**1.9-2.5**	**CD-45II**	**$469.95**
TH-3JRS	3	• Call toll-free		600	10, 15, 20	3.35	80	12	27.25	14.75	21	1.25-2.0	CD-45II	$359.95
TH-2MK3	**2**	800-973-6572		**1500**	**10, 15, 20**	**3.25**	**80**	**6**	**27.3**	**14.25**	**20**	**1.9-2.5**	**CD-45II**	**$369.95**
EXP-14	4			1500	10,15,20 opt. 30/40	7.5	100	14	31.5	17.25	45	1.9-2.5	HAM IV	$599.95

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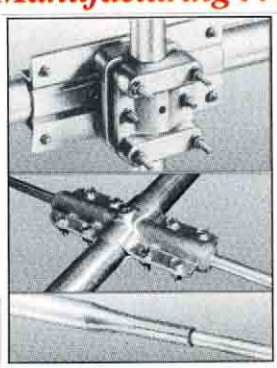

1. Hy-Gain's famous super strong *tooled* die cast *Boom-to-Mast Clamp*

2. *Tooled* *Boom-to-Element Clamp*

3. Thick-wall *swaged* aluminum tubing

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"IT SEEMS TO US..."

A Little Perspective, Please

[This month we have a guest editorial from Ward Silver, NØAX.]

Once upon a time, I recall a letter written to the ARRL (that was it...just "ARRL") by a high-school Novice asking, "Can a dipole can be made twice as long by grounding one end?" He wanted to get on 80 meters, but only had room for a 40-meter dipole. That was a dumb question, but he received a courteous reply from the ARRL technical staff with some helpful information and an article about ground-plane verticals, addressing the source of confusion in the first place. The Novice went away happy and figured out another way to get on 80 meters.

Read *QST*'s "Correspondence" column or browse the Internet and you will often see the opinion expressed with sincere concern that Amateur Radio is "dumbing down." The bands are full of rotten operating and hams who can't do more than push mike switches. Soon the service will be little more than CB. As the columnist George Will might say, "Well."

I teach Electrical Engineering lab courses at the college level and I will agree that students have a lot less hands-on experience today. Rarely have any of them built equipment. What they have instead is a bright, highly developed appreciation for complex computer-based network applications. In the old days, the focus was on what was in the box. Today, innovation is happening at the *system* level. People are not stupid; they're just doing other things.

Amateurs come from the population at large and if there is a declining interest in electronics, then that will be reflected in the new licensees. Over the past several years, I have personally tutored and examined about 30 new hams. Two were interested in electronics and only one in CW beyond just upgrading. The rest were interested in the communications potential—mostly emergency communications. All who are active I consider assets to our service.

People asking questions often don't have a convenient Elmer to help them through the rough spots we all encounter (and like to forget). If someone came up to you at a club meeting and asked a basic question about electronics or operating, how would you respond face-to-face? I recall that many old-timers cobbled together something out of a magazine and stumbled around on the air rather badly until they were rescued by a friendly local ham or club.

A couple of my son's friends came over to work the 2002 ARRL Phone Sweepstakes. One had his license, one didn't—neither knew much about electronics. Yet, after pitching in on Field Day and getting a little one-on-one coaching they now know something about operating a radio, a little about antennas, a dab of propagation and are getting exposed to stuff they would otherwise never see. While they weren't operating, we were at the bench building a new computer and doing some PL-259 soldering. It was fun for them; maybe they'll stick with it. I know one was going to go put up a dipole for the ARRL 10-Meter Contest.

Amateur Radio is approaching its 100th year. Looking back, there have been four great upheavals: spark-to-CW, CW-to-phone, homebrew-to-commercial gear and the ongoing integration of radio-PC-Internet. While each has been absolutely denounced as "The End of Amateur Radio," the service has survived and prospered in many ways. Currently, we are undergoing both a technological transformation and a demographic shift, making the necessary changes doubly important (and stressful).

Any organization or group, including the ARRL in particular and Amateur Radio in general, which is too focused on its existing constituents, is likely to stagnate. Although they seem to be doing everything right—they listen to the membership, tailoring programs and products to their tastes—the organizations wither. If I was a pilot, I would call it "controlled flight into terrain." A mature organization must continually renew itself in order to replace and expand its membership. Except in extraordinary circumstances, this requires moving beyond traditions and history.

If we want to dry up Amateur Radio for good, and quickly, I can think of no better way than to raise the barrier to entry by demanding skills that are largely disappearing from the general population. If newcomers don't have the same background and interests that we do, we can either berate them for it or help them learn what we consider important. If there is rotten operating on the air (just like there has always been), then it is up to us—you and me—to educate the newcomers (just like it has always been). The ARRL should work hard at keeping the doors to Amateur Radio wide open to a healthy influx of new hams and to provide forums in which the established amateur community can educate and lead them by example.

By the way, the Novice at the beginning of this commentary was none other than me in 1972—and the letter was from Lew McCoy, W1ICP. It was like a letter from God Himself and the League letterhead might as well have been a stone tablet. The detailed, instructive reply went a long way toward cementing my life-long relationship with Amateur Radio. I now have an engineering degree and more than 30 years of experience—largely due to getting into this marvelous avocation that has room both for newbies greener than June apples and grizzled veterans of the solder wars. Let's lighten up and figure out how to help others enjoy it. There is no higher accolade in Amateur Radio than "Elmer."—*Ward Silver, NØAX*

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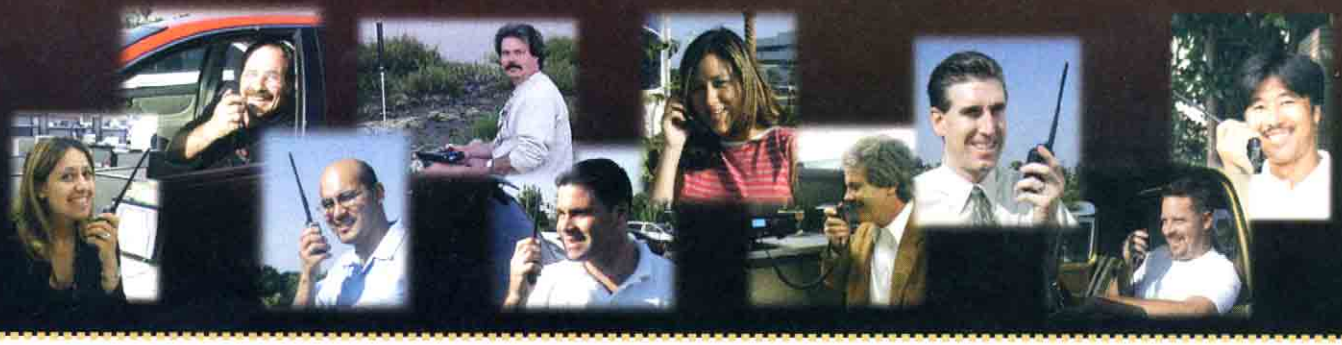

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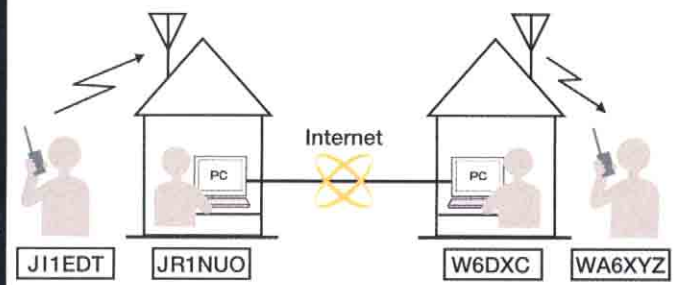
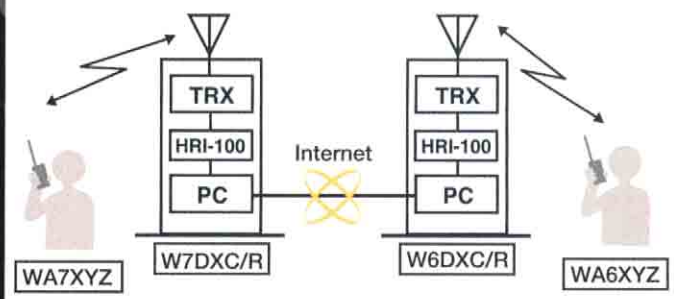


Repeater with WIRES™-II



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ARRL in ACTION

YOUR membership at work

By Dave Hassler, K7CCC, dhassler@arrl.org

ARRL Reaffirms Close Ties with the American Red Cross

The ARRL and the American Red Cross have renewed and updated the *Statement of Understanding* (*SoU*) between the two organizations, last visited in 1994.

"Both ARRL volunteers and American Red Cross workers will work cooperatively at the scene of a disaster and in the disaster recovery, within the scope of their respective roles and duties," the *SoU* provides.

ARRL President Jim Haynie, W5JBP, said the updated document reaffirms the spirit of cooperation that has existed all along between the two organizations. "In the wake of 9/11 and all the wonderful work that was done in New York City and Washington, DC," Haynie said, "this agreement has rekindled our enthusiasm." Amateur Radio Emergency Service and Red Cross volunteers worked side-by-side following the September 11, 2001, terrorist attacks.

ARRL President Jim Haynie, W5JBP (left), and American Red Cross Disaster Services Executive Vice President John McDivitt shake hands after signing the updated *SoU* between the ARRL and the ARC.

In the document, the ARRL recognizes the American Red Cross as "having primary responsibility for responding to domestic disasters" and expresses the League's desire "to maintain a harmonious and cooperative relationship" with the ARC in providing emergency communication services.

Among other things, the *SoU* calls for each organization to "share current data" regarding disasters and disaster declarations. The new agreement also characterizes the ARRL Amateur Radio emergency communications courses as a mutually beneficial training program. "Volunteers holding valid ARRL Emergency Communications Certification credentials will be recognized for this knowledge," the *SoU* states.

The *SoU* will remain in force for the next five years, with one provision calling for representatives of American Red Cross Disaster Services and ARRL to jointly evaluate progress in implementing the SoU and to "revise and develop new plans or goals as appropriate" annually. A copy of the ARRL-ARC *Statement of Understanding* is available on the ARRLWeb, **www.arrl.org/FandES/field/mou/redcro.html**.

Antenna Inquiries Top TIS' 14,000 Questions

Putting RF into the sky efficiently and effectively are primary concerns for all Amateur Radio operators, a fact reflected in the number of antenna questions the ARRL Technical Information Service answered in 2002.

TIS Coordinator Al Alvareztorres, AA1DO, said that "the great preponderance of questions—over 50 percent—have to do with antennas and the rest are on about 50 different topics." Other major areas of inquiry were RFI and equipment troubleshooting, he said. TIS handled approximately 14,000 questions during 2002, or about 54 a day. Of the total, nearly 10,000 were submitted by e-mail, while another 3000 came in over the phone.

Alvareztorres pointed out that a wealth of information is immediately available on the ARRLWeb at **www.arrl.org/tis**. There, members can browse hundreds of topics and thousands of articles and find fast answers to many sticky questions.

WRC-2003 Preparations Shift into High Gear

Preparations for next year's World Radiocommunication Conference (WRC-03) dominated discussions during the annual meeting of the International Amateur Radio Union (IARU) Administrative Council November 7-8 in San Marino.

The IARU reviewed WRC-03 agenda items of importance to amateurs, including harmonization of amateur and broadcasting allocations in the vicinity of 7 MHz. ARRL Chief Executive Officer David Sumner, K1ZZ, acting in his capacity as IARU Secretary, attended the San Marino session.

Other WRC-03 agenda items of concern to the amateur community include possible revision of Article 25 of the international *Radio Regulations,* which includes the current requirement to demonstrate Morse code proficiency. During its San Marino session, the Council affirmed its policy supporting the removal of Morse code testing as an ITU requirement to obtain an amateur license to operate on frequencies below 30 MHz—a position adopted in October 2001 at its last annual meeting.

In other business, the IARU Administrative Council expressed concerns that radiation from power line communications (PLC) could interfere with Amateur Radio reception and urged member-societies to recognize the importance of studies now under way and to share information on investigations conducted in their respective countries.

Also attending the Council meeting were IARU President Larry Price, W4RA; Vice President David Wardlaw, VK3ADW; regional representatives Lou van de Nadort, PAØLOU, Tim Hughes, G3GVV, Ole Garpestad, LA2RR, Pedro Seidemann, YV5BPG, Rod Stafford, W6ROD, Fred Johnson, ZL2AMJ, Peter Naish, VK2BPN, and K. C. Selvadurai, 9V1UV; and Recording Secretary Paul Rinaldo, W4RI.

ARRL Outgoing QSL Service Volume Up

Toward year-end, the ARRL Outgoing QSL Service reported that volume during 2002 was up by more than 6 percent over the same period in 2001. The Service has sent out literally tons of members' cards all over the globe, and hoped to top two million QSL cards at year's end. That failed to happen in 2001 after card volume slowed drastically late in the year because of the anthrax scare. As of November 15, the Bureau had shipped 1,738,000 QSLs to DX stations from members in 2002.

QSL Service Manager Martin Cook, N1FOC, said the stream of cards ebbs and flows from week to week, but always numbers in the tens of thousands. "Last week, we handled 53,000 cards and some weeks a lot more," he said. "We ship out every two weeks, and nothing sits here over 90 days, no matter how few cards are in a slot." The bureau also takes care of 40 to 50 pounds of *incoming* cards a week—many of them from Russia and the other nations of the Commonwealth of Independent States. Aside from sorting cards, boxing them up and shipping them, Cook and his assistant, Heather Dzamba, handle up to 70 e-mails and phone calls daily, answering questions from members about the Service's procedures, card routing, and incoming bureaus.

Hoping for two million: ARRL outgoing QSL Service Manager Martin Cook, N1FOC, responds to a member's e-mail, while his assistant, Heather Dzamba, files a stack of cards bound for England.

Contest Branch Issuing Redesigned Certificates

The ARRL Contest Branch has begun issuing newly designed certificates for various ARRL-sponsored contests. The League began sending the new certificate designs to qualified operators starting with the December 2001 ARRL 160-Meter Contest.

"They replace a design that has been in use by the ARRL for at least the past 20 years," ARRL Contest Branch Manager Dan Henderson, N1ND, said. Part of the redesign involved reformatting the certificates from a "landscape" (horizontal) to a "portrait" (vertical) layout.

The ARRL November Sweepstakes certificate features an attractive red, white and blue design and incorporates the popular outline map of the US and Canada that has been used on Sweepstakes plaques. The "globe" icon now found on the International DX Contest plaques highlights certificates for other HF events.

VHF/UHF/Microwave contest certificates incorporate a larger dish antenna as a background motif. While the criteria for winning an award vary among the various operating events, certificates normally go to the top-finishing station in each category from each ARRL/RAC section and DXCC entity.

Looking for Expanded Contest Results, Section News?

You'll find contest line scores, soapbox comments, tables, analysis and photos at **www.arrl.org/contests/results**.

Looking for news from your section—or anyone else's, for that matter? You'll find what you're looking for at **www.arrl.org/sections**. No Web access? We'll be glad to mail you a copy of your section news. Just drop a note to Steve Ewald, WV1X, 225 Main St, Newington, CT 06111.

Bulletin Board

♦ **Maximize your public relations efforts with new presentations:** Thanks to the efforts of ARRL Public Relations Committee member and Santa Barbara Section Public Information Coordinator Jeff Reinhardt, AA6JR, the ARRL offers two new *PowerPoint* presentations to help field volunteers get the most out of their public relations programs. Both presentations are on the PR Department Web site, **www.arrl.org/pio**. The presentation "How to be a Media Relations Superstar" is packed with pointers to guide you in successfully promoting Amateur Radio in your area, while "100 Great Publicity Ideas for your Amateur Radio Club" speaks for itself. Check them out to help build positive public awareness about Amateur Radio all year long!

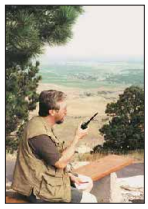
♦ **New on-line edition of *The ARRL Public Information Officer's Handbook*:** A new on-line edition of *The ARRL Public Information Officer's Handbook* debuted recently to rave reviews. The latest edition now is available on the ARRLWeb, **www.arrl.org/pio/handbook**. Formerly a hard-copy publication, the new PIO *Handbook* is a 12-chapter manual packed with helpful advice for anyone interested in promoting Amateur Radio. The League's Public Relations Committee has been developing the new Web-based manual, based in part on a previous publication by Gene Pressler, W3ZXV.

The PIO *Handbook* is perfect for ARRL Public Information Coordinators, Public Information Officers, club PIOs and anyone with the desire to help raise public awareness—predominantly via the media—about Amateur Radio in their communities. The PIO *Handbook* covers basics such as how to identify what is news and how to write a press release, as well as how to write for magazines, how to deal with major breaking stories, the how-tos of media interviews and much more.

"Because this is a Web document, we'll easily be able to add information and keep the PIO *Handbook* timely," said ARRL Media Relations Manager Jennifer Hagy, N1TDY. "I hope our PR volunteers find this to be a useful tool in their efforts to provide a very important service for the League and also for Amateur Radio on the local level."

Guide to ARRL Member Services

ARRL, 225 Main Street, Newington, CT 06111-1494



www.arrl.org/services/ 860-594-0200

Technical and Regulatory Information Services

A wealth of problem-solving information is available to you on the ARRLWeb at **www.arrl.org/tis/**. Can't find the answer there? Call the Technical Information Service at 860-594-0214 from 9 AM to 4 PM Eastern Time, or e-mail **tis@arrl.org**.

Do you have a question about FCC Rules or local antenna restrictions? See the Regulatory Information Branch on the Web, call 860-594-0236 or e-mail **reginfo@arrl.org**.

ARRLWeb www.arrl.org

Log on for news, information and ARRL services. Members have access to special ARRL Web site features. Place free classified ads. Download and view *QST* product reviews and search the on-line periodicals index.

ARRL E-mail Forwarding

Life in cyberspace is easier when you have your own **arrl.net** e-mail address. When you switch Internet Service Providers, all you have to do is let us know and we'll change your e-mail forwarding automatically. You're spared the hassle of having to tell everyone that you've changed addresses! Sign up on the Web at **www.arrl.org/members-only/emailfwd.html**.

ARRL News

The ARRL News service is the most credible source of news for the amateur community. Breaking stories are available on the ARRLWeb. You can also listen to ARRL Audio News on the Web, or by telephone at 860-594-0384. Do you have a news tip? E-mail **n1rl@arrl.org**.

QSL Service

The most economical way to send and receive QSL cards throughout the world is through the ARRL QSL Service.

Educational Materials

A complete line of educational materials are available to schools, clubs and individuals.

Insurance

The ARRL "All Risk" Ham Radio Equipment Insurance Plan provides protection from loss or damage to your amateur station and mobile equipment by theft, accident, fire, flood, tornado, and other natural disasters. Antennas rotators and towers can be insured too. Call 860-594-0236.

DXCC/VUCC

The DX Century Club and VHF/UHF Century Club award programs are among the most popular Amateur Radio awards in the world.

Volunteer Examiner Coordinator (VEC)

Are you looking for a place to take your license exam? Do you have questions about the examination process? The ARRL VEC network is the largest in the nation.

ARRL Foundation

This is your source for scholarships and other financial grant programs to support Amateur Radio. See **www.arrl.org/arrlf/** on the Web or call 860-594-0230.

Write for *QST*

We're always looking for articles of interest to amateurs. See our Author's Guide at **www.arrl.org/qst/aguide/**. If you have questions, or wish to submit an article for consideration, send an e-mail to **qst@arrl.org** or simply mail your article to *QST* c/o ARRL Hq.

Interested in Becoming a Ham?

Phone toll free 1-800-326-3942, or e-mail **newham@arrl.org**. We'll provide helpful advice on obtaining an Amateur Radio license. See **www.arrl.org/hamradio.html**.

We're at *your* Service

ARRL Headquarters is open from 8 AM to 5 PM Eastern Time, Monday through Friday, except holidays. Call **toll free** to join the ARRL or order ARRL products: **1-888-277-5289** (US), M-F only, 8 AM to 8 PM Eastern Time.

If you're in Connecticut, stop by ARRL Headquarters for a visit and tour. Located at 225 Main St, Newington, CT 06111, HQ offers tours at 9, 10 and 11 AM, and 1, 2 and 3 PM Monday through Friday, except holidays. Bring your license and operate W1AW anytime between 10 AM and noon, and 1 to 3:45 PM.

If you have a question, try one of these ARRL Headquarters departments . . .

	Contact	*Telephone*	*Electronic Mail*
Joining ARRL	Membership Desk	860-594-0338	**membership@arrl.org**
***QST* Delivery**	Circulation Desk	860-594-0338	**circulation@arrl.org**
Publication Orders	Sales Desk	860-594-0355	**pubsales@arrl.org**
Regulatory Info	John Hennessee	860-594-0236	**reginfo@arrl.org**
Exams	VEC	860-594-0300	**vec@arrl.org**
Educational Materials	Educational Services	860-594-0267	**ead@arrl.org**
Contests	Dan Henderson	860-594-0232	**contests@arrl.org**
Technical Questions	ARRL Lab	860-594-0214	**tis@arrl.org**
DXCC	Bill Moore	860-594-0234	**dxcc@arrl.org**
Awards/VUCC	Eileen Sapko	860-594-0288	**awards@arrl.org**
Development Office	Mary Hobart	860-594-0397	**mhobart@arrl.org**
Advertising	Advertising Desk	860-594-0207	**ads@arrl.org**
Media Relations	Jennifer Hagy	860-594-0328	**newsmedia@arrl.org**
QSL Service	Martin Cook	860-594-0274	**buro@arrl.org**
Scholarships	Mary Lau	860-594-0230	**foundation@arrl.org**
Emergency Comm	Steve Ewald	860-594-0265	**emergency@arrl.org**
Clubs	Field Services	860-594-0267	**clubs@arrl.org**
Hamfests	Gail Iannone	860-594-0262	**hamfests@arrl.org**
Write for QST	Joel Kleinman	860-594-0273	**qst@arrl.org**

Can't find the department you're looking for? Call 860-594-0200 or e-mail **hq@arrl.org**.

Sending e-mail to any ARRL Headquarters staff member is a snap. Just put his or her call sign (or first initial and last name) in front of **@arrl.org**. For example, to send mail to Martin Cook, QSL Service Manager, use **n1foc@arrl.org** or **mcook@arrl.org**. And, if all else fails, send a message to **hq@arrl.org** and it will get routed to the right person or department.

ARRL Division Directors

As an ARRL member, you elect the directors and vice directors who represent your division on ARRL policy matters. If you have a question or comment about ARRL policies, contact your representatives at the addresses shown.

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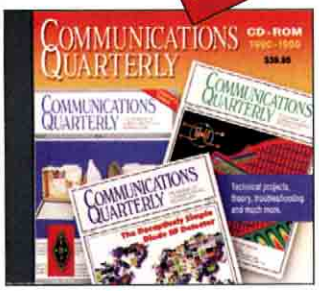

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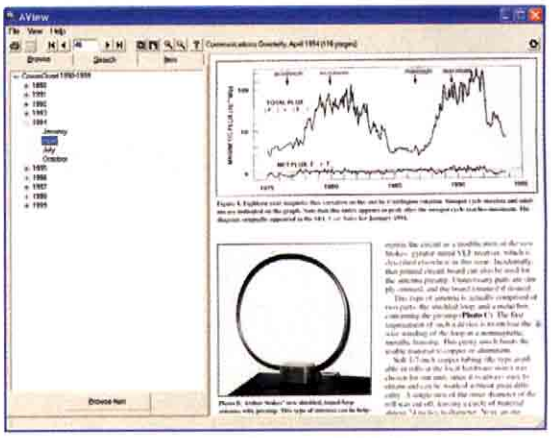

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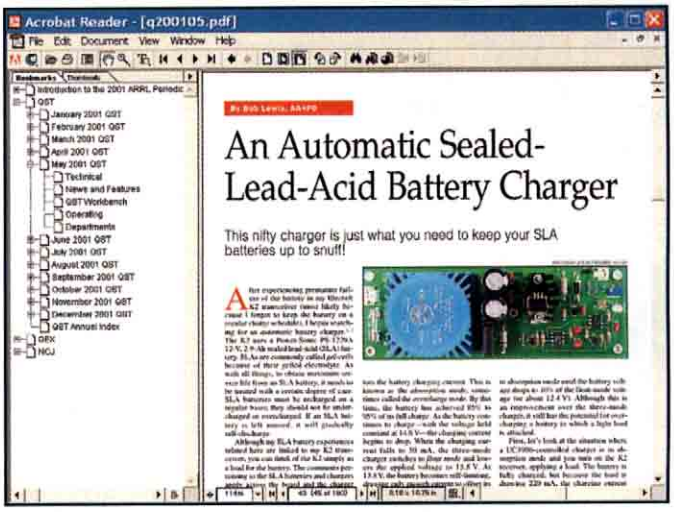

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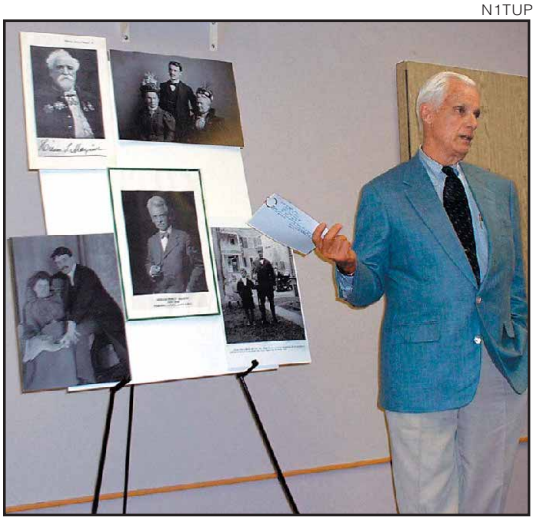


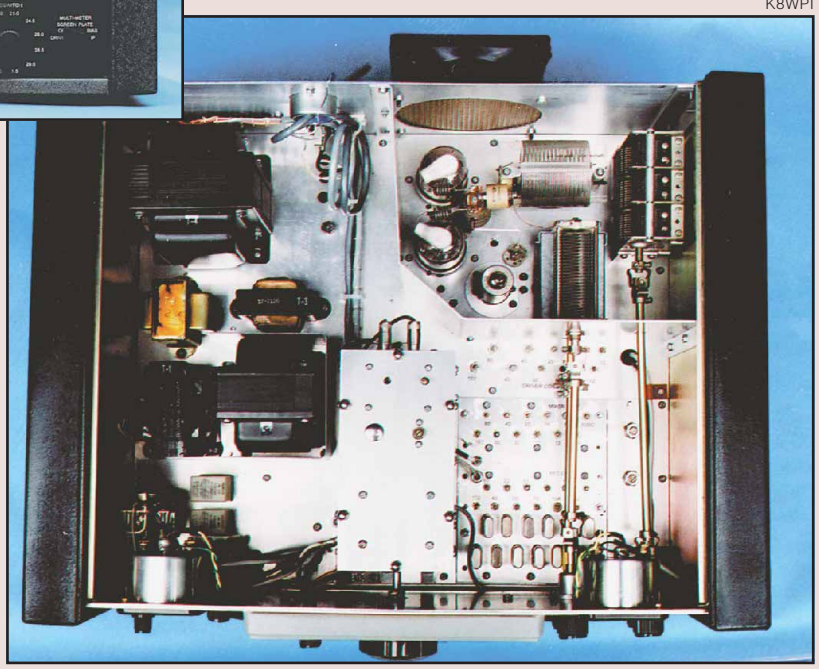
The Old Man's grandson visits Newington: Hiram Percy Maxim II, of Lyme, Connecticut, discussed his famous great-grandfather (Sir Hiram Maxim) and grandfather (Hiram Percy Maxim, cofounder of the ARRL), at the October meeting of the Newington Amateur Radio League. Although he describes himself as mechanically inclined, HPM II is not a ham. At the meeting, he characterized HPM's motivation for invention as altruistic—he invented the famous Maxim silencer so he wouldn't disturb those who lived near the gun range where he enjoyed target shooting.

K8WPI

Four years in the making: K8WPI's homebrew transmitter, based on a 30-year-old design.

The innards of the painstakingly designed transmitter reveal it to be a work of art.

K8WPI



A new vintage transmitter: James Buchanan (JeRB), K8WPI, of Kalamazoo, Michigan, spent two years just digging for parts for his "new" transmitter, inspired by the T-9er from early *1970s ARRL Handbooks*. The entire project took four years. JeRB writes: "The unit features a Vackar VFO offering linear tuning of 500 kHz band spread on 12 bands, all current and planned HF amateur bands. A 'vintage' transmitter that can hold its own in today's crowded bands and against receivers with 250 Hz filters places unique requirements on stability and frequency agility. It is now my primary transmitter. A matching antenna tuner and 12, 17 and 30-meter converter for use with a vintage receiver complete the station. It is a hoot!"

Former astronaut meets South Carolina scouts: In late September, former space shuttle astronaut Frank Culbertson, KD5OPQ, met with scouts from Troops 555 and 249 in Greenville, South Carolina. It was a special thrill for the scouts, as they had contacted Culbertson in October 2001 while he was in orbit aboard the International Space Station. While he was in Greenville, Culbertson also spoke at Wings Expo 2002, a NASA-sponsored exhibit that included a demonstration Amateur Radio station.—*Jim Stewart, WA4MVI*

JIM STEWART, WA4MVI

At left, former NASA astronaut Frank Culbertson, KD5OPQ, addresses Wings Expo 2002 in Greenville, South Carolina. At right, he meets with a group of Greenville scouts who had spoken with him while he was aboard the International Space Station.

W4LHH

Lew Howard, W4LHH, now of Loganville, Georgia, shared this photo of his first station, in Shenandoah, Iowa. As he describes the circa 1934 equipment lineup: 59 tri-tet oscillator, 210 buffer, WE-212D final on 40 meter CW, TPTG 211 on 20 meters. "Many of the parts were given to me as castoffs by W9CIJ, chief engineer of a local radio station."

W6SJ—and his original keyer—are back after half a century: Randy Johnson, W6SJ, of Corona del Mar, California, was recently licensed again—after a 50 year hiatus. As he tells it:

"I was first licensed as a 14 year old kid in 1951 as WN1UNG, and soon thereafter as W1UNG. Let it all go when I went off to college a couple of years later. I became interested in getting active again and was licensed again 50 years later in December 2001.

"My original shack was a Hallicrafters SX-40 rcvr, an 80-m 5-W crystal controlled xmtr and an ARC-xx for 40 m. I was a regular key pounder, but as speed got up above 20 wpm, it was hard, even for my young reflexes. A neighbor sold me his homebrew keyer, perhaps for $10 (minimum wage was probably 25 cents per hour back then). It and the paddle were the only pieces of equipment I kept, probably because they were small—they went into a box that I kept dragging around."

The paddle, along with the keyer, are all that's left of WN1UNG's station from the early '50s.

The keyer sold to young WN1UNG by a neighbor.

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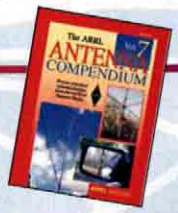

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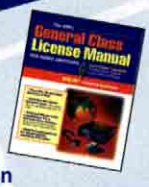

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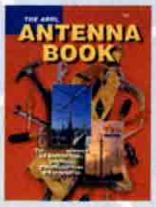

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MORE ON THE COOPER LOOP

♦ I enjoyed the Copper Loop for 2 meters in the December 2002 *QST*. While Mr Stroud did a fine job in the presentation, it should be noted that the design has been done before. I published an almost identical design on the eHam Web site in 2000 at: **www.eham.net/articles/1264**. There is also an article on a 6 meter version, and 80/160 receiving loops. Kits of the hard to make machined parts are offered for the homebuilder. It's nice to see homebuilding still alive and well in our hobby, and I encourage everyone to try to make something for his shack with his own hands.

QST has always offered a mix of complicated and simple homebrew articles, so there is probably a project geared to everyone's present level. On the electronic construction projects, printed-circuit boards make things neat and easier, but are by no means absolutely needed. Many other methods of circuit construction allow quick and effective wiring, not the least of which are point-to-point wiring.

There is nothing quite so satisfying as a QSO that includes the words: "...and the rig here is homebrew, OM."—Happy Homebrewing!—*George "Geo" Dowell, KØFF, New London, Missouri*

ECHOES OF "QST DE W1AW"

♦ I just made my contribution to the W1AW endowment fund. How could I not? The headquarters station of the American Radio Relay League was a key factor in developing my radiotelegraph skills some 36 or so years ago. I can remember many evenings monitoring W1AW code practice sessions on my HA-226 general coverage receiver, with a pair of extremely painful earphones clamped onto my head. "*QST QST de W1AW...*" I'll never forget the feeling of picking up that call. As I copied its great CW signal, I could envision the station as it was in those days, from the photos of it in several ARRL publications. And talk about a great CW call sign: I pity you folks who haven't experienced its beautiful cadence...such music to my ears!

I eventually passed the novice exam, administered by my dear Uncle Joe, K1AWP (A1 Operator), in the spring of 1967. That summer I fired up the old Hallicrafters HT-17 transmitter, "rockbound" on 3.714 MHz, and with my S-85 receiver began to explore my new world. Within the year a QSO was made with W1AW. The QSL is still with me to this day and is one of my prized possessions.

Since those days I have made more than a few visits to W1AW and operated the station. It is one of my favorite road trips in the fall. You folks that live far off are missing something! There's nothing like a fall motor trip down through the back roads of central Connecticut and in to Newington. When I turn in at 225 Main Street, that beautiful little building with the call **W1AW** over the door with the little "lightning bolts" between each character stands proudly on its little hill, beckoning me as if to say... **"where you been OM? It's been a while...come on in!"**

I am always warmly greeted by the station managers, who immediately set me up to operate the station. I typically work CW, getting great pleasure when I work DX stations, giving them the QTH as "ARRL HQ USA." I usually operate as long as possible: right up until late afternoon, when the staff preps the station for its evening tasks.

W1AW is a living memorial, honoring both Hiram Percy Maxim and his efforts to advance Amateur Radio around the world, and the ARRL itself: an organization which, through its many publications, helped me develop self-teaching skills that I have applied to numerous other endeavors. Because of this the ARRL has been sort of my alma-mater, with W1AW its "ivied hall."

I urge my fellow radio amateurs from the United States and even from around the world to contribute to this fund, and if possible to make a trip down to Newington to operate the station. Your contribution is going toward a great cause...who knows, perhaps some 12 year old is tuning in to W1AW right now getting some inspiration just as I did (and perhaps you did too)!—*Michael E. Amaral, N1MX, Walpole, Massachusetts*

END OF AN ERA

♦ I was very disappointed to learn of the demise of the "Flying Horse" *Radio Amateur Callbook* after 82 years in business. The *Callbook*, and especially its famous logo of Pegasus charging through the clouds with lightning flashing from his hooves, was one of the great attractions of ham radio for me when I entered the hobby in 1962.

But he's still out there, flashing and thundering through the clouds, eyes blazing, snorting through flared nostrils like a locomotive.

May it ever be so!—*Keith Kunde, K8KK, Independence, Ohio*

BE PREPARED!

♦ This past year on June 15 was the first of our fires, a huge grass fire called the Borel fire that swept over the hills from near Highway 178 into the Bodfish area about three miles from Lake Isabella, California. My wife Martha (Marty, KC6RIZ) and I had just finished our Red Cross training. Jack Lemaster, WB6ECB, an old-timer with the Red Cross passed the word to us that since several homes were threatened in this mountainous area, the Fire Department had requested us to set up an evacuation center.

Fortunately we had installed 2 meters in the disaster response truck, as the phones went down right away and the cell phone relay point was so jammed with calls that it was closed off for emergency responders only. With the use of our repeater, which services the Kern Valley, we were able to set up at the local community center. We were there all night before we were relieved by others in the Kern County Chapter of the Red Cross who came from Bakersfield, 47 miles away and its surrounding communities. Six homes were destroyed and we used our new knowledge to help several people get back on their feet.

It would seem that this would be the end of the story; after all, it was the biggest fire in at least 10 years.

Nooo. A little over a month later on July 21 some kids were playing camping in a gully. The wind swept the fire up Bodfish Canyon and over the hills and down toward Lake Isabella, eventually burning 47 homes and 83 structures. It moved so fast that most people barely got out with their lives. My wife and I did some damage assessment in the area and it was like going into a war zone. There were only two homes still standing. We

set up an evacuation center again as people poured into the same area that we had been in only a month before. This time the phones were out for about two weeks, Thank God for ham radio. It wasn't long before Jim Holloman, KE6BKV, showed up on the scene to activate the local ARES team. One man who had tried to save his home showed up with bad burns and he was sent to the local hospital. A month later, we were still seeing to the needs of many of the people who had lost everything.

We learned that it is important to be prepared even though you have just gone through a natural disaster—the next one could be just around the corner.

To all hams who are prepared to serve, my highest respect. We will be ready for the next emergency and I know that you will too. It's a great thing to be a part of the Amateur Radio Team.—*Donald Jefferson, KC6OCA, Bodfish, California*

INDISPENSIBLE

♦ I look at no. 1, being a member of the ARRL and reading *QST*. And no. 2 is owning *The ARRL Handbook*—it is worth the price many times over. So if you don't own one, check out your local library. I would think that all radio clubs would make sure their local library had one. —*Fred Jones, WA4SWF, ARRL Assistant Section Manager, Louisa, Kentucky*

PCs RULE!

♦ In the October 2002 issue of *QST*, VA3SMM [Correspondence, p 24] laments the lack of software for the Mac and Linux. In the past, we have offered a number of Mac-based programs for sale and none has ever been successful. We have also worked with developers who were trying to rewrite DOS programs for the Mac especially for contesting. They all gave up for two reasons: programming for the Mac is not easy, and a lack of demand.

The reason PC-based software has been so popular is that programming in DOS is not all that difficult. One program that stands out is *NA* by K8CC. Dave's program is a tight, well-written DOS program that will work on machines from the very old 8088XT processor to the new lightning fast Pentium processors.

I'll soldier on with DOS and play with Windows-based programs. But I can't leave without taking a "gratuitous slap" at Apple. Apple loves to poke fun at Microsoft and their programs. Just remember, Apple gave us the Mac with an 8-inch screen and told us to take it or leave it… they knew better than we did. What gets forgotten in the Mac vs PC controversy is that the computer is a tool. You use the tool that meets your needs in the most cost-effective way.

The DOS-based PC meets more Amateur Radio needs than the Mac ever will.—*J. Craig Clark, K1QX, Radioware and Radio Bookstore, Rindge, New Hampshire*

AMPUTER RADIO

♦ Amateur Radio no longer exists. "Amputer Radio" replaced it, like cars replaced trolleys.—*Ed Jones, WB2DVL, Highland Park, New Jersey*

WHO'S LISTENING ON 146.520?

♦ I have read in the pages of *QST* the controversy surrounding the National Simplex Calling Frequency of 146.520 MHz. Having a reserved calling frequency is a great idea for the marine band, but may not be so good for today's ham operator.

Now it is time to ask the questions: If 146.52 is to be reserved for persons making calls, then who are they going to be calling? If the QSO in progress has moved off to another channel, how is the caller going to find it?

If 146.52 MHz is working like Marine Channel 16 in your part of the world, don't change a thing. But please understand that the local customs where you travel might be different. If you want to call someone when you pass through this part of Florida, use the National Simplex Calling Frequency. The friendly folks who listen will gladly interrupt their QSOs and lend assistance.—*Tim Madden, KI4TG, Palm Bay, Florida*

CONSIDERATION AND COURTESY

♦ These are two words that are ignored when contests occur on the ham bands. It is almost like road rage—some contesters jump on the air with mega power and don't seem to pay attention to who is there or close by. The hams who enjoy talking to people do not have a chance on contest weekends to talk to their friends. Many nets have been interrupted or canceled by contesters on top of or close by active nets. Very seldom do they ask if the frequency is in use before they put out a call. Most of the contesters I've encountered are very aggressive, demanding, rude and downright obnoxious.

There needs to be a wakeup call for consideration and courtesy for your fellow hams. The frequencies should be shared by all hams and not stop all use except for contests. Contests are good for ham radio to encourage more on the air activity and broaden the scope that hams operate in. With some consideration and courtesy, all parties can operate and enjoy ham radio.—*Carl Raish, KG0HS, Denver, Colorado* QST

It Doesn't take a DIRECT HIT!

Dangerous static charges measuring 1000s of volts can be developed from local thunderstorms, high wind driven snow or sand; so potent, they can actually puncture the dielectric of coaxial cable. Solid-state transceivers and other equipment in your hamshack are very vulnerable to these high-voltage charges so you should take every precaution to protect your equipment and shack from possible serious damage... and, ALPHA DELTA has the answer!

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$599

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By Phil Salas, AD5X

A Compact 100-W Z-Match Antenna Tuner

The nice thing about the Z-Match tuner is that it will match just about anything on the HF bands and it uses only two controls. Here's a 100 W version using toroid inductors.

After reading about Z-Match antenna tuners for quite a while, I eventually capitulated and bought an Emtech ZM-2 QRP Z-Match tuner kit.[1] After building it to go along with my Yaesu FT-817, I became a real believer in the Z-Match design. The folks who use these tuners speak very highly of them, but it had always appeared to me that acquiring the necessary air-wound inductors and variable capacitors for a higher power (100 W) version was more trouble than it was worth. In addition, air-wound inductors implied larger enclosures and I was interested in a tuner that was compact enough for me to easily take along with my portable HF setup that used an ICOM IC-706.

I later discovered an excellent article on Z-Match tuners by Charles Lofgren, W6JJZ.[2] In that article, the author suggested using a toroidal core inductor. This idea effectively solved the inductor size problem for me. I then found that 440 pF (per section) variable capacitors were available from Fair Radio Sales.[3] Similar capacitors are available from other sources, although it might take a bit of hunting. All of my excuses for not building a 100 W version of the Z-Match had vanished!

Construction

The final circuit shown in Figure 1 is based on W6JJZ's article, with the output transformer changed to a single 8-turn output link. Also, 440 pF per section variable capacitors were used for C1 and C2. So far, I haven't found anything I can't match and that's from 80 through10 meters!

I built the tuner in a 5¼×3×5 inch (HWD) aluminum box. Toroid L1 is supported by its own leads, as shown in Figure 2. Some hot glue is used between this inductor and the frame of C2, one of the variable capacitors. I also put a little hot

[1]Notes appear on page 30.

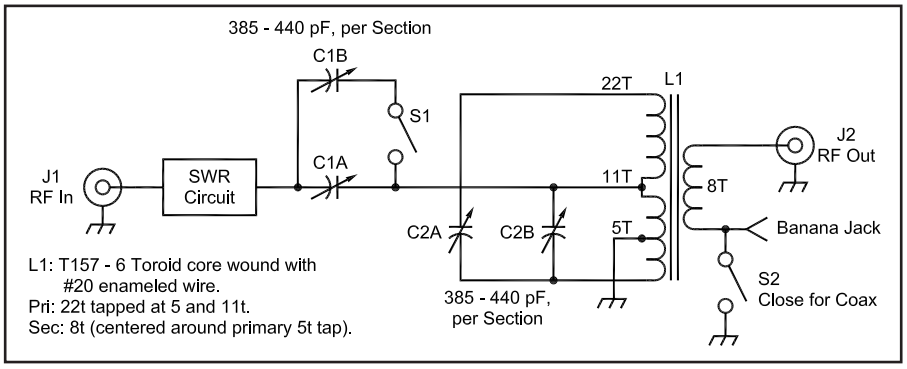


Figure 1—Schematic of the 100-W Z-Match tuner. AA = Amidon Associates (www.amidon-inductive.com); RS = RadioShack (www.radioshack.com); FRS = Fair Radio Sales (www.fairradio.com).

C1, C2—385-440 pF 2-sec variable capacitor (FRS APS-440 or equivalent).
C3—2-20 pF variable capacitor (RS 900-5850).
C4—100 pF capacitor (RS 272-123).
C5-8—0.01 µF capacitor (RS 272-131).
C9—4.7 µF capacitor (RS 272-1012 or 272-1024).
D1—Red LED, high-intensity (RS 276-307).
D2—Green LED, high-intensity (RS 276-304).
D3, D4—1N4148 (RS 276-1122).
L1—T157-6 toroid (AA).
L2—FT37-43 toroid (AA).
R1—150 Ω, ¼ W.
R2—3.3 kΩ, ¼ W.
R3—2 kΩ, ¼ W.
R4—4.7 kΩ, ¼ W.
R5—100 kΩ, ¼ W.
R6—2.2 kΩ, ¼ W.
R7—1.5 kΩ, ¼ W.
S1, S2—SPDT mini-toggle switch (RS 275-634).
U1—Display driver IC, LM3914 (RS 900-6840).
U2—10-LED bar graph display (RS 276-081).

Misc

J1, J2—SO-239 connectors (RS 287-201).
Enclosure (RS 270-253).
Perforated board (RS 276-1394).
#20 solid enameled wire.
#26 solid enameled wire.

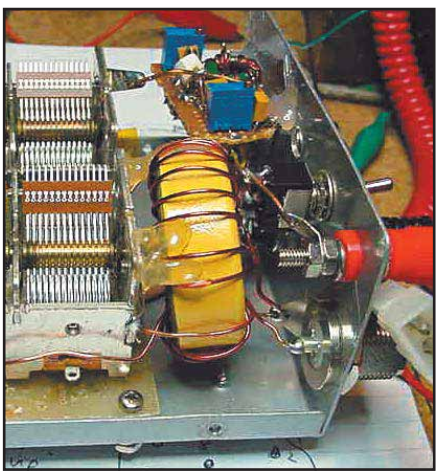


Figure 2—L1 is mounted with hot glue to the bracket of C2, but also supported by its leads.

glue between the inductor and the side of the enclosure.

Because both variable capacitors must be insulated from ground, including their shafts, I mounted both on a piece of perforated board that was cut to fit the aluminum case. The assembly is mounted in the case with stand-off screws, as shown in Figure 3. I made my own capacitor shaft couplings from a 1/8-NPT brass nipple, available in the plumbing section of most hardware stores. These nipples have a ¼-inch inside diameter. Cut a 1-inch long nipple in half to make two couplers. Drill and tap holes for two #6 set screws in each coupling. The completed shaft coupling is shown in Figure 3. For the insulated shafts, I used ¼ inch diameter nylon rods, which are also available from most hardware stores.

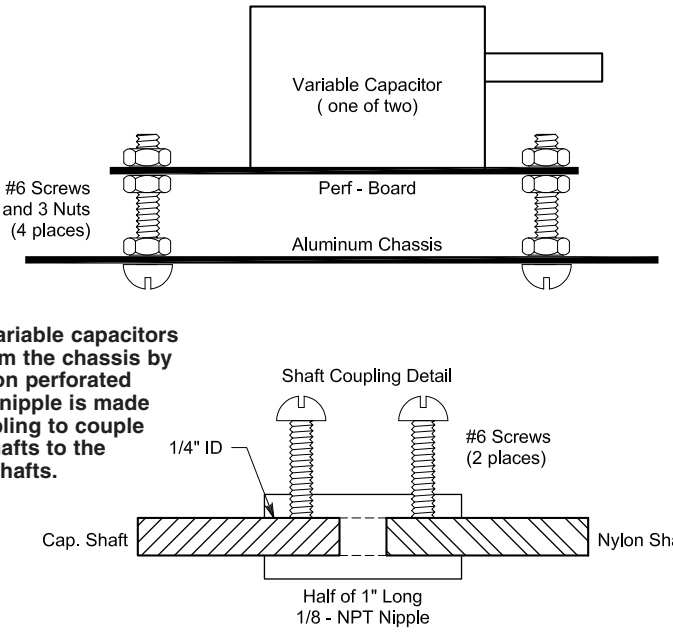


Figure 3—The variable capacitors are insulated from the chassis by mounting them on perforated board. A 1/8-NPT nipple is made into a shaft coupling to couple the insulating shafts to the main capacitor shafts.

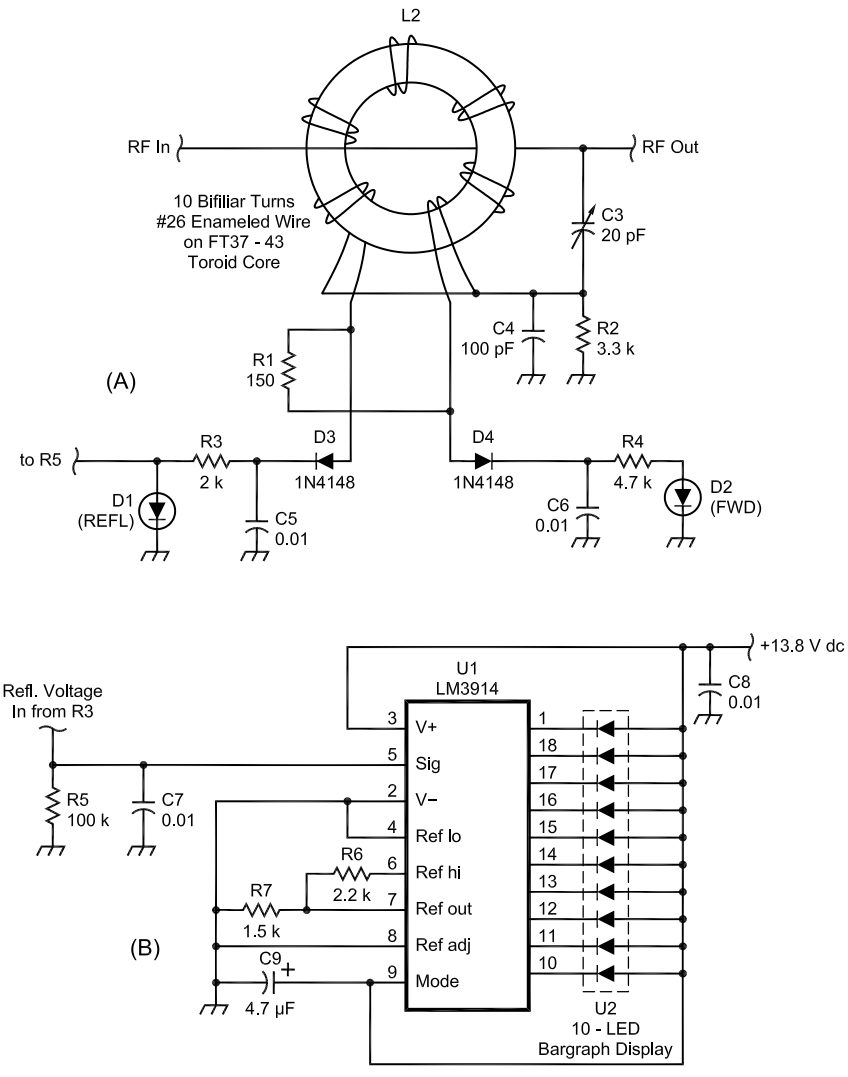
Operation

Tuning the Z-Match tuner is very easy. First, adjust the resonating capacitor C2 for maximum receiver noise. Then apply some RF power and adjust C1 and C2 for minimum SWR. If you need more capacitance for matching, use S1 to switch in extra sections for C1. Balanced feed lines, which are terminated in banana plugs, plug into the center pin of the output SO-239 and the adjacent banana jack. To feed coax, ground one end of the output link with switch S2.

Optical HF SWR Meter

You can use an external SWR meter with the Z-Match tuner, but I built a convenient optical (LED) SWR meter into the same case. It works well with the newer high intensity LEDs that are currently available. The schematic is shown in Figure 4A. I built the circuit on a small piece of perforated board and mounted it into the Z-Match tuner enclosure. This can be seen in Figure 5. I also added a bit of hot glue between the perforated board assembly and the back of the chassis.

This broadband circuit works well at the 100 W level through at least the 10 meter amateur band. With short leads, it should work well through 6 meters. The transformer is an FT37-43 ferrite core wound with 10 bifilar turns of #26 enameled wire. The primary is just the single wire passing through the center of the toroid. To calibrate the SWR bridge, connect the output to a resistive 50 Ω load. Apply RF power on any HF band and adjust the 20 pF variable capacitor until the REFL LED goes out.



Except as indicated, decimal values of capacitance are in microfarads (µF); others are in picofarads (pF); resistances are in ohms; k = 1,000.
All resistors are 1/4 - Watt

Figure 4—Optical SWR meter schematic with the bar graph display modification (see text). The basic LED version is shown in A and the bar graph addition in B.

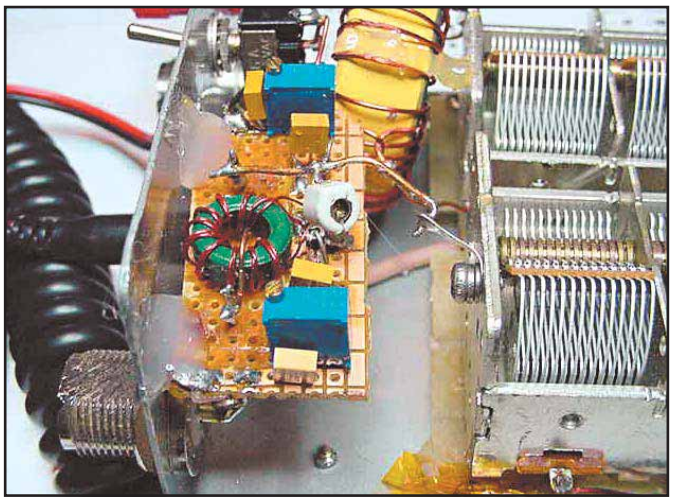


Figure 5—The SWR Meter circuit is soldered directly to the RF Input connector and attached to the back panel with hot glue.

Figure 6—The bar graph display of reflected power makes tuning easier and more intuitive.

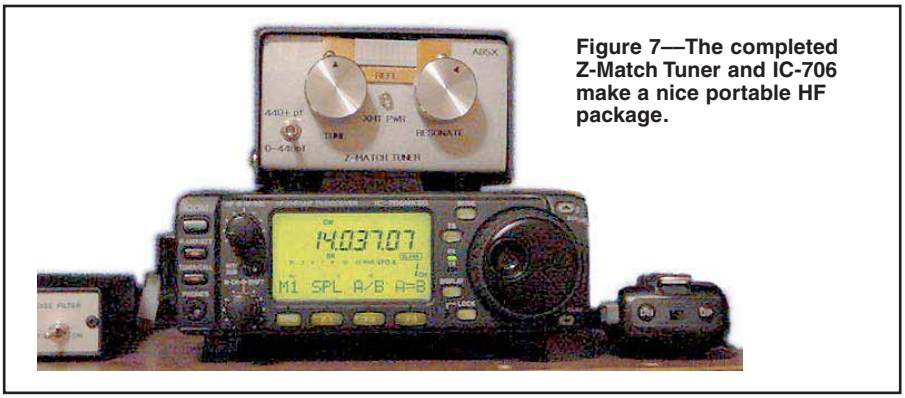


Figure 7—The completed Z-Match Tuner and IC-706 make a nice portable HF package.

Adjust the Z-Match tuner for minimum brightness of the REFL LED. When this occurs, the SWR will be something less than 1.5:1. The brightness of the FWD LED is an indication of transmitter forward power output. If the green LED is too bright, increase the value of the current limit resistor in the FWD circuit. If desired, you can eliminate this LED completely and use only the REFL LED.

If you can supply dc power to your Z-Match Tuner and SWR meter, you may want to add a bar graph display for the SWR reflected power. This is shown, schematically, in Figure 4B and physically, in Figure 6. It uses an LM3914 LED display driver to drive a bar graph display and takes its input from the reflected voltage output of the SWR sampler. If you do use the bar graph display, you can remove LED 1 and connect pin 5 of the LM3914 input to the output of R3. The nice thing about the bar graph display is that it seems easier to null the reflected power, as this display brings the operator closer to the intuitive "feel" of a classic analog meter pointer, but it does require an external dc voltage.

Conclusion

The completed Z-Match tuner on top of the IC-706 is shown in Figure 7. It is very easy to adjust. The biggest obstacles to construction of a compact 100 W version, the necessity of using large air-wound inductors and finding cost-effective multi-section air-variable capacitors, were overcome. The result is an inexpensive, wide-band, easily adjustable tuner for portable or base station operation.

Notes

[1] Emtech, 1127 Poindexter Ave W, Bremerton, WA 98312, tel 360-405-6805; **www. emtech. steadynet.com**.

[2] C. Lofgren, W6JJZ, "An Improved Single-Coil Z-Match," *The ARRL Antenna Compendium, Vol 5*, p 194.

[3] Fair Radio Sales, 2395 St Johns Rd, Lima, OH 45802, tel 419-227-6573; **www.fairradio.com**. Similar capacitors in this range are available from other sources.

Phil Salas, AD5X, has been a ham for 38 years. He is an ARRL Life Member, and is currently the Director of Hardware Engineering at Celion Networks in Richardson, Texas. You can reach the author at **ad5x@arrl.net**. QST

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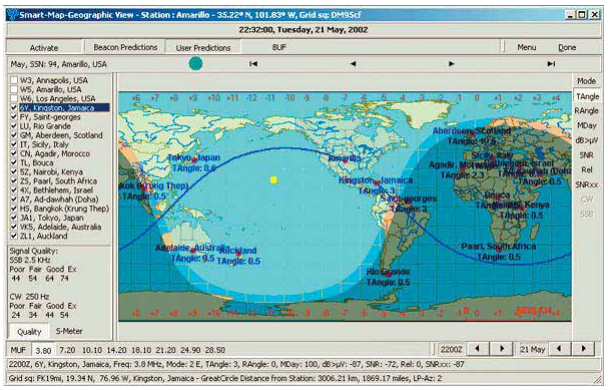


By Paul Wade, W1GHZ

A 222 MHz Transverter for the Yaesu FT-817

Missing the multimode action on 222-MHz? This easy-to-build transverter is the perfect addition to Yaesu's popular mini rig.

Figure 1—A view of the transverter on top of the FT-817.

When the Yaesu FT-817 portable transceiver was introduced last year, it seemed like an ideal IF rig for mountaintopping with portable microwave transverters—a compact radio driving a stack of compact transceive converters. I couldn't resist! After playing with my new toy for a while, I noticed that the only missing feature was 222 MHz coverage. Many new transceivers offer VHF/UHF bands in addition to HF, 6 and 2 meters, and some even add 70 cm, but no current multimode radio operates on the 222-225 MHz band. After the mountains closed for winter, I started thinking about fixing this oversight.

An ideal accessory should have the features and characteristics that make the FT-817 so attractive: good performance in a small, lightweight package requiring only modest power. An ideal location for a transverter would be inside the battery compartment, but the FT-817 uses AA-cells rather than the larger C-cells found in older-generation portable transceivers, so there just isn't enough space. Instead of building a ship in a bottle, I was able to package the 222-MHz transverter shown in Figure 1 in a small aluminum box that sits on top of the transceiver. It provides performance similar to the other covered frequencies and even switches bands automatically in sync with the radio. The transverter will transmit only when the IF band is selected.

Description

One of my previous projects was the "Miniverter"[1]—a bare-bones printed-circuit transverter for 144 MHz. I intended to install several of these inside small 10 meter transceivers to make microwave IF rigs, but the release of the FT-817 shifted my thoughts into new gear. What I learned from the Miniverter became the starting point for the 222-MHz transverter described here.

The transverter design started with the block diagram shown in Figure 2, which outlines the device's basic functions. After I determined the requirements for each functional block in the diagram, I could start on the detailed design of each block. I take the "divide and conquer" approach to engineering. For a large commercial product this is usually a formal process, but for an amateur project, some sketches on scratch paper are sufficient. The block diagram is also helpful in following the circuit descriptions below.

The heart of a transverter is a mixer, also called a "frequency changer," a nonlinear device that combines two signals at different input frequencies to produce new frequencies at the mixer output. These new output frequencies are the sum and difference of the original input frequencies.

In this transverter, the mixer combines input signals with a 198-MHz local oscillator. To transmit, a 24-MHz signal is applied at the IF port from the FT-817; the sum frequency is 222 MHz, which is amplified and sent to the antenna. To receive, 222-MHz signals from the antenna combine with the local oscillator, and the difference frequency, 24-MHz, is sent to the IF port, where the FT-817 is tuned to the desired signal, which has now been converted to the 12-meter band.

The transverter uses filters before and after the mixer—a helical band-pass filter at 222 MHz and a low-pass filter (LPF) in the IF section, which only passes frequencies below about 28 MHz. The mixer used in this transverter is an inexpensive packaged, double-balanced diode mixer commonly used in VHF and UHF transverters. In this case, I

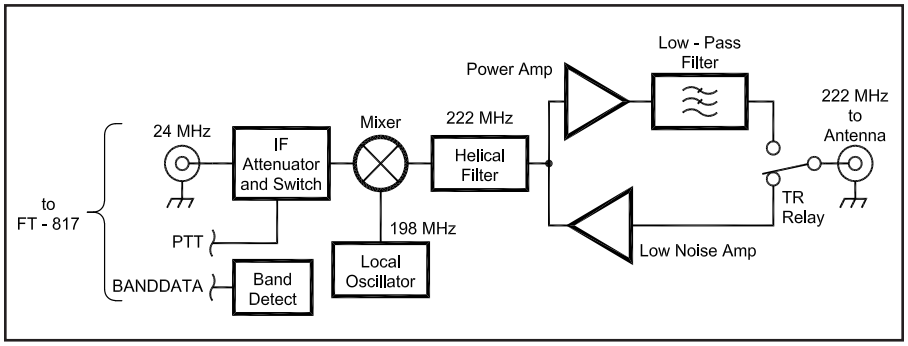


Figure 2—A block diagram of the 222 MHz transverter.

[1]Notes appear on page 38.

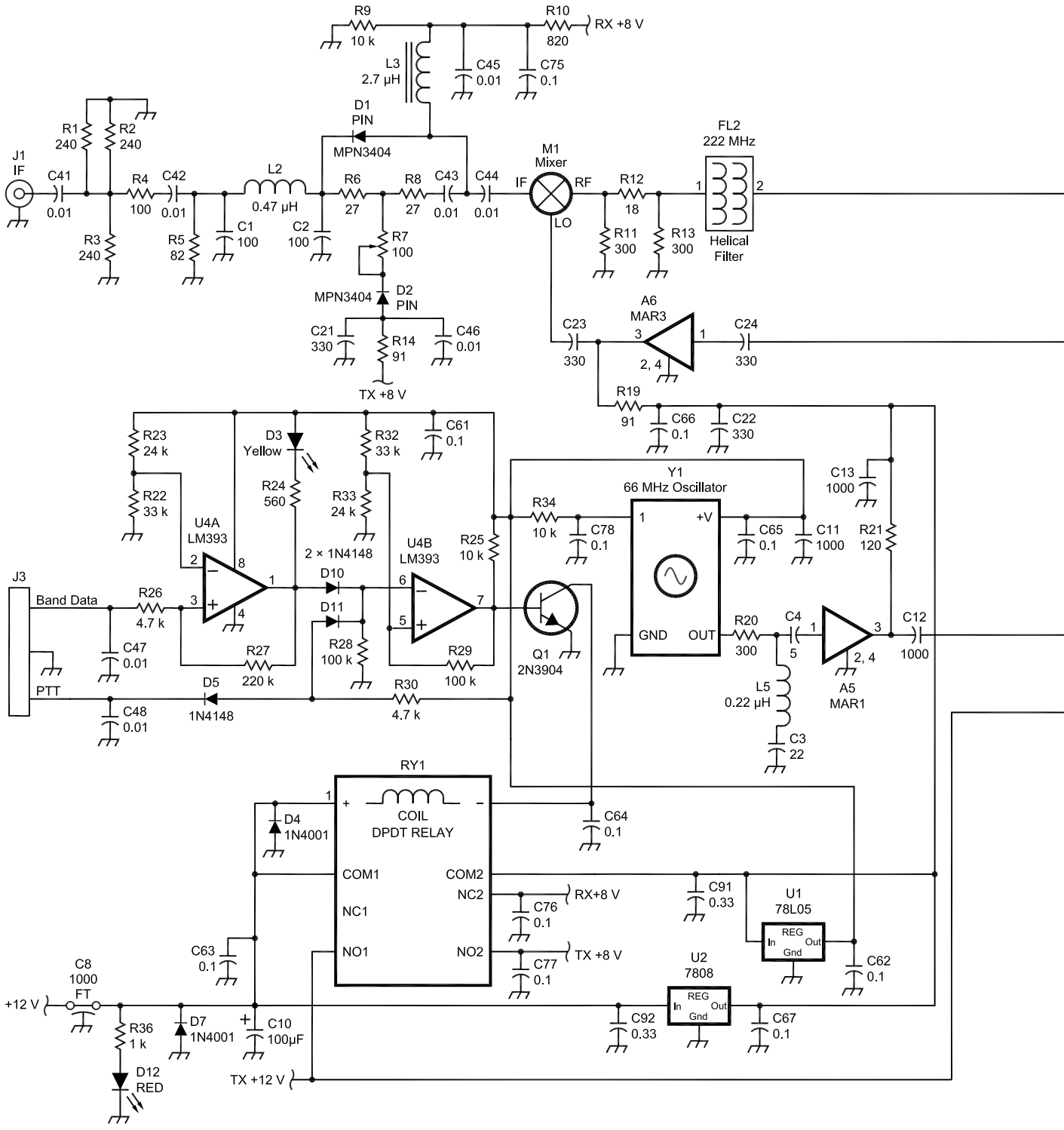
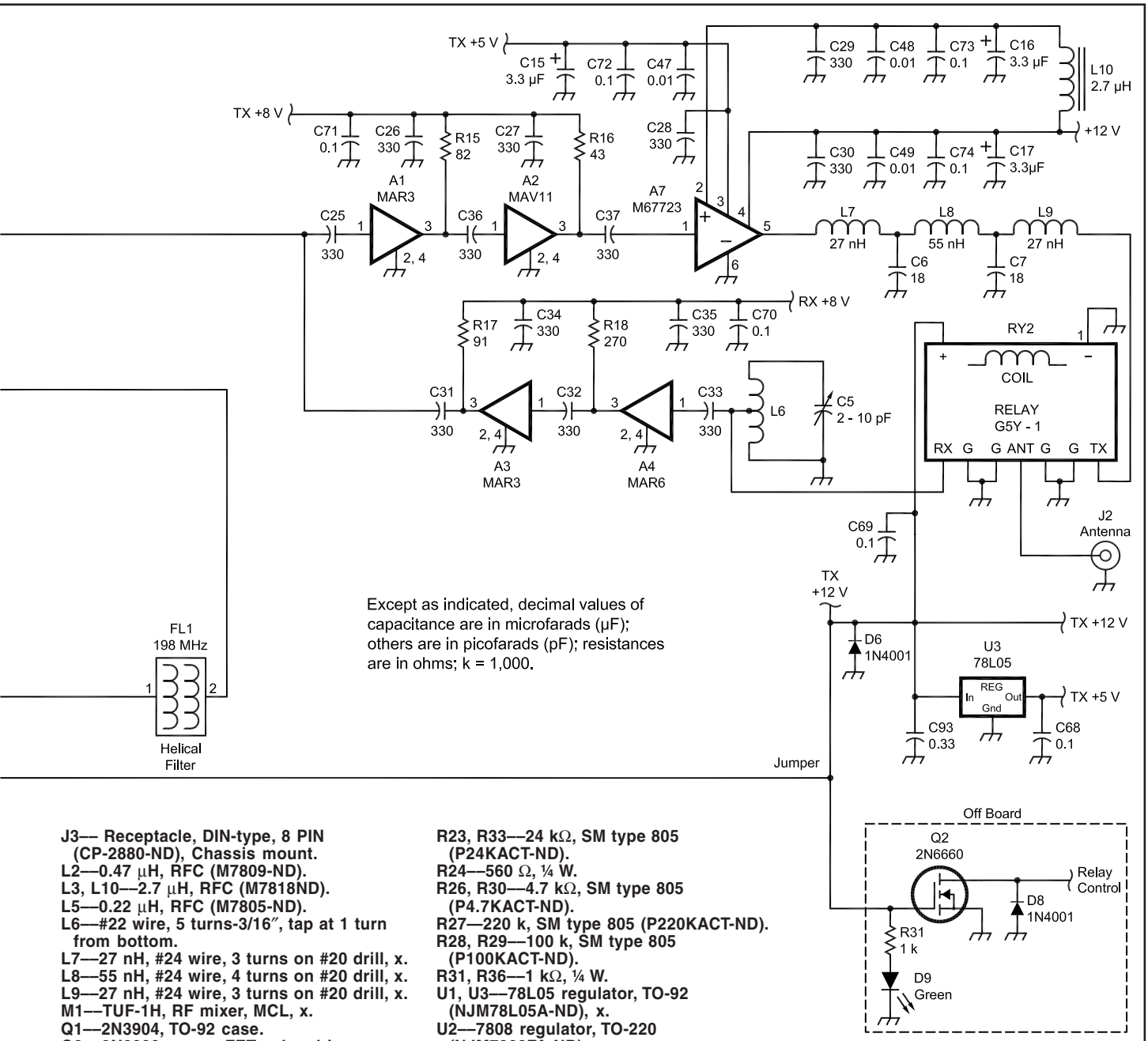


Figure 3—schematic and parts list.

A1, A3, A6—MAR3 MMIC amplifier, MCL, x.
A2—MAV11 MMIC amplifier, MCL, x.
A4—MAR6 MMIC amplifier, MCL, x.
A5—MAR1 MMIC amplifier, MCL, x.
A7—M67723, Mitsubishi 7 W RF amplifier module.
C1, C2—100 pF, SM type 805 (PCC101CGCT-ND).
C3—22 pF, SM type 805 (PCC220CNCT-ND).
C4—5 pF, SM type 805 (PCC050CNCT-ND).
C5—2-10 pF, trimmer (DK SG3002-ND).
C6, C7—18 pF, SM type 805 (PCC180CNCT-ND).
C8—1000 pF, feedthru **.
C10—100 µF, can (P5529-ND).
C11-C13—1000 pF, SM type 805 (PCC102CGCT-ND).
C15-C17—3.3 µF, can (P5565-ND).
C21-C37—330 pF, SM type 805 (PCC331CGCT-ND).
C41-C48—0.01µF, SM type 805 (PCC103BNCT-ND).
C61-C78—0.1µF, SM type 805 (PCC1828CT-ND).
C91-C93—0.33 µF, SM type 805 (PCC1856CT-ND).
D1, D2—PIN diode, MPN3404, **.
D3—LED, yellow.
D5, D10, D11—1N4148.
D4, D6-D8—1N4001.
D9—LED, green.
D12—LED, red.
FL1—198 MHz helical filter, Toko (TK3603-ND), x.
FL2—222 MHz helical filter, Toko (TK3501-ND), x.
J1-J2—BNC RF jack, chassis mount, **.



J3—– Receptacle, DIN-type, 8 PIN (CP-2880-ND), Chassis mount.
L2—–0.47 µH, RFC (M7809-ND).
L3, L10—–2.7 µH, RFC (M7818ND).
L5—–0.22 µH, RFC (M7805-ND).
L6—–#22 wire, 5 turns-3/16″, tap at 1 turn from bottom.
L7—–27 nH, #24 wire, 3 turns on #20 drill, x.
L8—–55 nH, #24 wire, 4 turns on #20 drill, x.
L9—–27 nH, #24 wire, 3 turns on #20 drill, x.
M1—–TUF-1H, RF mixer, MCL, x.
Q1—–2N3904, TO-92 case.
Q2—–2N6660, power FET, relay driver.
RY1—–DPDT relay, G5V-2-DC12 (Z768-ND).
RY2—–RF relay, DIP, G5Y-DC12 (Z724-ND), ** or (255-1087-ND) (alternate).
R1-R3—–240 Ω, ¼ W.
R4—–100 Ω, ¼ W.
R5—–82 Ω, ¼ W.
R6, R8—–27 Ω, SM type 805 (P27ACT-ND).
R7—–100 Ω, potentiometer (3329H-101-ND).
R9, R25, R34—–10 kΩ, SM type 805 (P10KACT-ND).
R10—–820 Ω, SM type 805 (P820ACT-ND).
R11, R13, R20—–300 Ω, SM type 805 (P300ACT-ND).
R12—–18 Ω, SM type 805 (P18ACT-ND).
R14—–91 Ω, ¼ W.
R15—–82 Ω, SM type 1206 (P82ECT-ND).
R16—–43 Ω, ¼ W.
R17, R19—–91 Ω, SM type 1206 (P91ECT-ND).
R18—–270 Ω, SM type 805 (P270ACT-ND).
R21—–120 Ω, SM type 1206 (P120ECT-ND).
R22, R32—–33 kΩ, SM type 805 (P33KACT-ND).
R23, R33—–24 kΩ, SM type 805 (P24KACT-ND).
R24—–560 Ω, ¼ W.
R26, R30—–4.7 kΩ, SM type 805 (P4.7KACT-ND).
R27—–220 k, SM type 805 (P220KACT-ND).
R28, R29—–100 k, SM type 805 (P100KACT-ND).
R31, R36—–1 kΩ, ¼ W.
U1, U3—–78L05 regulator, TO-92 (NJM78L05A-ND), x.
U2—–7808 regulator, TO-220 (NJM7808FA-ND), x.
U4—–LM393 comparator, DIP8 (LM393N-ND).
Y1—–66 MHz oscillator, ½ DIP (SE1128-ND).

Misc

Box, Hammond 1590BB (HM152-ND).
Ferrite beads (wires leaving board).
Plug, Mini, DIN-type, 8 PIN (CP-2080-ND).
Solder, low residue (KE1407-ND).
PC board—–SSB Electronic USA, 124 Cherrywood Dr, Mountaintop, PA 18707; www.ssbusa.com/; tel 570-868-5643.
Parenthetical part numbers are Digi-Key; 701 Brooks Ave South, Thief River Falls, MN 56701; www.digikey.com/; tel 800-344-4539
SM indicates surface mount.
Parts marked x are available as a partial kit from Down East Microwave (see text).
Parts marked ** also available from Down East Microwave; www.downeastmicrowave.com/; tel 908-996-3584.

Why dBm?

RF designers generally characterize signals by their power levels, not their voltages. A signal level of +12 dBm, for example, is 12 decibels greater than a milliwatt, or approximately 13 mW. There are lots of reasons for this apparently arcane choice. The most significant is that if we express everything in decibels (relative to a milliwatt), then we can *add* the gains of adjacent stages. That is, if we pass our +12 dBm signal into a power amplifier with 20 dB of gain, we end up with a signal that is +32 dBm, or a little more than a watt. The system takes a while to become second nature, but once you become comfortable with the terms and the concept you'll wonder how you got along without it!

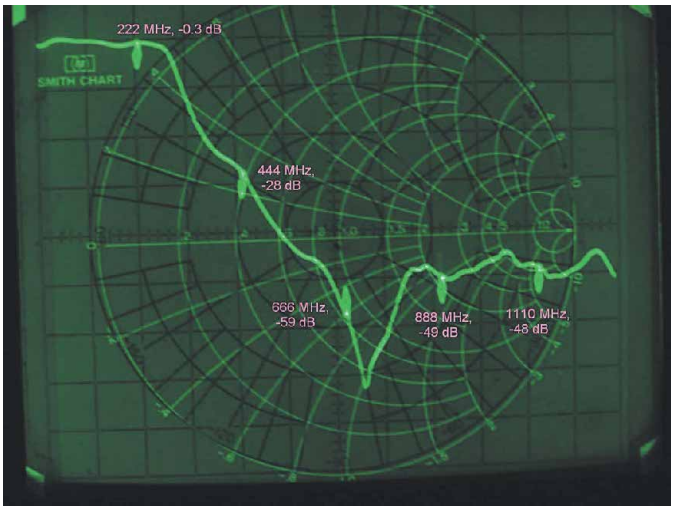


Figure 5—The output low-pass filter response.

used a high-level version for better dynamic range. (Although 222 MHz isn't 20 meters, dynamic range is important for rejecting out-of-band signals from other services, particularly TV signals, which often prevail at the elevated locations we choose for portable operation.)

A good local oscillator is usually the hardest part of any transverter design. It *must* provide a clean signal, because any undesired frequencies generated by the LO can become a source of "birdies" in the receiver. It must also be stable and have low phase noise. Low phase noise is important, as a noisy local oscillator will raise the noise floor of the receiver, particularly in the presence of strong out-of-band signals. Above 50 MHz, the interesting signals are usually the weak ones, so a low noise floor gets them in the log.

A crystal oscillator is the most obvious LO solution. Good crystals have become more expensive and harder to find, except those cut for frequencies used in computer hardware—those are cheap and produced in high volumes. I looked through the Digi-Key catalog (**www.digikey.com**) for DIP-packaged oscillators and found one usable for 222 MHz: 66 MHz times three is a perfect LO for a 12-meter (24-MHz) IF.

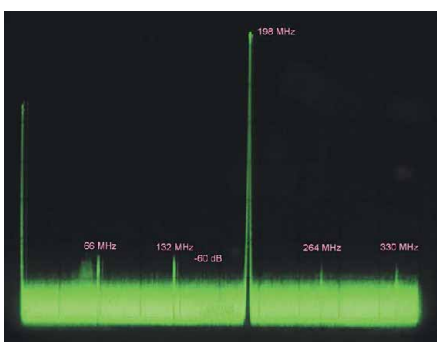


Figure 4—A spectrum display of the local oscillator (LO) output. Note that all spurious signals are at least 60 dB down with reference to the LO.

The next problem is multiplying the oscillator frequency times three. Frequency tripler circuits are usually touchy and inefficient. After some thought, I realized such a circuit is also unnecessary. The packaged oscillators have square-wave outputs, and square waves have plenty of third-harmonic content. Separating the third harmonic and amplifying it with an MMIC (monolithic microwave integrated circuit) probably produces more output than using the same MMIC as a frequency tripler.

Because the frequencies are widely spaced, a simple diplexer is sufficient to separate the 198-MHz third harmonic frequency from the 66-MHz fundamental crystal frequency. I sketched a simple circuit, built a dead-bug-style prototype and fiddled with component values for the best results.

The final circuit is shown in the schematic, Figure 3. Because the packaged oscillator is designed to drive logic circuits with an equivalent load of several hundred ohms, and the MMIC amplifier input is closer to 50 ohms, series resistor R20 is used to provide a better load for the oscillator.

The series-resonant circuit formed by L5 and C3 is a short circuit at 66 MHz, so the fundamental output is dissipated in R20. At the same time, L5 and C3 form an inductive combination at 198 MHz. In combination with C4, the result is an impedance step-down transformer that also forms a high-pass filter.

MMIC amplifier A5 puts out several milliwatts at 198 MHz, with other frequencies at least 10 dB down. After the helical filter, FL1, and another amplifier, A6, an LO level of about +12 dBm (see the sidebar, "Why dBm?") is supplied to the mixer. All other oscillator harmonics are at least 60 dB down, as shown in Figure 4.

Packaged oscillators don't have any provisions for frequency adjustment, but they are inexpensive. I placed two orders for four pieces each, and each group had two oscillators that came within 1 kHz of 198.000 MHz. They do seem to be quite stable, settling down after a short warm-up and staying put, which is what really counts.

The RF Circuit

The 222-MHz output from the mixer passes through a three-resonator helical filter, FL2, to eliminate the other mixing products. The receive path passes through the same filter to eliminate out-of-band signals. A 3-dB pad made up of chip resistors R11-13, inserted between the mixer and the filter, allows each to achieve a reasonable impedance match, which makes both circuits perform more predictably. Mixers are much better behaved when they "look into" a load impedance that is constant over a wide bandwidth. Filters also behave better when their inputs and outputs are terminated by the impedance for which they were designed.

The Transmit Circuit

In transmit, the clean signal coming out of the helical filter is amplified by two MMIC stages, A1 and A2, to boost the output to the +13 dBm required to drive power amplifier module A7. I chose a 5-W Class AB module for linear operation, the Mitsubishi M67723 (**www.rfparts.com**), because it was a good complement to the FT-817. A higher-power module would require much more current and heat-sinking, increasing the size and weight.

Finally, the output passes through a low-pass filter, L7-9 and C6-7, to reduce harmonic content. The design is right out of the tables in the *ARRL Handbook*[2], and works just like the book says it does. The measured response is shown in Figure 5.

The *Handbook* suggests that some amplifiers are less stable with capacitor-input filters, so I took the hint and used the inductor-input design.

The Receive Circuit

I chose to use a MMIC front end, a Minicircuits (**www.minicircuits.com**) MAR-6, for its simplicity, rather than using a GaAsFET in search of the ultimate noise figure. Even so, the noise figure is still better than that found in most transceivers. A tuned circuit, L5 and C6, at the front end is tapped to provide reasonable rejection of out-of-band signals (but not enough for an RF-polluted mountaintop where *serious* filters are required).

The overall receive gain, with two MMIC stages, is just high enough to overcome the losses in the mixer and IF switch. More important is the dynamic range; the second-stage MMIC, a MAR-3, operates at a higher current and has a higher intercept point than the MAR-6 first stage. This device and the high-level mixer were chosen so that the dynamic range is limited by the FT-817 and not the transverter.

The IF Interface

The IF interface is also tailored to match the FT-817, which has two RF-output antenna jacks, selectable by band. I prefer to connect the transverter to the rear jack and use the front jack for other VHF and UHF bands. A band-selection voltage is available on the transceiver's rear accessory jack (called BANDDATA by Yaesu). This voltage is connected to the transverter to make sure it will only transmit when tuned to the IF band, 12 meters. Thus, the transverter can be permanently connected to the rear antenna jack, but will only operate when the FT-817 is tuned to 12 meters.

On the Web, I found a nice band-detect circuit by K6XX (**www.k6xx.com**). Because only 12 meters is needed, I reduced it to a simple comparator, an LM393 dual-comparator IC, U4. The other half of the comparator is used for the PTT line from the accessory jack, with diodes to provide the AND logic so the transverter transmits only when the appropriate band is selected. The comparator also drives a yellow LED to indicate that the transverter is enabled, and a green LED when transmitting. Together with a red power LED, we have a simple traffic-light pattern.

The comparator output logic drives a relay, which is the simplest way to switch voltages between the transmit and receive circuits. The voltages also activate the PIN diode switches for the IF. The FT-817 is operated at its lowest standard power output level, ½ W, but further power reduction is necessary before driving the mixer, which can handle only a few milliwatts.

At the ½ W level, ordinary ¼ W resistors can be used as an input attenuator. In this case, R1 through R5 form a 13 dB attenuator (for transmit and receive). Further power reduction for transmit is provided by a variable attenuator consisting of R6, R7 and R8. R7 adjusts the maximum drive power. On receive, the variable attenuator is bypassed by the PIN diodes, D1 and D2, but the input attenuator remains in the line to protect the mixer in case of switching failure. Between the two attenuators, a simple low-pass pi filter, C1, L2 and C2, keeps LO and RF energy out of the transceiver, passing only frequencies below about 30 MHz.

Voltage Regulators

The FT-817 will operate with rather low battery voltage, so the transverter has internal voltage regulation to maintain stable operation over a wide range of voltages. Most of the circuit is supplied from an 8 V, three-terminal regulator IC, U2. The regulator needs 3 V of headroom, so operation is guaranteed down to 11 V. At 11 V, a "12 V" battery is nearly dead. (Always power your portable gear from a separate battery so the car will start at the end of the day!)

The oscillator is powered from a 5 V, three-terminal regulator, U1, running off the 8 V regulator, so it is doubly-regulated for additional stability. A separate 5 V regulator, U3, provides stable bias for the power amplifier. If it were not separately regulated, the additional current drawn during transmit could change the oscillator frequency slightly.

The Printed-Circuit Board

One of the things I experimented with while building the Miniverter was a "Miniboard" printed-circuit service from ExpressPCB. They provide free PCB layout software (download it from **www.expresspcb.com**) that is quite easy to learn and use. When the PCB layout is complete, the layout is uploaded to their website. The boards are high quality, double-sided boards having plated-through holes for good grounding and are fully tinned for easy soldering. You can't make these in your basement! For those who would rather order completed boards, they are available from SSB Electronic USA (**www. ssbusa.com**).

Looking at the top view of the board in Figure 6, the main helical filter, FL2, is placed as a barrier between the RF side of the board and the IF and LO sections. The isolation helps to reduce "birdies" and other unwanted interactions. The lower-frequency side is crammed fairly tightly to preserve as much space as possible on the higher-frequency side (most of the gain is at 222 MHz). High gain and tight spacing is a recipe for instability. (Instability is the bane of VHF homebrewers and professional RF engineers alike! It often occurs when the output of an amplifier is inadvertently coupled to the amplifier's input, turning the amplifier into an oscillator. We need to pay close attention to layout to avoid these sneaky feedback paths.)

The other key to stable, predictable performance is adequate bypassing. Figure 3 includes plenty of capacitors of different values at different frequencies, with the values chosen for operation just below the self-resonant frequency of each capacitor (see the sidebar, "When Capacitors are Inductors…"). The exact values aren't critical, but shouldn't be changed too much. The power amplifier module, A7, is bypassed for a wide frequency range by using several different capacitor values (bipolar transistor amplifiers are prone to oscillate at low frequencies). The multiple bypass capacitors can be seen in the detail photo in Figure 7. Chip capacitors are small enough to use freely and inexpensive enough, perhaps a nickel each in small quantities, to use by the dozen.

To aid in keeping track of the different bypass capacitors, all the capacitors of the same value have consecutive reference designators (for example, C21 through C37 are all 330 pF) on Figure 3 and the parts list in the caption.

Construction

All essential components are mounted on the printed circuit board. The two that require heat sinking, A7 and U2, attach along one edge so they can be bolted to the box (a dab of heat-sink compound doesn't hurt). Figure 8 shows the completed assembly. The die-cast aluminum box I used had some raised text and mold marks on the bottom, so the surface wasn't flat enough to serve as a heat sink for amplifier module A7. To fix things I flattened the area by scraping off the raised metal with a deburring tool and wrapped some sandpaper around a small flat block so I could sand the area flat. The die-cast metal is soft, so it isn't a big job, but, if you've access to a milling machine, that would make it easier to flatten the bottom surface.

Component placement diagrams from ExpressPCB can be found on the ARRLWeb.[3] There are a lot of chip components—77 resistors and capacitors by my count. Most are the 0805 size (0.08×0.05 inch = 2×1.25 mm), slightly smaller than the 1206 size used by Down

East Microwave in many of its transverters, but large enough for me to assemble without a microscope.

If you aren't comfortable working with chip components and surface-mount soldering, this could be a difficult project. Surface-mount soldering isn't really difficult, however, and can be learned with a bit of practice. A temperature-controlled soldering iron with a fine tip is important (I prefer about 700 ºF), as is thin, "low-residue" solder to eliminate the need for flux removal.

My technique is to put a small amount of solder on one pad, then hold the component in place with tweezers while reheating that pad to attach one end of the component. I then solder the other end of the component to the other pad and touch up the first end if necessary. Where pads and components are close together, a little planning can make it easy to solder the second end of one component while starting the first end of another.

An alternative technique uses soldering tweezers to heat both ends of a component simultaneously. I haven't tried this, but some people like it. I've also heard of folks using two soldering irons the same way.

Because chip components are inexpensive, buy a few spares. If you mess one up or reheat it too many times, simply remove it and throw it away, clean up the pads and try again.

Additional close-up photos of the assembly might help with construction and these can also be found on the ARRL web site.[4] Larger color photos can be downloaded from my Web site, **www.w1ghz.org**.

A parts list is shown in the Figure 3 caption. All parts are readily available from the suppliers listed. There is no complete kit available, but Down East Microwave (**www.downeastmicrowave.com**) has made a partial kit available that includes all of the RF-type parts except the power amplifier. Call them for details. The printed circuit board may be ordered from ExpressPCB by submitting the file **222xvtr.pcb** as a "Miniboard" order for a lot of three boards.

The local oscillator should be assembled first and aligned, along with voltage regulators U1 and U2––but not the mixer. Heat sinking of U2 isn't necessary at this time because only the LO is powered. The key LO adjustment is to retune FL1 to 198 MHz, as standard Toko filters are only available for 187 or 192 MHz. A coaxial connector is temporarily attached near the mixer pins to measure the LO output (see the sidebar, "Simple Power Measurement") and the two tuning screws on top of FL1 are adjusted for maximum output. Turning the screws *clockwise* increases the frequency; at least two full revolutions of each screw will be required to reach 198 MHz.

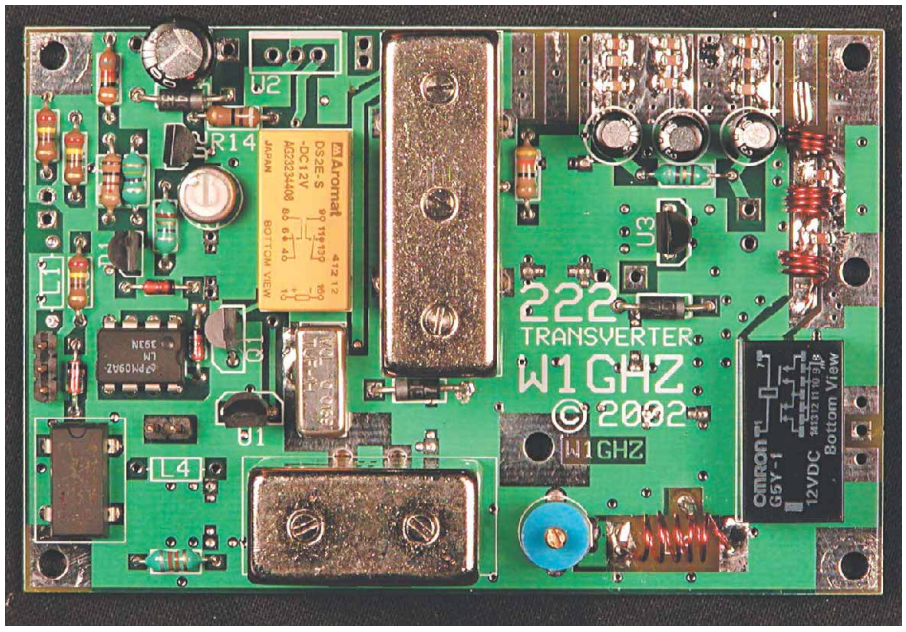


Figure 6—A top view of the transverter board. The main helical filter, FL2, can be seen at the board center, mounted vertically.

When Capacitors are Inductors...

The dirty little secret of passive devices is that at VHF and UHF, things may not be what they seem. Consider an ordinary 1000-pF ceramic disc capacitor, frequently used as a bypass capacitor. With short wire leads sticking out of two parallel metal plates, a 1000-pF ceramic capacitor may actually function as a capacitor at 10 MHz, but at 100 MHz its lead inductance dominates and it's an inductor! The frequency at which the reactance from its lead inductance is exactly equal to the capacitive reactance from its parallel plates is called its *series resonance*—perhaps 40 or 50 MHz for our 1000 pF capacitor. As we approach the series-resonant frequency, the capacitor becomes an RF short-circuit, which is exactly what we want from a bypass capacitor. At higher frequencies, however, it quickly becomes an inductor and it is useless as a bypass capacitor. That's why you won't see many disc capacitors in modern VHF/UHF radios. In fact, surface-mount chip capacitors, with small, low-inductance leads, are much better. Still, their inductance isn't *zero* either and the landing pads on the PC board add additional inductance. So, these tiny parts also exhibit series resonance; it's simply at a higher frequency.

The bypass capacitor values in this transverter were chosen so that the components are operating just below their series-resonant frequencies. Designers also employ several capacitors in parallel when they want to create a broadband RF short. The large capacitors create a path for low-frequency signals and the smaller capacitors (which often have much higher series-resonant frequencies) create a path for higher frequency signals. The bypassing of the power amplifier A7 in Figure 7 illustrates this technique.

After the LO is aligned, the rest of the board can be assembled. I like to test the board before final assembly, with the FT-817 or appropriate test equipment connected to the IF port and a clip lead to operate the PTT line. The transmit output without the power amplifier should be more than +10 dBm at the A7 input pin connection and should be adjustable with R7. The receive section is tested by applying a signal generator to the antenna connection and peaking C5. R7 should not affect the receive gain. A printed-circuit-mount SMA connector will slip on each of the above-mentioned test points without soldering, or a short piece of coax could be tack-soldered to each test point.

Try to test everything possible before final assembly, while both sides of the board are still accessible. The band detect input should operate and turn on the yellow LED when the input voltage is below about 2.9 V (and not at higher voltages). Grounding the PTT input should only activate the relay when the yellow LED is on. Finally, trim all of the component leads on the bottom side and go over everything one last time, checking for shorts.

The printed circuit board is mounted to the box with six 4-40 screws through the big holes in the board. The board must be spaced high enough from the bottom

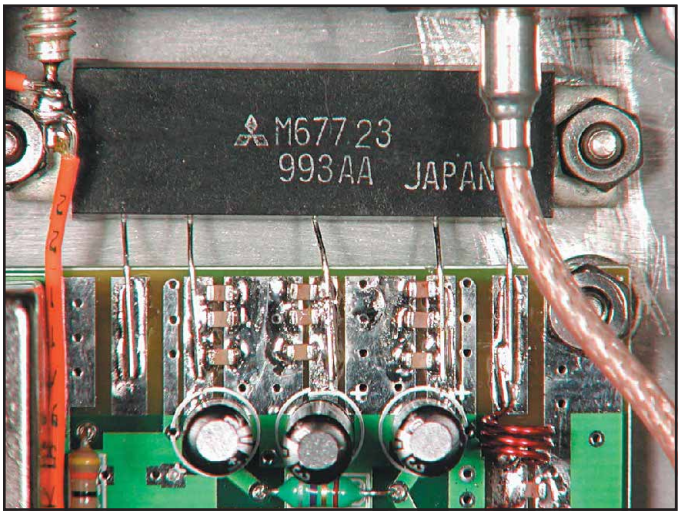


Figure 7—The technique of using multiple RF bypass capacitors to overcome lead reactance. The 9 chip and 3 can capacitors can be seen immediately below the power amplifier module. (See "When Capacitors are Inductors..." sidebar.)

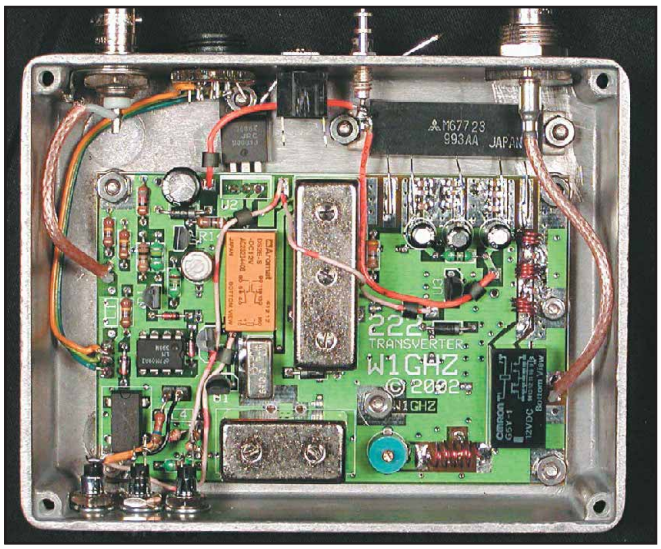


Figure 8—The transverter enclosure with the cover open, showing the completed assembly.

of the box to provide clearance for bottom-side components, but low enough so that the power amplifier leads are short. A flat washer and a hex nut seem to be about the right combination (the washer is against the box). Component leads must be trimmed close to the board. The PCB is held down with more hex nuts, and at least two spots need small-pattern nuts to clear the components.

RF input and output connections from the board terminals to the BNC jacks should be made with thin coaxial cable. The braid must be grounded at both ends with short leads. All other leads leaving the board should be routed away from the RF areas. Placing ferrite beads on the wires will help keep stray RF where it belongs. The photos show how I did the assembly.

Adjustment

After assembly, the transmit attenuator must be adjusted. Hook up the FT-817 and a dummy load and make sure all the switching circuitry works correctly—using the mike button in CW mode will switch to transmit with no output power. Turn R7 fully counterclockwise and set the FT-817 for low power (0.5 W) at 24.9 MHz CW. Key the transverter and adjust R7 for maximum output, which will probably be about 6 or 7 W. If you adjust R7 for 5 W output, the SSB linearity will be good. Now peak FL2 at this frequency so the band-pass filter will cover the whole band. Then readjust R7 for 5 W output. Finally, C5 should be adjusted while receiving a weak signal (or adjusted for best noise figure, if possible).

Performance

The transmitter output is set for 5 W to match the power output of the FT-817 on other bands. The output spectrum is pretty clean, as can be seen in Figure 9. The LO is 45 dB down and other spurs are even lower. The second harmonic is 50 dB down and higher harmonics are more than 70 dB down. At this power output, total current for the radio plus the transverter is about 2 A, which is reasonable for battery operation and close to the current drawn by the FT-817 alone at 5 W output on other bands.

The output spectrum is, however, not quite clean *enough* to put on the air directly. A 5 W transmitter at 222 MHz should have unwanted outputs down to at least –53 dBc (decibels relative to carrier).[5] An external band-pass filter can easily reduce the spurs and harmonics to the required level and help protect the receiver front end from TV transmitters and other interference. Good filters can be found new, such as the DCI-223.5-3H (**www.dci.ca**); surplus, such as the F-199/U (**www.fairradio.com**) or homebrew, such as that recently described in *QEX*.[6]

On receive, the transverter draws about 250 mA. Although I haven't measured the noise figure, weak-signal sensitivity seems very close to a Down East Microwave transverter with a GaAsFET front end. Frequency stability is excellent after warm-up and no frequency adjustment is required. Audio reports on sideband are good.

Of course, if you want this transverter to cover the whole 222-225 MHz band, the FT-817 must be modified to transmit on all frequencies, as no HF ham band is wide enough to provide unmodified coverage. This can be a tricky situation, as modifying your radio for "dc-to-daylight" transmit coverage will violate the warranty. If you want to enable full-band coverage, see **www. mods.dk** for details.

Comparison

The benchmark transverter that I used for comparison is available from Down East Microwave (**www.downeastmicrowave.com**). It's a high-performance unit that was built from a kit for my home station. Some ideas were borrowed from it when I designed this transverter, but I also elected to make some tradeoffs. Here's a quick comparison:

Power Output—The Down East unit puts out 25 W or more and needs a hefty heat sink as a result. I chose to keep the power to 5 W and to use the metal enclosure as a heat sink. The dc input power is also much lower.

Filtering—The Down East unit has an additional helical filter before the power amplifier to further reduce spurs. It's probably more important at the higher power levels. I also reduced the output low-pass filter from four sections to three, losing a bit of harmonic reduction.

Receiver—The Down East unit has a

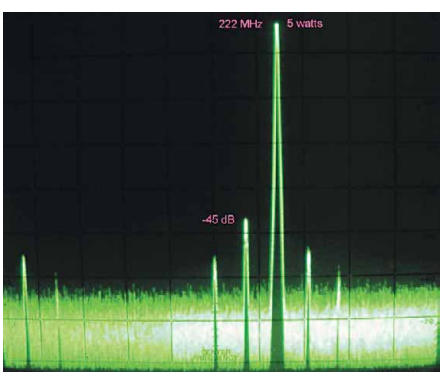


Figure 9—The output spectrum of the 222 MHz transverter, before any filtering. The LO is 45 dB down and the second harmonic is 50 dB down, all referenced to the carrier.

Simple Power Measurement

In writing this article I assumed that you can measure RF power in some reasonably accurate fashion (because I find it an essential capability). How else can you tune a circuit or even tell if something is working? A power meter doesn't have to be a precise instrument. I've used a simple RF detector for years for uncalibrated, relative readings at VHF. The circuit shown in Figure A is simple enough to "dead-bug" on a scrap of PC board or on the back of a coax jack. Simply remember to keep the leads short and you'll be okay. With such a device you can measure RF power in the range of 0 to +20 dBm (1 to 100 mW should yield a corresponding dc voltage from millivolts to several volts).

Because this circuit actually indicates peak RF voltage, it's very sensitive to harmonics and unwanted frequencies, but because both of the test points follow helical filters, the output signal should be clean enough for easy measuring.

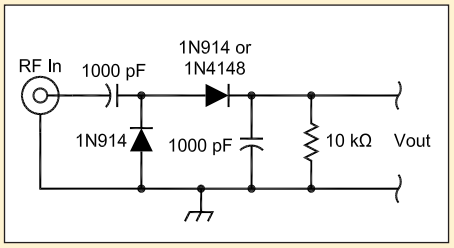


Figure A—Simple RF detector.

GaAsFET front end, so the noise figure is a couple of dB lower. Making a stable, self-biased GaAsFET amplifier can be tricky, so I went with a simple, reliable MAR-6 MMIC design. It's perfect for this low-power station.

IF interface—The Down East unit devotes a lot of board space to a universal IF interface so it can be used with just about any radio ever made. This one is tailored to the FT-817. To use it with another rig (an Elecraft K2, for example) modify the circuit as needed and feel free to change the board design to accommodate those changes.

Local oscillator—The Down East unit uses a relatively expensive crystal with a trimmer to set it right on frequency (until it ages) and a heater to reduce temperature sensitivity. I used a cheap computer oscillator for simplicity and compactness.

Alternatives

Although this transverter is intended for the FT-817, it could certainly be used with other QRP transceivers. For example, it would probably fit inside an Elecraft K2. The choice of IFs is limited only by available oscillator frequencies. Custom oscillators, however, are prohibitively expensive and programmable oscillators have excessive phase noise.

An interesting alternative is to use a 65 MHz oscillator (rather than 66 MHz) to put the IF at 27 to 30 MHz. A CB transceiver could be used for SSB at the low end of the 222 MHz band and a 10 meter transceiver would cover the 223-224.7 MHz segment for FM use. Full-band coverage would still require a modified transceiver.

If more power is required, the use of an external amplifier is fairly straightforward. A solid-state "brick" is fine for FM and CW. Some units are close to being linear and can be used for SSB. Tube amplifiers can provide higher power with better linearity. My transverter easily drives a surplus AM-6155 (**www.fairradio.com**) amplifier to 400 W output—but that amplifier is far from being small and lightweight! The FT-817 transverter was designed for portable and rover operation. For serious high-power operation, a Down East transverter with a full-size transceiver is probably a better choice.

Conclusion

This transverter adds the missing link to the FT-817, giving it 222-MHz capability with performance that is comparable to its other bands. Now backpackers, rovers and other portable operators can have true all-band coverage and still travel light.

Notes

[1]P. Wade, W1GHZ, "2-Meter Miniverter," N.E.W.S. Letter, North East Weak Signal Group, Mar 2001, pp 5-6.

[2]*The 1993 ARRL Handbook for Radio Amateurs*, ARRL, 1992, p 2-40.

[3]**www.arrl.org/files/qst/qst-binaries/wade0103.zip**.

[4]See note 3.

[5]"External-Filter Requirements," *QST*, May 2001, p 33 (sidebar).

[6]Z. Lau, W1VT, "A Low-Cost 222-MHz Helical Band-Pass Filter (RF)," *QEX*, May 2001, p 58.

Paul Wade, W1GHZ, has been licensed since 1962 and has previously held the calls N1BWT and WA2ZZF. Paul has been a microwave experimenter for years; he is President of the North East Weak Signal Group. A former microwave engineer and retired ski instructor, he is currently employed as a computer hardware designer. He was honored by the ARRL with the 2000 Microwave Development Award and, in 2001, with the Thomas Kirby Eastern VHF/UHF Society Award.

NEW PRODUCTS

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Price: $1900 (includes PC software). For more information, contact LP Technologies at 1919 N Amidon, Ste 216, Wichita, KS 67203; tel 316-831-9696, fax 316-831-9692; **samuel.lee@lptech.com**, **www.lptech.com**.

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Price: $4 (USA shipping included; add $1.50 for non-USA deliveries). Send checks or money orders to Jovan Peric, KB9K, 3425 W Ardmore Ave, Chicago, IL 60659 or order at the Web site.

By Steve Johnston, WD8DAS

The Two Tube Tuna Tin Transmitter (T5)

The tuna tin emerges once again as a classic two-tube transmitter. This easy-to-build, diminutive blowtorch can pump out 8 W with a comforting glow that transistors can't match.

My homebrew circuits are rarely original. I generally spend a couple of weeks looking through my old magazines, books and online sources, asking questions of friends and experts, combine the good ideas I find, then, maybe, start building. My design ends up being a hybrid of other peoples' projects, fine-tuned by my troubleshooting efforts. The projects used for ideas were probably a merging of yet other projects, fine-tuned by other troubleshooting efforts, and so on. A form of evolution, I suppose.

After the success of my three-tube *Secret Dream* breadboard 100 W transmitter[1] and five-tube HF receiver,[2] I was ready for my next challenge—QRP.

I noticed a posting on an e-mail list offering a super bargain: a carton of 100, new-in-the-box, 1985-vintage, type 5763 (a beam power pentode) tubes at a great price—25 cents each! From my reading and experience working on old commercial rigs, I knew the 5763 to be a very useful tube for building and repairing receivers and transmitters. It was long a popular choice in *ARRL Handbook* construction projects. I couldn't pass up the deal.

Reference Material

The Internet is a great stimulus for Amateur Radio projects. I get extra satisfaction in the application of a modern medium to the needs of vintage radio builders and restorers. Two of the most useful online places to swap ideas on glow-in-the-dark radios are the *Glowbugs*[3] and *Boatanchor*[4] mailing lists.

While waiting for the tubes to arrive, I researched existing designs for something that would be fun to build. My favorite books to consult on tube projects include:

1962 *RCA TT-5 Transmitting Tube Manual*

1975 *RCA RC-30 Receiving Tube Manual*

ARRL Handbook of 1945, '50, '59, '66, '71 and '75

Radio Magazine/Editors and Engineers *Radio Handbook* from 1938-1975

Understanding Amateur Radio, ARRL, 1971.

The latter is one of my most cherished books on Amateur Radio. When I was starting as a Novice I read *Understanding Amateur Radio* again and again.

On-line vacuum tube specifications can be found at **www.hereford.ampr.org/cgi-bin/tube**. Back issues of magazines such as *CQ, QST, 73* and *Ham Radio* can be very useful, too. A contemporary magazine for tube project enthusiasts is the excellent *Electric Radio*.[5] My research turned up some great designs for transmitters using the 5763 and similar pentodes.[6-9]

A Web search yielded excellent ideas from the modern ARRL *Technical Information Service*. The *HF Transmitters & Receivers* Web page, **www.arrl.org/tis/info/tranrcvr.html** is a good example. I found a great design, The *Novice Special Transmitter*, from *The Radio Amateur's Handbook*, 1971, pp 181-183 or **www.arrl.org/members-only/tis/info/pdf/71hb181.pdf** (ARRL Members only). This 15 W, 80 and 40 meter CW transmitter was intended for the Novice builder using a 6C4 oscillator and a 5763 power amplifier stage.

The ARRL *Technical Information Service* has some great projects from past ARRL publications. The service also includes lists of appropriate sources for parts: air core inductors, air variable capacitors, surplus components, transformers and vacuum tubes.

The Design

After consideration of all these sources, combined with my growing collection of notes, I decided on the design shown in Figure 1.

My chassis selection was a major turning point in the project. Looking at the small parts count of this transmitter, just an oscillator and power amplifier, I knew I could keep the size to a minimum. The relatively low voltages and currents from the transmitter meant the parts could be small, many on the same scale as solid-state QRP projects. When my eyes fell upon my version of the original Tuna Tin 2 transmitter on the shelf, I was struck by an idea—wouldn't it be wonderful to also build this rig into a tuna fish can! It would be in line with one of the finest traditions of homebrewing—the Doug DeMaw, W1FB, Tuna Tin rigs.[10] That comparison can be seen in Figure 2.

I emptied a tuna can in the kitchen

[1]Notes appear on page 42.

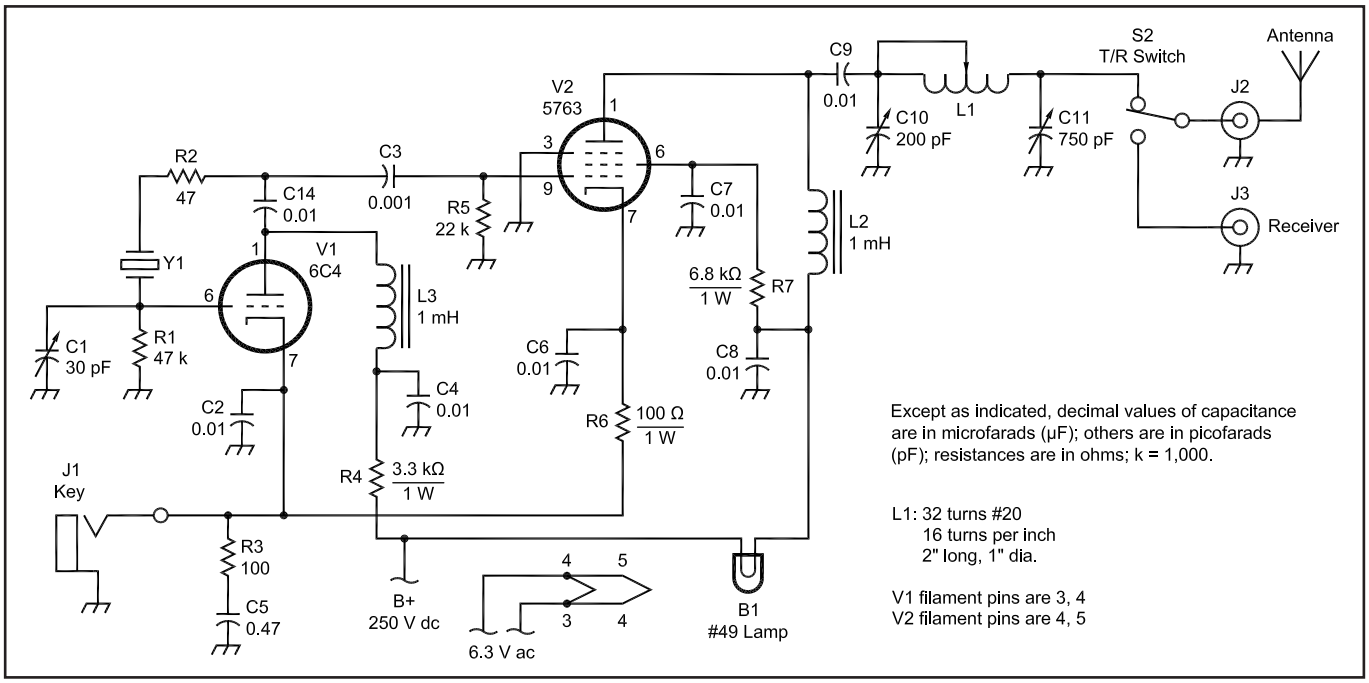


Figure 1—The T5 schematic. C10 is a 200 pF air variable capacitor; C11 is a 750 pF compression trimmer capacitor. All other capacitors are ceramic disc type, 500 V minimum working voltage. L1 is constructed on a 1-inch diameter form (see parts list). All resistors are ¼ W except where noted. All capacitors are ceramic disc type, 400 V dc minimum, unless otherwise specified. (B&W can be contacted at www.bwantennas.com/ama/mini.ama.htm.)

B1—#49 panel lamp held in rubber grommet.
B2—Neon lamp with current limit resistor (47 kΩ or 68 kΩ, ¼-W) or 120 V ac neon lamp with built-in resistor.
C1—30 pF compression trimmer.
C2, C4, C6, C7, C8, C9, C14—0.01 µF.
C3—0.001 µF.
C5—0.47 µF tubular.
C10—200 pF air variable.
C11—750 pF compression trimmer.
C12, C13—22 µF, 250 V dc minimum.
D1, D2—1N4007 silicon diode.
F1—Fuse, 0.4 a, 250 V dc, cartridge type.
F2—Fuse, 1.5 a, 120 V ac, cartridge type.
J1—Key jack, ¼″ or ⅛″.
J2, J3—SO-239 or BNC or RCA type coaxial antenna jacks.
L1—32 turns #20 wire, 16 turns per inch, 2″ long, 1″ diameter. (A B&W miniductor, type 3015, may be used, if available.)
L2, L3—1 mH RF choke.
R1—47 kΩ.
R2—47 Ω.
R3—100 Ω.
R4—3.3 kΩ, 1-W.
R5—22 kΩ.
R6—100 Ω, 1-W.
R7—6.8 kΩ, 1-W.
R8—470 kΩ, ½-W.
S1—SPST mini-toggle switch.
S2—SPDT mini-toggle switch.
T1, T2—120 V primary / 12.6 V CT secondary, 3 A; see note 11. (RadioShack 273-1511).
V1—6C4 tube.
V2—5763 tube.
Y1—Crystal (fundamental frequency; see text).

Misc
7-pin miniature tube socket.
9-pin miniature tube socket.
Crystal socket.
Rubber grommets.
AC power cable and plug.
4 conductor dc power cable.
Cylindrical fuse-holders, (2) panel-mount.
4-pin Molex style plug and socket.
Tuna tin and mini-loaf tin (see text).

(and devoured a couple of tuna sandwiches!) as I pondered the possibilities. A few trial fits of the parts showed the smallest standard size of tuna tin would be too small for easy construction. But the next larger size, the 12-ounce version, would be perfect. Besides, that's how I usually build things—unusual housings and recycled parts. They don't call it a *junk* box for nothing. The resulting transmitter is very compact, 4×4 inches, and it's *cute* (as my wife put it).

Tube Safety Habits

Although this project is considerably safer than my previous breadboard transmitter, there are still some serious safety issues the builder/operator must keep in mind. Hams who have only built solid-state projects may not have developed "tube safety habits." This is no reason to shy away from building a tube project; just be aware of the risks and treat the equipment with due respect:

1. Keep in mind even the medium voltages used to power this rig can be lethal.

2. Lay out the circuit so exposed, live conductors are inside the chassis.

3. Use insulated wire and spaghetti tubing to minimize junctions with exposed voltage.

4. Don't work on the equipment when tired or feeling stressed.

5. Turn off the power supply *every* time a circuit change is needed and discharge the power supply filter capacitors.

6. Turn off and unplug the power supply if the equipment is to be left unattended.

7. Keep children, pets and visitors clear of the energized rig.

8. When testing and adjusting the op-

Figure 2—A side-by-side comparison: The T5 is on the left and the classic W1FB design, the Tuna Tin 2, is on the right

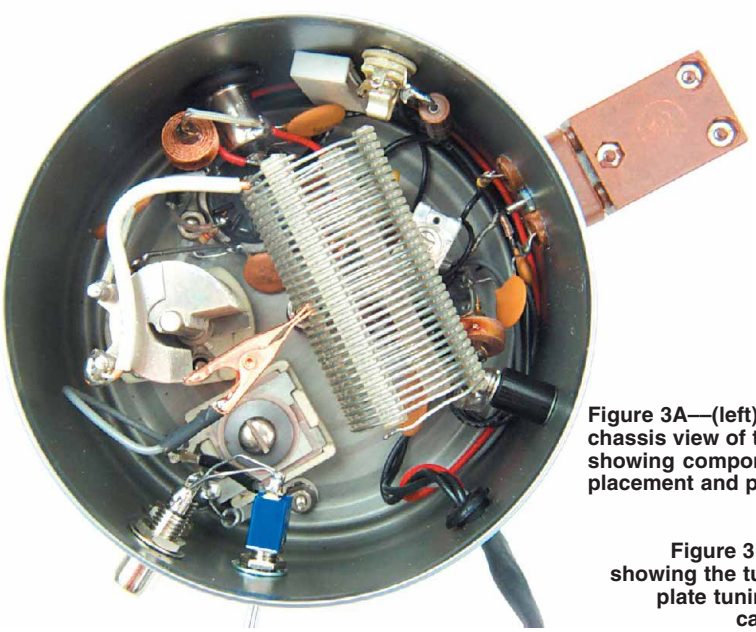


Figure 3A—(left) A below-chassis view of the T5, showing component placement and parts layout.

Figure 3B—A top view, showing the tube socket and plate tuning and loading capacitor layout.

erating transmitter, keep one hand in a pocket.

This final rule provides some back-up protection; in case of accidental contact with the circuit, it reduces the possibility of heart-stopping current flow across the chest. Remember, these voltages can be lethal… so switch to safety! An additional caution—there is high-voltage across the key terminals of this transmitter, so be careful.

Construction

Construction used normal hand tools. The metal of the tuna cans is incredibly easy to work; I found it was easy to make holes for the jacks, tie strips, crystal socket and tube sockets. I chose the older FT-243 style crystals since I already had a few in the shack, but other types can be used. Select the socket style to suit your collection, or install multiple sockets in parallel to allow various types to be used (but only plug in one at a time!). A below-chassis view of the completed transmitter will give you some idea of the component layout. It can be seen in Figure 3A. A top view of the transmitter appears in Figure 3B.

I initially powered the prototype transmitter's plates and filaments from an old EICO variable regulated bench supply I bought at a hamfest, but I later built the matching power supply, whose schematic is shown in Figure 4.[11] For its chassis I used a small baking pan, about the size suitable for a tiny loaf of bread. This maintained the food container theme. It is shown in Figure 5, next to the transmitter.

On the Air

The initial tests were conducted into a 50 Ω power resistor and wattmeter. It worked! The power amplifier was stable, showing no tendency to oscillate. The oscillator ran loud and clear and did not stall under any condition of tuning. Listening on a nearby receiver, I heard no key clicks. After adjusting the trimmer capacitor in the oscillator grid circuit, the CW note sounded near perfect and one of the best I've heard from a simple homebrew rig.

The warmth (ouch!) of the resistor RF load indicated significant power output. Moving the output to a wattmeter and a conventional 50 Ω dummy load revealed about 8 W out at the optimum settings of the 5763's pi-network (coil and capacitors). The scope showed a smooth waveform low in harmonic energy.

I discovered a bonus—the transmitter works well on four bands: 80, 40, 30, and

Sources of Classic Parts

HF crystals in FT-243 holders can be a challenge to locate. Used and surplus crystals can occasionally appear at hamfests, but ones on useful amateur frequencies seem rare. Places to buy new, cut-to-frequency, FT-243 type (same pin spacing) crystals include the following:

- JAN Crystals, PO Box 60017, Fort Myers, FL 33906-6017, 800-526-9825.
- PR Crystals, 2735 Avenue A, Council Bluffs, IA 51501, 712-323-7539.

Many hams bemoan the difficulty in locating vacuum tubes, but in some respects it has never been easier. In recent years a number of excellent on-line or mail order tube dealers have appeared. Examples include:

- Electron Tube Enterprises, PO Box 8311, Essex, VT 05451-8311, 802-879-1844; **members.aol.com/etetubes/**.
- ERSC, 1599 SW 30th Ave, Unit 4, Boynton Beach, FL 33426, 561-737-8044; **home.att.net/~esrc/esrcmain.html**.
- Radio Electric Supply, PO Box 1939, Melrose, FL 32666, 352-475-1950; **www.vacuumtubes.net/npage/indexc.html**.

The source of the 5763 tubes mentioned in the text was a newsgroup posting: "New, old-stock 5763 tubes in packs of 100—only $25!" **stevie@foothill.net**.

Additionally, for tubes, sockets, variable capacitors, connectors and other vintage electronic components, look at these resources (there are others):

- Antique Electronic Supply, 6221 S Maple Ave, Tempe, AZ 85283, 480-820-5411; **www.tubesandmore.com**.
- Dan's Small Parts and Kits, PO Box 3634, Missoula, MT 59806-3634, 406-258-2782; **www.fix.net/dans.html**.
- Ocean State Electronics, 800-866-6626; **www.oceanstateelectronics.com**.
- Fair Radio Sales, PO Box 1105, Lima, OH 45802, 419-227-6573; **www.fairradio.com**.
- Play Things of Past, 9511 Sunrise Blvd, #J-23, Cleveland, OH 44133, 216-251-3714; **www.oldradioparts.com**.

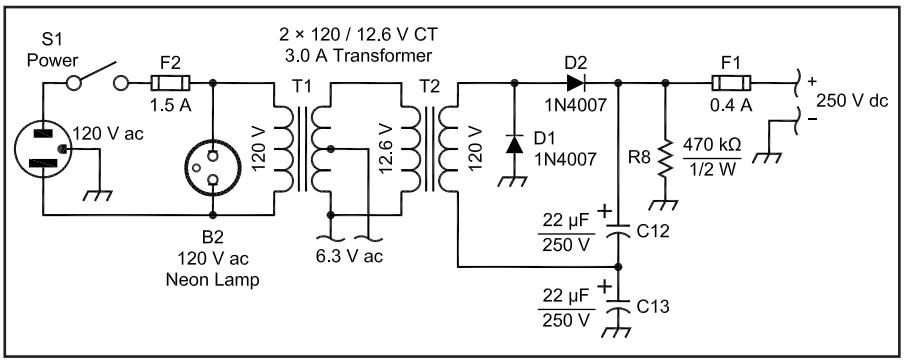


Figure 4—The T5 power supply schematic is a good example of a voltage doubler circuit. This project is meant to rely on your junk box, but some parts may have to be purchased. The transformers shown use 12.6 V CT, 3 A windings, but 6.3 V transformers can also be used (see note 11). The neon indicator lamp, B2, must have an internal current limiting resistor. The common NE-2 neon lamp does *not*. Be sure to observe polarity on C12 and C13 and make sure to include R8, the 470 kΩ, ½ W bleeder resistor—it's a required safety item.

Figure 5—The completed project: Mini-Loaf power supply next to the T5.

20 meters. Using fundamental crystals the rig tuned beautifully on all frequencies with output ranging from 5 to 10 W on the various bands. Do not use crystals on a lower band to try to work a higher band on harmonics—this rig won't. If a tuned stage was added to peak the oscillator on a harmonic it could work, but not with the simple RF choke used in my design. The pi-network components might be less than perfectly configured for 80-meter operation, but I found that the transmitter had a decent RF power output level with no strain obvious on the pentode.

The first on-air test was a snap. I tuned around the low end of 40 meters and didn't hear anything exciting, so I plugged in a crystal and called CQ. Unlike my previous homebrew solid-state transmitters such as the flea-power Tuna Tin 2, the Two Tube Tuna Tin Transmitter has significant RF output. Unless the other operator was using a "brick" for a receiver I should be heard. Bob, N6WG, answered my first CQ and we had a solid contact. The first QSO on a new homebrew rig is always satisfying.

Discussions with friends on the mailing lists have resulted in further 5763 projects. I sent some tubes to my fellow NERTs (the proud "New Era Repeater Technocrats"—a gang of old friends who keep in touch on the air and on the Internet) and we're planning a building contest. We'll bring our finished rigs to the traditional NERT-gathering at the Dayton Hamvention and compare our work. Some decided to build one-tube power oscillator transmitters, while others are going for more elaborate, multi-stage rigs—including an AM transmitter and a high-level SSB design. We'll compete for the "Most Unusual, Non-Conformist Construction Technique" award, the "Built All From Used Parts" award and the "It Could Never Work" award.

Conclusion

I am proud of the Two Tube Tuna Tin Transmitter. It's my retro-tribute to Doug DeMaw's original Tuna Tin design and it generates considerably more RF output. Not bad for some 25-cent tubes and a few evenings' work!

Notes

[1]S. Johnston, WD8DAS, "The Secret Dream Transmitter," *CQ Magazine,* Feb 2001, p 70. Also shown at **www.qsl.net/wd8das/dream.html**.

[2]Five-tube HF receiver; **www.qsl.net/wd8das**.

[3]The *Glowbugs* email mailing list. To subscribe see **www.home.cfl.rr.com/happysurfer/glowbugs.htm**. To post, **glowbugs@piobaire.mines.uidaho.edu**. File archive at **www.mines.uidaho.edu/ftp/pub/Glowbugs**.

[4]The *Boatanchors* e-mail mailing list. To subscribe see **www.qth.net**. To post, **boatanchors@qth.net**.

[5]*Electric Radio,* 14643 County Rd G, Cortez, CO 81321-9575—monthly magazine.

[6]D. Ishmael, WA6VVL, "A Two-Tube 6AG7 80/40M CW Transmitter," *Electric Radio,* Dec 1993.

[7]L. McCoy, W1ICP, "Novice 80 and 40 Meter One Tube Rig," *QST*, Nov 1953, p 28.

[8]V. Chambers, W1JEQ, "A Two-Band Miniature Mobile Transmitter," *QST*, Sep 1952, p 11.

[9]Two-tube 5763 transmitter shown in the 1st edition (1955) of the ARRL *Mobile Manual for Radio Amateurs,* pp 92-95.

[10]Solid State Tuna Tin 2 articles from *QST*: D. DeMaw, W1CER, "Build A Tuna-Tin 2," May 1976, p 14; F. Stevens, WA5LIE, "Tuna-Tin 2" (Strays), Feb 1977, p 36; R. Arland, K7SZ, "Of Tuna Tins, Black Cats and Zombies," Mar 2000, p 91; E. Hare, W1RFI, "The Tuna Tin 2 Today," Mar 2000, p 37; "Up Front in *QST*—Another Tuna Tin Aficionado," Aug 2000, p 21.

[11]Power supply transformers T1 and T2 are shown as 12.6 V, 3 A units with a center-tapped secondary, as these are readily available. You can improvise, however. A 12.6 V CT, 1.4 A transformer for T2 can be used, while a 2.4 A transformer will be needed for T1, if you can find these in your junk-box. If available, you can use two 6.3 V filament transformers without a center-tap, provided they can supply the required current. You would need a 3.8 A, 6.3 V unit for T1 and a 2.8 A, 6.3 V unit for T2. T2 has to supply about 16 W to the 5763 power amplifier, assuming a plate efficiency of about 60% and about ½ W for the oscillator. Transformer T1 has to supply the 1 A filament load for both tubes, plus the current required for T2. Bear this in mind when picking transformers for this project, as these transformers will affect the input regulation of the power supply and hence the output voltage under load.—*Ed.*

Steve Johnston, WD8DAS, has been a builder, repairer and restorer of electronic equipment nearly all his life. He started taking apart radios as a youngster and became a ham at age 13. He has been active in school radio clubs, including the University of Akron station W8UPD in Ohio and, in later days, the international NERT radio club. A Broadcast Engineer for the past 20 years, Steve is Director of Engineering and Operations for Boise State Radio; a 20-station, 5-network, public radio system in the Northwest. In the rare hours not spent with radio he pursues his other avocation as a writer and historian. He has been a ham for 26 years and lives in Boise, Idaho with his wife, Christy, and two children, Kaitlin and Noah. You can contact the author at **sbjohnston@aol.com**.

NEW PRODUCTS

UHF ANTENNAS FROM TECHNO LAB

◊ Techno Lab's product line now includes antennas for 900 MHz and 2.4 GHz, including wireless LAN range extenders. For scanner listeners and wideband receiver enthusiasts alike, the ham-friendly Los Angeles company now offers several 900 MHz and 2.4 GHz models with SMA, TNC and BNC connectors.

Prices: 2.4 GHz SMA Pro ($49.99); 2.4 GHz TNC WLAN ($49.99); 2.4 GHz BNC ($29.99); 900 MHz BNC ($49.99). For more information, contact Techno Lab at 323-571-1963 or send e-mail to **inga@technolab-inc.com**.

The Luckiest Man Alive

A chat with Joe Knight, W5PDY, the longest-serving ARRL Section Manager.

In September 2002 I had the pleasure of speaking with New Mexico Section Manager Joe Knight, W5PDY, at ARRL Headquarters. Joe has the distinction of carrying the title of Section Manager longer than anyone else in the ARRL Field Organization. He has led a fascinating life—both in and out of Amateur Radio. Here is his story, in his own words.—Steve Ford, WB8IMY, *QST* Editor

I think my run of luck started when I was drafted into the Army during World War II. That may not sound like a lucky thing, but you have to know the whole story. You see, I was sent to boot camp, and from there to the staging area to be shipped to Europe. Just as we were about to go we got the word that Hitler was dead. The war in Europe was over.

So, they sent me off to California to prepare to join the slaughterhouse that was the Pacific Theater. Once again, luck intervened. I was ready to leave for the invasion of Japan when they dropped the atomic bombs. My departure was scrubbed.

Nuclear weapons continued to figure prominently in my life. I went on to build and test atom bombs, and that exposed me to more 'lucky' opportunities. For instance, on November 13, 1963 an explosion destroyed a storage bunker at the Medina Facility on the western edge of San Antonio, Texas, where we were disassembling obsolete warheads. Two guys were dismantling the high-explosive component of a nuclear bomb when it began burning spontaneously. The result was a chain-reaction conventional explosion. The one day when I wasn't at the disassembly area several thousand pounds of explosive went sky high. The blast was so powerful, it registered on seismographs around the world.

More Than a Quarter Century of Service

When it comes to Amateur Radio, I've been lucky enough to serve 26 years as New Mexico Section Manager. This is my 27th year of service. In nearly three decades there have been many highlights in our Section, too many to mention individually. The most striking event in recent memory, however, was the Los Alamos fire a couple of years ago. It was a prescribed burn that got out of control and caused an incredible amount of damage.

During the fire I followed the Section Emergency Coordinators and District Emergency Coordinators. Our people were on HF, 2 meters, 222—every band and mode that was appropriate. Our troops did a fantastic job. I wish I could thank them all individually.

Our amateur public service capabilities were already well-known to the powers that be, but we still surprised them during the fires. For example, a repeater atop the Los Alamos ski run was ravaged directly by the flames, and it kept operating. That was impressive to the state and federal agencies, I can tell you.

The Megalink

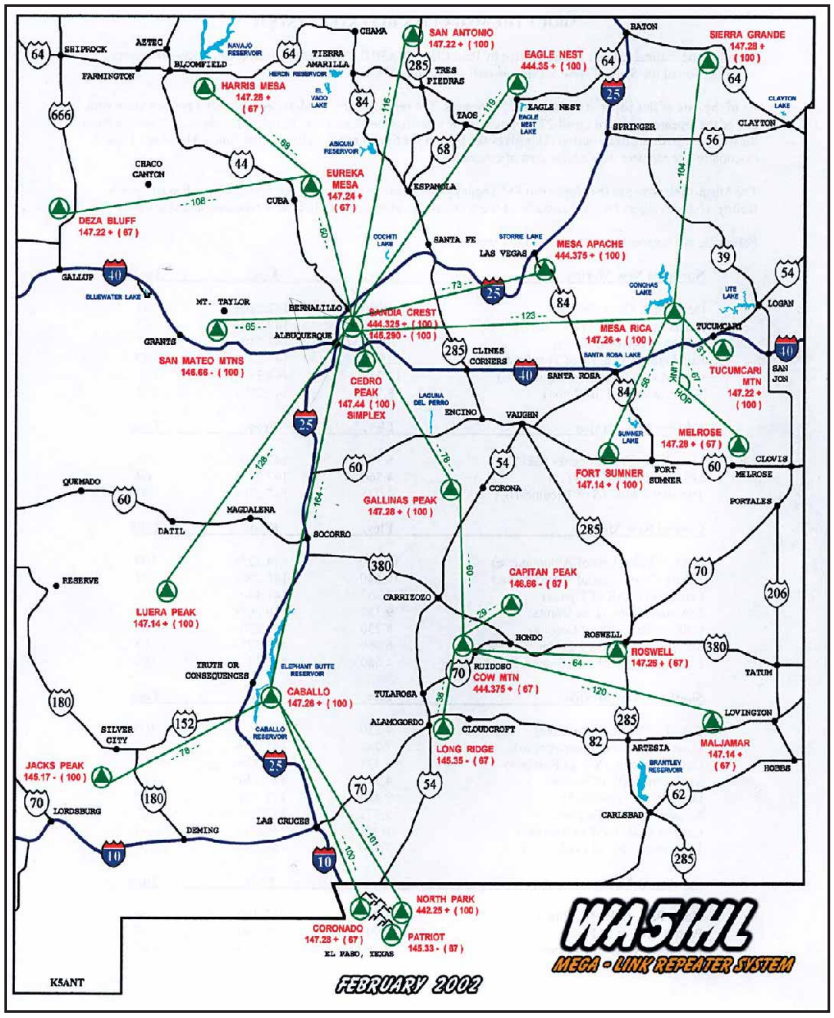
Speaking of repeaters, one of our great strengths in New Mexico is an amazing linked-repeater network known as the Megalink. The network is composed of 27 individual repeaters throughout the state. Thanks to the Megalink, one ham with a hand-held radio in any part of New Mexico can communicate with all parts of the state, and beyond. In an emergency such as the Los Alamos fire, we can isolate parts of the Megalink by remote control, essentially setting up a mini-network separate from the rest of the Megalink.

I help maintain the hub machine in Albuquerque, but the entire system is maintained by Paul Choc, WA5IHL, at his own expense. Megalink handles a great deal of emergency traffic. We've linked the National Weather Service offices into the system for obvious reasons.

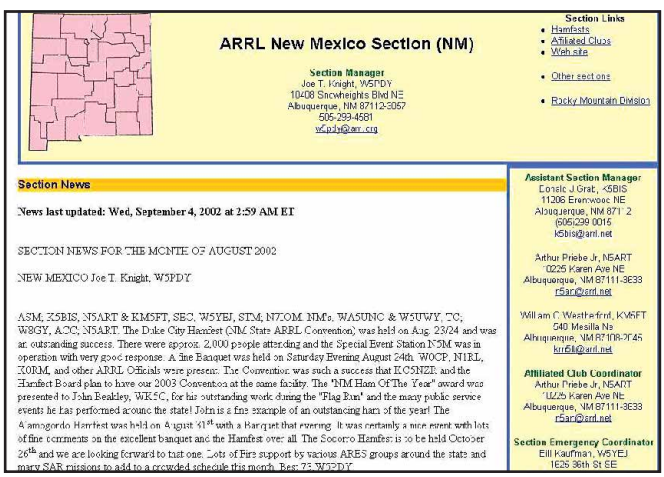
Although not part of the Megalink *per se*, we also have a network of Automatic Position Reporting System digipeaters on peaks throughout the state. In recent years we've found that APRS is every bit as vital to our public service duties as FM voice. We use APRS to monitor the positions of many involved in a mission. We even attach APRS

Joe Knight, W5PDY, at his impressive home station.

The W5PDY antenna farm at sunset.



A map of the Megalink, a link-repeater system that provides coverage throughout New Mexico.



The New Mexico Section page on the ARRLWeb.

beacon transmitters to search dogs!

HF Nets

HF plays a strong role in covering a state as large as New Mexico. We have 75-meter nets in the mornings and evenings. We even have a regional swap net. These are all phone nets. Sad to say, but CW has declined considerably as a net resource. We can hardly get anyone to meet the 12th regional CW traffic nets these days.

Search and Rescue

New Mexico has many remote areas. It's easy to get lost and never be found. Every year we lose hikers and the occasional private aircraft. Whenever that happens, our amateurs swing into action.

Search and rescue operations are so critical that legislation was passed to put the New Mexico state police in charge, issuing "mission numbers" whenever people or aircraft have gone missing. The reason for this has to do with all the counties we have in the state. Before the legislation was passed, every time you came up to a new county line, you ran into a sheriff who said, "Now we're going to do things my way." That was a formula for chaos.

Strange as it may sound, we haven't generally participated in SET operations in the past. However, more SET exercises are now being conducted to improve our response.

Volunteering to Serve

I often hear from new hams, wondering why they should be interested in Amateur Radio public service activities. The answer is easy: It's the tremendous gratification you get from serving your state and community. You get a chance to put your Amateur Radio skills and other areas of expertise to work in something that really matters.

Our Section volunteers come from all specialties. We have experts in direction finding, for example, which we do an awful lot of. Our direction-finding people respond to searches for downed aircraft, homing in on their automatic Emergency Locator Transmitters. It's all for the satisfaction of serving.

The response in our Section has been tremendous. We have an overflow list of people waiting to take the Emergency Communications course. Some Sections have difficulty filling positions, but that's not true in New Mexico.

I'd encourage any amateur to find out what positions are open in their ARRL Sections. They should look up their Section Manager in *QST* or on the ARRLWeb and either drop them an e-mail or give them a telephone call. Just ask, "How can I serve?"

The Future

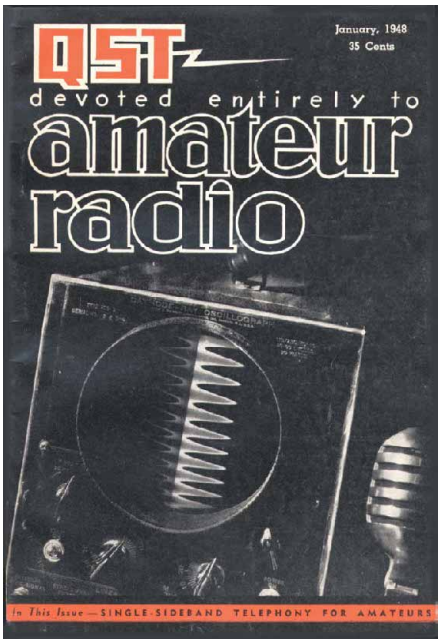
Amateur Radio is presently in decline, there's little doubt about that. The Internet has had a large role to play, but there are many other factors, some of them cultural. But even though our avocation is waning, I don't think it will disappear. The numbers will continue to drop for a while, but they'll eventually stabilize. Amateur Radio will exist as long as there are people who love the art and science of communicating by radio.

I hope to continue serving my Section as long as I am able. I suffered a stroke seven years ago, but it didn't slow me down much. My wife Lois, KC5CXO, is an invaluable aid. I've since recovered and I intend to enjoy Amateur Radio for years to come. I can say that with confidence, being one of the luckiest men alive! QST

By Gil McElroy, VE3PKD

Amateur Radio and the Rise of SSB

The hams who were first to get on the air with single sideband created a revolution in Amateur Radio. Along the way, sideband would even affect the course of the Cold War.



The cover of the January 1948 issue of *QST* was, well, different. An oscilloscope was pictured, and though it was a piece of equipment few hams owned or were familiar with at the time, that wasn't what made the cover so unusual. Rather, it was the strange-looking modulated wave envelope displayed on its CRT screen. Or actually, only one side of the modulated wave envelope. Normally symmetrical about one axis, the envelope was missing one entire half. What was this all about?

Inside the issue, there was no "On The Cover" to explain the picture. Rather, there were an editorial and three articles all devoted to introducing hams to the arcane subject of "s.s.s.c."—single-sideband, suppressed carrier. The articles also discussed the messy state of the ham bands, clogged as they were with frequency-hogging AM signals often interfering with one another. "In the usual present-day snarl of 'phone interference," *QST* editorialized, "we have the piercing shrieks of heterodynes." It went so far as to predict boldly that "everything points to s.s.s.c. becoming the accepted amateur method in the near future." The three articles that appeared in the issue laid the groundwork for the transformation of Amateur Radio that was to come over the next quarter-century. For most hams, the strange-looking oscilloscope pattern on the cover was to be their first introduction to what would eventually come to be simply called "sideband" or "SSB."

Enormous Impact

If there has been a technical advancement that distinguished ham radio over the past half-century, it would have to be single sideband. The move from AM to SSB would be as controversial in its time as the move from spark to CW had been in the 1920s. Sideband's impact has been enormous and the changes it has created in Amateur Radio far-reaching. It is ubiquitous today, a standard feature on virtually every commercially produced piece of amateur equipment. And it isn't simply useful for voice communication; sideband technology is employed in computer modems, and vestigial sideband (VSB) has been developed for use in digital television.

The existence of sidebands as distinct from a carrier was first determined mathematically in 1914. A year later, John R. Carson, an engineer working for AT&T, invented sideband technology for use in long distance telephone carrier circuits as a means of increasing the number of calls that could be transmitted simultaneously. Carson's invention, which involved the use of filters to remove a carrier and one sideband while passing the other through, was patented in England that same year, but court litigation held up his US patent until 1923. In January of that year, the first experimental one-way transatlantic single sideband transmissions were made from Long Island, New York, to London, England. In 1927 a regular two-way transatlantic low-frequency radiotelephone circuit using sideband technology opened for commercial use at a cost of $75 for a three-minute call (that's about $760 in today's money!).

It wouldn't take hams long to take note of this new technology. A series of three articles on sideband by Robert Moore, W6DEI, appeared in the Amateur Radio magazine *R/9* in 1933 and 1934, and *QST* Technical Editor James Lamb, W1CEI, published the magazine's first article on the subject, "Background for Single-Side-Band 'Phone" in October 1935. An

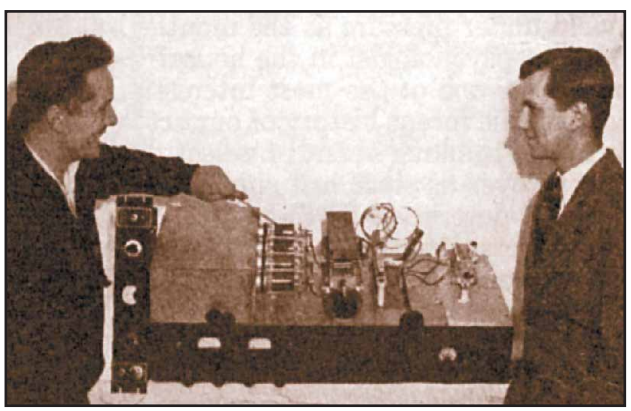


Figure 1—This photo, from the February 1948 issue of *QST*, was captioned: "Although full technical information on the single-sideband suppressed-carrier transmitter at W6YX is not available at this time, this photograph shows Dave Thomson, W6VQB, pointing out the final amplifier to Robert D. Smith, W6QUW, president of the Stanford Radio Club… The transmitter was designed by Oswald G. Villard, Jr, W6QYT, of the electrical engineering faculty at Stanford University."

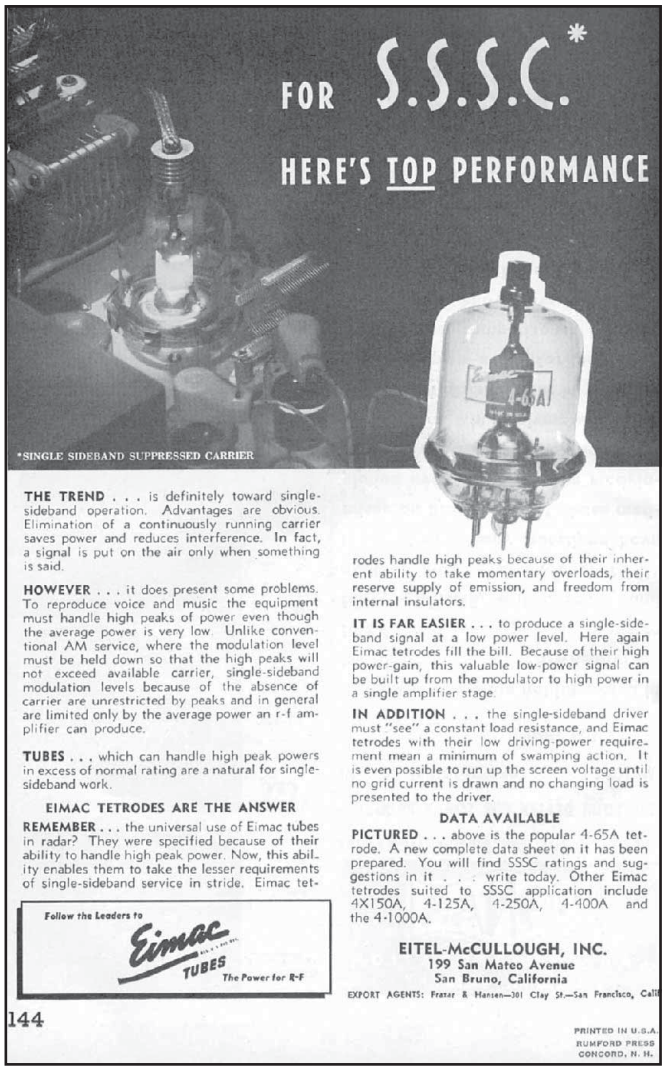


Figure 2—This full-page ad for Eimac tubes, published in the July 1948 issue of *QST*, touts the advantages of SSSC.

Figure 3—This ad, for Eldico, features the company's new 7-tube, 5-W sideband rig. "Everyone can now enjoy all the benefits of single sideband transmission," the ad proclaims.

editorial introduction to his article noted that by "action of the 1933 A.R.R.L. Board Meeting, the technical staff of *QST* was instructed to investigate the feasibility of single-side-band carrierless 'phone transmission on amateur frequencies." Some sideband experimentation was carried out in the mid-1930s by a small group of hams,[1] but it was hampered by technological limitations of equipment at the time. World War II changed all of that, making enormous advances in radio technology. After hostilities ended and Amateur Radio resumed, there was no longer any technological reason for sideband to stay on the sidelines and a very pressing need for a communications mode that would occupy less bandwidth than did AM and so free up space on ham frequencies. Sideband was exactly what the doctor ordered, and a concerted push by the ARRL would effectively spread the word, altering the course of ham radio.

W6QYT at Stanford

It was experimental sideband work begun in 1947 on the 75 and 20 meter bands at W6YX, the Stanford Radio Club at Stanford University in California[2] that inspired the series of January 1948 articles in *QST*. In the issue, Assistant Technical Editor Byron Goodman, W1DX, described this new mode of communicating in "What Is Single-Sideband Telephony?" In addition, Oswald Villard, W6QYT, of Stanford, explained the results of his club's test transmissions and informed hams how to go about tuning in these new signals ("it is very desirable to use the minimum r.f. gain setting when the b.f.o. is used for demodulation," he would write, advice repeated through many issues of *QST* for hams unaccustomed to tuning in these strange-sounding signals). Finally, Art Nichols, WØTQK, detailed the sideband rig he built to communicate with W6YX in "A Single-Sideband Transmitter for Amateur Operation." A follow-up Stray the following month showed a photo of the Stanford station. See Figure 1.

The following month, a full-page advertisement by the National Company in *QST* extolled the possibilities of duplex sideband. By April, *QST* Technical Editor George Grammer, W1DF, was able to prognosticate:

> It may not be too much of an exaggeration to say that our present-day 'phone methods will be just as obsolete, a few years from now, as spark was a few years after c.w. got its start. "Old-fashioned 'phone" will eventually be something that can be tolerated only where there is plenty of room for it.[3]

In July of the same year, Byron Goodman's column "On the Air with Single Sideband" debuted in *QST*, keeping hams informed of the increased sideband activity in the United States and

[1]Notes appear on page 47.

around the world. The same issue also featured a full-page ad for tetrodes from Eitel-McCullough specifically aimed at sideband enthusiasts. See Figure 2. It was a sign that the radio industry was beginning to see the potential of a market in equipment for amateur sideband use.

Another sure sign of sideband's potential could be gauged by letters to the editor in *QST*. In October 1948, a writer decried "single-sideband gibberish," and accused the magazine of "trying to shove it down the throats of the ham fraternity." But more hams than not were open to the possibilities that sideband offered, realizing that it offered a solution to the very real problems that plagued the ham bands. "I personally have had no experience as yet with single sideband," wrote a Canadian ham in the December issue, "but anything that may relieve the overcrowded conditions of our bands today and make for QRM-free QSOs, I'm all for it."

Filter vs Phasing

The next year, "On the Air With Single Sideband" was discussing the merits of generating sideband signals with filter versus phasing systems. The former involved sharp filters and multiple frequency conversions, sophisticated technical requirements that many hams felt they couldn't achieve. But phasing systems, which used a 90° phase difference in two signals to balance one out while augmenting and passing the other through, offered a simpler solution to getting a sideband rig on the air. Ralph V. L. Hartley of Western Electric, best known to hams for his invention of the Hartley oscillator circuit back in 1915, had patented a phasing SSB system in 1928, but Don Norgaard, W2KUJ, would pioneer its use in "A New Approach to Single Sideband" in the June 1948 *QST*. By April of 1950, the magazine would report that hams using phasing methods outnumbered those using filter 2 to 1.

Manufacturers began taking more notice. In the June 1950 *QST*, a full page ad from the Collins Radio Company claimed its 75A-1 receiver to be the "SSSC Receiver of the Year," and in January 1951, the magazine announced a commercially produced amateur sideband transmitter, the "SSB Jr.," new from Eldico. See Figure 3.

By April 1953 *QST* had reported a tally of over 300 US sideband stations active, and the first two-way 75 meter sideband transatlantic QSO. In November 1956, *QST* reported the first sideband awards for WAC and WAS (there were 48 states then). The first sideband DXCC had been accomplished a year earlier.

Figure 4—This photo of General Curtis LeMay, then K3JUY/K4RFA, from the July 1961 issue of *QST*, announced his nomination as chief of staff of the US Air Force. During the mid '50s, Gen LeMay had converted Strategic Air Command communications from AM to SSB, based on his ham experience with the newer mode.

The Military Takes Note

In the mid-1950s, hams and amateur sideband actually had a hand in altering the course of the Cold War. General Curtis LeMay, W6EZV, was Commander of the Strategic Air Command (SAC), charged with deterrence of the Soviet nuclear threat. See Figure 4. New jet aircraft then being introduced were resulting in the elimination of in-flight radio operators and SAC was planning on the use of AM voice equipment in the cockpit. LeMay became aware of the successes of amateur SSB work, and in 1956 undertook two flights, one to Okinawa and the other to Greenland, during which SSB was put to the test using Amateur Radio gear and hams themselves. Two of the hams invited to operate on those flights were Art Collins, WØCXX, of Collins Radio, and Leo Meyerson, WØGFQ, of World Radio Labs. SSB far outperformed the conventional AM communications systems then in use by the military. In 1957, it was formally adopted by SAC for use in its (then) new B-52 bombers,[4] the same year that General Francis "Butch" Griswold, KØDWC, of SAC would give the keynote address on the subject at the ARRL National Convention in Chicago.

Writing in the January 1953 *QST*, Byron Goodman would report that "Art Collins, WØCXX at Cedar Rapids, Iowa, is making a lot of the a.m. diehards think 'maybe there's something to this single-sideband stuff after all.'" Indeed he was. In addition to his personal involvement in helping SAC decide on SSB for its communications systems, his company, Collins Radio, would end up making arguably the largest single contribution to amateur use of SSB when, in 1955, it all but abandoned production of AM gear and threw its considerable resources behind development of sideband gear, having prepared the way with a series of full-page "Engineering Notes" that appeared in *QST* in late 1954. In May of 1957 Collins would make history with the launch of the KWM-1 transceiver, "the first mobile transceiver," the advertisement in *QST* read, "and the first to offer SSB." A review of the rig in the April 1958 issue would be positively glowing:

> It is the writer's opinion that the KWM-1 may well mark the end of one era and the beginning of another. This unit is more than another piece of ham gear; it could be a way of life (in Amateur Radio).[5]

Byron Goodman's column "On the Air With Single Sideband" was discontinued after March 1954 and the ARRL's handbook, "Single Sideband for the Radio Amateur," made its first appearance in December of the same year. SSB had made a secure place for itself within Amateur Radio. Change, however, didn't come easily or quickly for a few hams. The disagreement between AM diehards who disparaged the "Donald Duck" sounds of SSB, and those who disdained the frequency-hogging of "ancient modulation" would continue well past mid-century. As late as 1963, a letter to *QST* urging the ARRL to "get on the ball and ask FCC to give the a.m. boys six months to go s.s.b.,"[6] resulted in an outpouring of mail in support of the "a.m. boys." In the end, the issue would finally only be overshadowed by another controversy: the regulatory changes of incentive licensing.

Sideband had won the day.

Notes

[1]"Correspondence from Members," *QST*, Feb 1948, p 64.

[2]As if its role in the sideband revolution wasn't enough, Stanford University would later be at the forefront of another technological revolution—the computer—and instrumental in the development of nearby "Silicon Valley." Oswald Villard himself was a pioneer in early meteor scatter investigations.

[3]"Technical Topics," *QST*, Apr 1948, p 29.

[4]Charles A. Keene, "Once Again, a Ham Operator in Command," *QST*, May 1997, p 43.

[5]"Recent Equipment," *QST*, Apr 1958, p 23.

[6]"Correspondence from Members," *QST*, Jan 1963, p 87.

Though his interest in ham radio goes back to the late 1960s, Gil McElroy, VE3PKD, didn't get his ticket until 1991 at age 35. His ham radio activities center around his love for straight-key CW. You can contact the author at PO Box 7, Colborne, ON Canada, K0K 1S0; **gmcelroy@eagle.ca**.

By John Ceccherelli, N2XE

Vibroplex—The Company and its Classic Key

VIBROPLEX®

On one level, the Vibroplex is just a bug—a type of Morse code key. But on another, it's a piece of ham radio history that resonates through the fists of generations of brasspounders.

Mechanically intricate yet functionally obvious, the Vibroplex is instantly recognizable as a quintessential telegraphic instrument. Second only to perhaps the steam locomotive, it is a classic example of form following function. People instinctively wiggle the lever, pushing it left then right. To the right is where it springs to life.

As a telegraphic instrument, the Vibroplex key eliminated a debilitating ailment and doubled code transmission speed. Regardless of its merits in telegraphy, it can draw you into a mesmerizing stare for hours on end. Later models have a liquid chrome finish that you expect to splash when touched. The knurling on the myriad of screws and lock nuts sends showers of glinting light. The adjustments beg the mind to determine their purpose.

The Vibroplex is a semi-automatic telegraph key. The operator makes dashes manually by pushing the lever to the left, but the action is to the right. The dots are automatic. When the lever is pushed to the right, the Vibroplex, as its name implies, vibrates. Weights suspended on a steel spring oscillate rapidly, opening and closing an electrical contact with seemingly endless repetition.

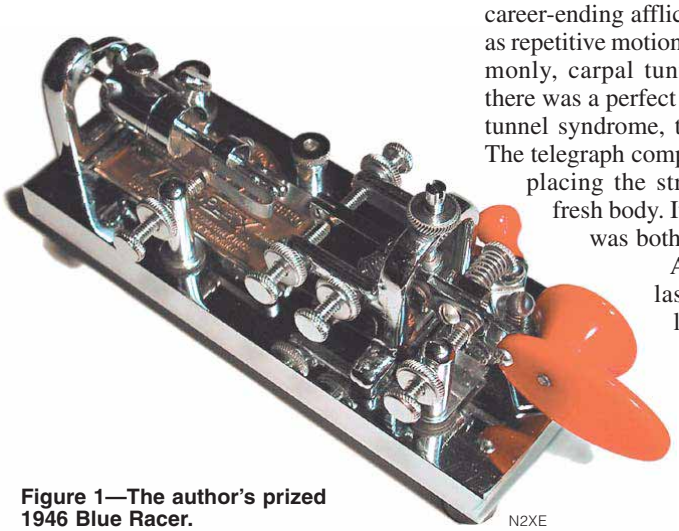


Figure 1—The author's prized 1946 Blue Racer. N2XE

Of Straight Keys and Bugs

The original telegraph key was invented in the late 1830s and was in commercial use by the 1840s. Until 1900, it remained stunningly unchanged. That original key, Alfred Vail's "lever correspondent," a simple switch, was the archetype of the telegraphic transmitter for over 60 years. But the straight key, as it's called today, has a couple of fatal flaws. The first is its speed, which tops out at about 20 words per minute. The second is that it tended to cripple those who used it for any length of time. The more skilled an operator was, the more likely he was to be injured. In a business where words equaled dollars, the best operators saw the most action for longer periods of time, placing themselves at greater risk.

Many operators fell victim to what was called "glass arm" or "telegrapher's paralysis." Characterized by excruciating pain and loss of fine motor ability, glass arm was a career-ending affliction. Today, it's known as repetitive motion disorder or, more commonly, carpal tunnel syndrome. If ever there was a perfect device to induce carpal tunnel syndrome, the straight key was it. The telegraph companies responded by replacing the stricken operator with a fresh body. It was a time when labor was both cheap and abundant.

Around the turn of the last century, a young telegrapher and experimenter was working on the problem. Horace G. Martin had developed an electromechanical widget that produced automatic dots and manual dashes. The human interface incorporated a side-to-side motion instead of up and down. This new contraption, the Autoplex, was somewhat bulky and required expensive batteries to power its electromagnets, but it was relatively easy to master and virtually effortless.

Martin developed a totally mechanical and compact version in 1904, which he named "Vibroplex." It brought simplicity, small size, modest cost (about a week's wages) and total relief of glass arm. Martin's Vibroplex was an instant success. The Vibroplex started to appear on telegraph circuits en mass. For reasons not entirely clear, it acquired the nickname "bug." Perhaps it was the rapid fire dots or the annoying racket that resulted in the hand of a poor operator, but the name stuck.

The Company Evolves

The Vibroplex was originally manufactured by United Electrical Manufacturing Company of Norcross, Georgia. One of the principal investors in the company, A. O. Brown, suffered a huge $3,000,000 loss on Wall Street in 1908 and UEM collapsed with him. At the time, it was the largest financial failure in history.

Martin subsequently hooked up with J. E. Albright, who had a successful typewriter sales and service business in New York City. Albright sold many typewriters to telegraphers so the Vibroplex was a natural extension of his business. Somewhere along the line, Albright had a bright idea—he was going to corner the bug market.

The partnership with Horace Martin gave Albright control of most, but not all, patents regarding semiautomatic keys. Albright purchased the remaining patents. With all bug patents in hand, Albright seems to have gone on an infringement holy

war. It was not enough to go after the counterfeit manufacturers and wire line companies; Albright threatened even the individual telegraphers using infringing keys. Within a few short years, Albright had exterminated all offensive bugs.

The Vibroplex enjoyed high demand and no competition until the patents started to expire around 1920. With time running out on his monopoly, Albright did what any good businessman would: he dressed up his product. In 1920 the Vibroplex label, that brass tag all Vibroplex bugs wore, got flamboyant. Its size exploded and it included a red lightning bug that was to become the company's trademark. See Figure 2. It is simply impossible not to notice it. No longer did the tag merely identify the product and serial number, the new label made a statement! When the patents did run out, dozens of manufacturers entered the semi-automatic key market. Some were more successful than others, but only one remains to this day—Vibroplex. Did the label make the difference? It didn't hurt.

Vibroplex remained in the Albright family for its first 65 years or so. From the mid-1960s to the mid-1990s, Vibroplex plugged along through several owners and declining sales. Over the years, Vibroplex produced 15 different models. By 1990 they offered only the "original." It seemed the Vibroplex destiny was to follow that of the industry it had originally serviced.

New Owner

The Vibroplex had been around to witness the development of radio, the sinking of the *Titanic*, two world wars, man landing on the moon and the Internet revolution; and you can still buy a brand new one. The need for landline telegraphers has long since vanished. Railroads no longer dispatch trains by wire. Yet the Vibroplex is still in demand and the demand is growing.

In 1995, Vibroplex found a new owner, S. Felton "Mitch" Mitchell, W4OA. Mitchell faced a set of challenges that only a 19th century product could present at the end of the 20th. To understand Mitchell's problems, one needs to understand manufacturing standards of 1900. While the Vibroplex is a fine instrument, it is not machined to super close tolerances. The Vibroplex was state of the art in 1904. In 2002, it's an arcane niche accessory in a market that demands high

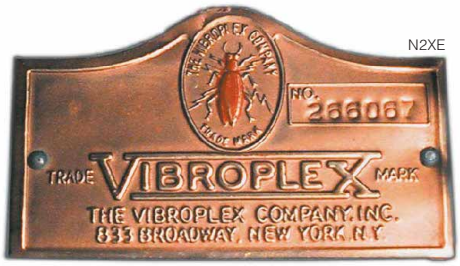


Figure 2—The label is perhaps the most distinctive feature of a Vibroplex key.

quality. A telegrapher in the mid-1900s cared little if there was a blemish in the chrome or a tooling mark here or there. A ham in 2002 will not tolerate imperfections. The chrome must be perfect, paint must be flawless. Mitchell has had to become expert in machining, metallurgy, plastics and plating, and in the process puts out the finest bug that this 19th century design will allow.

New users find bugs to be a bit loose and sloppy feeling. You cannot adjust a bug to 1 micron contact spacing. A bug likes motion and lots of it. Your wrist, after all, is the power source. The Vibroplex is also noisy. In particular, you'll notice the constant clank of the damper. This is not a stealthy key; anyone within earshot will know you're on the air. The Vibroplex still has 10 or 11 possible adjustments to fiddle with. It can take a week to fine-tune a newly acquired bug. It is, with all its quirks, wonderful. It's more emotional than practical but many agree that to tame and master a bug is to become a more complete ham.

Work of Art

Today's Vibroplex is made with some of the same tooling used 100 years ago. The same outfit that first stamped that flamboyant label in 1920 is still stamping them out in 2002. A bug made in 1920 was a necessary tool of the trade and remaining bugs from that era show it. The nickel plating is worn and dull; the base paint is peeling.

Semi-automatic for a Reason

While the Vibroplex is employed today to send International or radio Morse, it was the perfect instrument for American or landline Morse. Landline Morse is a different code than the radio Morse in common use today. Not only was it made up of dots (dits) and dashes (dahs), the length of dashes and spaces (letters C, Y and O) was critically important. The character L was long duration dash. The number 0 was a really long dash—actually the character elements were time intervals between the *click* and *ka-lunk* sounds made by a mechanical sounder. The difference between landline and radio Morse is distinguishable even by those who know neither. American Morse is "ditty" and comes in bursts; International Morse is smoother but less interesting. The Vibroplex was ideally suited for American landline telegraphy with its high proportion of dits and variable length dahs. Martin went halfway, making only the dits automatic out of necessity.

Morse Nirvana

On Amateur Radio bands, old landline telegraphers are not hard to discover. Even though they are sending radio Morse, old habits expose their history—and they have a lot of history. Virtually nobody was learning landline Morse after 1950 so a practitioner is at least 70 years old. The long tone zero can be a giveaway but many radio Morse telegraphers have picked that up also. More subtle is the letter L. In radio Morse it's *di da di dit*. If you learned landline Morse first then it's *di daaah di dit*. They linger a little on the dah. They also favor bugs instead of the more popular electronic keyers. To strike up an in-depth conversation with a retired railroad telegrapher is a special treat. Their sending is musical and structured but unique to that individual's fist. With a little prodding, you can usually get their life story and it's well worth the effort. Their jobs, kids, loves, the war, retirement, loss of their spouse, the solitude of twilight years. The conversation sometimes ends with a tear shorting out the bug.

A few years ago, I was fortunate to acquire a 1946 vintage Blue Racer Deluxe. Deluxe it is. All chrome, jeweled bearings, bright red finger pieces and quick on the dots. While not particularly rare, the Blue Racer is highly sought. All you need do is use one to know why. Many consider the postwar Blue Racer Deluxe to be the most attractive bug ever produced. It is a very fluid machine both visually and functionally. On the air, you forget the physical interface; dits and dahs disappear. The bug takes you into a telegraphic zone where you directly enter the other operator's mind. If you are lucky enough to find a retired railroad telegrapher on the other end, it is Morse nirvana.

John Ceccherelli, N2XE, of Wappingers Falls, New York, loves CW, QRP and backpacking with both. He is a senior engineer at IBM Global Procurement. Previously, John designed GPS receivers for IBM. You can reach the author at 134 Myers Corners Rd, Wappingers Falls, NY 12590; **n2xe@arrl.net**.

Need More Information?

The Vibroplex Company Web Site: **www.vibroplex.com**.
A great Vibroplex collectors page: **www.la.ca.us/frandy/index.html#bug**.
Need to adjust your bug? **www.vibroplex.com/New_Folder/BUGAdj.htm**.

By Joel Thurtell, K8PSV

Harold Collins and his Wonderful 75A-1

How the author came to own a memory-laden radio.

A crisp Saturday afternoon, October 2001. I'm in a big rush. We're getting ready for a trip to the Detroit art museum. I pace briskly through the house, looking for something. The red light is blinking on my phone answering machine.

I slow, stop and from habit push the play button.

A man's tinny voice: Want to buy a Collins 75A-1? Receiver's complete with mechanical filter adapter, Central Electronics Sideband Slicer, speaker.

I remember a setup just like that. A long time ago.

Area code 616. Now he has my attention. Western Michigan, where I grew up. The exchange: 897. Wow—my hometown, Lowell!

After all these years, could this be the radio I've most wanted to find?

I jump in the car, steering for Detroit. But my mind is not on Degas or Renoir.

I First Meet Harold Collins

Another crisp fall. 1958. I'm an eighth-grader and I want to build a radar set as a science fair project. I learn there's something out there called Amateur Radio. Sounds more intriguing than radar.

Hmmm. There's a house on my paper route with a weird sort of antenna on the roof. A guy named Harold Collins lives there.

I'm collecting for the paper. Mr Collins' wife, Alma Collins, pays me. Before she can shut the door, I blurt it out: I am interested in ham radio.

Wait, she says. Mr Collins comes to the door. A guy in his 50s. Gray hair. I am 13. Boy, is he old. But he has a great idea. Come back before nine tomorrow night. He'll show me ham radio.

I'm half an hour early. It's okay. The rig has to warm up anyway.

He calls the spare bedroom a "shack." It once belonged to his older son—"Joe," he calls him, or "Gardner." Joe or Gardner had been in the Navy. By 1958 he was an electrical engineering student at the University of Michigan.

JOEL THURTELL, K8PSV

On the desk, there's a dark gray metal box. Electrical meter on the left beside a big glass window. A smaller, curved glass window under the big one. This, Harold said, was his receiver. It was a Collins 75A-1. No relation to him, he laughed.

A metal rack on the floor holds Harold's transmitter. Homemade. I didn't ask who built it. AM, the premier mode then. He switched it to transmit and said his call sign: W-Eight-L-E-Zed.

His 75A-1 receiver was tuned to 28.620 megacycles. Soon, he was chatting away. Then, suddenly, he said he had a visitor: Joel. He handed me the mike. I wanted to run.

The following Sunday, I went back. Harold explained the calibration on that big billboard of a dial glass. Frequency. He drew a picture of a sine wave: One cycle. "Kilo," Greek for thousand. "Mega," Greek for million. So it's twenty-eight-point-six-twenty megacycles or twenty-eight-thousand-six-hundred-twenty kilocycles. Or twenty-eight-million-six-hundred-twenty thousand cycles.

A wonderful teaching tool, that 75A-1.

Ten meters could be very busy in the late 1950s. Sometimes California stations would drown out our pals in Grand Rapids. No problem. Harold pulled a tube out of the A-1 and plugged a gadget into its socket.

He called it a mechanical filter. He drew another picture. A "transducer," Harold said, changes electrical energy to mechanical energy. A microphone or loudspeaker is a transducer. In Latin, it means to "lead across." The transducer leads the energy from the state of electrical to mechanical energy. As mechanical vibrations, the signal passes through a series of metal discs. The discs resonate at a certain frequency but reject energy above and below that resonant frequency. You might say they select that frequency, rejecting signals at other frequencies. Having passed through the discs, a second transducer returns the vibrations to electrical energy for use once again in the receiver. This process is called "magnetostriction." If you insert such a device, resonant at 455 kilocycles, into a receiver's 455 kilocycle intermediate frequency stage, it will easily pass signals that resonate with it but lop off those that don't.

Magnetostriction.

Transducer.

Wow!

I was hooked.

I Become KN8PSV

April 29, 1959. I stopped at Harold's house with a sealed envelope. I tapped something in Morse code. He sent some Morse back to me. I answered 20 questions and in June 1959, a little, white FCC

THE LOWELL LEDGER

In November 1953, Hal Collins, W8FNH, shows dad Harold E. Collins, W8LEZ, the mobile transmitter he had built.

THE LOWELL LEDGER

Also in November 1953, W8FNH (with mike) and W8LEZ put Hal's homebrew 829B transmitter through its paces.

envelope came. Now I had a call sign: KN8PSV. I was a Novice ham.

By then I'd built my first receiver–-a three-tube regenerative set, the Knight-Kit "Ocean Hopper." Sensitive, yes. Selective? Not at all. My hand moving near the panel would change the frequency. It cost eleven bucks. My next receiver was $100, a National NC-173. It was the real thing.

But Harold Collins warned me that it was a "single-conversion" receiver. More new words. The NC-173 would convert the signal at, say, 14.2 megacycles down to the one and only intermediate frequency of 455 kilocycles. But the conversion process produces two signals—the wanted signal, and another, weaker "image" signal 455 kilocycles away. I would hear duplicate signals 455 kilocycles away from the real signal. That did not happen with the 75A-1, which had "dual conversion." By converting the signal twice, the receiver eludes the unwanted image.

It was true. I heard images on the NC-173. I sure admired Harold's 75A-1. Another big word: "Permeability tuning." You could vary frequency either by changing capacitance or inductance. Other manufacturers used variable capacitors to change frequency. Not Collins. Variable capacitors' values were hostage to heat changes. Collins varied inductance in its variable intermediate frequency oscillator. The knob of Harold's receiver turned a lead slug through a coil in this "permeability tuned oscillator." Less prone to heat-induced drift. Stability, that was Collins, per Harold Collins.

I went to college, but when I came home I would visit Harold. It was Harold who had explained the beauty of single-sideband to me, using that 75A-1 dial as his blackboard: Imagine the carrier on this calibration mark and consider that when AM is applied, two sidebands appear. One is 3 kilocycles above the carrier, the other 3 kilocycles below. Six kilocycles of band space for the AM transmitter. What if you removed a sideband? You'd liberate three kilocycles of band space. If everybody did it, the effective spectrum would be doubled. Now, what if you removed the carrier? No more squealing heterodynes!

Even better, he said, now making marks with pencil on paper, consider a carrier with 100 watts of power. Modulated at 100 percent, it should have 50 watts of audio—25 watts in each sideband. What if you removed a sideband—25 watts—and the carrier—100 watts—and poured their 125 watts into the remaining sideband? You'd have 150 watts of power in the speech part of your signal, instead of a mere 25 watts. Quite a bargain.

I was hooked on sideband as well.

Sideband Takes Over

What the 75A-1 lacked was a detector for sideband. Harold had to back off the RF gain and run the audio wide open to compensate for strong signal overload. In the 1950s and early 1960s when many hams still were on AM, this was not such a problem. But by 1963, when I went off to college, it was clear that sideband was taking over. Harold was all for it.

But Harold loved his 75A-1. And he had a solution: A Central Electronics Model B Sideband Slicer. It was a standalone unit meant to take sideband signals from the IF output of a conventional AM receiver and process them with a product detector.

Harold's son Joe was by this time an electrical engineer designing avionics equipment and living in California. On a visit to Lowell, he modified the 75A-1 so it would work with the Slicer.

I came back from college and visited Harold. He'd tune the A-1 to a sideband signal and then finely adjust the Slicer's vernier until the voice sounded rich and warm.

By the early 1980s, I was living in southwestern Michigan in a farmhouse where I had a little ham station. I had not seen Harold for some time. Christmas, 1981, my parents visited us. My mother told me the ghastly news. On December 23, 1981, Harold and Alma Collins were going to look at a Nativity scene near their church in Lowell. It was dark and snowing hard. As they crossed the street a driver, blinded by snow, struck and killed Harold and Alma.

Since then, I've often thought of Harold Collins and how he taught me basic radio using that 75A-1. Every time I saw a 75A-1 at a hamfest, I'd think of those Sunday sessions and the warm glow of the dial lights.

Words like "magnetostriction" and "transducer" would pop into my head.

Over the years after Harold's death, I tried to contact Harold's son. I knew he'd dropped his first call sign, W8FNH, and had a California call sign. I didn't know what it was. I'd heard him referred to as "Joe" and "Gardner." With the Internet, I'd plug "Joe Collins" and "Gardner Collins" into search engines and get nothing. Then in February 2000, *QST* published my cover story about a Collins

75A-4 homebrewed by a onetime Collins technician. "A 75A-4, One Piece at a Time" caught the eye of an engineer in southern California. His name was not Joe, it turns out—that was just an on-air nickname he used back in Lowell. And Gardner was only a piece of it—his middle name. No, he was like his dad, Harold Collins, now W8JES and going by Hal.

Hal, the son of my mentor Harold Collins, is an antenna design engineer who worked on Apollo, GPS and space shuttle projects. We corresponded several times by e-mail, but I never asked him what happened to his dad's 75A-1.

The Radio Finds Me

The phone rang that crisp October afternoon and I heard Merritt Wissman, KA8DMP, aka Curly, describe a virtually mint 75A-1 with mechanical filter adapter, Central Electronics Slicer and speaker. Yes, he was just outside Lowell.

I asked him if he'd known Harold Collins.

No, he said. He never knew Harold.

Well, I thought, close but no cigar.

But, Curly added, "I bought his 75A-1 from his son."

Harold's radio had found me.

As we ambled through the art museum that afternoon, my mind was only partly on those wonderful suits of medieval armor, the great Picassos and the amazing Diego Rivera mural.

I've gone on some pretty exciting radio quests. When I first got the homebrew 75A-4, it was something of a curiosity that, as I considered and reconsidered it over time, revealed itself as an amazing find. When I was offered the Central Electronics 100-R (November 1998 *QST*, "Zenith's One-And-Only Ham Receiver") I put the phone down and drove straight to Chicago.

As we got ready to go to the museum, my wife, Karen Fonde, listened as I described the call from Curly.

"It's a big deal," she said. "It's part of *your* history."

This was a radio that could mean much to only one person. Well, maybe to Hal, too, but as I would find, it was my experience of sitting for hours in Harold's shack before that lit billboard dial that made this *my* one-and-only receiver.

"Outstanding!"

The day before I went for the 75A-1, I sent an e-mail to Hal Collins.

"Hal—I found your dad's 75A-1. The radio never left Lowell."

"Joel," Hal replied, "your note is something special about Dad's receiver. It must be Dad's A-1. This event is outstanding. Or maybe it's best described as 'awesome.'"

Lowell is a two-hour drive from my home in Plymouth. Less on this trip.

It was sitting on a shelf on Curly's radio desk. Ten minutes from Harold's old house.

From Hal, I learned the story of how Harold and Hal each happened to buy a 75A-1, unbeknownst to the other.

It was in 1955, and Hal was in the Navy, stationed in Kodiak, Alaska. He and his dad had both dreamed of finding a 75A-1. The station in Lowell used a Hallicrafters SX-43—decent radio, but no match for the Collins. In Kodiak at the Navy base, Hal was using a National NC-183-D—"a great performer," recalls Hal. "Personally, I wanted a Collins receiver. Model? Hadn't decided."

"Henry Radio in West LA was reselling the A-1 for something like $180 for a good, clean unit. So I told Dad that I was going to get an A-1 when I got out of the Navy."

"As it turned out, I had the chance to obtain an A-1 while still in Alaska, unbeknownst to Dad. And unbeknownst to me, dad bought an A-1 for me. So when I returned to Lowell in April 1955, Surprise! Surprise! So Dad kept his A-1, which he substituted for the SX-43. And I kept my A-1."

Hal said his wife, Dottie, was not excited about this purchase. Harold and Hal were paying about $200 for the 75A-1 in 1955. Adjusted for inflation, that would amount to $1318 today. But it's better than the 1946 price of $375 when it was new. That would be $3394 now.

From Hal, I learned that my radio mentor was Lowell's radio pioneer as well. In the 1920s, Harold Collins and a friend built the first radio in town. A collection of his dad's home-built broadcast radios inspired young Hal to build two-tube regenerative receivers during World War II. Via shortwave radio, Hal, a junior high kid, heard news of the Japanese surrender in 1945.

"I woke my parents up and said, 'Hey, the war is over!' They said, 'Go to bed—you're dreaming.'"

Like his dad, Hal found a Central Sideband Slicer for his 75A-1. The father-son duo had duplicate receiving systems. Hal's transmitter was a phasing rig he built. It was similar to a Central Electronics 20-A, except that it drove a pair of 4CX300As to better than a kilowatt.

That AM transmitter Harold was using on my first visit to his shack? Hal knew all about it. He built it. It was a 100-watter with 829B final amplifier.

Harold replaced the 829B rig in the 1960s. The new transmitter was a Heath Marauder sideband transmitter. By the 1970s, Harold was tired of the Marauder's regular breakdowns. He bought a Yaesu FT-101-E transceiver, but was so attached to the 75A-1 that he devised a way to use the Yaesu as a transmitter while receiving on the 75A-1/Slicer.

After his dad's death, Hal recalls selling the 829B rig and his homebrew sideband transmitter to a Lowell police officer. He couldn't recall the guy's name.

On a Christmas 2001 visit to Lowell, my mother showed me an article in the *Grand Rapids Press* about a student ham radio club at Lowell High School. It was organized by the high school security director, Al Eckman, WW8WW. I remembered Al—he was Lowell High School class of '60, three years ahead of me. Hal said he sold his equipment to a cop. Well, I knew Al had been a cop in Lowell.

I called Al.

"I bought that equipment," said Al.

Fantastic, I thought.

"But I sold it."

Now for a Transmitter

Many of us collectors try to recreate our early stations or stations of mentors like Harold Collins. Seldom do we find the actual artifact—we simply find similar rigs. They're stand-ins, but we make do.

Now I can recreate part of the first ham station I ever saw. I have Harold's receiver—the same receiver he used, not just a duplicate.

What about a transmitter?

I suppose I could use something I have on hand. Maybe a Central Electronics 100-V or Hallicrafters HT-32-B.

All surrogates, I'm afraid.

But wait! It once seemed implausible, but today Harold's 75A-1, the radio I most wanted to find, is now in my shack. What if …

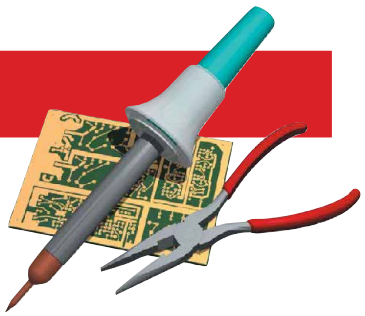
Has anybody seen a 100-watt AM transmitter?

It would be a homebrew rig.

Rack-mounted.

With an 829B final.

Joel Thurtell was licensed as KN8PSV in 1959. His first receiver was a three-tube Knight Ocean Hopper, soon replaced with a National NC-173. Eventually, by mowing lawns and peddling newspapers, he raised money to buy a second-hand Collins 32V-1 and 75A-2. He worked lots of DX with that station, mostly on 10 meters in the early 1960s. The 32V-1 communicated with lots of TV sets, too, and the neighbor's QSLs were not always fun. Joel loves to write about his adventures with old radios. He deals in old radios through his Web site, **www.radiofinder.com**. *He is a reporter with the* Detroit Free Press *and can be reached at* **finder@radiofinder.com** *or* **joel@thurtell.net**.



The Doctor is IN

QDan, W9CP, asks about burying coaxial cable: "I want to bury my coax using electrical PVC pipe and would like to know if there are any specific precautions that must be taken to ensure a good installation."

A If the cable is of the type designed for burial, no precautions are usually needed to place it directly in the ground. Such a product is BURY-FLEX, a 50-Ω cable with double shield yielding 100% shield coverage, consisting of a 97% braid shield which is tinned for ease of soldering and corrosion protection, plus a bonded foil shield for added moisture protection. The jacket is also designed to withstand the abrasiveness of living in the ground with sharp sand and small stones that can move around a bit with changes in the soil. If the cable will be subject to excessive soil moisture or heavily acid or alkaline soil, you may want to use coax with a "non-contaminating" jacket—chemicals or moisture don't leach materials from the jacket that damage the rest of the coax.

However, if you'd rather place the cable in a PVC pipe, you will have to prevent water condensation in the pipe. The Doctor asked our advisor in commercial and cell phone installation, John, K1TLV, for his input. John, who has also been a ham for 40 years, had this to offer:

Figure 1—BURY-FLEX is a 50-Ω cable with double shield yielding 100% shield coverage, consisting of a 97% braid shield that is tinned for ease of soldering and corrosion protection, plus a bonded foil shield for added moisture protection.

> The easiest solution is to use the pipe available with perforations used for "drain tile" around the perimeter of dwellings. These perforations, or holes, are limited to one side of the pipe and so the pipe is buried with holes facing down. However, I would also use a sand and stone combination under the pipe (6 inches–1 foot) to allow any water accumulation to drain away.

Rainwater, soil or insects could get into the pipe, so the Doctor also recommends sealing the ends of the pipe well to minimize the entry of contaminants into the pipe. It is not recommended to bury coax in PVC or any other pipe below the water table.

QAs if he knew we were getting another coax/moisture question from W9CP above, Joe, N1KHB, follows up with: I have heard about the detrimental effects of moisture in coax, but no real explanation was ever offered. After thinking about it, I kind of thought that maybe the most damage might occur to foam filled or air cell types of cable, whereas solid dielectric might be minimally affected if at all.

Could I do a test of the characteristic impedance of the line to determine if moisture has affected the line? People also occasionally talk about "aged" coax and that they periodically change it as a precaution. Can you shed any light on any of these subjects? I have checked through many of my references including ARRL publications and so far have found nothing that addresses these points as presented here.

A You pose some interesting questions! Unfortunately, The Doctor is not aware of many studies in this area. One actual lab experiment was conducted in the ARRL Lab and published in our experimenter's magazine *QEX*. In the "RF" column of the March 1999 issue, Senior Lab Engineer Zack Lau, W1VT, published a study of the effect of soaking exposed N connectors (on RG-213) in a jar of water for various periods of time. At each time interval, he measured the resulting loss at a number of VHF, UHF and microwave frequencies. This was a good study of short-term moisture exposure. In this study, the losses ranged from a few hundredths of a dB for short soaking and VHF test frequencies to more than 10 dB for longer soaks and UHF.

However, long-term moisture exposure is also a major concern. The Doctor have yet to hear of a study on long-term exposure to moisture. But Doctor can offer anecdotal information from the examination of coax that was being replaced after years of exposure to the elements. The chief problem noted was that the braided shield was severely corroded for several inches along its length the end. It would seem that this corrosion would be due to a 'wicking' effect of the braided strands. It is possible that this could have been prevented by properly sealing the connection on the ends.

Of course, there are a number of weather related effects that cause degrading of cable, including wind, prolonged sunlight exposure and ice. Each of these degrades the jacket and will in time allow moisture intrusion in places far removed from the connectors. It would be difficult to isolate each of these problems using an outdoor test, and performing a prolonged indoor lab test would be rather expensive and time consuming.

So what about coax kept for years in a dry basement or garage? Well, those conditions are much kinder to coax, but they still pose some problems over the long run. Again, the Doctor has not seen studies on this, but the soft plastics used for many dielectric and jacket materials in coax may harden over time in a dry environment. This may create small cracks in the jacket and if cable with a cracked jacket is used outdoors, moisture will take its toll quickly. In extreme cases, the changes in the dielectric materials could cause a change in characteristic impedance and line loss.

The bottom line here is that if one is ever in doubt, it is best to perform a test on the specific coax in question. A fairly simple way to do this is to connect the length between a dummy load and transmitter with a known power output and measure the loss directly by measuring the power going into the dummy load. Note that this technique is useful even if the original loss of the line is not known.

The loss in dB can be determined from the formula:
Loss dB = 10log(power at transmitter / power at load)

Q Thomas, N2YTF, has a troubleshooting question: Yesterday I bought an RF Concepts 4-32 440 20W RF amp used at my club's hamfest. At first it worked just fine, putting out 30 W with the max 5 W input. The built in GaAsFET worked well also (the GaAsFET can be switched in and out independently of the power amp section).

Within 10 minutes of light on-off use on 432, trouble developed with the preamp. Now when switched in, received signal strength drops significantly. Power output and operation without the preamp seems just fine.

I'm curious as to just what happened. Nothing looks bad inside the amp; there was no smoke or noise, as far as I could tell. Did transmit power fry the GaAsFET or is it more likely that there is a relay failure somewhere along the way? If the GaAsFET is fried what would I expect? I have a schematic for the amp. I only paid $25 for it, and although I don't have any electronic engineering experience, I would like to try diagnosing/repairing this amp or learn trying.

A This problem could be a stuck relay or a bad FET. On SSB, the rig's VOX circuitry or the amp's RF switching may cycle that relay on and off a lot. Transistor failure is quite common with modern RF switched preamplifiers and SSB. The output of the preamp sees a huge amount of power everytime you transmit enough power to switch the amp into transmit. If the relay doesn't switch fast enough the GaAsFET will fry. Old-fashioned JFETs are much more rugged, but don't offer the low noise performance possible with GaAsFETs. If that old amp has not been used a lot, the relay may have been a bit sluggish and may not have switched fast enough. The result may be a bad GaAsFET. The easiest way to diagnose the GaAsFET is to substitute another. Try Mouser (**www.mouser.com**) or Down East Microwave (**www.downeastmicrowave.com**).

To test the relays, you can simply measure across their contacts with an ohmmeter. You could also temporarily solder wire jumpers across them and try using the amp in receive only.

If the amp is an older unit and if the FET looks like it has been replaced before, there may be some sort of intermittent problem with the switching circuitry that caused the FET to fail—unfortunately, this can be very difficult to diagnose. I would replace the relays and all transistors and diodes associated with controlling the relay. Replacing power supply bypass capacitors might be a good idea as well.

One way to avoid this problem is to hard wire a push to talk (PTT) connection, so the amplifier switches when you press the PTT switch, before any RF is generated.

Finally, $25 for the amp was a good deal. And the Doctor is pleased to hear you're willing to tackle the repair. This is one of many "real" things you can do with ham radio!

Q Ken and Joann Earle, KCØKPB and KCØKPA, ask: We live and cruise on our sailboat. We have an ICOM IC-706 transceiver with a Comet SB15 triband antenna mounted on the stern rail. Realizing the '706 has an internal antenna tuner, I still find it difficult to use the transceiver either on the boat or at home. People are telling me to buy a tuner and hook the tuner to the '706 and run a wire to a steel side stay or back stay of my sailboat and this will allow us to use the transceiver. We have a wooden mast and apparently this helps (according to other hams). Will you please give us information as to the type of tuner to buy and is the hookup correct as stated.

A The Comet SB15 is a vertical, ground-plane type 6-meter, 2-meter, 70-cm mobile antenna. It sounds like you want to operate on HF, and this antenna really won't work well on bands for which it wasn't designed. Even on VHF/UHF, the antenna needs a ground or ground-plane connection. If the rail is metal, it will be enough ground plane to work.

On HF, many hams do indeed load a backstay as a good all-band HF antenna. The internal antenna tuners in transceivers are quite limited in the amount of mismatch they can handle. Beyond a certain point—typically about 4:1—they may not be able to achieve a match, and the transmitter's internal SWR protection will reduce output power to protect the transmitter. The tuner may also achieve a match to a load outside its rated range, but the tuner internal components could fail as a result.

Feeding a backstay results in a "random" impedance that may or may not be outside the range of the internal tuner. Most hams who use this set-up use an external tuner, which almost always has more matching range than internal tuners. The Doctor recommends a good quality tuner with large spacing in the capacitor to prevent arcing. Any good quality antenna tuner capable of full legal limit will be fine to handle extreme mismatches at the 100-W level.

A wire can run from the lower end of the backstay to the operating position, but keep in mind that this will be a radiating part of the antenna system. It is also possible to connect an external antenna tuner to the bottom of the backstay. See *The ARRL Antenna Book*, 19th Edition for more information.

To end feed a wire as described, you need to provide an RF ground. Even though it may be difficult to find places to run ground-plane wires in the boat, your work done laying out such wires will pay off with better results than so-called "ground-plate" systems for HF communications. Be sure to tie in any large metal structures to form a reasonable ground plane, including engine(s), tanks, etc.

Q Chuck, NØEBN, has this question: I have an old Unadilla W2AU balun, but I can't remember if it is a 1:1 or a 4:1 ratio. Is there any way to tell? Or, should I just toss it and buy a new one? This would very much go against the grain.

A Heavens no… don't toss anything! "Real hams" have to have a basement or other room chock full of all sorts of fine "junque" to keep you amused for the rest of your life!

To check the ratio of a balun, connect coax to both ends, and run the antenna side coax to a 50 Ω dummy load. Feed a modest amount of power into the transceiver side (an antenna analyzer makes this a snap, but you can also use a transmitter with the output reduced to perhaps 5-10 W), and you should see an SWR indication. If the SWR is low—around 1:1—the balun is a 1:1 type, and if it is high, it should be a 4:1 type. A 4:1 balun should theoretically read 4:1, but your SWR meter may not be accurate at high SWR, so a "high" reading generally indicates that the ratio is 4:1.

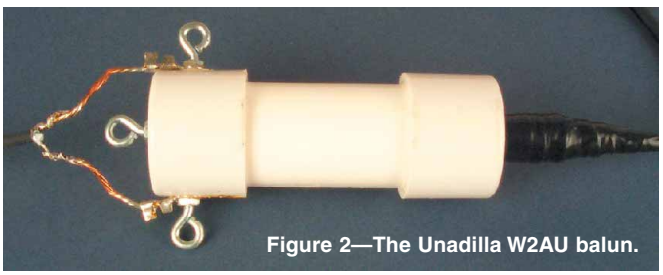


Figure 2—The Unadilla W2AU balun.

Do you have a question or a problem? Ask the Doctor! Send your questions (no telephone calls, please) to: "The Doctor," ARRL, 225 Main St, Newington, CT 06111; doctor@arrl.org; www.arrl.org/tis/. Add your comments: "The Doctor is On-line" at www.arrl.org/members-only/qst/doctor/. QST

TRX-Manager

Laurent Labourie, F6DEX, developed *TRX-Manager* primarily as a means to control transceivers via computers running Microsoft *Windows*. Most modern transceivers offer computer control and there are many programs available to do the job, but what makes *TRX-Manager* different is its versatility. The program does so much, it is impossible to describe everything in a "Short Takes" review. Instead, I'll concentrate on several highlights.

Rig Control

TRX-Manager communicates with your transceiver through the computer COM (serial) port. You can control up to two radios and two antenna rotators, but not simultaneously. A drop-down menu allows you to select your rig model from a long list including ICOM, Kenwood, Yaesu, TenTec, Alinco, Elecraft and more. All you need is an interface between the computer and the rig itself. For this review, I used the LCU-3 W1GEE serial interface to my ICOM IC-706 MkII transceiver (the interface is available for a very reasonable price from Personal Database Applications, the US and Canadian distributor of *TRX-Manager*).

Logging

TRX-Manager incorporates a comprehensive station log, complete with award tracking. You can print and sort records at will, print QSL labels and perform call sign lookups on CD-ROM databases (assuming you have them). If you purchased the *LOGic* software by Personal Database Applications and prefer to use it instead, *TRX-Manager* has a toolbar "button" to bring it up automatically.

DX Spots

With *TRX-Manager,* you can establish either a telnet or packet radio connection to a DX PacketCluster and receive DX spots as they appear. Just double click your mouse on the spot information and suddenly your radio tunes to the frequency and mode.

Shortwave Listening

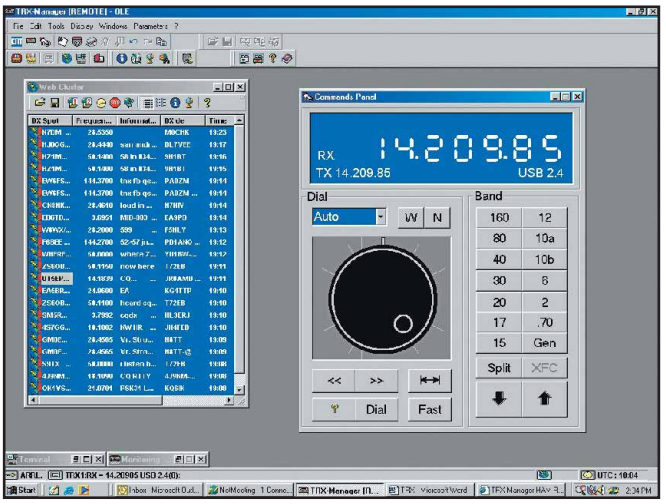
TRX-Manager maintains a separate database for shortwave listening. You can enter stations that you find on your own, or download broadcast schedules from sources such as Fineware at **www.fineware-swl.com/**. I downloaded an English-language schedule database and enjoyed a new appreciation of shortwave listening. I could sort by time of day, then simply click on the desired station and my IC-706 would tune automatically. *TRX-Manager* even provides a sound recorder that allows me to record programs by manual activation, or at specific times of the day when I'm away from the radio.

Remote Control

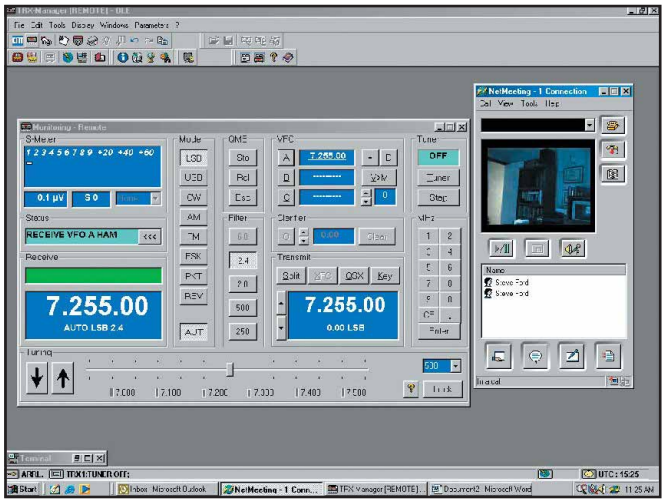
Remote control is one of the most fascinating and popular features of *TRX-Manager*.

With my DSL Internet connection at home, I have been able to use *TRX-Manager* to control my IC-706 remotely from my office computer at Headquarters. Before I leave for work, I turn on my transceiver and start *TRX-Manager* in its "slave" configuration. With the terminal window open, *TRX-Manager* is standing by for an Internet control connection via telnet.

At the office, I boot up *TRX-Manager* in the "master" mode, open its terminal window, enter my IP address in the telnet line and click on the green "connect" arrow. Within a few seconds, I'm in control of a transceiver that's 30 miles from my operating position.



Hunting DX with the PacketCluster function (left window).



Remote control with *TRX-Manager*. The right-hand window is Microsoft *Netmeeting* (not supplied with *TRX-Manager*), which I use to relay audio from my home station to my office.

Conclusion

If you want to try computer control of your radio, *TRX-Manager* should be at the top of your list—especially if you are interested in remote control. The software is so multifaceted, there still are several features I've yet to explore fully (such as the memories and bandscope). I experienced only one glitch, which involved loading a shortwave broadcast database. I posted my dilemma on the Yahoo *TRX-Manager* reflector (**groups.yahoo.com/group/TRX-Manager**) and had a solution within 24 hours. Try the free 30-day *TRX-Manager* demo. It's downloadable from **www.hosenose.com/trx-manager/**.

Manufacturer: Laurent Labourie, F6DEX, distributed in the US and Canada by Personal Database Applications, 1323 Center Dr, Auburn, GA 30011-3318; tel 770-307-1511; **www.hosenose.com.** *$69. LCU-3 serial interface: $25. System requirements:* Windows 95/98/2000/NT/XP *on a 100-MHz Pentium PC (minimum) with a CD-ROM drive.*

Steve Ford, WB8IMY ♦ *QST* Editor ♦ sford@arrl.org

By Ralph C. Craig, AJ8R

Restoring a Heathkit

Bringing a classic radio back to life can be a challenge, but as the author found, it's likely to be a rewarding one.

The letter was ominous. It was unusual for a technician in the Field Office to receive something directly from Corporate; correspondence had always come through the Field Office Manager. What could it mean? With trepidation, the envelope was opened. The words stood out with shocking clarity: *"…due to a reorganization, the position you now hold has been eliminated. A similar position in the Dayton, Ohio area is available. If you accept this position please report to the Dayton office within three weeks."* Its recipient had no idea that this letter would lead to a serendipitous gift, a desperate search and an exhilarating adventure for me, 35 years later.

Serendipitous Gift

The receiver, tuned to the local radio club's repeater, crackled to life—I was being called. I answered to find an offer from an old friend. Knowing that I liked to experiment and build equipment, he asked if I would like to have an old, non-working, SSB, tube-type transceiver to salvage, for parts. I hesitated before answering. My junk box was overflowing; my shack was stuffed…did I really need more of this stuff? However, I hated to disappoint him…so, in a moment of weakness, I answered yes.

That's how it all started, on a rainy November day. Showing up at my door with a tattered, water-stained and faded cardboard box in his hands, he explained how, more than 30 years prior, he had been transferred to the Dayton area. He had just received a license upgrade, permitting voice operation on the HF bands. In anticipation, he purchased a Heathkit[1] SSB transceiver. Although it was just about done, there was no time to complete it before the transfer took place. He placed it in a box and set it aside. After the transfer, he had temporarily abandoned Amateur Radio and stored the boxed kit in the attic. Later, coming back into the hobby, he purchased a new, all mode, solid-state transceiver, forgetting the kit. Now, 35 years later, he found it during an attic cleaning and thought of me. I thanked him and put the box in the shack for safe-keeping.

Surprise

I had become quite curious, so…after a week had passed, I opened the box. Removing some newspapers that were used as padding, I noticed the date on a page, a day in April of 1967… 35 years prior. This transceiver was older than half of the local radio club's members! As I removed it, a few items, including the instruction book, fell out of the box. There, sitting before me, was a Heathkit Model HW-12, 80 meter Single Band SSB Transceiver, in good condition and far from the "junk box" candidate I had expected to see (see Figure 1).

I wondered whether the transceiver would work. Had the parts deteriorated so much in 35 years that they would fail when power was applied? If parts did fail, were replacements available? Where could I find them? And, lastly… how would its operation compare with today's sophisticated equipment? The challenge to place the transceiver into operation seemed daunting, but I felt confident that it could be done.

Expecting the worst, I gently removed the outer case. I was amazed…there was not even a cobweb; just a coating of dust with some minor corrosion on a few metal parts (see Figure 2). Turning the chassis over, I found that the underside was in even better condition than the top. Impatient, I wanted to plug it in immediately but I knew better. From prior experience, I knew that could lead to disaster. I searched for information on restoring older equipment. I found some ideas in *QST*, *Popular Communications* and *Monitoring Times*. It soon became apparent, however, that they dealt primarily with commercially

[1]Notes appear on page 58.

Figure 1—Heathkit HW-12 SSB transceiver, introduced and first sold in 1963.

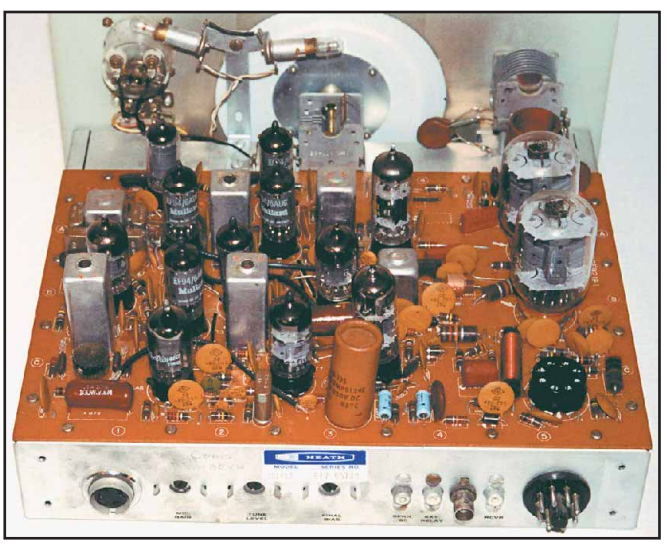


Figure 2—Interior of the HW-12 showing tubes and components.

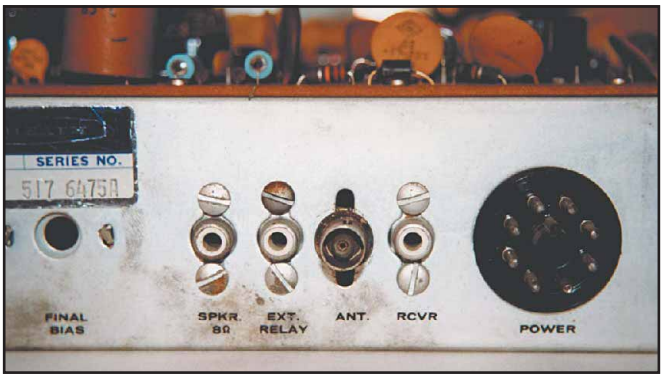


Figure 3—The only modification—a BNC antenna jack substitution by the original builder.

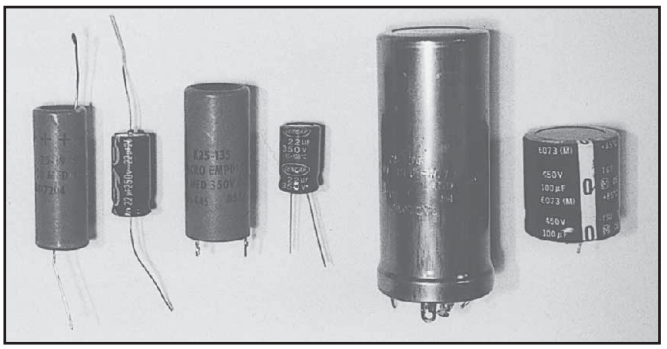


Figure 4—I hollowed out the old capacitors and inserted new, smaller units to preserve the original appearance.

built equipment. Restoration of a kit-built transceiver would require a different approach.

After pondering a course of action, I devised the following basic approach to restoration and used those steps that were applicable:

- Get all the available instruction books, schematics and construction procedures.
- Clean the unit using a vacuum and a soft paintbrush, being careful around delicate components.
- If the unit was stored in a damp area, there was probably moisture penetration into transformers, coils or inductors. Place the unit in an oven set to its lowest temperature to dry it thoroughly.
- If the equipment is extremely dirty, gently wash it with soap and water, then rinse well with distilled water and again dry in an oven set to its lowest temperature.
- Check to see whether the kit has been completed. If not, are parts available to finish it? If not, can those parts be fabricated from other components?
- Check to see that parts have been installed correctly. Look at stenciled locations on PC boards and assembly manual details for parts locations.
- In point to point wiring, check for signs of modification, different types of hookup wire, substitution of similar parts and newly soldered joints.
- By visual inspection, look for any obviously faulty parts—burned resistors, leaking capacitors or broken wires.
- Visually inspect all soldered joints for cold solder joints or faulty soldering technique.
- Check switches or relays for oxidation of contacts; clean all dirty or oxidized contacts with contact cleaner.
- Check all wiring for insulation that has deteriorated and replace damaged wiring.
- Check installed tubes and transistors for proper types.
- Identify any electrolytic capacitors. In older units they surely will be dried out and useless. Replace all electrolytics with new units.
- Be careful not to disturb settings of adjustable coils, trimmer or padder capacitors and IF transformers. Alignment can be done later using proper test equipment and procedures.

Many of these steps can be combined to simplify the process. The wholesale replacement of parts, without proper testing, is not recommended. Aside from electrolytics, more problems can be introduced by indiscriminate part replacement than may already exist.

When a physical inspection is completed and any obviously damaged parts replaced, the equipment is ready for further testing. If possible, use a variable voltage ac transformer to *slowly* raise the line voltage to the unit over a period of an hour or more.[2] This will allow the parts, especially capacitors, to adjust to operating voltages that have been dormant, preventing some failures. Apply the usual troubleshooting procedures: check voltages at key spots against those known from the schematic and replace any parts found faulty with exact component types, if possible.

Restoration

With these steps in mind, I removed the chassis from the case and carefully inspected it. Despite the statement by my benefactor that he did not have time to finish assembling the unit, the transceiver appeared to be complete. The underside of the printed circuit board was impressive; the soldering was impeccable. It was not surprising that the exposed silver contacts of a relay and a wafer switch were dark from oxidation. [Silver oxide is black in color and it is common on older, silver plated conductors. Although it appears ominous, it's as good a conductor as the native silver.—*Ed.*] I cleaned all contacts with contact cleaner. Considering its age, the transceiver was in remarkable condition. There was one modification—a BNC type RF connector had been substituted for the phono connector originally used by Heathkit as the antenna output jack (see Figure 3). I left it alone.

Next, I checked the separate power supply, a Heath model HP-23A. No schematic was available, although its point-to-point wiring made it easy to draw a schematic. The first portion traced was the –130 V bias power supply. Next came the "low voltage" +250 V dc supply and, finally, the transmitter's truly high voltage 800 V dc supply. These voltages can kill you. Use extreme caution when working on energized tube equipment and its power supplies. Discharge all medium voltage and high voltage filter capacitors, even after you remove power. Never trust bleeder resistors—they may be defective. The advice of an old timer came to mind: "Keep one hand in your pocket when troubleshooting live circuits with high voltage."

Dilemma

There were three electrolytic capacitors in the transceiver and seven in the power supply. These capacitors use a wet paste-type electrolyte to form an insulating barrier on an aluminum foil electrode that acts like a dielectric. Over many years, the electrolyte dries out and the barrier is lost. It is therefore routine practice to replace all older electrolytic capacitors. All were faulty, with low capacitance and high leakage. Finding exact replacements was next to impossible; the values listed in numerous catalogs did not match those that needed replacement. I had to choose the closest value to that needed. Because of technological advancements, the physical size of the replacement units was vastly different from the original (see Figure 4).

This posed a dilemma. Should the transceiver be restored to working condition only or should it be restored to working and

Figure 5—The Heathkit HP-23A power supply. Note the 11-pin socket that needed a plug and the 2 conductor ac cable that was replaced with a 3 conductor grounded type.

original physical condition? I decided to compromise. The original capacitors were hollowed out, leaving only the outer shells. I then inserted replacement units into the shells and reinstalled the new package. The original physical appearance was thus retained, but with new, modern components. A second appearance item took more thought. The power supply ac line cord was the old non-grounding, non-polarized type, having only two conductors. Should I replace the cord with a grounded line cord with the ground conductor connected to the metal case? Safety won out and I installed a 3-wire grounding cord.

With inspection and replacements completed it was time for the proverbial "smoke test." I plugged the power supply into a variable voltage ac transformer and slowly raised the ac line voltage. Nothing came out of the supply, even with full line voltage applied. My heart sank. If the power transformer had failed there was no way a replacement could be found, since it was custom designed. Wait…there was an output connector on the power supply, 2 pins of which went to the transceiver, so that primary power could be switched from the transceiver. Quickly, a jumper was made to temporarily connect the two pins. Power once again was applied and, once again, nothing happened. This time, the problem was traced to a circuit breaker in the supply. It was temporarily bypassed with a fuse, and presto, the supply became operational! All voltages were present and within expected limits.

Desperate Search

With the power supply operating properly, it was time to energize the transceiver. There was, however, one last item. Where was the power cable that connected the power supply to the transceiver? In my excitement while restoring the units, I had overlooked this cable. A search revealed that no cable came with the units, nor could my benefactor find one. I would have to fabricate one. The transceiver end of the cable used a standard 8-pin octal tube socket. The power supply end was different; it used an 11-pin plug and socket (see Figure 5).

I made a casual search of several catalogs and then to a local surplus electronics store. Nothing. Then to fellow ham junk boxes and, again…nothing. With no plug available, there were two alternatives, neither entirely satisfactory. A plug would either have to be fabricated using pins from an old octal tube or the connector would have to be changed. A bit discouraged, I waited and procrastinated, which eventually resulted in a pleasant surprise. WD8BMA showed up at the shack with some Motorola, GE and Air Force equipment, circa 1960. As we unloaded an old Motorola commercial FM transceiver chassis, I noticed a cable. One end was cut off. Unplugging the cable to dispose of it, I quickly glanced at the end…hooray! Here was the exact plug I had so desperately searched for. I removed the plug and assembled the power cord, being cautious to use wire with the proper voltage rating, as at least one of the conductors had to handle 800 V dc safely.

Testing...

With the two units connected by the new power cable, it was time for the final "smoke test." I connected a dummy load to the transceiver RF output jack and turned on the ac power. A faint hissing sound came from the speaker. The transceiver was working! To compare the operation of the HW-12 to today's more sophisticated equipment, I decided to align the unit using the instructions contained in the manual rather than use more advanced test equipment, as I wanted it to be representative of the way hams of the day would have built it.

With alignment completed, I connected the transceiver to an 80 meter antenna and compared its performance against a modern transceiver. I found receiver sensitivity to be excellent. Contacts on the less crowded frequencies were satisfactory, although on the more active frequencies the simple two-stage crystal filter was too wide to separate closely spaced signals. Without a narrow IF, sharp filters, passband tuning, a receiver notch filter and RIT, reception was difficult. The transmitter, rated at 200 W PEP input, performed better than expected, reaching every station the modern transceiver did.

Conclusion

Restoring older equipment built from a kit is gratifying, but it requires a different approach than that used to restore commercially built equipment. The original builder may not have used proper soldering techniques or possessed good assembly skills; components might have been custom-designed and modification in later years would have been more likely. In many cases, the original assembly manual might not be available. Restoration is an educational and satisfying experience, however, and it will reward the restorer with a significant sense of accomplishment in resurrecting some of Amateur Radio's past.

Operating with "yesterday's" technology can be challenging, as the performance of older equipment, particularly kits, will probably not equal that of modern equipment. Despite the challenges, the next time you're offered an old kit, take the plunge and restore it…you'll be exploring a bit of the history of Amateur Radio.

Notes

[1]Formerly known as the world's primary producer of electronics kits, the Heath Company of Benton Harbor, Michigan started producing kits for the Amateur Radio market around 1953. During the mid 1980s, a declining electronic kit market caused the company to close its doors. Many an Amateur got his or her start by building a Heathkit.

[2]A word of caution. Too low a line voltage may actually inflict additional damage, as the instability caused by voltage differentials, regulator "starving" and improper bias voltages can upset intended circuit design. Also, fans or other electromechanical components often overheat at reduced voltages. The object is to effect a "soft-start," so capacitors have a chance to "re-form" and not be subject to the shock of rated voltage levels. If this technique is used, it is suggested that the equipment be started at its specified minimum line voltage input, usually 85-90 V ac, rather than at 0.—*Ed.*

Ralph C. Craig, AJ8R, was first licensed in 1948 as W1RAW. After completing a five-year Electronic Technician apprenticeship at the Portsmouth Naval Shipyard in Maine, Ralph worked for the FAA for 25 years, 20 years as Field Office Chief. His wife, daughter, son-in-law and a grandson are all hams. You can contact the author at **ralph.craig@juno.com**.

Let's get Started

Welcome to "Hands-On Radio"—a series of simple bench-top experiments for the ham. Every month, this column will present a simple electronics or radio experiment for you to try at home with basic equipment. You'll learn a few simple design rules and equations that you can use on your own when you design your own circuits. We'll cover transistors, op amps, voltage regulators and all sorts of useful circuits. This will be a low-cost, interesting and fun way to get your feet wet building real, functional electronics.

Equipment

To perform the experiments, you'll need to have some basic electronics test equipment, of course. Let's start with the minimum that will enable you to perform the dc portions of the experiments:

12 V at 0.5 A power supply. These are widely available from all of the sources listed below. In a pinch, you could use your rig's power supply. Don't use a wall-transformer supply—they're too poorly regulated.

Volt-ohmmeter (VOM), digital or analog, with test probes. Use a name-brand meter, such as a Fluke, B&K, or those available from RadioShack. Don't rely on a "mystery meter" from a hamfest—these are often inaccurate, have too great an effect on the circuit being tested, or have been damaged. An example can be seen in Figure 1.

Figure 1—A typical digital volt-ohmmeter (VOM).

A prototyping board or breadboard. Because you will be making a lot of circuits and adjusting the values of the components frequently, a plug-in style base for construction is invaluable. You'll need one with at least 30 rows of contacts and dual power busses on each side. RadioShack #276-169 (p 256 in the 2002 catalog) is a good example of what's needed.

Clip leads. Buy or make a dozen 10 to 18 inch leads of stranded hookup wire with small, insulated alligator clips on each end. These will be used for connecting the power supplies and meters. While you're at it, obtain a few feet of solid #20 AWG or #22 AWG wire for the prototype board. Used telephone twisted-pair cable is a good source.

Tools. Have a small pair of needle-nosed pliers, wire clippers and wire strippers

The circuits are most useful when used with ac signals, so you will get an awful lot more out of the experiments if you can obtain the following:

20 MHz oscilloscope with two probes. Good deals abound for oscilloscopes with excellent specifications. A typical oscilloscope is shown in Figure 2. Internet auction sites, hamfests and ham swap Web sites regularly show excellent 'scopes selling for less than $200. Make sure it has internal triggering and be sure to get probes (they'll cost from $20-50 separately) and an operating manual.

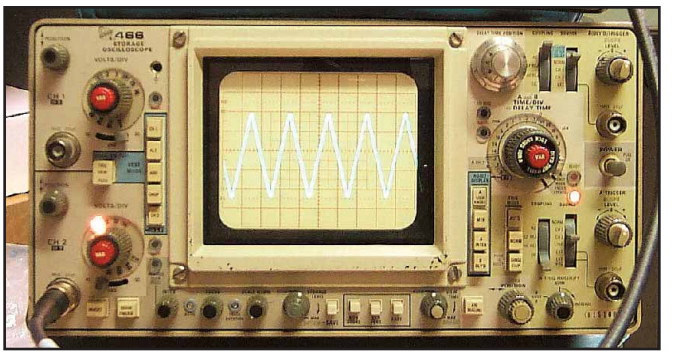


Figure 2—A wide-band oscilloscope with internal triggering.

Adjustable, dual power supply, 0-20 V at 0.5 A. A dual supply will allow you to have a source of adjustable dc voltage, as well as power your circuit. Dual supplies will be needed for our op-amp experiments, as well. Figure 3 shows an example of a multi-output power supply.

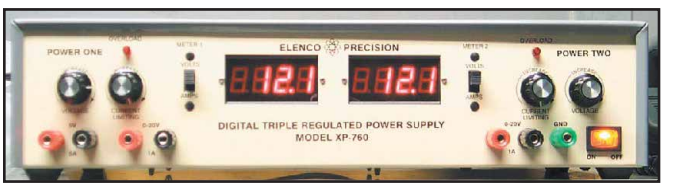


Figure 3—A variable multi-output power supply.

Function generator, 0-1 MHz. As with the 'scopes, excellent equipment is widely available for under $100. The generator should be able to supply both sine and square waves at voltages from 0.1 Vp-p to 5 Vp-p. Other features such as dc offset, triangle or asymmetric waveforms and sweep are not required, but you will find them helpful for your own use. If your generator has a coaxial cable output (usually BNC) you'll need either a BNC-to-binding post adapter (for connecting the clip leads) or

Figure 4—A basic function generator.

H. Ward Silver, NØAX ♦ 22916 107th Ave SW, Vashon, WA 98070 ♦ n0ax@arrl.org

a BNC cable with test clips. Figure 4 shows a function generator. The figures show some examples of commonly used test equipment. Don't be intimidated. You'll find that a small investment in basic test equipment now will be valuable for learning and troubleshooting later.

Figure 5—A typical analog type VOM.

A second VOM and test probes. Very useful to allow comparisons in real-time or to allow monitoring of one parameter while adjusting another. The second meter can be less capable than the primary meter and should be able to measure voltage at a minimum. A typical analog VOM, useful for the second meter, is shown in Figure 5.

Components

You'll also have to provide some inexpensive components, such as resistors, transistors, capacitors, integrated circuits, and the like. Some of these can be seen in Figure 6. A shopping list of components and equipment will be provided in the column preceding the experiment. In this way, you will be able to have them on hand when *QST* arrives. Generally speaking, if you have the following selection of components, you'll be ready to go!

- ¼-W resistors from 10 Ω to 1 MΩ and adjustable resistors or "pots" of 1 kΩ, 10 kΩ, and 100 kΩ
- capacitors from 100 pF to 10 µF of various types
- signal diodes such as 1N4148 and low-voltage rectifiers such as the 1N4001
- common NPN and PNP transistors such as 2N2222 or 2N3904 (NPN) and 2N2907 or 2N3906 (PNP)
- op-amps ICs such as types 741 or LF353

Other components may be needed for a specific experiment.

Sources

Here are a few of the distributors for components and equipment that I've found to be reliable vendors with good quality products: Future Electronics (**www.futureelectronics.com**); Digi-Key (**www.digikey.com**); Jameco (**www.jameco.com**); Marlin P. Jones (**www.mpja.com**); MCM Electronics (**www.mcmelectronics.com**); Mouser Electronics (**www.mouser.com**); Ocean State Electronics (**www. oselectronics.com**); RadioShack (**www.radioshack.com**).

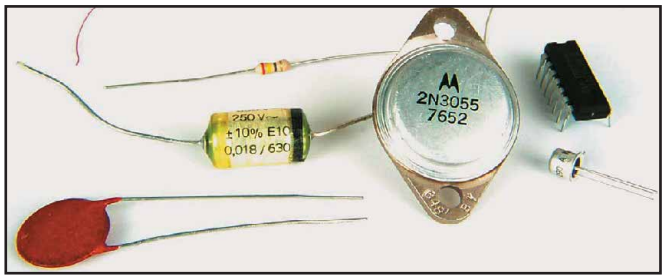


Figure 6—Some of the components you'll use.

References

Because of the limited space available in the column, I'll only be able to give a limited amount of background on the experiment and the circuit. Having one or more of these texts on your shelf as a backup is highly recommended: *The ARRL Handbook for Radio Amateurs*—I will use the 2002 edition as my primary reference for all of the experiments; *Solid State Design for the Radio Amateur*, by Wes Hayward, W7ZOI, and Doug DeMaw, W1FB, published by the ARRL; *Understanding Basic Electronics*—by Larry Wolfgang WR1B, published by the ARRL; *The Art of Electronics*—by Paul Horowitz and Winfield Hill, published by Cambridge University Press.

Experiment #1—Common-Emitter Amplifier

Our first experiment will feature the most common single-transistor amplifier—the common emitter. You'll need the following components:

- 2—100 kΩ adjustable resistors
- ¼-W resistors of the following values (Ω): 100, 470, 1000, 2.7 k, 3.9 k, 4.7 k, 10 k, 27 k, 39k, 47 k, 68 k, 100 k
- 2—1 µF capacitors with a voltage rating of 25 V dc or more (electrolytic or tantalum are fine)
- 2N3904 transistor (have two or more on hand).

If you can, read "Transistor Amplifier Design—A Practical Approach" in Chapter 8 of *The ARRL Handbook*. QST

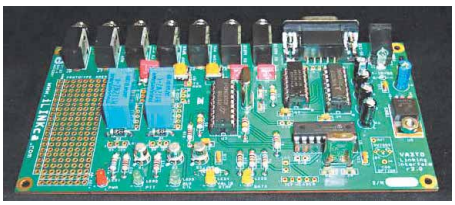
NEW PRODUCTS

KILL-A-WATT AC POWER METER FROM RADIO CITY

◊ Ever wonder how much power your PC or your refrigerator is really using or how much a particular ac-powered device might cost to operate? With the plug-in Kill-A-Watt ac power meter from Radio City, you'll know with 0.2% accuracy! Simply plug the unit into a standard three-prong, 117 V ac wall socket and plug the device to be measured into the built-in pass-through outlet. The unit instantly measures ac voltage, current, power, kilowatt hours, line frequency (Hz) and power factor for loads of up to 1875 W (125 V at 15 A maximum). The unit's large LCD is housed in an attractive molded body measuring about 5 × 2 × 2 inches.

Price: $49.95. For more information, contact Radio City at 2663 County Rd I, Mounds View, MN 55112; tel 763-786-4475, **www.radioinc.com**.

INTERNET/RADIO LINKING INTERFACE FROM ILINKCA AND VA3TO

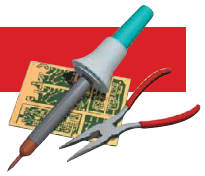


◊ Linking ham radio systems via the Internet is growing in popularity thanks in part to hardware such as the enhanced iLINK/Echolink interface from VA3TO, currently in version 2. Features include five status LEDs, a four-minute time-out timer (TOT), true RS-232 communications, a DTMF controlled auxiliary relay and a small prototyping area for experimenters.

The board can also be used as a digital mode (PSK31, SSTV, etc) sound card interface with a simple modification. The linking interface is well documented (download PDFs from the Internet) and is available in kit form or assembled and tested.

Price: $45 (complete kit), $65 (assembled an tested interface). For more information, send an e-mail to **iLINKca@rogers.com** or point your Web browser to **www.iLINKca.com.** QST

HINTS & KINKS



BATTERY-CHARGER POLARITY PLUS OR MINUS?

◊ My junk-box contains several battery chargers, or "wall warts," of various voltages and polarities. A few have only ac output. A simple bridge rectifier installed in the power-input circuit of your projects will cure polarity problems and, if the supply is ac only, will rectify the voltage so that the project always receives the correct polarity. (The input connector must float from the chassis. You may need to change the connector if one side is grounded, as are most RCA connectors.—*Zack Lau, W1VT, ARRL Lab)*

RadioShack sells several bridge rectifiers. The two pins marked "~" are the input pins. They accept any polarity: plus, minus or ac. The other two pins are marked "+" and "–." They always produce the marked polarity, even when the polarity of a connected dc source is reversed. The down side is that the bridge output voltage is 1.4 V lower than its input voltage because the current must pass through two diode junctions in the bridge.

If a "wall wart" is to be used to replace a 9-V battery, be aware that additional filtering may be necessary. I found some 3000 µF, 16 V capacitors do the trick. Figure 1 shows a schematic. They are 0.65 inches in diameter, 1.05 inches high and have 0.3-inch lead spacing.—*H. M. Knickerbocker, K6SK, 7750 Highgate Ln, La Mesa, CA 91942;* **knickk6sk@aol.com**

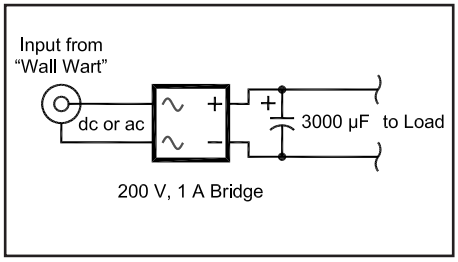


Figure 1—K6SK recommends that a simple bridge and filter assembly be installed in every project with an external power supply. The practice protects projects against reversed power connections.

A HANDY WAY TO INSTALL INSULATORS ON LOOP ANTENNAS

◊ When setting up a portable station for Field Day often the configuration of a loop antenna must be altered to fit the situation. With the traditional method of wiring the insulators on, it is difficult to move them, or remove them. The following simple method avoids the problem, and makes it easy. With this method it is not necessary to open the loop in order to move an insulator. It works well with stranded or flexible wire, but probably not with stiff copper coated steel wire. Refer to Figure 2 while reading these instructions:

1. Bend the antenna wire double at the desired location of the insulator, and pass the doubled wire through the opening at the end of the insulator.

2. Pass the insulator through the loop of wire, and pull the wire tight. This makes a secure connection to the insulator. It will not slip, but is easily undone if you need to move the insulator.

3. Insulators that you want to be able to have loose, so that the wire is able to move, should be threaded on the wire before assembly of the loop antenna.

This method also works well if you want to add a new insulator to a loop. It helps, too, if you want to move the antenna to a new location, and need to change its configuration so that it will fit. It does not seem to make any significant difference

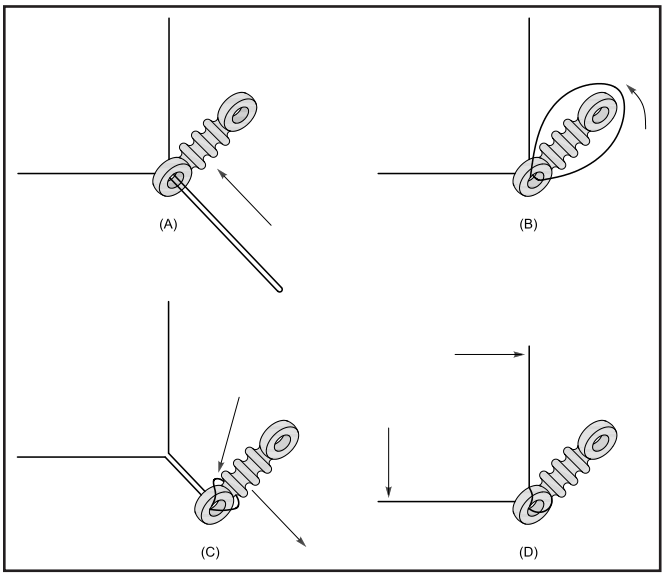


Figure 2—Install insulators on loops without breaking the loop conductor. For flexible conductors, this method makes it easy to reposition the insulators as needed on portable antennas.

to the function of the antenna. It can be used with insulated or uninsulated wire. It shortens the antenna a little, but loop antennas are broad-banded, and no problems seem to result.

Considering how well this works, it could be applied to fixed location antennas as well.— *Hugh Inness-Brown, W2IB, 5351 State Hwy 37, Ogdensburg, NY 13669*

MORE ON SALVAGING PARTS FROM PC BOARDS

◊ With no intent to show disrespect to Steve, W7VEW, his suggestion in Hints & Kinks (Nov 2002, p 69) is a downright dangerous and environmentally bad practice.

Steve suggests we recover parts from PC boards by sanding the solder from the solder side of the PC board until the parts fall from the other side. While he cautions readers to use eye and breathing protection during the work, he neglects the fact that the sanding process generates large numbers of small, even microscopic, particles of lead-bearing solder. This presents a human and environmental hazard that extends beyond the time that the process is being conducted.

Such particles will contaminate the work area. They can be picked up on one's hands, feet and clothing later, from where they can eventually be inadvertently transferred to one's mouth and/or eyes. The particles can also be stirred up with other dust by physical activity, or even air currents, and, once airborne, are subject to inhalation at a later time by the ham, his/her family, visitors or pets. Either method of exposure can result in lead poisoning, which is cumulative over time and amount of exposure.

Even if one could be sure that one vacuumed up absolutely all of these particles, when the shop vacuum is emptied, where does the solder go? Into some landfill or other dumping site, where it will contaminate the soil and ground water supply.

While this method may seem convenient, I would caution

readers to *not* use it for the reasons I've listed above. The heat-gun method is much safer, even if slightly less convenient.

Readers should also remember that PC boards and other equipment containing solder should be recycled in an appropriate fashion, rather than being discarded in landfills. Check with your local or state government for electronic-equipment recycling programs that are designed to keep lead out of the environment.

Let's not keep dumping lead into our environment to pollute the soil and our ground water supplies.—*Carl R. Stevenson, WK3C, 4991 Shimerville Rd, Emmaus, PA 18049;* **wk3c@fast.net**

MORE PSK31 FILTER OPTIONS

◊ I just read "Use Kenwood TS-570 Optional Filters for PSK31" in the Apr 2002 column (p 64). I've another hint that also allows you to use the narrower CW filters, but without any physical modifications to the rig.

This hint allows use of the CW filters in a rig for PSK31 reception, even if the rig doesn't allow switching to them in SSB mode. One of the nice features of my older TS-690S was that it allowed selection of any filter—regardless of operating mode. Many newer rigs (like the TS-570, and my TS-870S) don't allow use of the CW filters for SSB reception.

The simple trick is to operate PSK31 in split mode: Receive in CW (using CW filters) and transmit in SSB. The trick is to adjust the receive frequency to offset the side tone. This aligns the received PSK31 signal to the transmitted SSB PSK31 signal. You can adjust the CW receive frequency through the RIT or by adjusting the receive VFO.

For example, let's consider running PSK31 at 14.070.000 MHz with a side tone at 700 Hz. Set the receive mode to CW and adjust the receive VFO to 14.070.700 MHz. (Alternatively, you might set the VFO at 14.070.000 and use the RIT to move up another 700 Hz.) Then set the transmit mode to SSB at 14.070.000 MHz. Now you're set! The CW filtering features are active for PSK31 receive, and you still transmit using SSB.

I use this trick with my TS-870, and it allows me to adjust the receive bandwidth down to 50 Hz, effectively eliminating any adjacent signals. It should work well with a TS-570 also.

It is a little trickier to set up, but allows you to keep the filters in their stock locations. On a TS-570 it allows use of the AF-DSP to narrow the receive-audio response down to 50 Hz in addition to the 500-Hz IF bandwidth. In addition, you can still use IF SHIFT to slide the filter up or down.—*Alan Wolke, W2AEW, 6 Crestwood Ave, Hillsborough, NJ 08876-4806;* **w2aew@arrl.net**

(If this doesn't work, you might try subracting 700 Hz instead, or trying the CW-reverse instead of the CW-normal mode if it's available. The CW-reverse function is often band dependent—so you might need to experiment on each band. It moves the carrier oscillator, so that the sidebands are inverted, just like going from USB to LSB.— *Zack Lau, W1VT, ARRL Lab)*

USING SWR TO MEASURE LINE LOSSES

◊ As described in *The ARRL Antenna Book*, losses in the line connecting a transmitter to an antenna reduce the actual SWR at the antenna to some lower value seen at the transmitter. Greater loss more greatly reduces the SWR. You can use this fact to get a direct measurement of the loss in a line. Create an approximately infinite SWR at one end by shorting the line. The short must be heavy and direct (very-low inductance) so that it closely approximates zero impedance, especially if the expected line loss is low. (In theory, you could use an open line, but capacitive effects make it difficult to create a good infinite impedance.) Then measure the SWR at the transmitter end of the line. Table 1 relates the line loss—in decibels—to the measured SWR.

Table 1
SWR versus Line Loss

SWR	Line Loss (dB)	SWR	Line Loss (dB)	SWR	Line Loss (dB)
40.00	0.22	5.00	1.76	1.80	5.44
30.00	0.29	4.50	1.96	1.60	6.37
20.00	0.43	4.00	2.22	1.50	6.99
15.00	0.58	3.50	2.55	1.40	7.78
12.00	0.73	3.20	2.81	1.30	8.85
10.00	0.87	3.00	3.01	1.25	9.62
9.00	0.97	2.80	3.25	1.20	10.41
8.00	1.09	2.60	3.52	1.15	11.56
7.00	1.25	2.40	3.85	1.10	13.22
6.00	1.46	2.20	4.26	1.05	16.13
5.50	1.60	2.00	4.77		

As you can see, when the line loss is high, a very accurate SWR reading is needed, but if the loss is that high you probably ought to replace the line anyway (or use it as a dummy load!)—*Edward K. (Ned) Conklin, KH7JJ, 2969 Kalakaua Ave #1004, Honolulu, HI 96815;* **ekc@forth.com**

(This technique assumes the line impedance is the same as the system impedance. It won't work with 75-Ω coax and a 50-Ω SWR meter.— *Zack Lau, W1VT, ARRL Lab)*

MORE ON HOMEBREW LABELS

◊ I've read John Bandy's suggestion in Hints and Kinks (Sep 2000, p 69) on how to prepare professional looking labels for home built equipment. I have a variation that I believe is somewhat easier.

Using a laser printer, print the desired label on a #5660 Avery clear laser label. Normally, I trim the label to fit the need, so after printing instead of peeling the label off the backing I carefully cut the label and the backing away from the rest of the labels with scissors. Then trim the label to size, peel it away it from the backing and attach it to the equipment. This procedure avoids the photocopy and glue steps in John's procedure. —*Bryant C. Winchell, W2RGG, 2901 Via Alvarado, Palos Verdes Estates, CA 90274;* **bryantcw@cox.net**

Hints and Kinks items have not been tested by *QST* or the ARRL unless otherwise stated. Although we can't guarantee that a given hint will work for your situation, we make every effort to screen out harmful information. Send technical questions directly to the hint's author.

QST invites you to share your hints with fellow hams. Send them to "Attn: Hints and Kinks" at ARRL Headquarters (see page 10), or via e-mail to **h&k@arrl.org**. Please include your name, call sign, complete mailing address, daytime telephone number and e-mail address on all correspondence. Whether praising or criticizing an item, please send the author(s) a copy of your comments. QST

NEW PRODUCTS

COLLINS S-LINE ACCESSORIES FROM JC REPRODUCTIONS

◊ The UK's JC Reproductions now offers a variety of new and reproduction items for Collins S-Line radios and accessories. These include 312B-speakers, replacement cabinets, pointer knobs, emblems and more. All products are endorsed by the Collins Radio Association.

Prices start at $18 plus shipping and handling. For more information, visit the JC Reproductions Web site at **www.advanced-optics.com/collins.htm**. QST

ICOM IC-T90A Triband Handheld Transceiver

Reviewed by Brennan Price, N4QX
Assistant Technical Editor

ICOM's newest entry into the multiband handheld market, the IC-T90A, is the first ICOM handheld that sports a look similar to Yaesu's most recent handheld offerings (the VX-5R and VX-7R). The half-pound package measures 3.4×2.3×1.1 inches and fits comfortably in the palm of the hand. The radio offers 5 W on three bands (6 and 2 meters on VHF and 70 cm on UHF) and AM and FM reception from 495 kHz to nearly 1 GHz, cellular frequencies excluded. I put the T90A to the test during October's Simulated Emergency Test and a November trip from Hartford to Pittsburgh. I was impressed.

On the Air Quickly

When the SET rolled around, I decided to simulate my own emergency conditions when testing the T90A. I vowed not to look at the manual at all until the weekend was over, and I kept that vow. Nevertheless, I successfully participated in the SET on both the 2-meter and 70-cm bands.

After charging the battery with the BC-110AR wall charger (included), the bright orange PWR button was impossible to miss. I keyed the appropriate repeater frequency on the keypad, and the display indicated that the standard repeater shift had been automatically selected. After adjusting the volume with the up and down arrow front panel buttons, I keyed the microphone and checked into the net within 15 seconds of turning the radio on.

The SET net was running concurrently on a 440 MHz machine, so I keyed in the 70-cm frequency on the keypad. Again, instant success. Successful operation on two bands within minutes was very impressive. Simple repeater operation is intuitive.

My experience was somewhat fortuitous, and is not typical of the universe of repeater operation. Neither repeater I keyed during the SET required CTCSS access, and both had standard repeater offsets; these require menu adjustments, which will be dealt with later. Also, I was surprised that I didn't have to adjust the squelch level before using the T90A. When I took a look at the manual after SET weekend, I found out why.

Automatic Squelch—A Good Idea that (Mostly) Works

Out of the box, the T90A's squelch level is set to "AUTO." At this setting, the T90A automatically adjusts the squelch in accordance with the noise pulses it counts over time. More pulses lead to a tighter squelch setting, and vice versa. For most of my transmitting with this radio, this worked wonderfully. I didn't try to change the squelch until I changed to the broadcast band, particularly the domestic AM and shortwave segments, where a marginal but readable signal would often fail to break the automatic squelch.

Changing the level is easy. The user first pushes the SQL button, on the left side of the receiver underneath the PTT key. If the user does nothing else, this opens the squelch while the button is pressed. By turning the DIAL on the top panel while SQL is pressed, the user can adjust the squelch setting from "AUTO" to "OPEN" or a numerical value from 1 (loose) to 9 (tight).

The top panel DIAL, incidentally, can be used as a manual tuning knob. If a user prefers, the volume and tuning control may be shifted from the DIAL to the up and down arrow buttons by pressing and holding the 1/V↔D button. Which brings me to my next topic:

No Pesky "F" Key!

There is no function key on the T90A to press while enabling certain options. Instead, each of the 15 keys on the main keypad has a red label under the number or the main text. Pressing and holding one of these buttons will execute the command described by the label. For instance, pressing and holding 2/TONE will enable one of fifty possible CTCSS transmit tones. Pressing and holding the key again will enable receive CTCSS squelch, and further toggles will enable digital code squelch and the "pocket beep" function, which will sound an alarm when a transmission with the appropriate tone or code is received.

Switching between high and low power (3/H/L), scanning (MODE/SCAN), toggling between duplex and simplex operation (4/DUP) and enabling the display of memory names (6/M.N) are accomplished in a similar manner. CTCSS tones and other variables are chosen in set mode, accessed by pressing and holding the 8/SET key. The DIAL toggles through a list of at least 19 and up to 37 items when in this mode. The first one, appropriately, is the most commonly used, the CTCSS tone selector. Touching the 8/SET key will display the current tone, which can be changed by rotating the DIAL and pressing 8/SET one last time.

Compared to the obscure and hard-to-access menu systems of some of ICOM's competitors, setting options on the T90A was a breeze. The process is not so intuitive that the user doesn't have to read the manual, but it is intuitive enough that the user—or at least this user—only has to read the appropriate section of the manual once before knowing the routine by heart.

Bottom Line

The ICOM IC-T90A combines user friendliness with a convenient size and a nice feel. FM enthusiasts will be pleased with its performance on 6 meters, 2 meters and 70 cm.

Brennan Price, N4QX ♦ Assistant Technical Editor ♦ n4qx@arrl.org

Table 1
ICOM IC-T90, serial number 01090

Manufacturer's Claimed Specifications	Measured in the ARRL Lab
Frequency coverage: Receive, 0.5-999 MHz (cell blocked), transmit, 50-54, 144-148, 430-450 MHz.	Receive and transmit, as specified.
Modes: FM, AM (receive only), WFM (receive only, 40-230, 450-810 MHz).	As specified.
Power requirements: 5.5-11.0 V dc; receive, 0.22 A; transmit, 2.0 A (max, high power).	Receive, 0.25 A (max volume, no signal); transmit, 1.5 A, with BP-217 battery pack
Receiver	**Receiver Dynamic Testing**
FM Sensitivity: 12 dB SINAD, 1.6-5 MHz, 0.4 µV, 5-50 MHz, 0.18 µV, 50-54 MHz, 0.16 µV, 54-144 MHz, 0.18 µV, 144-148 MHz, 0.16 µV, 148-222 MHz, 0.4 µV, 222-225 MHz, 0.32 µV, 225-247 MHz, 0.4 µV, 247-430 MHz, 0.32 µV, 430-450 MHz, 0.16 µV, 450-833 MHz, 0.32 µV, 833-999 MHz, 1.0 µV; WFM, 40-108 MHz, 1 µV, 175-222 MHz, 1.8 µV.	For 12 dB SINAD, 6 m and 2 m, 0.15 µV; 70 cm, 0.16 µV; WFM, 100 MHz, 0.6 µV.
AM Sensitivity: 10 dB S/N, 0.5-5 MHz, 1.3 µV, 5-30 MHz, 0.56 µV, 118-136 MHz, 0.5 µV, 222-230 MHz, 0.79 µV, 320-330 MHz, 1.0 µV.	10 dB S+N/N, 1-kHz tone, 30% modulation, 120 MHz: 0.42 µV.
Two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset: 6 m, 52 dB; 2 m, 58 dB; 70 cm, 57 dB; 10 MHz offset: 6 m, 68 dB; 2 m, 65 dB; 70 cm, 60 dB.
Adjacent-channel rejection: Not specified.	20 kHz offset: 6 m, 58 dB; 2 m, 66 dB; 70 cm, 58 dB.
Spurious response: VHF, 60 dB (except IF rejection on 50 MHz); UHF, 50 dB.	IF rejection, 6 m, 41 dB; 2 m, 91 dB; 70 cm, 102 dB; image rejection, 6 m, 104 dB; 2 m, 107 dB; 70 cm, 72 dB.
Squelch sensitivity: VHF and UHF, 0.18 µV; 23 cm, 0.25 µV.	At threshold, 6 m, 0.17 µV; 2 m, 0.18 µV; 70 cm, 0.16 µV.
Audio output: 200 mW typical at 10% THD into 8 Ω.	210 mW at 10% THD into 8 Ω.
Transmitter	**Transmitter Dynamic Testing**
Power Output: VHF and UHF, 5.0 W high; 0.5 W low.	with BP-217 battery pack, 6 m, 4.8 / 0.5 W; 2 m, 5.3 / 0.5 W; 70 cm, 4.4 / 0.5 W; with 11 V dc: 6 m, 5.3 / 0.5 W; 2 m, 6.0 / 0.5 W; 70 cm, 5.3 / 0.6 W.
Spurious signal and harmonic suppression: VHF and UHF, 60 dB.	6 m, 68 dB; 2 m, 72 dB; 70 cm, 70 dB. Meets FCC requirements.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal, VHF, UHF, 385 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	6 m, 200 ms; 2 m, 260 ms; 70 cm, 325 ms.
Size (height, width, depth): 3.4×2.3×1.1; weight, 8.5 ounces.	

Taking the T90A on the Road

With a fuller understanding of the T90A's capabilities, I took it on the road with me to Pittsburgh. In the car, I replaced the multi-part antenna with an SMA connector that comes with the radio with a mag-mount antenna with a BNC connector. A BNC to SMA adapter put me in business.

The front-panel speaker provided pleasant audio throughout the trip, although I found I had to turn the volume above half-scale in order to reliably hear, but that may have been a function of the noise of the car and my halcyon days listening to loud music in broadcast radio stations. In order to avoid annoying my non-ham driver, I frequently used a headset and microphone, which fit via the standard mic/speaker jacks on the top panel. Of course, these jacks can connect the T90A to a TNC for digital use.

I enjoyed a few repeater contacts with hams across the Keystone State countryside, and the hams I worked were complimentary of how the radio sounded. The one moderately serious complaint that I had about the radio was the transmit-receive turnaround time. The T90A paused noticeably when I released the PTT key before the repeater signal broke the squelch. ARRL Lab tests seem to confirm a significant turnaround time (see Table 1). While not terribly annoying, such a long turnaround time might cut off transmissions from hams who key up immediately at the end of your transmission. When you're not talking to hams who are quick on the draw, the long turnaround time fades into the background.

Advertising for the T90A has indicated that handheld is "splash resistant" to "JIS 4 specifications." I took the radio to the November 10 National Football League contest between the Atlanta Falcons and the Pittsburgh Steelers at Heinz Field, which was dogged by in-

Figure 1—Putting the "splash resistant" claim to the test, we threw a bucket of water at the IC-T90A. Here is the aftermath of the dousing.

Figure 2—After the dousing, with drops of water still clinging to the case, the T90A passes the test.

termittent periods of substantial rain. The T90A held up nicely in the showers and worked well afterward. The buttons on the keypad feel like they are designed to withstand some moisture, but ICOM doesn't claim that you can drop the radio into a bucket of water.

So I dumped (or at least splashed) a bucket of water on the T90A instead, in order to really put the "splash resistant" claim to the test. After throwing some water on the rig outside of ARRL Headquarters (Figure 1), it still operated successfully (Figure 2). While the T90A does not feel like it has the extensive gasketing that makes the Yaesu VX-7R "submersible," ICOM's claim of splash resistance is quite meritorious (and impressive).

After the game, I tuned in the postgame broadcast on the Steelers' AM and FM flagship stations. The FM reception was very clear. Reception of AM broadcast signals was good when I held the radio in my hand, presumably because my arm added to the ground plane of the included antenna. However, when I set the radio down, AM reception significantly degraded, even with the included 50 MHz and below band adapter attached. This is not uncommon in similar handhelds, and is understandable, given the small size of the antenna with respect to the wavelength of domestic AM broadcasts.

Odds and Ends

In addition to the domestic AM and FM broadcast bands and the three ham bands, pressing the BAND key repeatedly will toggle the user through all major band segments from 495 kHz to 999.990 MHz. The user can program his or her favorite amateur frequencies as well as broadcast, public safety and aircraft frequencies into 500 memory channels and five calling channels. An alphanumeric label of up to six characters can be assigned to each memory and displayed if the user desires. The user may assign memories to 18 programmable banks, which may be individually scanned. A variety of VFO and memory scanning options exist.

An alkaline battery case (the BP-216) is available to power the T90A with two AA batteries. We did not review operation with the optional battery case, but it is safe to assume that at 3 volts of battery potential, the output on high power would be less than 5 W (although the full half watt should be available on the low power setting.)

From either of the two VFOs, a touch of the CALL/TV/LOCK key enables the five calling channels, which can be individually selected by the DIAL. Pressing CALL/TV/LOCK again enables North American television channels 2-69, again tunable with the DIAL. Pressing the key a third time allows tuning of 10 NOAA frequencies. A weather alert function allows for continuous monitoring of the NOAA channels and enables an alarm when a watch or warning is issued.

Sight-impaired hams will find the Morse code synthesizer useful. When enabled, the current frequency, television channel or weather channel will be sounded in Morse code when the BAND key is pressed and held. The speed is adjustable from 10 to 25 words per minute.

Conclusion

The IC-T90A doesn't offer quite as many features as other recent entries into the high-end handheld transceiver market. But the features it does incorporate are very nicely done, and the basic operation of the radio exudes a friendliness to the user that other major manufacturers should strive to emulate. The IC-T90A does everything that an FM handheld operator would need to do on the three most popular VHF and UHF bands, and the ease of operation makes the radio particularly ideal as a first handheld for a new amateur.

Manufacturer: ICOM America, 2380 116th Ave NE, Bellevue, WA 98004; tel 425-454-8155; fax 425-454-1509; **www.icomamerica.com**. Price: $249.95.

Peet Ultimeter 2100 Weather Station

Reviewed by Stan Horzepa, WA1LOU
QST *Contributing Editor*

When I was a kid, I bought a book about weather from the Scholastic Book Club. The book described how to build a home weather station. I studied the book and became a weather maven. My goal was to build my own weather station, but for some reason, I lost interest in the project and put it on the back burner with my many other lost interests.

Instead of building my own weather station, I started saving money to buy a simple weather station advertised in the Edmund Scientific catalog. I saved for a while, but for some reason, I lost interest and spent my savings on something else.

As an adult, I bought a house on top of a mountain for ham radio propagation reasons. In addition to interesting radio propagation, I quickly became familiar with such interesting weather conditions as snow when there was none anywhere else in the area, rain clouds so low that they surrounded my home in a thick fog, very high winds and lots of precipitation. I looked it up and discovered that an environmental study claimed that my neighborhood had the highest average rainfall in the state of Connecticut!

My home begged for a weather station, especially in light of my heavy involvement in APRS (Automatic Position Reporting System), which includes an interstate network of weather stations. When the opportunity arose, I jumped at the chance to review a weather station for *QST*.

I "shopped" for weather stations at the last Dayton Hamvention and determined that among the stations shown at the Hamvention, the offerings from the Peet Bros Company were the most APRS-friendly. In fact, Peet had a handout at the Hamvention that described how to interface and program their weather station to a Kantronics KPC-3 Plus TNC, which I just happen to have in my collection of TNCs.

The station I put together for this review started with the Peet Bros Ultimeter 2100 Weather Station, which monitors indoor and outdoor temperature, barometric pressure, wind speed and direction. I upgraded its anemometer/wind vane to one that is heated to avoid lockups caused by frozen winter precipitation. I added the Ultimeter Pro Rain Gauge with heater (to affirm that I lived in the most precipitation-prone area in the state) and the Ultimeter Outdoor Humidity and Temperature Sensor to complete the station. (The Outdoor Humidity and Temperature Sensor made the outdoor temperature sensor included with the Ultimeter 2100 Weather Station redundant.)

Testing

Before installing the station, I tested all the components as recommended by the owner's manual. Before testing the components, I had to assemble one of them—the anemometer/wind vane unit. The assembly was simple and testing commenced thereafter.

Testing involved connecting all the components and using the weather station keypad and display to see if the connected components worked properly. Everything seemed to work out of the box as advertised.

Installation

I chose a sunny summer day to install the weather station.

The anemometer/wind vane installation requires a nonferrous mast. Too much iron could interfere with the magnets in the unit, but the mast must be metallic in order to provide proper grounding. (By the way, the system includes built-in static electricity discharge protection for all outdoor sensors.) I used a 5-foot aluminum mast mounted with two hose clamps to the drain/waste vent near the peak of my house's roof.

I used a level to make sure the mast was vertical and a GPS receiver to determine which way was north. I marked the north direction on the mast, slipped the anemometer and wind vane onto the top of the mast and rotated it so that the north calibration mark on the wind vane matched the mark I made on the mast. Finally, I clamped the unit and tie-wrapped its cable to the mast.

The rain gauge installation required that it be in the open, away from overhanging trees, well clear of the house or other structures that might block blowing rain, and easily accessible for periodic inspection and cleaning. That was a tough list of requirements to meet at my location because I am treed-in. Ground mounting was out of the question.

The solution was to install the rain gauge on a 10-foot PVC pipe and attach the pipe with U-bolts to the second-floor deck. After some judicious tree limb trimming, it was clear of trees and above the edge of the roof, but it was still accessible for inspection and cleaning by simply loosening the U-bolts and lowering the PVC pipe.

I installed the rain gauge on the top of the PVC pipe, leveled the pipe for near-perfect vertical alignment, tie-wrapped its two cables and tightened the

Bottom Line

Amateurs looking for a weather station to complement their APRS activities will find the Peet Ultimeter 2100 attractive—and not just because of its packet-generating capabilities.

U-bolts (see Figure 3). Interestingly, as I finish this review, most of the leaves have fallen from the trees around here, but when I inspected the rain gauge, it was free of any debris.

Installing the outdoor humidity and temperature sensor was comparatively simple. Its installation had to be in the shade, where it can never receive direct sunlight, protected from wind and rain, so air can circulate freely around it, away from incidental heat sources, such as roof circulation vents, and not directly above radiated or reflected heat sources, such as cement patios or large picture windows. The back outside wall of my house met all those requirements, and all it took was two screws to mount the unit to the house (see Figure 4).

I had to drill a hole through the back wall of the house in order to get all four cables into the house (the anemometer/wind vane and outdoor humidity and temperature unit required one cable each, while the rain gauge had two cables, one for the gauge and one for its heater).

Once I threaded all the cables inside the house, I connected them to the weather station's junction box. Another cable connected the weather station's keypad and display to the junction box.

I powered up the keypad/display and went through the set-up procedures. I had to set the date, time, formats for date and time and the units of measurement for wind speed, temperature, barometric pressure and rainfall. I also had to obtain the local barometric pressure and adjust the weather station's barometric pressure reading to match. The weather station was up and running, and I let it run a few days before interfacing it to my APRS station.

My Kantronics KPC-3 Plus TNC has two serial ports. One is for connection to a computer; the other is for connection to a GPS receiver. Since the TNC is not going anywhere fast, I do not have a GPS connected to it, so that frees up that serial port for connection to the weather station using the weather station's serial cable.

Byron Smith, WA6YLB, has a Web page that includes information for connecting the KPC-3 TNC to a weather station (**www.theworks.com/~wa6ylb/kpcdigi.txt**). This information was invaluable for programming the TNC to operate with the weather station. I used a variation of WA6YLB's setup for my station.

The primary differences, aside from call sign and location information, were that WA6YLB's setup was intended for a remotely controlled TNC whereas mine is in my ham shack, and WA6YLB's weather station connection was to the first serial port whereas I used the second serial port for the weather station connection. If you are interested in how I programmed my TNC for that setup, I dumped all my TNC settings to a text file you can view at my weather station's Web page, **www.tapr.org/~wa1lou/wx.html**.

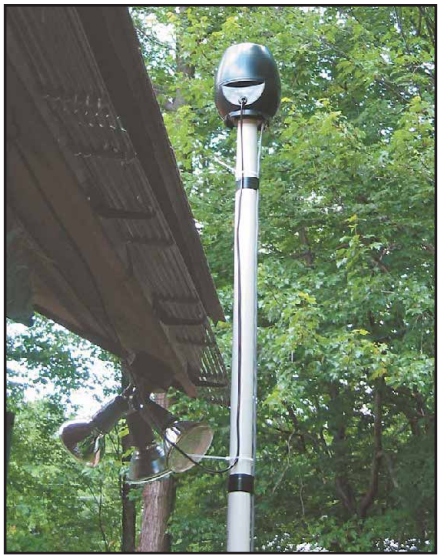


Figure 3—The Ultimeter Pro Rain Gauge must be in the open, away from overhanging trees and clear of the house or other structures that might block blowing rain.

Figure 4—The Ultimeter Outdoor Humidity and Temperature Sensor must be installed in the shade, where it can never receive direct sunlight. It must also be protected from wind and rain, and in a place that allows air to circulate freely around it.

After I successfully interfaced the weather station to my APRS station, I built a quick and dirty Web page so that I could view the weather at my house from anywhere in the world. The APRSWXNET/Citizen Weather Observer's Program (**www.wxqa.com**) enlisted my station to be part of its network. The National Oceanic and Atmospheric Administration (NOAA) collects data from the network for research use by Forecast Systems Laboratory in Boulder, Colorado.

The weather station sends current weather data to its serial port in three ways. In the "data logging mode," the weather station puts out a steady stream of records, about one per second. Each record includes all current weather readings including time and date. In the "packet mode," the weather station puts out one record every five minutes. Each record includes all current values, plus the highest wind speed over the past five minutes with the associated wind direction, three-hour barometric pressure change, station calibration numbers, and current time and date. In the "complete record mode," the weather station puts out a steady stream of records, about 20 per minute. Each record includes all current values, three-hour barometric pressure change, today's high and low values, yesterday's high and low values, and long term high and low values, station calibration numbers, and current time and date. To minimize transmissions, most APRS weather stations using Peet equipment use the packet mode, as do I.

Operation

The keypad/display of the Ultimeter 2100 is easy to use. The unit is small, but its display is big relative to the size of the unit. The unit measures 7.75×2.75×1.25 inches; the LCD is 3.25×1.5 inches. The unit may be wall- or desk-mounted and has available a brilliant blue display backlighting to provide visibility in darkness or low-light conditions (see Figure 5).

To view data on the LCD, you press one or two keys. The LCD continues to display and update whatever data you selected to view last. You can choose to view wind speed, outdoor temperature, indoor temperature, rainfall, barometric pressure, outdoor humidity, indoor humidity (if you have an optional indoor humidity sensor, which I did not review), dew point, time and date. A compass displays the wind direction and shows up in each and every display.

Up and down arrow buttons indicate the daily, previous day's, and all-time high and low readings of whatever weather reading you are viewing. For example, with the outdoor temperature displayed, pressing the up arrow once displays the highest temperature reading since midnight and the time and date that high occurred. Pressing the up arrow twice displays the highest temperature reading during the previous day and the time and date that high occurred. Finally, pressing

Figure 5—The brilliant blue backlighting of the Ultimeter 2100 keypad/display provides excellent visibility in the dark

the up arrow three times displays the highest temperature reading ever recorded by the unit and the time and date the high occurred (97ºF on August 14, 2002 at 13:54 EDT). You can reset the unit to erase any of the stored records.

I like to leave the display set to the wind speed/direction display, because it is the most likely to change. But during a storm, I switch to the rainfall display to watch the inches of rain climb upward. During a particularly nasty storm earlier this fall, the storm alarm sounded, so I switched to the barometric pressure display and watched the mercury drop like a rock. (By default, the storm alarm occurs when the pressure has fallen more than 0.18 inch over the last 3 hours.) The system also has a rain rate alarm, which serves as an adjustable flash flood alert.

Conclusion

The Ultimeter 2100 weather station system has performed flawlessly through the summer and autumn. There have been no problems with any of the system components. As this issue was going to press, an ice storm hit my house, knocking down numerous limbs. The Ultimeter 2100 performed admirably, and the heating functions of the anemometer/weather vane and rain gauge worked until power was lost. Even then, the station continued to provide some weather data for a while, thanks to its internal 9-V battery. After a prolonged outage, I reprogrammed the weather station. It is now running fine.

The components of the Ultimeter 2100 weather station are sturdy and well constructed and should be able to sustain outdoor operation for many years to come.

The accuracy of the readings obtained from the weather station seems to correspond with weather reality. They closely match the readings of an indoor/outdoor thermometer and barometer installed in my home. They also closely match the readings from the National Weather Service and The Weather Channel.

The Internet allows me to view readings from 19 other weather stations in my area (select the "Wx Stations" link from my weather station Web page, **www.tapr.org/~wa1lou/wx.html**). The readings from the surrounding weather stations correspond favorably with the readings from my weather station. Interestingly, when it rains, my weather station is always near the top and usually at the top of the list with regard to the total rainfall amount.

During the installation and initial operation of the weather station, I had questions and called the Peet Bros technical support line for assistance. Each time I called, they quickly provided me with an accurate answer.

Overall, I have a very favorable impression of the Ultimeter 2100 and recommend it to anyone considering the purchase of a weather station for their Amateur Radio station. An added benefit using the weather station is that it is an education; it definitely expanded my knowledge of the weather.

Manufacturer: Peet Bros Co, 31 E 17th St, St Cloud, FL 34769; tel 800-872-7738; fax 407-892-8552; **peetbros@peetbros.com**; **www.peetbros.com**. Manufacturer's suggested retail price: Ultimeter 2100 Weather Station, $399; upgraded Heated Anemometer/Wind Vane, $29; Ultimeter Pro Rain Gauge with Heater, $190; Ultimeter Outdoor Humidity and Temperature Sensor, $110; serial cable, $20. QST

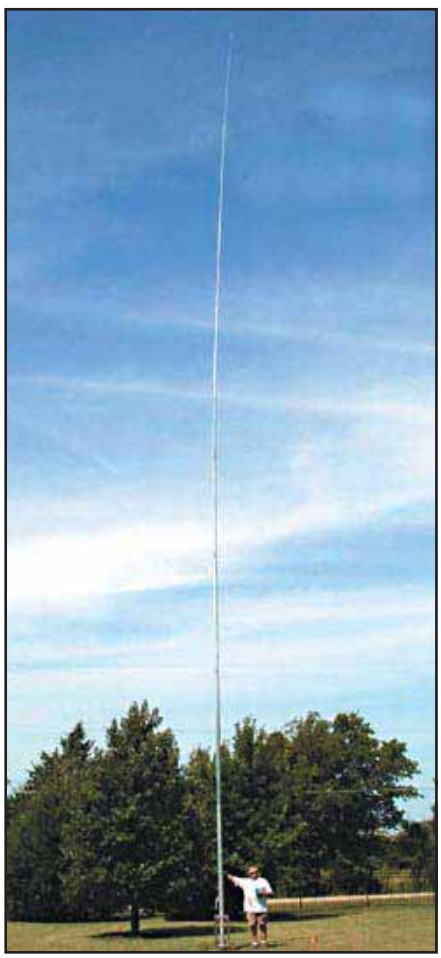
NEW PRODUCTS

80/75-METER VERTICAL FROM ARRAY SOLUTIONS

◊ Array Solutions of Sunnyvale, Texas, has recently added a full-size, ¼-wavelength, 80/75-meter vertical antenna to its wide selection of antenna systems and related products. The AS80-FS consists of a freestanding 70-foot aluminum radiating element that's attached to a steel foldover base.

The bottom portion of the antenna made of 4-inch-diameter aluminum tubing. A drilled radial plate, for connecting up to 120 radials, is included. The base assembly can be mounted in as little as one cubic yard of concrete while maintaining a wind survival rating of 110 MPH. According to the manufacturer, the 200-pound antenna can handle up to 15 kW of RF. 160-meter operation is possible with a tuner.

Price: $1340; the optional winch sells for $250. For more information, contact Jay Terleski, WX0B, at Array Solutions, 350 Gloria Rd, Sunnyvale, TX 75182; tel 972-203-2008, fax 972-203-8811; **wx0b@arraysolutions.com**, **www.arraysolutions.com**. QST



Great Lakes Members Choose New Director; Incumbents Re-Elected Elsewhere

Members of the ARRL's Great Lakes Division have elected Jim Weaver, K8JE, of Mason, Ohio, to lead their division for the next three years. Weaver, with 2295 votes, topped the field in a three-way race. Incumbent Gary Johnston, KI4LA, got 1629 votes, and Paul Daley, WT8S, picked up 783. Incumbents were re-elected in contested races in the Atlantic, Delta and Midwest divisions.

"I will seek opinions and fully represent the division," Weaver said during the Great Lakes campaign. "I will not forget that ARRL is its members." An ARRL Life Member and an amateur licensee for 40 years, Weaver also pledged—among other things—to seek ways to improve recruitment, promote increased awareness of League services and join the fight against restrictive antenna laws, ordinances and deed covenant, conditions and restrictions (CC&Rs).

Weaver served as a Great Lakes Assistant Director under four directors. He's active in traffic nets, DXCC and 10-10 International as well as in local clubs, and he once wrote a newspaper column on ham radio.

The former Great Lakes Vice Director, Johnston had been seeking election in his own right to the director's position he gained following the surprise resignation of George Race, WB8BGY, during last July's ARRL Board of Directors' meeting. Former Michigan Section Manager Dick Mondro, W8FQT, was unopposed for Great Lakes Vice Director.

Jim Weaver, K8JE, of Mason, Ohio, becomes Great Lakes Division Director January 1.

(L-R) New England Division Director Tom Frenaye, K1KI, ARRL HQ staffer Dave Patton, NT1N, and Hudson Division Director Frank Fallon, N2FF, acted as Tellers during the November 15 ballot count.

The only other director's seat up for grabs was in the Atlantic Division, where incumbent Bernie Fuller, N3EFN, handily won re-election over challenger Anthony Gargano, N2SS. The vote was 3115 to 1948.

In the Delta Division, incumbent Henry Leggette, WD4Q, was re-elected as Vice Director over Nicholas Smith, W4GKM. The final tally was 1520 to 629. Delta Division Director Rick Roderick, K5UR, had no opposition.

In the Midwest Division, incumbent Vice Director Bruce Frahm, K0BJ, overcame a challenge from Bill Wheeler, K0DEW, 1231 to 1036. Midwest Division Director Wade Walstrom, W0EJ, also was unopposed for re-election.

Dakota Division Director Jay Bellows, K0QB, and Vice Director Twila Greenheck, N0JPH, also faced no opposition in their bids for re-election. Candidates running unopposed were declared elected. All new terms begin January 1.

NTIA Study is Bad News for SAVI 425-435 MHz Proposals

A National Telecommunications and Information Administration (NTIA) study supports the ARRL's position that the FCC would be making a mistake to permit SAVI Technology to deploy RF identification (RFID) tag devices at 433 MHz at much greater duty cycles than current Part 15 rules permit for such devices. RFID tags are used for tracking shipments and packages, among other applications.

"NTIA has grave concerns about the Commission's proposal to amend its Part 15 rules to permit the operation of RFID tags in the band 425-435 MHz at increased power levels and increased duty factor (or activity factor) and data transmission by remote control devices," wrote Fredrick R. Wentland, the NTIA's acting associate administrator in the Office of Spectrum Management. "Given the likelihood of interference to critical government radars, NTIA is unable to support the Commission's proposal."

The NTIA filed initial comments in the proceeding, ET Docket 01-278, last March but requested additional time to document an NTIA staff study with respect to field strength limits for RFID tags in the band.

ARRL Chief Executive Officer David Sumner, K1ZZ, said the NTIA staff study bears out what the League has been saying all along. "RFID tags represent a significant source of potential interference to sensitive receivers," Sumner said, adding that use of the 425-435 MHz band would be incompatible with ongoing requirements of incumbent services—military and amateur. "We trust that the FCC will now terminate this portion of the proceeding and that the RFID proponents will focus their attention on other, more appropriate parts of the radio spectrum."

That's exactly what the NTIA advised. It recommended that the FCC "explore other bands that might be able to accommodate the technology without causing unacceptable interference to critical incumbent users." Among the suggestions

Rick Lindquist, N1RL ♦ Senior News Editor ♦ n1rl@arrl.org

FCC REJECTS AMATEUR'S *PETITION FOR RECONSIDERATION* ON CC&R ISSUE

The FCC has turned down a *Petition for Reconsideration* filed by a Florida amateur of the Commission's 2001 decision to deny the ARRL's *Application for Review* in RM-8763. That proceeding concerned the League's lengthy effort—ultimately stymied by the FCC—to have the Commission include privately imposed deed covenants, conditions and restrictions—CC&Rs—under the limited federal preemption known as PRB-1. That policy, codified in Section 97.15(b) of the FCC's rules, calls on municipalities to "reasonably accommodate" amateur communication when regulating the installation of outdoor antenna structures. The League subsequently sought a congressional solution to the issue in the form of HR 4720.

The FCC dismissed the League's *Application for Review* December 18, 2001, on the grounds that PRB-1 "adequately protects the predominant federal interest in promoting amateur communications from regulations that would frustrate the important purposes thereof." Not long after, and acting on his own, W. Lee McVey, W6EM, of Bradenton, Florida, filed his *Petition for Reconsideration*, claiming it presented additional evidence that the FCC had not considered in dealing with the ARRL's petition.

"McVey's Petition fails to explain why he did not present his arguments earlier and fails to present new facts or circumstances," said the *Memorandum Opinion and Order* by D'wana R. Terry, who heads the Public Safety and Private Wireless Division of the FCC's Wireless Telecommunications Bureau. Terry pointed out that under FCC "delegated authority" she could dismiss as repetitious any *Petition for Reconsideration* that "fails to rely upon changed facts or new circumstances." She contended that McVey could have made his arguments by commenting on ARRL's *Petition for Rule Making* but did not participate in the proceeding before filing his own *Petition for Reconsideration*. Terry concluded that none of McVey's arguments warranted reconsideration of the *Order* that denied the ARRL's *Application for Review*.

The FCC said McVey filed his own *Petition for Rule Making* on the CC&R issue while the ARRL's *Application for Review* was pending in 2001. The FCC dismissed that petition last February, reasoning that it was substantially the same as the ARRL's.

Amateur Enforcement

♦ **FCC judge's initial decision favors Schoenbohm's return to Amateur Radio:** An FCC administrative law judge has agreed that the FCC should grant the General class Amateur Radio license application of Herb Schoenbohm—formerly KV4FZ. Schoenbohm lost his bid to renew his ham ticket in 2000 but applied for a new license the next year. Following an FCC hearing on Schoenbohm's application last spring, an initial decision of Administrative Law Judge Arthur I. Steinberg October 11 declared that Schoenbohm appears qualified to rejoin the Amateur Radio ranks.

"In sum, it has been concluded that Mr. Schoenbohm has not engaged in any significant wrongdoing since his prior disqualifying misconduct; that Mr. Schoenbohm's prior misconduct was not of very recent origin; that Mr. Schoenbohm's reputation for good character in his community is excellent; that Mr. Schoenbohm has taken meaningful measures to prevent the future occurrence of misconduct; and that the loss of Mr. Schoenbohm's licenses, coupled with the shame and humiliation that resulted, provide a sound basis for concluding that a recurrence of misconduct is unlikely," wrote Steinberg.

Steinberg concluded that Schoenbohm "possesses the requisite character qualifications to be a Commission licensee" and that the FCC should grant his application. Schoenbohm also has taken and passed the Extra class exam (Element 4), but that application was not part of the proceeding.

was 450 to 470 MHz, which provides nearly the same propagation characteristics as the band SAVI picked. The NTIA also noted that 902 to 928 MHz—an amateur allocation—or 2400 to 2483.5 MHz—which includes part of an amateur microwave allocation—might accommodate the proposed RFID tags as spread spectrum devices.

Accompanying Wentland's letter was a six-page NTIA technical analysis. The study asserts that the FCC's proposal to permit increased duty cycles and field strengths for the 425-435 MHz RFID emitters "would result in received power levels in excess of the required interference-to-noise ratio" that could adversely affect "critical government radar systems."

SAVI subsequently filed its own detailed study that rebuts the NTIA's position. SAVI suggested it would be willing to have the FCC limit the available band for "advanced RFID" products to 433 to 435 MHz, lower the peak-to-average ratio to 14 dB, strengthen the definition of RFID products to add language forbidding voice transmissions and limit use of RFIDs to "commercial or industrial locations."

Most of the some 130 amateurs commenting supported the ARRL's position that the proposed rules are flawed and should not be adopted.

RETIRED ARRL HQ STAFFER RETURNS TO HELP CATALOG HISTORICAL DOCUMENTS

It seems like Perry Williams, W1UED, can't get enough of ARRL Headquarters. An ARRL staff member for 40 years, Williams, 74, retired in 1994 as Washington Area Coordinator. Now he's back in a part-time capacity to help catalog the contents of a bank of file drawers filled with ARRL documents, letters, and other materials that had been filed away and largely forgotten. Some materials date back to the very early days of the ARRL and, occasionally, even earlier.

"The first phase is to survey the materials and find out what's here," said Williams. Ironically, the very first piece he catalogued after starting his Herculean task in late August was a letter he'd written to Guatemala in 1954, shortly after joining the ARRL staff.

Over the years, as ARRL moved its headquarters from Hartford to West Hartford and finally to Newington, many archived materials survived. They finally came to rest in the attic—often referred to as "The Penthouse"—of the current ARRL Headquarters building. Not long ago, they were rediscovered by ARRL Pacific Division Director Jim Maxwell, W6CF. Last winter, he and his wife Trudy, KC6NAX, performed what Maxwell called "triage" on some of the archived materials.

Subsequently the ARRL Historical Committee and the Board of Directors agreed to a more formal approach to pre-

For his part, Schoenbohm said he was very grateful for the outcome and said he appreciated "all the amateurs who came to my defense and supported the application." He said he does not yet know if he will attempt to regain his KV4FZ call sign if his application is granted.

Assuming the FCC does not object to Steinberg's initial decision, Schoenbohm has made good on his promise to one day return to Amateur Radio after losing a lengthy battle with the FCC to renew his license. Steinberg's decision essentially mirrored last summer's *Proposed Finding of Fact and Conclusions of Law* from the FCC Enforcement Bureau, which recommended that the evidence presented at hearing supported giving Schoenbohm another chance.

In 1994, the FCC put Schoenbohm's renewal application for KV4FZ up for hearing following his 1992 felony conviction on federal fraud charges. The Commission finally turned down his renewal application in 1998, the US Appeals Court upheld the FCC's decision in 2000, and the US Supreme Court declined to hear the case later that same year.

In March 2001, a couple of months after his authority to operate as KV4FZ had expired, Schoenbohm took and passed the General class examination. A couple of weeks later, he qualified for Amateur Extra as well, but the FCC refused to act on the second application since it had not yet granted the first.

The FCC designated Schoenbohm's General license application for hearing on the basis of character issues stemming from his 1992 conviction as well as his alleged lack of candor during subsequent FCC hearings on the matter.

♦ **Ohio ham suspended following repeater interference:** An Ohio amateur accused of interfering with a local repeater system has agreed to stay off the air for one year. FCC Special Counsel for Enforcement Riley Hollingsworth notified Gary R. Weiler, KI8DI, of Loveland by letter October 22 to confirm the voluntary license suspension.

"The interference consisted of sound effects, harassment and unidentified communications," Hollingsworth said in his letter. In late September, Hollingsworth had served Weiler with a *Warning Notice* citing monitoring information alleging that on several occasions since last March Weiler had "deliberately interfered" with the K8CLA repeater in Cincinnati, Ohio. The *Warning Notice* also threatened him with enforcement action up to and including a fine of up to $7500 and revocation of his amateur license.

Hollingsworth credited the Cincinnati Amateur Radio Club with helping to pin down the source of the interference to Weiler's location. In his reply September 30, Hollingsworth said, Weiler owned up to the infractions and said they'd involved a personal dispute of some kind. "He said he realized he shouldn't have done it," Hollingsworth said.

After reviewing his reply, Hollingsworth said Weiler agreed to the proposed one-year suspension, during which he will not maintain an Amateur Radio station. FCC said the suspension will end at midnight October 30, 2003.

♦ **FCC returning privileges to California ham**: On October 24, FCC Special Counsel for Enforcement Riley Hollingsworth reminded Danny A. Kenwood, WA6CNQ, of San Francisco—that he'd be getting back his General-class privileges December 1. Some two years earlier, Kenwood agreed to a modification of his ham ticket that prohibited all but CW operation below 30 MHz for two years. It was not the first FCC sanction Kenwood had endured. In the fall of 1999, Kenwood lost his VHF and UHF privileges for 90 days following allegations of profanity, obscenity and deliberate interference directed at users of the K7IJ Grizzly Peak repeater, and of failure to properly identify.

In the spring of 2000, the FCC issued Kenwood a *Warning Notice* on the basis of reports from the K7IJ repeater system control operator that the repeater had to be shut down due to what Hollingsworth called Kenwood's "interference and harassment to other operators on the repeater system." Kenwood subsequently agreed to the HF CW-only sanction.

serve this aspect of the League's history, and Williams was hired. The materials also were moved to a more secure and commodious location—a fenced-off area within Headquarters' second-floor warehouse that Williams calls his "cage."

For now, materials are being catalogued in the order they went into the attic, not chronologically. "We will create a searchable index, and move things from one place to another, so like items are in the same place," he explained. But, he conceded, "We saved an awful lot of stuff we didn't need to save."

Among the possibly significant items are agendas for board meetings, committee reports, a proposal for a new "Class D" no-code microwave-only licensing scheme put forth in the post World War II years, questions about regulations and advertising correspondence. And that's just in one of the 120-odd file drawers chock full of paper and, occasionally, photographs from decades past.

Williams says he's learned a few interesting bits of ARRL trivia. Depression-era correspondence tells how former ARRL Managing Secretary K.B. Warner. W1EH, and other staff members took voluntary cuts in pay to help tide the League over during the tough economic times that followed the 1929 stock market crash.

Williams also encountered some early information about Paul Segal, W3EEA, who served as an ARRL Board member in the late 1920s and later as the League's first general counsel. "Paul actually was the architect of the federal preemption policy," Williams explained. Segal, he said, built the foundation for the policy giving the federal government exclusive authority over radio transmissions and precludes local governments from interceding in the regulation of Amateur Radio. He also was the originator of "The Amateur's Code."

Also stashed away was a photo album from 1962. It shows the current ARRL Headquarters site when W1AW was the only building standing (a huge rhombic antenna occupied the area where the headquarters building now stands). Other photos from the era document the con-

Perry Williams, W1UED, tackles yet another drawer full of archival materials from ARRL's past.

struction of the first part of the current headquarters building.

Assisting Williams a few hours a week is Charles Griffen, W1GYR, a retired librarian and history buff.

The effort got a boost last year thanks to a generous donation to the Preservation of Artifacts Fund from an Amateur Radio couple from Dallas—Barry and Judith Spencer Merrill, W5GN and KA5PQD, both ARRL Life Members.

ARRL ASKS FCC TO DENY US USE OF EUROPEAN/UK FRS-TYPE RADIOS

The ARRL has asked the FCC to deny a petition, filed by a Virginia amateur, that would set aside eight channels in the 70-cm band on which visitors from Europe and the United Kingdom would be permitted to use their Personal Mobile Radio (PMR 446) transceivers while in the US. PMR 446 is similar to the US Family Radio Service (FRS), which uses frequencies in the 462-467 MHz range.

"ARRL is not unsympathetic to the compatibility concerns of international travelers, but at the same time, there are far less problematic solutions to the problem noted by the petitioner than those contained in the *Petition*," the League said in its comments. The ARRL recommended that European and UK visitors purchase FRS transceivers to use during US visits.

The FCC put the *Petition for Rule Making* from Dr Michael Trahos, KB4PGC, on public notice in August and designated it as RM-10521. A General-class licensee, Trahos said his proposal would help to promote international goodwill. He asked the FCC to amend its Amateur Service "and/or" Family Radio Service rules to allow "visiting/transient/tourist non-amateur non-United States resident foreign nationals" unlicensed access to certain frequencies between 446.0 and 446.1 MHz at up to a half watt PEP output. The ARRL band plan for 70 cm designates 446.0 MHz as a national calling channel.

The ARRL demurred. "Not all means of fostering international goodwill constitute public interest justifications sufficient to support regulatory changes," the League said. The ARRL pointed to "obvious" enforcement problems associated with the *Petition* and contended that putting unlicensed users on a ham band was "a formula for serious interference."

"If nothing else, this *Petition* reveals the problems that arise from the failure to harmonize allocations internationally," the ARRL noted. "Had the United States and CEPT [the European Conference of Postal and Telecommunications Administrations] taken steps to harmonize FRS channels internationally prior to creating the FRS in the first place, the problems reasonably noted by the petitioner might have been avoided."

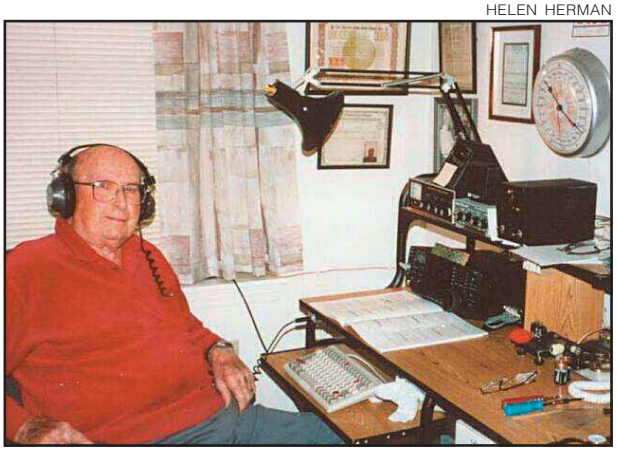
Former FCC Official A. Prose Walker, W4BW, SK

Former FCC official A. Prose Walker, W4BW, the man some consider the godfather of the so-called "WARC bands"—30, 17 and 12 meters—died August 8 following a brief illness. He was 92.

The chief of the FCC Amateur and Citizens Division from 1971 until 1975, Walker made the initial proposal for three new amateur allocations at 10, 18 and 24 MHz during an International Amateur Radio Club (4U1ITU) meeting in Geneva in 1972. Later, he organized and chaired the US preparatory committee for the Amateur Service—the Advisory Committee of Amateur Radio—which took the initial steps to turn the idea into reality at the 1979 World Administrative Radio Conference (WARC-79). The committee also included former ARRL General Manager Richard L. Baldwin, W1RU, who said he was greatly saddened to learn of Walker's passing.

"One of my fondest memories of WARC 79 was the pleasure and the challenge of working with Prose in preparing for that conference," Baldwin said. "He was a stalwart supporter of the Amateur Service, and few amateurs realize how very much they owe to him."

HELEN HERMAN



Walker's most recent recognition came at Dayton Hamvention 2000, when he was presented with a special achievement award, an honor his daughter, Helen Herman, said he coveted above many other more prestigious awards. The award recognized his work in obtaining the new amateur allocations more than two decades earlier.

An ARRL Life Member and a licensee since the 1920s, Walker was an enthusiastic amateur who remained quite active on the air until shortly before his death. His favorite operating mode was CW, and he was a frequent visitor to the bands he'd helped to create.

SECTION MANAGER RACE A SQUEAKER IN WEST CENTRAL FLORIDA

ARRL West Central Florida Section Manager Dave Armbrust, AE4MR, narrowly won re-election as ballots were counted in three contested races. Armbrust—the first and only person to serve as WCF SM—edged out Gerald Dee Turner, N2MNC, by just two votes—490 to 488. An ARRL Life Member, Armbrust was first appointed to the job in November 1999, when the new section was created, and he was elected to a two-year term the following year.

Results in two other ARRL sections were not nearly as close. In South Carolinia, incumbent SM South Carolina Patricia Hensley, N4ROS, lost out to James Boehner, N2ZZ, of Aiken, in her bid for a new term. Boehner, an ARRL Life Member and a physician, outpolled Hensley 431 to 239. He has said he wants to enhance Amateur Radio growth in his section and "guide the path of Amateur Radio in South Carolina into the 21st century."

In Western Pennsylvania, incumbent John Rodgers, N3MSE, won re-election 485 to 410 over David Leiser, K3NPX. Rodgers, a ham since 1992, was appointed SM in 2000, replacing Bill Edgar, N3LLR, who had acceded to Vice Director. Rodgers was elected to a full term later that same year.

ARRL Field and Educational Ser-

In Brief

● **Two hams in US House, CC&R bill sponsor, most cosponsors survive election:** The only two Amateur Radio operators in the US House of Representatives as well as the sponsor and most cosponsors of the CC&R bill, HR 4720, were returned to office in the November 5 midterm election. HR 4720 sponsor, Rep Steve Israel—a New York Democrat—beat back a challenge in that state's second congressional district. An original HR 4720 cosponsor, Texas Republican Rep Pete Sessions, of the 32nd congressional district also was re-elected. Elsewhere, Rep Greg Walden, WB7OCE, an Oregon Republican, handily won re-election in a three-way race in that state's second congressional district. Also returned to Washington in Arkansas' fourth-district was Democrat, Rep Mike Ross, WD5DVR. Walden and Ross are both HR 4720 cosponsors and the only hams in Congress. Of the 35 HR 4720 cosponsors signed on to date, only three won't be back when the new Congress convenes. Rep Patsy Mink, the Hawaii Democrat died September 28, but she was re-elected anyway. A special election will be held to fill the vacancy. Another cosponsor did not seek a new term, and a third was defeated for re-election. The ARRL will renew its effort to secure a congressional solution to the issue of CC&Rs—deed convenants, conditions and restrictions as they affect the ability of amateurs to erect outdoor antenna systems—after the new Congress is gaveled into session.

● **Position opening at ARRL Headquarters:** ARRL seeks a state-certified teacher with classroom experience—preferably several years at the middle-school level—to coordinate ARRL's Amateur Radio Education and Technology Project, "The Big Project," and handle other duties as needed. The candidate should be an Amateur Radio operator, preferably with experience in a wide range of ham activities. The position is at ARRL Headquarters in Connecticut. For information on skills required and job responsibilities, contact ARRL Field and Educational Services Manager Rosalie White, K1STO, **rwhite@arrl.org**, ARRL, 225 Main St, Newington, CT 06111. Please, no telephone calls. The ARRL is an Equal Opportunity Employer.

● **Former ARRL staffer returns to the fold:** Former ARRL Lab staff member Mike Gruber, W1MG, rejoined the laboratory staff October 14 as the new electromagnetic compatibility (EMC) and radio frequency interference (RFI) engineer/specialist. He replaces John Phillips, K2QAI, who is retiring. "We are delighted to have him back," said ARRL Lab Supervisor Ed Hare, W1RFI. During his previous stint at ARRL HQ—from 1990 until 1997—Gruber focused mainly on product review testing. He also has written a number of articles for *QST* and *QEX*. Members may address RFI concerns via e-mail to **rfi@arrl.org** or call him at 860-594-0392. Welcome back, Mike!

● **FAR invites applications for 58 scholarships:** The Foundation for Amateur Radio Inc (FAR)—a non-profit organization with headquarters in Washington, DC, plans to administer 58 scholarships for the academic year 2003-2004 to assist radio amateurs. Composed of more than 75 Amateur Radio clubs in Maryland, the District of Columbia and Northern Virginia, FAR fully funds seven scholarships with the income from grants and its annual hamfest. The Foundation administers the remaining 51 without cost to the donors. Radio amateurs may compete for these awards if they plan to pursue a full-time course of study beyond high school and are enrolled in or have been accepted for enrollment by an accredited university, college or technical school. Awards range from $500 to $2500. In some cases, preference goes to residents of specified geographical areas or those pursuing certain study programs. FAR encourages clubs—especially those in Delaware, Florida, Maryland, Ohio, Pennsylvania, Texas, Virginia and Wisconsin—to announce these opportunities. For additional information and an application form, send a letter or QSL card postmarked prior to April 30, 2003, to FAR Scholarships, PO Box 831, Riverdale, MD 20783. FAR is a non-profit organization incorporated in the District of Columbia. It is devoted exclusively to the scientific, literary and educational pursuits that advance the purposes of the Amateur Radio Service.—*FAR news release*

● **Vote on *QST* Cover Plaque Award:** The winner of the *QST* Cover Plaque Award for October was Mike Marcus, N3JMM, for his article "Linux, Software Radio and the Radio Amateur." Congratulations, Mike! The winner of the *QST* Cover Plaque award—given to the author of the best article in each issue—is determined by a vote of ARRL members. Voting takes place each month on the Cover Plaque Poll Web page, **www.arrl.org/members-only/qstvote.html**.

● **No comments filed on multiple vanity applications petition:** A *Petition for Rulemaking* put on public notice (RM-10582) by the FCC in late September that asked the Commission to consider only one vanity call sign application per applicant per call sign attracted no comments. The period for comments ended in late October. The application, filed by Marvin Edwards, K4BWC, Frank Lynch, W4FAL and Norman Young Jr, KA4PUV, sought either a change in Part 97 Amateur Radio Service rules or modification of the FCC's current vanity call sign policy. FCC rules do provide for filing comments beyond the filing deadline, but commenters must justify the reason for late filing. The petitioners said that permitting multiple applications from the same applicant for the same call sign "has created a *de facto* lottery" that favors applicants who can afford to pay multiple application fees (now $14.50 per application and refundable if the call sign is not granted) and put applicants unable to do so at "a distinct disadvantage." The petitioners also cited specific instances where the winners of particular call signs had filed as many as 30 separate applications. By dismissing all applications after an initial vanity request for a given call sign, the FCC "would permit every licensed amateur competing for an available call to have an equal chance of having that call granted," the petitioners concluded.

vices staff members counted and verified all ballots November 19 at ARRL Headquarters.

Incumbent ARRL SMs in six other ARRL sections did not face opposition and were declared elected for new two-year terms. They are Phil Temples, K9HI, Eastern Massachusetts; Dale Bagley, KØKY, Missouri; Bill McCollum, KEØXQ, Nebraska; George Tranos, N2GA, New York City-Long Island; Thomas Dick, KF2GC, Northern New York; and Jean Priestley, KA2YKN, Southern New Jersey

Terms of office for all successful candidates begin January 1, 2003.

Kansas also will get a new SM on January 1. Orlan Cook, WØOYH, announced his retirement from the Kansas Section Manager's position as of end of 2002 after serving for five years.

ARRL Field and Educational Services Manager Rosalie White, K1STO, has appointed Ron Cowan, KBØDTI, of La Cygne to complete the year remaining in the present term of office.

Cowan has been an Assistant Section Manager since April, 2002, and has been the Kansas Section Traffic Manager for about two years. He is also an Emergency Coordinator, Net Manager, Public Information Officer and an Official Relay Station within the ARRL field organization.

DAUGHTER OF ARRL CO-FOUNDER DIES

Percy Maxim Lee, the daughter of ARRL co-founder Hiram Percy Maxim, W1AW, died November 9. She was 96. "She was a remarkable woman, one more in a line of remarkable people," said ARRL Pacific Division Director Jim Maxwell, W6CF. Born July 4, 1906, Percy Maxim Lee led an active political and civic life, serving as president of the Connecticut League of Women Voters from 1941 to 1950 and four terms as president of the League of Women Voters of the United States from 1950 to 1958.

She received national appointments to various councils and commissions from four presidents and was active in water and land-use issues in Connecticut. She also founded the Junior School (now Renbrook School) in West Hartford, Connecticut, served on the boards of several New England schools and was vice chairman of the board of trustees for Connecticut College.

The family invites memorial contributions to Lawrence and Memorial Hospital, 365 Montauk Ave, New London, CT 06320 or to or the League of Women Voters of the United States, 1730 M St NW, Ste 1000, Washington, DC, 20036-4508.—*some information from The Day of New London*

Media Hits

❑ *The Plain Dealer* in Cleveland, Ohio, ran an excellent piece about SKYWARN volunteers involved during the tornadoes that hit several states November 10. The article detailed how the spotters assisted the National Weather Service and relayed information to local TV stations. The article mentioned that many SKYWARN volunteers are ham radio operators and participate in the program as a public service. Storm spotter Paul Buescher, N8HHG, was among those interviewed for the article.

❑ ARRL Tennessee Section Emergency Coordinator Sheila Tallent, KB4G, was featured on CNN regarding the role she and others played during the November 10 tornadoes. The CNN report said that "Amateur Radio operators played the role of hero." When telephone lines were down, Amateur Radio was the only means of communication in some areas. The CNN piece also reported on the work of hams in six other states affected by the tornadoes.

❑ Assistant Delta Division Director John Porter, W4KGJ, submitted an article from his local paper, the *Hattiesburg American* in Mississippi. The piece focused on the ham radio response to September's Hurricane Lili and what hams do during emergencies. The article also included general information on ham radio and licensing requirements. Interviewed were James Lee, KC5TYL, Lex Mason, KD5XG, and Brad Amacker, N5MZ.

❑ College alumni magazines are a great way to spread the word about Amateur Radio. A recent issue of *Currents* from the Michigan State University College of Engineering included a two-page story about the school ham club's new repeater. Professor and club advisor Michael Shanblatt, K8MAS, was interviewed about how repeaters work, what ham radio is all about and the history of the club.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in Maryland-DC, Nevada, New Hampshire, Northern New Jersey, Rhode Island, San Joaquin Valley, Utah and West Texas. You are hereby solicited for nominating petitions pursuant to an election for Section Manager (SM). Incumbents are listed on page 16 of this issue.

To be valid, a petition must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are *not* acceptable. No petition is valid without at least five signatures, and it is advisable to have a few more than five signatures on each petition. Petition forms (FSD-129) are available on request from ARRL Headquarters but are not required. We suggest the following format:

(Place and Date)

Field & Educational Services Manager,
ARRL
225 Main St
Newington, CT 06111

We, the undersigned full members of the _____ ARRL section of the _____ division, hereby nominate _____ as candidate for Section Manager for this section for the next two-year term of office.

(Signature___ Call Sign___ City___ ZIP__)

Any candidate for the office of Section Manager must be a resident of the section, a licensed amateur of Technician class or higher and a full member of the League for a continuous term of at least two years immediately preceding receipt of a petition for nomination. Petitions must be received at Headquarters by 4 PM Eastern Time on March 7, 2003. Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on or before April 1, 2003, to full members of record as of March 7, 2003 which is the closing date for nominations. Returns will be counted May 20, 2003. Section Managers elected as a result of the above procedure will take office July 1, 2003.

If only one valid petition is received from a section, that nominee shall be declared elected without opposition for a two-year term beginning July 1, 2003. If *no* petitions are received from a section by the specified closing date, such section will be resolicited in the July 2003 *QST*. A Section Manager elected through the resolicitation will serve a term of 18 months. Vacancies in any Section Manager's office between elections are filled by the Field & Educational Services Manager. You are urged to take the initiative and file a nomination petition immediately.—*Rosalie White, K1STO, Field & Educational Services Manager* QST

Escape from Alcatraz Challenge Swims

By Barry Bettman, K6ST

"How important is our communications network? Let me put it this way: I do not know how we ever lived without hams."—Joe Oakes, Alcatraz Swim Director

"You must be at least a little curious about the possibility of escaping from Alcatraz or you wouldn't be reading this article."

Those are the words my friend and Swim Director Joe Oakes wrote for the beginning of *The Alcatraz Swimmer's Manual.*

Each year for the past four years, a dedicated groups of hams have provided communications to a combination of swims on the bay where as many as 1500 swimmers jump off of two ferries at Alcatraz and swim back to San Francisco. It's not enough to swim across the chilled and turbulent waters of San Francisco Bay. There are, in some events, a run and even a bike ride. Now is this crazy or what?

The first Escape from Alcatraz Challenge and Escape from Alcatraz Triathlon took place in 1981 in the San Francisco Bay Area. Back then, communications was handled by running around on the bay with boats and yelling at each other. Later, communications was done via point-to-point cell phones. Then came "control" with the use of trained ham radio communicators.

Swimmers jump from the ferry to begin their swim from Alacatraz to the shore in San Francisco.

A Challenge to be Met

For the 2002 event on June 30, the Alcatraz Challenge Swim had six radio positions aboard boats that covered responsibilities ranging from medical communications to monitor the swimmers to ferry transportation for the swimmers heading over to Alcatraz. They also had radio positions set up on land to handle communications for the aid stations along the bicycling portion of the route.

The most challenging part of coordinating the swim with over a thousand swimmers is to have them all make it across the finish safely. During the two days prior to each swim event, the Swim Director and his team performed some tests to determine the current. Our job as communicators during the swim is to help coordinate the support vessels to herd the swimmers so that they make it directly to shore and not out to sea via the Golden Gate Bridge. One year, the safety crew had to move over one third of the swimmers from turbulent water to calm water. Plucking people out of the water and moving them to better water is a challenge. Sometimes a swimmer is working hard and doesn't realize that the current is actually pushing them backwards.

John, KR6CR, and Dana, K6BRR, on board the ferries, stayed in contact with Barry, K6ST, on the control boat. Drew, KD6GLY, said, "I'm sure that the spectators are not fully aware of the amount of planning and coordination that goes into making a swim of this type successful and safe."

Swim Director Joe Oakes emphasized the importance of Amateur Radio to this event. "Little did I suspect at that time that we would eventually have 1500 athletes registering for the event in 2002, with twice that many turned away because we were filled to capacity."

"In a typical swimming race," Joe said, "the fastest swimmers are about twice as fast as the tail end of the pack. Our swim course goes from the south side of Alcatraz to Crissy Field, a distance of about three miles. That means that by the time the fastest swimmer hits the beach finish line, the slowest one is still a mile and half out in the water with 1498 swimmers of varying abilities scattered in between them. What is needed is control, but control is not possible without two key elements: constantly updated knowledge and the ability to send commands to the various safety personnel scattered over that mile and a half."

Enter the Hams

Barry Bettman, K6ST, Alcatraz Swims Communications Director, was in contact, via his Amateur Radio network, with the lead boat up front setting the course, the sweep boat at the rear of the pack and the medical boat. Hams are also at the beach where the kayak guides start. In addition, radio amateurs are stationed on the medical boat, where professionals serve swimmers in need of assistance, and at the finish area where emergency help might bring an ailing swimmer to the hospital.

Thanks go out to the communications crew for the 2002 Swims: Barry, K6ST; Drew, KD6GLY; Jason, W6SN; Lance, KG6GGK; John, KR6CR; Faride, KF6WHV; Frank, KF6FRJ; Bob, K6GD; Harold, AE6FC; Barry, KE6GQI; Dana, K6BRR, Eoin, KK6Q and Dan, KF6IQL.

YOU SHOULD HEAR WHAT YOU'RE MISSING

By Stan Halstead, W4GOD

For many, severe weather information and warnings go unheard. It's not because the information is unimportant, but because some people are not able to hear it because they are deaf. The Albany Metro Area SKYWARN group in southern Georgia have developed a system to ensure that severe weather watches and warnings issued by the National Weather Service can be "heard" by everyone.

The City of Albany, Georgia, installed a community-wide alert system following an outbreak of deadly tornadoes that ravaged a community south of the city on Valentine's Day in the year 2000. The system is equipped with powerful sirens and public address speakers to broadcast weather warnings and provide information on how to respond to the event. The system has been touted as a welcomed relief to strained nerves during bad weather. Overall, it works well,

Steve Ewald, WV1X ♦ Public Service Specialist ♦ sewald@arrl.org

but it does not work for those who are deaf or have a severe hearing loss.

In a dinner table conversation with several deaf members of Byne Memorial Baptist Church in Albany, it was determined that something needed to be done to help the deaf community know when severe weather was approaching or when the National Weather Service issued watches or warnings.

"If we're not looking outside or watching television, we have no way of knowing that something is going on," said Ann Singletary through an interpreter. Singletary is totally deaf and is concerned that she will miss warnings that may cause fatal injuries if she and her husband, Roscoe, who has a severe hearing impairment, are unaware of the warnings. "Most people who are deaf are not as aware of their surroundings since they can not hear what's going on around them," according to Toni Halstead, an educational interpreter for the deaf and board member of the Georgia Registry of Interpreters for the Deaf.

With these concerns and the desire to insure as many people as possible are warned when severe weather threatens, the Albany Metro Area SKYWARN group set out to provide weather information to the deaf community. The group is part of the Albany Amateur Radio Club and has gained widespread recognition as an important source of weather information. "Albany has a well trained and very functional SKYWARN program," says Bob Goree, the Warning Manager for the National Weather Service in Tallahassee, Florida. The Tallahassee office is responsible for the southern part of Georgia.

A meeting with SKYWARN Net Manager John Kincaid, KR4OH, and the club's board of directors resulted in the development of a pilot program using Telecommunications Devices for the Deaf (TDD) to inform deaf residents of severe weather information. The telephone company is providing the group with the devices that display text typed from the SKYWARN communications center. The center calls members of the deaf community who have a TDD and use the devise to issue a watch or warning.

The church, which has a deaf mission with almost one hundred members, was used as the contact organization for the deaf to register for the weather information. A brochure with specific response information was given to each person who signed up for the free service. The brochure outlines what each watch and warning means and instructs the deaf members on how to respond to the information. If a watch is issued, the call goes out to the registered TDD units with the times and areas of the watch. The brochure tells the deaf members to keep a "watch" for rapidly changing weather conditions. Likewise, if a warning is issued, the call simply says "WEATHER WARNING" to save time. The members then know to take cover immediately.

A light flashes when the phone rings activating the TDD. When the weather information is issued, members have been instructed to tune in to WALB-TV 10, the local NBC affiliate, for continuing weather coverage. The SKYWARN group has worked in concert with one of the station's meteorologists, Kent Williams, to fine tune the project. Williams produced a feature story for the television station, which was picked up and aired by several other NBC affiliates. The station is now providing a registration outlet for the program through its Internet Web site.

"This is a great idea and a great program," added the weather service's Goree. "I have encouraged the Albany SKYWARN group to publish this project for other SKYWARN groups," he said.

Since the system was implemented, it has been used almost 20 times to issue severe weather statements, including warnings for an early fall outbreak of severe thunderstorms and tornadoes. It was part of the same deadly system that struck the southeastern United States. The number of registered deaf members with a TDD increased following that watch. "The word is getting out and more people want to have access to this information," said Halstead.

"I thank you for calling me and telling me about the bad weather. I feel so much better knowing what is going on and getting the warnings," said Janice Ivey in a TDD conversation with the SKYWARN communications center. Ivey and her husband Clint are both totally deaf and had depended on others calling to tell them to watch television if something was happening.

The project was evaluated in July of 2002 by the SKYWARN group, the National Weather Service in Tallahassee and local Emergency Management officials. For more information about SKYWARN for the Deaf, you may contact the project's coordinator Stan Halstead, W4GOD at **albanyskywarn@mchsi.com** or by writing Albany Metro Area SKWARN, c/o Albany Amateur Radio Club, Inc, PO Box 70601, Albany, GA 31708-0601.

FLIGHT 93 MEMORIAL, SEPTEMBER 11, 2002

By Jim Crowley, NJ3T,
Somerset County RACES Radio Officer

Amateur Radio operators were asked to help during the first anniversary memorial service for United Flight 93 in Somerset County, Pennsylvania on September 11, 2002. Rick Lohr, N3VFG, the Emergency Management Agency and 9-1-1 Director for Somerset County, contacted Jim Crowley, NJ3T, during the early planning stages to summon help.

Since the site of the memorial service was in a rural setting, all visitors and participants in the memorial service had to park at designated areas throughout the county and take shuttle buses to the site. Radio amateurs were recruited to help watch the parking areas, and to report to the emergency operations center (EOC) any suspicious activity and be available to handle any emergency message a visitor or agency may need to pass. Any medical emergencies would also be relayed by ham radio if necessary. Amateur Radio operators including RACES and ARES members from Somerset, Bedford, Cambria, Fayette and Westmoreland counties signed up and registered to help. Amateur Radio operators were also set up at the EOC.

Everything went like clockwork and all Amateur Radio communications worked very well. There were a few minor incidents reported. An ambulance was requested for a visitor at one of the parking areas and for one at the memorial site. Someone also locked their keys in their car at another area. All in all, the event went well.

LATE SUMMER TORNADOES STRIKE INDIANA

By Dave Crockett, WA9ZCE
Indiana Public Information Coordinator

Amateur Radio SKYWARN spotters from 14 central Indiana counties were given credit for helping save lives during an outbreak of late summer tornadoes during the morning of Friday, September 20, 2002.

The National Weather Service in Indianapolis had been tracking a line of strong thunderstorms associated with a cold front. The front began to mix with warm moist air and upper level wind disturbances. Shortly before 11 AM, the Storm Prediction Center in Norman, Oklahoma, issued a tornado watch for the southern half of Indiana. The watch

A temporary memorial for United Flight 93 in Somerset County, Pennsylvania.

President George Bush used this helicopter to visit and participate in the memorial service on September 11, 2002.

was soon followed by a report of a possible touchdown in Posey County in southwestern Indiana. Subsequent watches and warnings were issued by the NWS.

A second touchdown was reported at Monroe City, in Knox County at 11:45 AM.

The NWS began to receive frequent damage reports. The Central Indiana SKYWARN net control station (NCS) W9NWS, located in the NWS Office in Indianapolis, took to the air on the Indianapolis 146.97 MHz repeater and requested activation of county SKYWARN operations in counties within the coverage area of the Indianapolis NWS radar. Timely spotter reports were critical to the NWS for it to be able to keep counties in the path of the storm alerted well in advance.

About 1 PM, an F3 size tornado touched down in Ellettsville, in Monroe County. The tornado passed extremely close to the homes of Ellettsville hams, Mike, KB9SGN, and Russ, N9DHX. Both Mike and Russ, while seeking personal shelter from the storm, excitedly reported seeing roof parts and other debris flying through the air to the Monroe County net. County warning sirens were activated and emergency services were dispatched into the affected area after a call to 911 by NCS Mike, N9RGI. Dwight, WB9TLH reported the Ellettsville incident, during its occurrence, to W9NWS.

Spotters from various counties tracked this single, fast moving twister from Ellettsville, Northeast through Martinsville in Morgan County, to Indianapolis, to Northeast of Anderson, in Madison County, on into Delaware County, and Hartford City, in Blackford County, a distance of close to 112 miles. Spotters forwarded sighting and damage reports to county public safety officials, who, in turn, activated county warning sirens. The broadcast media interrupted regular programming to deliver continuous storm progress reports to the public, based on what was heard on the 146.97 SKYWARN net.

Actions exhibited by responding spotters were credited with helping the NWS increase its watch and warning lead times by 25 minutes, thus saving lives and minimizing injuries.

After the storm passed, many spotters teamed up with local Red Cross and Emergency Management agencies to provide communications between shelters and county EOC's, with damage assessment teams, and with National Guard clean up crews. Hams were also dispatched to area hospitals to help track the walking wounded. A Salvation Army SATERN communications team was active as well. Operations continued through the weekend and into the first days of the following week.

Property damage and loss was estimated to be in the millions of dollars. The greatest amount of damage occurred in Ellettsville, Martinsville, Anderson and Indianapolis suburbs of Lawrence, Southport, Beech Grove, and Greenwood. The path of destruction ranged from Poseyville in Posey County, to Hartford City, in Blackford County. Miraculously, no loss of life!

Two individual storm cells are to blame for the damage. The cells were 20-25 miles apart and believed to have produced three tornadoes, ranging in intensity from an F0 on the Fujita scale (winds up 72 MPH) to an F3 (winds 158 to 206 MPH). Travel speed of the storm was approximately 50 MPH.

Indiana Governor Frank O'Bannon, after performing an aerial survey of the devastation said, "This is the longest path of tornadoes that I remember hearing about in the State of Indiana."

Special thanks to the following who contributed to this story: Mike Palmer, N9FEB; Mark Shaffer, N9GDR; Dwight Hazen, WB9TLH; John Mills, KC9BRX; Ernest Clark, KB9SKI; and Mike Enyeart, N9RGI, Russ Ryles, N9DHX, and Dave Tucek, NWS Indianapolis.

Field Organization Reports

Compiled by Linda Mullally, KB1HSV

Public Service Honor Roll
October 2002

This listing is to recognize radio amateurs whose public service performance during the month indicted qualifies for 70 or more total points in the following 6 categories (as reported to their Section Managers). Please note the maximum points for each category:
1) Participating in a public service net, using any mode. —1 point per net session; maximum 40.
2) Handling formal messages (radiograms) via any mode. —1 point for each message handled; maximum 40.
3) Serving in an ARRL-sponsored volunteer position: ARRL Field Organization appointee or Section Manager, NTS Net Manager, TCC Director, TCC member, NTS official or appointee above the Section level. — 10 points for each position; maximum 30.
4) Participation in scheduled, short-term public service events such as walk-a-thons, bike-a-thons, parades, simulated emergency tests and related practice events. This includes off-the-air meetings and coordination efforts with related emergency groups and served agencies. — 5 points per hour (or any portion thereof) of time spent in either coordinating and/or operating in the public service event; no limit.
5) Participation in an unplanned emergency response when the Amateur Radio operator is on the scene. This also includes unplanned incident requests by public or served agencies for Amateur Radio participation. — 5 points per hour (or any portion thereof) of time spent directly involved in the emergency operation; no limit.
6) Providing and maintaining a) an automated digital system that handles ARRL radiogram-formatted messages; b) a Web page or e-mail list server oriented toward Amateur Radio public service — 10 points per item.
Amateur Radio stations that qualify for PSHR 12 consecutive months, or 18 out of a 24 month period, will be awarded a certificate from Headquarters upon written notification of qualifying months to the Public Service Branch of Field and Educational Services at ARRL HQ.

828 K6SOJ
665 K2CSS
610 KC2DAA
540 W2MTA KC2HUV
495 N2LTC
490 W9RCW
440 N9TVT
425 N2CCN
410 W7TVA
380 N9VE
350 KB2SNP
345 KA2ZNZ
335 K1CFI
290 W8JEB
275 AB2IZ
267 NN2H
257 AC5SU
250 KB2KOJ
240 KB2RTZ VE3EUI
230 KB2CCD
225 W2LC
223 KBØDTI
222 N5JCG KA2GJV
221 K5ER
215 W3YVQ
197 N4TAB
190 KB2VRO N2OPJ KK3F WI2G
189 K9JPS
183 KB3GFC
180 W5XX N2IKR
178 KB2ETO
175 NØZIZ
170 N1VXP
165 KD1SM
164 NN7H
161 WNØY AC5VN
160 KC5LFB
158 W6IVV
154 N2GJ
150 AG9G W6DOB KB8ZYY KG4DZN WB5ZED K5IQZ
148 N2HQL
147 N2RTF
146 N8JAT
145 NM1K
142 N2YJZ
140 KV4AN KG4OTL
138 W5PY
135 K4BEH
134 WA2GUP
131 WB2KNS AF2K
130 WJ2F KG4CHW KM5YL
128 WA5LQZ
125 W4ZJY AA8SN W3BBQ KØIBS NC2F KK1A
124 W2GUT
122 N1IST WB4BHH
120 K9FHI KW1U N1LKJ KD4CQJ AB4XK KC8LBZ W6QZ
WX4J KA4FZI KG4FXG W4EAT K4RLD K4IWW K6YR W3BBQ N2JRS
119 KG4OQA WA2YBM
117 N3WAV WA1QAA
115 WA2WMJ
111 N2ECR N3RB K4FQU
110 K2UL WB2UVB KB9KEG N3SW N2AKZ KC2JXM WA1FNM WB4GM K8GA N8FPN K4YVX WA2MSU W7GB W7QM N7YSS W7ZIW NJ5M NR2F WX4H KD4GR KC4ZHF WA2YL W7GB AF4NS KE4JHJ K4YVX K5MC KA2BCE
108 KA4LRM AL7N KC6NBI
107 W4AUN
105 K9LGU
W4CC
104 WA1JVV K4BB KC8CON
103 KU6Z
101 K4DND
100 W9CBE W9YCV WB2GTG KB2KLH WA2YOW N1IQI W1ALE KF4OPT K4SCL WD9F K7GXZ W7LG N9MN WA9VND W7GHT K4DZM K7GXZ AF4QZ KA4UIV WØWWR W1QU N3WK KC2EOT WB2QIX KA1VED AC7DD
99 K2PB N8NMA
98 KO4OL WØOYH KD5ITA
97 K1TSV KJ7SI
96 KB5WY
95 AA4AT KG4MLC W4FAL WJ3K
94 N6NKO WD4LSS
93 K8ZJU N8ZJU WA4EIC
92 KC3Y W3CB
91 KB2GEK W6JPH
90 AA2SV WA2CUW K2BCL W4CKS AA8PI K8AE WX8Y KEØXQ KK5GY WB4PAM W4WXA K4WKT WB4GGS WD8DHC KA8WNO NØSU AA3GV AA3SB KF6OIF KG2D WB2IJH KA1GWE W7VSE
89 W7TC WB2LEZ AG4DL
88 KAØDBK
87 KL5T
86 KE2SX N1TPU W2CC WB7VYH NB4K W7EP
84 W4NTI
83 K6IUI WB4BIK
82 KD4EFM W4MOO
KC8SZR
81 KC6SKK W5NK
80 KA2YKN W2MTO WA8DHB W6PRI WA5OUV K1JPG KF4WIJ KE4UOF KG4MLD AA4YW
79 N3OR KC7SGM
78 N5JU
77 K5DPG K2DN
76 W4DGH WB4UHC KG4QIP W1JTH KB8NDS N8PAM KJ5YY
75 W7DPW N4VVX
74 N2BVM AD4BL
73 AK6DV W4JLS WA4DOX W4CAC
72 KB1CVH WD4GDB K4FUM
71 K2DBK K8VFZ W4DLZ
70 N1LAH KA7TTY

The following stations qualified for PSHR points in previous months, but were not recognized in this column: (Sept) W8JEB 286, WB2UVB 150, KO4OL 92, K4DZM 79, NB4K 79. (Aug) N2HQL 167, KB2RTZ 160, K2UL 130, WA2YL 130, WB2UVB 130, WJ2F 93, AA2SV 90, KA2YKN 78, WA2CUW 73.

Section Traffic Manager Reports
October 2002

The following ARRL Section Traffic Managers reported: AK, AL, AR, CT, EMA, EPA, EWA, GA, ID, IL, KS, KY, LA, MDC, ME, NC, NH, NLI, NM, NTX, NV, OH, OK, OR, ORG, SC, SD, SDG, SFL, SJV, SNJ, STX, TN, WCF, WI, WMA, WNY, WPA, WV, WWA, WY.

Section Emergency Coordinator Reports
October 2002

The following ARRL Section Emergency Coordinators reported: AK, AR, AZ, EWA, ENY, IA, IL, IN, KS, KY, LA, MN, NC, NLI, OH, OR, SFL, STX, SV, TN, WNY, WV.

Brass Pounders League
October 2002

The BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 points or a sum of 100 or more origination and delivery points for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL radiogram format.

Call	*Orig*	*Rcvd*	*Sent*	*Dlvd*	*Total*
W1GMF	0	982	1886	24	2892
KK3F	18	1386	1330	44	2778
NM1K	788	334	979	21	2103
W1PEX	0	122	1520	0	1642
N2LTC	0	584	613	7	1204
K9JPS	0	505	33	494	1031
W4ZJY	0	457	503	1	961
KW1U	0	529	368	17	914
WB5ZED	15	461	425	20	921
W9RCW	0	431	54	388	873
WX4H	*0*	*400*	*360*	*6*	*766*
WØWWR	0	188	499	15	702
W4EAT	0	351	344	0	695
KA5KLU	2	274	371	38	685
KA1VED	13	323	330	14	681
W6DOB	28	147	463	39	677
WB5NKC	29	58	510	8	609
NG1A	0	293	291	2	586
N1IQI	268	46	268	0	582
KF5A	1	263	296	0	560
K5UPN	18	319	203	2	542
K7BDU	26	272	210	6	514
KA2ZNZ	33	231	207	37	508
N9VE	0	239	39	223	501

BPL for 100 or more originations plus deliveries: K9GU 199, NJ5M 131.

Freeband

This month we are going to look at the subject of Freeband, which is a form of Citizen's Band Radio (CB). Freeband activity supposedly takes place between 26.000 and 27.995 MHz. Searching the Internet can produce multiple Web sites that are dedicated to this activity, which is potentially devastating to Amateur Radio and DXing as we know it. The sites cover clubs, awards and clusters.

In many countries CB is illegal; some authorities tolerate this activity, however. Most government authorities do not issue licenses for CB operations, so many call signs are assigned individually or by clubs. The Alfa Tango CB Group, one of the leading organizations of this activity, actually issues call signs to their members. The Alfa Tango group issued the call sign 342AT0, the first CB DXpedition to the Chesterfield Islands. The AT indicates the club. The numbers before AT indicate the country code. Each DXCC country is assigned a number. They even have their own awards.

Now some of you are probably wondering, where is Bernie going with this. Stay with me. Over the last few years groups of Amateur Radio operators, mostly from Europe, have been going on DXpeditions in the name of Amateur Radio but also putting these DXCC entities on the CB band. Some of the CB operations have gone to remote rare locations without permission, thus jeopardizing future legitimate Amateur Radio DXpeditions.

During the multinational DXpedition early last year, one of the team members had plans to secretly get on Freeband and operate. This was clearly an illegal act. The organizers of the operation were totally unaware of these intentions and did not condone this activity. They informed the person there would be no illegal CB activity and told him this would not be acceptable. At a later point the team member was caught doing so and was basically kicked off the team and sent immediately to the ship. So as you can see, this could have very easily escalated into a real problem.

I am sure most of you who have operated 10 meters have heard these pirates operating in our Amateur Radio bands illegally. It's important for us as DXers and Amateur Radio operators not to close our eyes and ears to this type of activity. DX clubs and foundations should not sponsor Amateur Radio DXpeditions that also operate illegally on the CB band. Do we want our Amateur Radio operators operating illegally on the CB bands? If a group of Amateur Radio operators operate Freeband or ham radio illegally and get caught by local authorities, they risk action by the ARRL DXCC Desk.

One thing is for sure: Some CBers are invading our 10 and 12 meter bands, and other bands too! Why on earth would any Amateur Radio operator have anything to do with this type of negative activity? I don't think we should keep CBers out of our great hobby. In fact we should try to convert them and train them to be good Amateur Radio operators by teaching them proper procedures and etiquette once they have legally obtained their tickets for the ham bands.

DX NEWS FROM AROUND THE GLOBE

6W—SENEGAL

Jean Marc, F8IXZ, will be in Senegal from December 14-22. He will be in the Djouj National Park, in the northern part of Senegal near the Mauritania border, and QRV as 6W4/F8IXZ. He will also spend a few days before and after in Dakar where he will operate as 6W1/F8IXZ. Equipment will include a FT-847 and a G5RV antenna for activity on 10 through 40 meters, mostly CW. QSL via F8IXZ.

K4ZW

Vlad, UA0ACG, receives his 5BDXCC. It was hand delivered in Mongolia at the station of JT1CG by K4ZW.

7Q—MALAWI

Joe, G3MRC, is currently QRV as 7Q7BP and expects to be active from Malawi "until at least early 2003." QSL via G3MRC, Brian J. Poole, 18, Grosvenor Ave, Kidderminster, Worcs DY10 1SS, England.

DX GATHERING IN BRITISH COLUMBIA

Mark your calendar for the annual Pacific Northwest DX Convention, which will be held the weekend of July 18 and 19, 2003. The keynote speaker will be Martti Laine, OH2BH. The event will be held at the Vancouver Metrotown Hilton in Burnaby, British Columbia. I was at this location for the 2000 PNWDXC and highly recommend this convention and the hotel. Keep a lookout on the British Columbia DX Club Web site at **www.bcdxc.org/**.

DX GATHERING IN FINLAND

The Contest Club of Finland will hold their annual Contest and DX Meeting on the third weekend of January 2003. Mark your calendar now for January 17-19 in Helsinki. More details are expected to follow soon. Questions may be sent to organizer Ari Korhonen, OH5DX (ex OH1EH) via e-mail to **oh5dx@sral.fi**.

DXERS' CHAT ROOM

The popular #CQDX chat room for DXers has a new address. Please

WA9JNM

Old friends on the air finally meet in Woonona, Australia after 20 years of QSOs on the air. Here are WA9JNM (VK2IWN), Steve Benell and Tom Potter, VK2VOD.

Bernie McClenny, W3UR ♦ 3025 Hobbs Rd, Glenwood, MD 21738-9728 ♦ w3ur@arrl.org

reconfigure your IRC client to connect to **irc.radiochat.org**. Information about the room and software configuration instructions can be found at **dx.qsl.net/cqdx**.

DXTRAVAGANZA

The LSDXA will once again sponsor DXtravaganza, which will be held in June 20-22, 2003 at Ham Com 2003. For more information on LSDXA and DXtravaganza, keep an eye here and at **www.dxer.org/lsdxa/**.

FR—JUAN DE NOVA

Freddy, F5IRO, is now on Reunion Island working with the French Army Signal Corps. He says it is possible that he will go to Juan de Nova, Europa and Glorioso Islands but he must first get the necessary authorization from his boss. If all goes well we could see activity on 15, 20 and 40 meters SSB only. Freddy will be stationed on Reunion until February. We expect to get notification before he would go to any of the islands, so keep an eye on your favorite DX bulletin. QSL via F6FNU.

AH8LG

K8O and K8T were DXpedition calls to Ofu and Tutuila Islands in the American Samoan Islands. Pictured are (standing l-r) GWØANA, AH6HY, G4KIU, DL5RBW; (sitting l-r) DL9RCF and GØWMW.

W8WOJ

Paul, ET3PMW (left), back in the US after volunteering in Addis Ababa for six months, shares a few DX tips with Don, W8WOJ. Paul, now W4PFM, will be remembered as 5Z4FO, 5X4F and OA8V.

K4ZW

Chak, JT1CO, is very active on both 80 and 160 meters. This past September K4ZW, K4YT, JT1CO, UAØACG and JT1BG (l-r) installed several Beverages to help Chak hear the weak ones on the low bands.

HC8—GALAPAGOS ISLANDS

A DXpedition rental QTH is now available in the Galapagos Islands at the hotel "Hogar de Don Guido," owned and operated by the family of Guido Rosillo, HC8GR, in the seaside town of Puerto Baquerizo Moreno, San Cristobal Island, Galapagos. Reservations are being handled by Trey, N5KO. See **www.donguido.com/** for additional details.

J2—DJIBOUTI

Vincent, F8UNF, is now QRV from Djibouti as J28UN. Look for activity on 10-160 meters on CW and SSB until June 2003. His favorite band is 10 meters. QSL via F8UNF, Vincent Charles, BP 12, Leyr 54760, France.

JD1—OGASAWARA ISLANDS

8N1OGA is a special event station from Ogasawara Island celebrating the 75th anniversary of the Japan Amateur Radio League, JARL. There will be multiple operations now through the end of January 2003. QSL cards will be automatically sent out via the bureau if you work them. Direct QSLs to JA1MRM will be answered direct. The log and more info can be found at **www.fivenine.com/8n1oga/eng/**.

S2—BANGLADESH

Eric, VA7DZ (VE3DPV), will be operating, presumably as S2/VA7DZ, from Dhaka and Sylhet, Bangladesh, between January 1 and 72003. Equipment will include a K2 transmitter and a Force 12 Sigma 5 vertical. QSL via Eric Manning, VA7DZ, 2909 Phyllis St, Victoria, BC V8N 1Y8, Canada.

Koichiro Takeda, JF1EQA, is now working in Dhaka, Bangladesh and has recently obtained his S21YY license. Look for activity on 10, 15, 20 and 40 meters on CW, SSB and RTTY until 2004. QSL via JF1EQA.

V3—BELIZE

Joe, K8JP, is back in Belize and hopes to be there through April 2003. He will mainly operate CW with some SSB and maybe RTTY. Look for him on 6 through 160 meters. If time allows, Joe will do single-op 40 meters in the CQWW CW. He plans on doing the ARRL DX CW and SSB and many other contests as time permits. QSL via KA9WON with a self-addressed envelope and postage.

VP5—TURKS AND CAICOS ISLANDS

VP5/W6XK and VP5/N6EE will be on from the VP5B contest station in the Turks & Caicos January 1-7 including the ARRL RTTY Roundup, when they will use the call sign VP5NN. Before and after the RTTY event, they will emphasize RTTY on all bands and CW and phone on the 30, 17 and 12-meter bands and low bands. QSL via their home calls and QSL VP5NN via NN6NN. VP5B and at least two other VP5 stations were active in the CQWW SSB this weekend.

WAZ WITH A TWIST

During the CQ World Wide DX Contests most participants try to work each of the 40 CQ zones. It was just a matter of time before someone tried and succeeded at operating the CQ World Wide Contest from all 40 zones. Yes, the first person to do so was none other than Dick Norton, N6AA. His last zone was #15 as he did a multi-op as TK4Z in the 2002 CQWW SSB DX Contest. Phil, N6ZZ, is very close to completing his with 37 zones.

XZ—MYANMAR

Hiroo, JA2EZD/XW2A, was QRV in mid-November as XY1M from the Panda Hotel in downtown Yangon. He plans to be back sometime between now and January 29, when his license expires. QSL via XW2A.

VHF+ Clubs and the Importance of Being ELMER

A recent study of ARRL VHF Contest results indicates that participation and log submission has been dropping steadily since the middle 1990s. By inference, it is highly likely that day-to-day activity is dropping as well. This, at a time when there have never been more radios with some type of VHF capability sold. What is happening? Clearly, in spite of the technical availability of equipment to work weak-signal VHF, amateurs with this capability are *not* flocking to the VHF bands.

A few years ago while preparing an article about attracting non-participants to VHF contesting, I posed a question to the members of the Stanford VHF Reflector. What is the most important factor(s) in attracting new contest participants? Is it emphasizing FM operation in hopes the FM operators will turn to SSB/CW? Is it the technical challenge? Is it the presence of an active VHF contester to act as a mentor? Of the two dozen replies I saw, interaction with an active contester was clearly the most important factor.

Think back to the time when you were just entering Amateur Radio. Almost every one of you can point to one or more individuals who guided your efforts in your days as a fledgling amateur. In the VHF world, this type of guidance is even more important. The equipment is often not quite "plug and play" and the propagation is such that if the operator does not understand it, (s)he might think there is never any activity. Calling frequencies, seasonal propagation, all of these require experience to exploit.

If we want more activity on VHF, we need to convince operators who are not active to try them. We must help them choose the right equipment/antennas and help them integrate their stations. We need to show them the proper operating techniques and give them a sense of why we find the VHF bands so exciting, and show them why we call 6 meters the "magic band." Moreover, they need to understand the thrill of working stations 1500 km away on bands that they thought they could not reach 100 km. In short, we who operate these bands must be Elmers for newer VHF operators.

This is the digital age but I am convinced that it still takes a personal touch, interaction with a human being—not a machine—to help budding VHF operators on their ways. I have seen many new operators try to use VHF reflectors as an Elmer. Even the most straightforward questions bring a variety of answers, many of which are contradictory. Sometimes it is a matter of opinion but often some of the answers are just plain inaccurate. How is the neophyte to know which is correct? He is dealing with folks in cyberspace who are complete unknowns rather than a local human being that he knows and has come to trust.

Most human beings are gregarious by nature and tend to band together into groups with common interests. I have always been a strong supporter of local radio clubs. When I was younger, almost every active ham belonged to a radio club, but these days many new hams are not joiners and they are the worse for it. VHF operators have formed a variety of organizations to take advantage of their common knowledge. This month's column, in honor of the January VHF Sweepstakes whose foundation is the club competition, is devoted to describing the rich mixture of organizations that support VHF operators. They range from general VHF clubs to clubs that specialize in certain aspects of the VHF world, such as contests or microwaves. Even the latter contain many folks who would all be more than happy to help a newcomer get started on the VHF bands. You would be surprised how many microwave mavens have very good 6-meter stations on the air in conditions like those last fall. Conversely, you'll find many 6-meter DXers standing behind a tripod holding a 10-GHz dish during a contest.

VHF/UHF/SHF Groups

What follows here is an extensive list of VHF+ groups of various kinds. It is not an exhaustive list, so if there is no group listed near you it is not necessarily true that one does not exist. These groups constitute a variety of resources. Some clubs have regular meetings. Some are VHF-contest groups that may or may not meet regularly. Some are regional VHF groups whose primary visible function is to run annual conferences, which bring together large numbers of VHF+ enthusiasts. This belies the importance and influence of groups like the Central States VHF Society, which is certainly best known for its conferences. There is a VHF net on 75 meters, which is a good source of general VHF knowledge. There are groups that promote a specific band and groups that operate almost completely via the Internet.

This Month

January 3	Quadrantids meteor shower peaks at 2300z
January 18-20	ARRL VHF Sweepstakes
January 19	Good EME conditions

VHF Clubs

Information about the VHF clubs of various types is summarized in alphabetical order along with other types of VHF+ organizations mentioned below in Table 1. You can find more detail about the clubs on the *ARRLWeb* at **www.arrl.org/WA50/**.

Band Promotion Organizations: There are a number of organizations that promote activity on a particular VHF band, some of which are confined to the Internet. Rather than listing all of them, I will mention three: two for six meters and one for two meters. The others are easy to find once you get going on VHF+. The Six-Meter International Radio Klub (SMIRK) has members in over 100 countries and promotes 6-meter activity—especially DX activity throughout the world. They support both DXpeditions and operation by locals in rare countries. Their Web site is **www.smirk.org/**, and you can contact Dale Richardson at **aa5xe@ktc.com** for further information. The Six-Meter Worldwide DX Club is another organization that fosters DX activity on 6 meters. Its Web site is at **6mt.com/club.htm**. It sponsors a VHF/UHF Discussion Board at **6mt.com/cgi-bin/yabb/YaBB.cgi** and an Internet reflector at **50mhz@topica.com**. You can contact Jerry Daugherty, W9FS, at **w9fs@6mt.com** for further information. Sidewinders on Two (SWOT) has promoted activity on 2 meter SSB since the 1970s. With a total membership of over 3000, SWOT sponsors weekly nets on 144.250 MHz throughout the US. Their Web site is **www.swotvhf.org**. For further information, contact John Petersen, KM5ES, at **km5es@swotvhf.org**.

Portable Multi-operator Contest Stations: These stations are not for beginners, but the operators of these stations are usually wonderful sources of information who are very helpful to new VHF operators. There are obviously more, but I will list the Web sites of three such stations: W2SZ

Gene Zimmerman, W3ZZ ♦ 33 Brighton Dr, Gaithersburg, MD 20877 (tel 301-948-2594) ♦ w3zz@arrl.org

Table 1
A Summary of the VHF+ Organizations

Organization names are sometimes abbreviated. For clubs, membership often extends outward some distance from the club focus area.

Group Name	*URL*	*Interest*	*Region*	*Contact*
Badger Contesters	**www.qsl.net/bc**	Contests	WI	Ken Boston, W9GA; **kboston@lsr.com**
Central States	**www.csvhfs.org**	Regional	Central US	Larry Hazelwood, W5NZS; **w5nzs@csvhfs.org**
Digital Group	**groups.yahoo.com/group/psk_vhf_uhf_hamradio**	Digital	International	Don Hobson, KB9UMT; **kb9umt@arrl.net**
Fourlanders	**fourlanders.org**	Contests	Southeast US	Robin Midgett, KB4IDC; **kb4idc@arrl.net**
K8GP	**k8gp.net**	Contests	Washington, DC	Gene Zimmerman, W3ZZ; **w3zz@arrl.org**
Midwest VHF/UHF Society	**www.ceitron.com/mvus/mvus.html**	General	IN/OH/KY	Gerd Schrick, WB8IFM; **wb8ifm@amsat.org**
Mount Airy	**members.ij.net/packrats**	Weak Sig	DE/NJ/PA	Brian Taylor, N3EXA; **n3exa@enter.net**
NIMRODS	**groups.yahoo.com/group/nimrods**	Microwave	Northern IL	Zack Widup, W9SZ; **w9sz@prairienet.org**
North Texas µW	**www.ntms.org**	Microwave	Northern TX	Kent Britain, WA5VJB; **wa5vjb@flash.net**
NE Weak Signal	**www.newsvhf.com**	General	New England	Del Schier, K1UHF; **k1uhf@arrl.net**
Northern Lights RS	**nlrs.dropboxone.net**	General	Twin Cities	Jon Platt, W0ZQ; **jon.platt@gte.net**
Ontario VHF	**www.geocities.com/ve3iey/OntarioVHFAssociation.html**	General	Toronto	Dana Shtun VE3DSS; **ve3dss@rac.ca**
Pacific NW	**www.pnwvhfs.org**	Regional	Pacific NW	Jim Aguirre, W7DHC; **secretary@pnwvhfs.org**
Roadrunners µW	**www.k5rmg.org**	Microwave	Southern TX	Tom Haddon, K5VH; **k5vh@texas.net**
Rochester VHF	**vhfgroup.rochesterny.org**	General	Rochester, NY	Rajiv Dewan, N2RD; **n2rd@arrl.net**
Rocky Mt VHF+	**www.qsl.net/rmvhf**	General	Denver, CO	Wayne Heinen, N0POH; **n0poh@arrl.net**
San Bernadino	**www.ham-radio.com/sbms**	Microwave	Southern CA	Bill Burns, WA6QYR; **bburns@ridgecrest.ca.us**
Six Club	**www.6mt.com**	Band	International	Jerry Daugherty, W9FS; **w9fs@6mt.com**
SMIRK	**www.smirk.org**	Band	International	Dale Richardson, AA5XE; **aa5xe@ktc.com**
Southeastern VHF	**www.svhfs.org**	Regional	Southeast US	Jim Worsham, W4KXY; **president@svhfs.org**
SWOT	**www.swotvhf.org**	Band	US/Canada	John Petersen, KM5ES; **km5es@swotvhf.org**
W2SZ	**www.mgef.org**	Contest	Northwest MA	Dick Frey; **frey@opal.crd.ge.com**
W9ICE	**w9ice.com**	Contest	IN	Dale Schieman WB9YCZ; **wb9ycz@w9ice.com**
Weak Signal Group	-			Tom Whitted WA8WZG; **wa8wzg@wa8wzg.com**
Western States Weak Signal Group	**www.wswss.org**	Regional	CA & west	Paul Hammer KA6CHJ; **ka6chj@arrl.net**

www.mgef.org (western Massachusetts), K8GP **k8gp.net** (Washington, DC) and W9ICE **w9ice.com** (Indiana). These portable stations are extreme examples of what can be done on the VHF+ bands.

Yahoo Clubs: For those interested in digital modes of weak-signal operation, a new Yahoo Group meets at **groups.yahoo.com/group/PSK_VHF_UHF_HAMRADIO/**. Their log-in message board to promote activity is at **www.functionalfuture.com/kd4fnb/qsoboard.pl**. This should be a fine resource for those interested in using any of the digital modes for long-distance contacts, including PSK31, Hell, MFsk16, SSTV and JT44/FSK441 as well. Contact Don Hobson, KB9UMT, at **dhobson123@aol.com** for further information. For those interested in the microwaves, a new Yahoo group is the Northern Illinois Microwave Radio Operators and Developers Society (NIMRODS) can be found at **groups.yahoo.com/group/nimrods/**. You can contact Zack Widup at **w9sz@prairienet.org** for further information.

Finally, there are groups whose major emphasis is in areas like HF DXing or contesting, yet have a considerable interest in VHF activities. Whatever the source, these are wonderful places to find individuals knowledgeable about VHF. Folks who are willing to demonstrate why they think VHF is so interesting and help newcomers and any others wanting to try the wonderful world of VHF. These include the Eastern Tennessee DX Association (**www.etdxa.org/**) and the Potomac Valley Radio Club (**www.pvrc.org/**).

All this information should help locate suitable Elmers for VHF newcomers and more experienced VHFers who wish to move to some new aspect of VHF. Remember that Elmers are flesh and blood people. You can learn a lot from Internet reflectors, but they are no substitute for a human being close by to guide you.

ON THE BANDS

October marks the beginning of the fall/winter 6-meter F2 season and a continuation of the enhanced tropospheric conditions associated with the change of seasons. Let's see how this October fared. My thanks to F1DFR, K1EP, K4KLK and KE4WBO not otherwise acknowledged, and the DX Summit and 50/144 Propagation Logger Internet spotting networks.

Aurora

As we progress further from the equinox, the aurora season normally drops off. This October the only reports in the US were late on October 1 to early on October 2. In particular, Sam K5SW reports contacts on October 2 with N8CJK (EN84), KAØPQW (EN33), KØHA (EN10) and KRØI (EM29). Disturbances on October 5, 14 and 24/25 produced some ordinary auroral contacts in Europe but little was reported in the US.

Tropo

October is often marked by enhanced microwave propagation, and this month was no exception. WZ1V (FN31) reports hearing the WA1ZMS beacon in FM07fm on Oct 1. Ron, NN5DX (DM80), reports that a cold front dropping down across the Rockies resulted in some spectacular tropo openings on 2 meters starting on the morning of October 11. He first worked W5SFW (DM95) and NØKQY (DM98). Most of the evening festivities occurred between 0350 and 0515Z. It began with NØSXW (EM39) at 59+ both directions and over the course of the next hour, WRØF (EM29) NØMST and NØLIE both in EM27. Best of all was KØMQS (EN31) 1496km/930 miles distant for best DX worked that evening. Sam K5SW (EM25) reports an opening on October 8 to KE4OYS (EM63) and W4OZK (EM64) and concomitant with the opening reported by NN5DX, Sam notes contacts to various grids in Texas: EL07, EM00, EM02, EM10, EM12 and EM13. The morning of October 19 brought an opening to the southeast US with contacts between KE8FD (EM84) and KD4ESV (EL87), KB4CRT (EL89), AC4TO (EM70) and KE4YYD (EM79). AC4TO worked north to W4DEX (EM95). The following day there was some excitement across Texas with W3UUM (EL29) working W5JLC (DM81) and K5CM (EM25) in Oklahoma.

Two-Meter E-skip

What is so rare as a 2-meter E-skip opening in October? Well, not much but we had a humdinger of one on October 6. Commencing at 2328Z AC4TO (EM70) reports contacts with WB2EZG (FN20), W1ZC (FN42), W1COT (FN31), N2OT, W3EP (FN31), WB2EBQ (FN20), AK3E (FM19), N2BX (FN20), N1NOL (FN31) and WA2FGK (FN21) in the next 15 minutes. At the same time, NN4X (EL98) was working VE3YCU (FN03), VE3VD (FN03) and N6NB/8 (FM08). Meanwhile W1ZC reports a contact with KG4KLR (EM70) in addition to his contact with AC4TO. The 144-MHz Internet Propagation Logger also notes contacts between KD4ESV in Florida with K4RTS (FM08) and K2AXX (FN12). VE3YCU reported a contact with KF4YOX (EL96). Overall, the opening appeared to begin at 2328Z on October 6 and end at 0011Z on October 7. It was quite a lot of excitement for October.

Six Meters

Six meters has provided some excitement this month associated with some solar upheavals, but so far the unbelievable conditions of last fall have not returned. The first week of the month was marked by several minor solar storms and a variety of 6-meter propagation, most of it of a north/south variety. Thus on October 2 TE/F2 links from CX, CE and LU to the southern US and to K1MIA (FN44) were noted. K1TOL (FN44) found some auroral E to the Pacific Northwest between 0400 and 0500 UTC.

October 3 brought a little of everything. John, WZ8D (EM79), reports a short opening to FJ5DX at midday. There were widespread reports including one from John, WA5KBH, of

PAUL HAMMER, KA6CHJ

OWEN WORMSER, K6LEW

Most rover pictures are antenna pictures because the owners are afraid to show the typical installation inside the cabin. Here are two real exceptions to the rule. On the left Paul Hammer, KA6CHJ, displays a beautiful HF/VHF/UHF combination including TS60/ TM255/TM455/FT-100 and various FM rigs. Not shown are his 300-600 W amplifiers for all bands from HF through 70 cm. On the right is the dc-to-daylight mobile of Owen Wormser, K6LEW, which includes an IC-706MkIIG with various FM radios and transverters that can run from 160 meters through 10 GHz with hundreds of watts from 6 meters through 23 cm.

E_s from the southwest to northeast. In amongst a lot of F2 backscatter, the W4s and W5s enjoyed a fine day of TE/F2 to CX, CE and LU.

October 4 brought a weak contact between K1MIA and MMØAMW perhaps by auroral E. ZP6CW was widely reported in the Gulf Coast and Florida. Roger, K6LMN (DM04), reports CE stations into the West Coast. Jon, NØJK reports E_s to the east on October 5. More disturbances on October 6 brought numerous reports from Emil, W3EP; Fred, K3ZO and Ken, WB2AMU, of widespread propagation from the northern US to all areas of South America from Brazil south. The South Americans also had good conditions into most of Europe. At the same time, NW5E (EL98) reports 275 E_s contacts to the Northeast and Midwest US.

For the next few weeks, conditions here were quiet except for good conditions between the Midwest and Southwest to Australia on October 11. WØRT (EM27) reports contact with VK4APG and Sam, K5SW (EM25), and Larry (NØLL) report contacts with Australia including VK2PU, VK4JH and VK4APG via an E_s/F2 link. Under the heading of "rare contacts," an interesting note from Raj, VU2ZAP, reports good conditions in MK82 with contacts on October 14 to YA4F, YI9OM, FY5LS and 5R8EE as well as numerous contacts into southern Europe to 9H1, IT9 and SV on October 19.

Another disturbance produced some interesting conditions on October 24-25. Widely scattered areas of the US, from the Northeast to Florida to K5CM (EM25), reported contacts with southern Europe and Africa: 9H1AW, EH8BPX, EH7KW, F6FHP, CT3FT almost all on skewed paths to the east. Direct contacts to the Caribbean, Central and northern South America were reported by Don, VE3CDP/W9, and Fred, K3ZO, and between K5SW, KH6SX and NH7R via an E_s/F2 link. Of greatest interest was the contact that was not made. Steve, K1SG, reports that W5EU (EM12) was heard by A45XR and K1TOL, and K1MIA heard partial calls from the A45. October 25 brought propagation from ZD7VC to N4JQQ (EM55), K5IX (EL29) and K5SW. October 28 brought a short but strong opening from the East Coast and the Midwest as far westward as KØFF (EM48) to ZD7MY (IH74).

HERE AND THERE

January VHF Sweepstakes: The major club competition in the ARRL VHF Contests takes place in the January VHF SS. The contest begins at 1800Z on January 18 and ends at 0300Z on January 20. Additional details are available in December 2002 *QST* (p 95) and on the Web at **www.arrl.org/contests/**. While propagation conditions are usually poor because of the cold and often inclement weather, the club competition brings out a level of activity unmatched in other ARRL VHF events. Whether you stay home, go out roving or just get on to work a few old friends, plan to spend at least a few hours in this one—you'll enjoy it.

APRS in ARRL VHF/UHF/SHF Events: There still appears to be some confusion about the legality of using APRS to track stations in ARRL VHF/UHF/SHF operating events. This in spite of what I thought were quite clear statements from ARRL Contest Branch Manager Dan Henderson, N1ND, on various VHF oriented Internet reflectors. For the record, Dan says, "The purpose of APRS is to announce, report and track a station's location. The use of APRS during an ARRL contest is considered self-spotting which is a violation of Rule 3.14 of the General Rules for all ARRL Contests, which reads: "In contests where spotting nets are permissible, spotting your own station or requesting another station to spot you is not permitted." So, the use of APRS as a tracking aid is *not* legal for *any* class of operation, single-op, multi-op or whatever.

20th Anniversary of VUCC: The year 2003 marks the 20th anniversary of the VUCC (VHF/UHF Century Club). This has been one of the ARRL's most popular award programs and has served to rejuvenate interest and activity on the VHF+ bands. Some of the VUCC specialties (such as working 100 grids from an East or especially West Coast location) are great challenges requiring knowledge and use of multiple propagation modes. From a personal standpoint, I would like to thank the members of the *ad hoc* VHF Contest Committee who recommended the idea. Especially Bill Tynan, W3XO, who was then Conductor of World Above 50 MHz and a member of that committee, who popularized the idea. John Lindholm, W1XX, was then Manager of the ARRL Communications Department; he had the foresight to follow the committee's recommendation in the face of the tradition of using ARRL sections as multipliers. Congratulations on a real success story!

Southeastern VHF Society Conference: This is the first call for technical papers for the SVHFS conference to be held in Huntsville, Alabama, on April 25-26. The deadline for submitting papers to Dick Hanson, K5AND, is March 11, 2003. Dick's e-mail address is **k5and@adelphia.net**. Contact him directly with any questions about formatting, media, hardcopy, e-mail, zip disks, etc. This has always been a first-rate gathering, and if you can make it, you will not be disappointed.

NU7Z Pacific Northwest VHFer of the Year: Rick Beatty, NU7Z, was presented the first annual "Pacific Northwest VHFer of the Year" award from the Pacific Northwest VHF Society (PNVHFS) at the 2002 Pacific Northwest VHF Conference in Bend, Oregon, on September 28, 2002. Rick was cited as having "been instrumental in promoting VHF, UHF and Microwave activity in the Pacific Northwest for many years. He has encouraged many to move up to the higher bands by making himself available to help with the construction and troubleshooting of transverters, antennas, etc." NU7Z also maintains a series of beacons on all bands from 903 MHz through 10 GHz that many in the Seattle area have used as references in determining whether equipment is working properly and to check propagation. He has also been instrumental in bringing the Microwave Update conference to the Seattle area in 2003, the first time this event will be held in the Pacific Northwest.

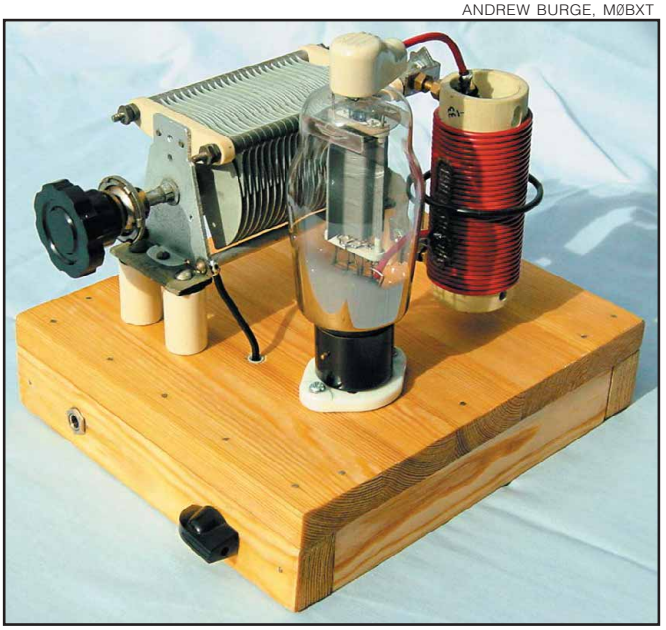
Winners of the ETDXA Spring Sprints announced: The Eastern Tennessee DX Association recently announced the winners of the 2002 Spring Sprints. The top three, overall, were VE3AX, K4QI and K8TQK. The top three microwave scorers were WA3DRC, K4QI and K6TSK. The top three rovers were KFØQ/R, NA9US/R and KF4VZQ/R. Congratulations, all!

Microwave Standings: Due to the length of this column, the microwave standings will be presented next month. QST

Vintage QRP

A few months ago, we featured Vintage QRP in this column. That column generated the second largest amount of e-mail correspondence of any I've written in the past three years. Here, loyal readers, is my holiday present to you: a return to Vintage QRP. Enjoy, and Happy Holidays!

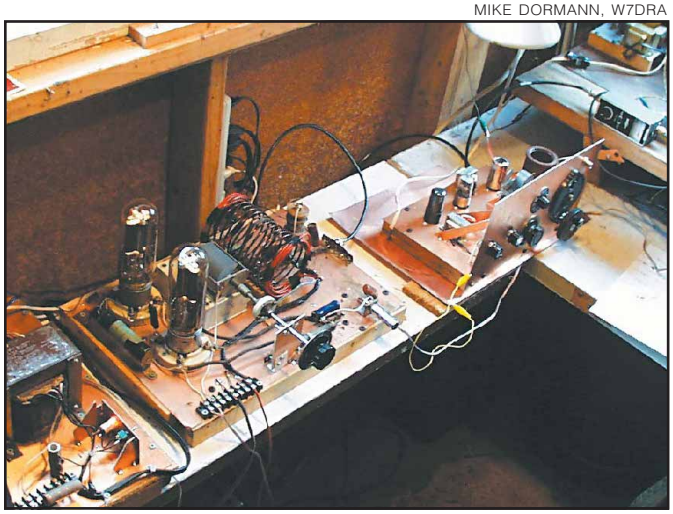
ANDREW BURGE, MØBXT



Andrew Burge, MØBXT, from the UK built this slick looking Hartley transmitter for 160 meters. It uses an 812A triode running 400 V on the plate for a whopping 4 W output. Notice the very neatly laid out breadboard construction. Nice job, Andrew!

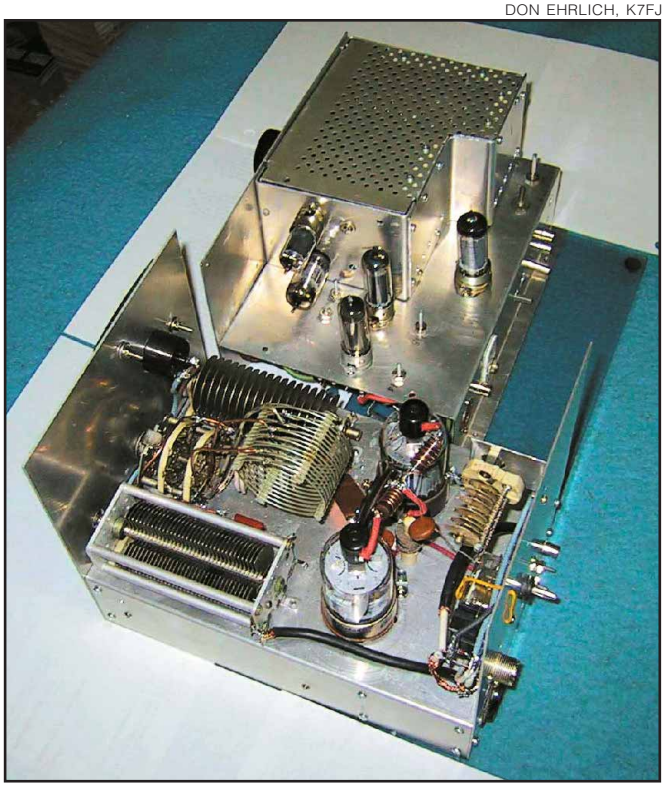
Some people—like Don Ehrlich, K7FJ, of Port Angeles, Washington—are just gifted when it comes to fabricating homebrew gear. The HB QRP transmitter is shown next to a small linear amp (we're supposed to ignore that, according to Don). This transmitter for 40, 30, 20 and 17 meters uses a 6AU6 oscillator driving several buffer-multiplier stages and finally feeding a 5763 final amp. This is a fully bandswitched transmitter that is very stable. The photo at the right shows an overhead shot of the transmitter (above) and the dual 6146 linear amp (below). That construction is so clean you could eat off of it! The transmitter's output is fully variable from 1 to 5 W.

MIKE DORMANN, W7DRA



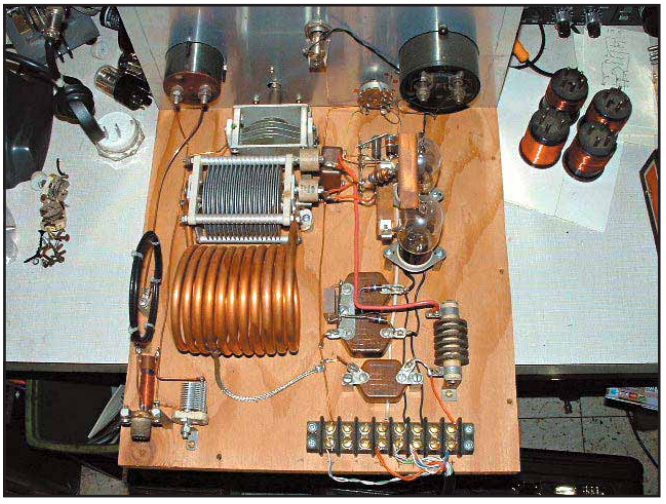
Mike Dormann, W7DRA, of Seattle, Washington, sent along this photo of his 1929 tuned-plate, not-tuned-grid (TPNTG) transmitter that uses a pair of 211 vacuum tubes capable of delivering about 200 W! To stay within QRP power levels, Mike reduces the plate voltage via a variable HV dc supply. Mike is a retired Boeing research engineer and adjunct professor who loves boatanchor gear. He pairs this transmitter with a four tube regen (to the right of the transmitter in the photo). Looks like a fun station, Mike.

DON EHRLICH, K7FJ



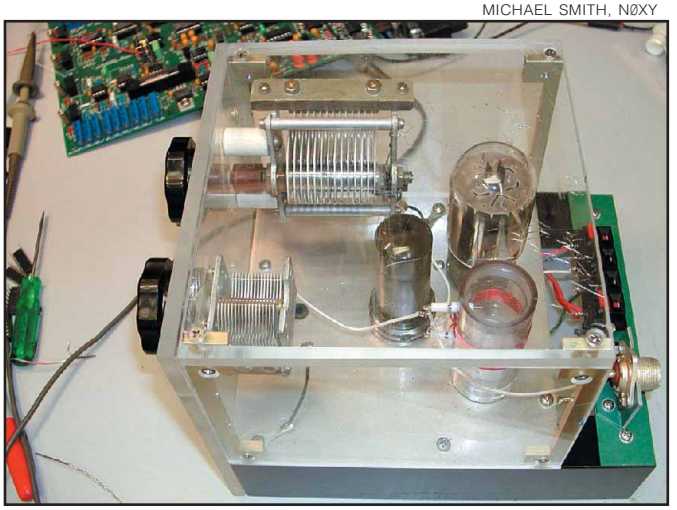
Rich Arland, K7SZ ♦ 25 Amherst Ave, Wilkes Barre, PA 18702 ♦ k7sz@arrl.org

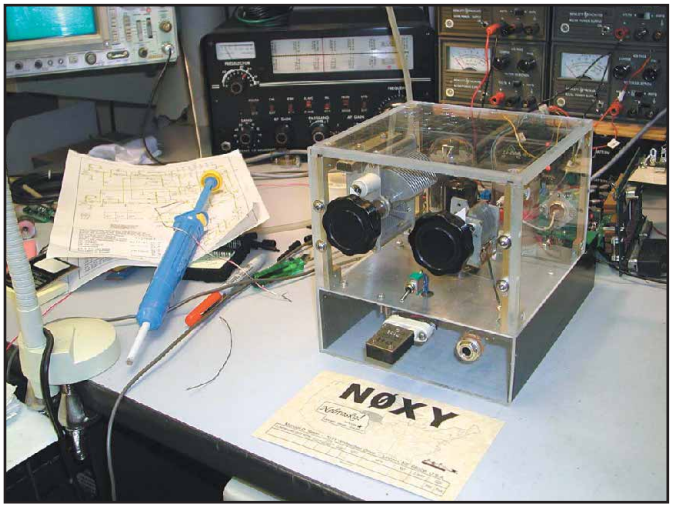
BOB ROEHRIG, K9EUI



Bob Roehrig, K9EUI, of Batavia, Illinois, sent along a couple of shots of his 80-meter shunt fed Hartley transmitter. At the top is a front view of the transmitter. Below is a shot from behind the front panel showing the neat and tidy breadboard construction. This HB Hartley uses two 3C24 tubes to obtain about 5-10 W output on 80 meters.

MICHAEL SMITH, NØXY





This really cool looking transmitter was built by Michael Smith, NØXY, of Lincoln, Nebraska. It features a 6AG7 as a crystal oscillator feeding a 6L6 final amplifier with pi output stage. Using 325 V on the plate of the 6L6, Michael gets about 4 W of RF output power. The photo at the bottom shows the homebrew two-tube transmitter along with one of my favorite vintage tube receivers, the Drake 2B (in background). What a pair!

JOHN BREWER, WB5OAU/4

John Brewer, WB5OAU/4, of Raleigh, North Carolina, is a confirmed boatanchor enthusiast. Pictured here is a fully restored 1930s Utah Junior crystal controlled transmitter. It uses a single 6L6 and is capable of up to 8 or 10 W output on 40 meters. John completely rebuilt the transmitter using "period" components to maintain the classic look of this wonderful old rig. Not satisfied, he paired it with a homebrew project from the February 1947 issue of *QST* titled "The Old Stand-By"—a four tube regenerative receiver featuring a 75 detector (with about 60 V on the plate) and two 6SQ7s in the audio amplifier feeding a 6F6 audio output stage. John acquired the receiver in 1997 and ended up stripping the rig down to bare chassis and completely rebuilding the receiver.

I hope you have enjoyed our all too brief trip down memory lane. As you can see from these photos, homebrewing and restoring vintage tube type stations is alive and well. By midspring, I hope to have my homebrew vintage station on the air. Look for it in an upcoming installment of "QRP Power."

My thanks to all the QRPers who took the time to take photographs of their vintage gear and send them in. If your pictures didn't make it into the column this month, rest assured Vintage QRP will be an ongoing topic, so keep the pictures coming.—*73, Rich, K7SZ* QST

Three More Associations Apply to Join IARU

Applications for IARU membership have been received via IARU Region 1 from organizations in Georgia and Armenia, and via Region 3 from an organization in Vietnam. The three applications have been examined and are now ready for consideration by the member-societies. Vote sheets have been sent to IARU member societies. The closing date for receipt by the International Secretariat of ballots on these proposals is 4 April 2003.

Georgia

The Executive Committee of IARU Region 1 has examined the application to join IARU of the National Association Radioamateurs of Georgia (NARG), and has determined to its satisfaction that the application meets the Bylaws and Constitution of the IARU.

NARG was founded on 21 September 2000. There are 156 licensed amateurs who are members of NARG out of 485 licensed amateurs in the country. The officers include Mamuka Kordzakhia, 4L2M, President; David Devdariani, 4L1DA, Secretary; and Michail Janverdashvili, 4L4CR, Gogita (George) Menabdishvili, 4L7CE, and Yuri Gviniashvili, 4L4AL, Board Members. The president serves as IARU Liaison.

Armenia

The Federation of Radiosport of the Republic of Armenia (FRRA) has submitted an application for IARU membership. The IARU Region 1 Executive Committee has examined the application and has determined to its satisfaction that the application meets the Bylaws and Constitution of the IARU.

FRRA was founded on 14 January 1999. There are 84 licensed members of the society, out of a total licensed amateur population of 128. The officers include George Badalian, EK6GB, President; Mher Markosian, EK6AN, Vice-president and IARU Liaison; Secretary Vahe Terzyan, EK6VT; and Council Members Valter Yeranosyan, EK6SW; Karen Karapetian, EK7DX; Rafik Vardanyan, EK1KE; Henrik Arakelyan, EK5KE, and Arman Akopdjanian, EK6OLA.

Vietnam

The Vietnam Amateur Radio Club (VARC) has submitted an application for IARU membership. VARC was founded as a national organization in July 2002 under the Vietnam Radio-Electronics Association. From February 1996 to July 2002 the VARC was chartered in the Ho Chi Minh City area. Five of its members participated as observers in the 1997 Region 3 Conference in Beijing. There are 11 Amateur Radio stations (6 collective and 5 private) with 25 operators. The administrative staff of VARC is Eng. Nguyen Minh Duc, 3W2REH, Chairman; Prof Dr Phan Anh, Vice Chairman; Eng. Nguyen Bac Ai, XV2A/3W6AR, President; Eng. Trinh Hau, 3W2LI, Vice President, and Dr Tran Ngoc Hung, 3W2SG, Secretary. The IARU liaison is Trinh Tuan Hoang, 3W2KD/XV3OOS.

Mr Nguyen Bac Ai, XV2A/3W6AR, President of the newly formed Vietnam Amateur Club receives gifts from Mr Shozo Hara, JA1AN, President of the Japan Amateur Radio League, at JARL's Ham Fair 2002 in Tokyo.

BRIEFS

• **Japan refuses permission for power line communications systems:** As a result of strong opposition from the Japan Amateur Radio League (JARL), Japan's government says it's too soon to allow power line communications—variously called PLC or PLT—between 2 MHz and 30 MHz, due to its interference potential to other HF users. JARL had expressed deep concerns about PLC to the Ministry of Public Management, Home Affairs, Posts and Telecommunications earlier this year. Field tests last January looked into the potential for RF leakage from power lines—specifically in cases where PLT was used to provide Internet access to homes via power lines. "JARL is glad that the Ministry's study group on PLC concluded that it is not suitable to allow PLC between 2 MHz and 30 MHz," said JARL President Shozo Hara, JA1AN. "However, we need to keep in mind that the future course of environmental demonstrative tests, their direction and international standards planning need to be watched very carefully." JARL Director Masao "Mike" Matsumoto, JA1AYC, visited Germany to research the PLC situation in Europe. Meanwhile, the Radio Society of Great Britain reports that it's continuing to press for tight limits on emissions from wired telecommunications systems such as PLC and is working with other HF users to try to ensure that the spectrum remains uncontaminated by wideband noise. The JARL's Web site has more information, **www.jarl.or.jp/English/4_Library/A-4-1_News/jn0208.htm**.

• **Mexico's FMRE celebrates 70 years of IARU membership:** The Federacion Mexicana de Radio Experimentadores (FMRE), Mexico's IARU member-society celebrated 70 years of membership in the International Amateur Radio Union with a special event station. The Mexican Comision Federal de Telecomunicaciones (COFETEL) authorized the FMRE to commemorate the occasion using special event call sign 6F1LM from its headquarters in late 2002. COFETEL also authorized all Mexican Amateur Radio operators to use the special prefix 6J—only used to contact DX stations. FMRE President Pedro Mucharraz, XE1PM, congratulated all Mexican operators. "The use of the special prefix will contribute to remember and pay homage to all amateurs who have paved the way for us to enjoy a great hobby," he said. *—The Daily DX*

• **Argentina to get 136-kHz band:** Radio Club Argentino (**www.lu4aa.org**) President Roberto Beviglia, LU4BR, reports that Argentinian amateurs will be the next to gain access to the 136-kHz LF band. As a result of a rule proposal the club made to federal officials, he reports, a portion of the 136-kHz band has been allocated to the Amateur Service on a secondary basis in Argentina. The segment 135.7 to 137.8 kHz will be coordinated by the Radio Club Argentino until it is finally assigned on a primary basis within a year.

Saving History

The story of Robert C. Gold, W9DHL, of Lomoni and Ames, Iowa; KH6JU of Honolulu, T.H.; W3PDA of Philadelphia, Pennsylvania; and finally WA2IIB of Mt Laurel, New Jersey—and what he accomplished—might have been lost forever if it were not for one last telephone call. One of his neighbors knew that Bob would not like to have his treasured ham radio station thrown away, as the house was being cleaned out, in preparation for it being sold. She finally contacted Phil Vourtsis, President of the New Jersey Antique Radio Club.

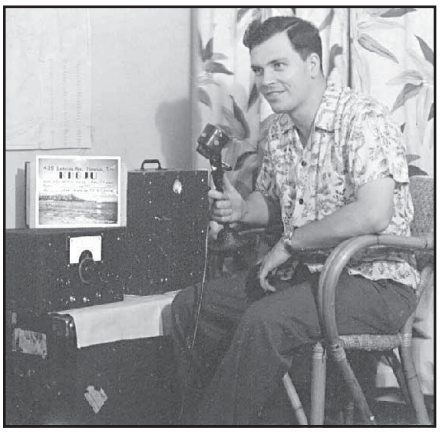
The NJARC is a radio-collecting club whose members have varied radio interests. Because I was one of the ham members, I was asked (along with Marv Beeferman, secretary of the club) to inspect the station. Upon discussion with the neighbor and the club's board members, it was decided to make an offer for the radio equipment, and our offer was accepted.

We immediately stopped the throwing out of all the radio room "junk," as the neighbor-volunteers who were helping to clean up the property called it. They didn't know we wanted that stuff too. A few items were lost to the trash man, but most of the usable papers and parts were saved.

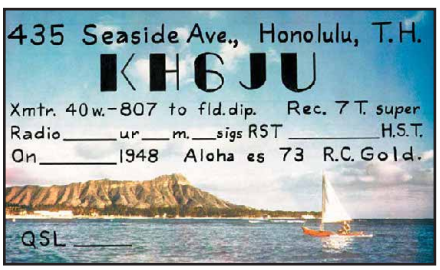
It's important to note here that we all need to spend some time when cleaning out a SK's ham shack to preserve what we can. If you get the opportunity to purchase some or all of an estate, ask your friends for help. Look for photos and papers that show parts of our hobby's past. Once it's thrown away, it's too late. If you're not interested in the history, please find someone who is and ask them to go along.

As our club members went through the piles of papers, we found that Robert C. Gold was an engineer and a significant player at RCA during the early days of color television. Among the papers were manuals, schematics, design notes and project reports on the development and early marketing of color TV. There were some 35-mm slides of the RCA "TV Road Show" taken at various locations around the world. Unfortunately, some of the papers were damp, moldy and in some cases unusable. There had been a minor flood at one time.

Bob had become ill in the 1980s, and then was in a nursing home for a while before he became a SK. His bride and love of 53 years, Jean, also became ill and



Robert Gold, KH6JU, at his Honolulu station in 1947. Bob was returned to Hawaii for a few years after the war by RCA to help straighten out its property and equipment used by the Navy.



Robert Gold's QSL card from Honolulu, Territory of Hawaii, in 1947.

Robert Gold working on his antenna in Lamoni, Iowa in 1939.

All the black front panel parts from the last station were placed in the 6 foot 6 inch cabinet for this photo. K2WI intends to try to rebuild this rig as close to original, as the present condition of the various units will permit. Most units have been modified over the years.

John Dilks, K2TQN ♦ 125 Warf Road, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

Robert Flory, K2WI, peeking through the racks, as units are being removed.

Robert Gold in his US Navy Technician uniform. He was employed by RCA and assigned to the Navy during WW II.

This is Robert Gold's friend, Stewart Wight, W9NMA, handling ARRL traffic from Iowa in 1939. The transmitter is one designed by Gold.

Some Memories of my Brother, Robert C. Gold

By Myra Gold Steinbrink

When 13-year-old Robert Gold was in the 8th grade he designed and built an electric map of the United States. I don't remember exactly how it worked, but there were two wired pointers, and when the state or capital was touched the corresponding state or capital would light up. Everyone marveled at his invention.

In 1932 when Robert was in high school (probably 15 or 16) he built a radio and walnut cabinet to house it for our parents. They had this radio for over 30 years. In 1937 on my 16th birthday (Robert was 21) my brother let my girlfriend and me spend that Sunday talking to ham radio operators all over the country. He had recently built his first "rig," which took up one whole little room on the second floor of our house. He later built a combination shop/ham radio building in our back yard. There was always a steady stream of friends who spent a lot of time in that building.

I remember he erected two very tall antennas for that equipment, one on top of the building, the other in a pasture across the street. Electrical storms were always a concern, and I remember when one was struck by lightning. There was also a fire in the radio building. On both occasions Robert got the fires out before the local fire department arrived.

Robert joined RCA in the summer of 1941. I rode with him in his new car to Kansas City, Missouri, where he was first assigned, but not for long. He was one of the first persons chosen by RCA to be taught the complexities of radar and sonar. A short time later while still working for RCA he was assigned to the US Navy as a Naval Technician, a post he held all during World War II.

After the war Robert was stationed at the New York City office and I remember him telling me when there were only 50 TV sets in the whole city and he was assigned to service them. He knew David Sarnoff (head of RCA) and worked a number of times with Dwight Hemion, winner of 24 Emmy Awards, who directed some of the "specials" that NBC produced. Robert mentioned having been the first to televise the birth of a baby for a hospital or medical school.

In 1957 he traveled to Japan for RCA, to introduce color TV. He said, that at that time the Japanese were having trouble getting color to work properly. He spent quite a bit of time working with the engineers there; some of that long time was because of the language differences. Eventually the Japanese figured it out with his help.

RCA was always sending him to international trade fairs in such places as Greece, Italy and Germany. Robert and his crew received an Emmy for the process that connects a number of unrelated commercials together—something we naturally take for granted now.

He was at the Berlin Wall, on May Day just after it was built, broadcasting this event to the world. On the other hand, in 1950 he broadcast the 50th anniversary of the Nobel Prize, and demonstrated the same for the King of Sweden and Sweden's Parliament. Later he was in charge of building the television display for the Museum of Science and Industry in Chicago. He also authored several technical manuals for RCA.

When he traveled to other countries, he made it a point to look up and find fellow hams. He would visit them and see their stations. It is my feeling that during the 40-plus years spent working for RCA, he never really lost his love of being a "ham" radio operator.

is still in a nursing home. Without children, and with no local relatives, there was no one to look after the home.

One Word of Caution!

Upon entering the shack on the first trip, I found the ac power still turned on—on the operating console and to all the equipment. In all that time—perhaps as long as 15 years—no one had turned it off. I carefully removed the plugs, one by one. Even though Bob was an engineer, and over-designed his station for safety, in later years he used lamp cord extensions. Never assume the power is off. In situations like this, take your time to be safe.

Removing the Equipment

Luckily, many hands make light work. We had a good turnout to remove and haul away the station and other radio items of interest. Also fortunate is the fact that there are so many varied interests in our club. All the papers will be examined and reviewed with knowledgeable eyes. I'm sure there will be a few good articles written on their contents, and eventually the more important papers will be placed with an appropriate museum or library.

Bob was also quite a transmitter designer. In 1938 he, with lifelong friend Stewart Wight, W9NMA, started a custom manufacturing shop. Several of their designs were built, sold and used on the air. They had customers from California to Rhode Island. After college they dissolved their company, Gold & Wight, and went on to their own radio and electronic careers. Many of his early designs have survived.

In a future column I will feature some of his ham designs and station equipment. If you would like to see more of Bob's station, visit my Web site: **www.eht.com/oldradio/arrl/index.html**.—*K2TQN* QST

Rain, Rain, *Don't* Go Away!

With precipitation on the increase across the Americas, it is time to talk about rain scatter. Although some of the most spectacular thunderheads occur during the months of May through August, much of the gentler and certainly more frequent precipitation covers our continent during the late autumn, winter and spring months.

One of the peculiar properties of microwaves is the ability to make use of scattering from precipitation. Scattering, as the word is applied to other events, in radio means the process that sends RF in directions other than originally sent.

All non-line-of-sight communications use scattering. With VHF and UHF most tropospheric scattering is caused by turbulence that makes small pressure differences in the air. These small and very slightly higher and lower pressure regions have different refractivity that scatters VHF and UHF signals. Although turbulence generated tropo scattering has an effect at 10 GHz, it is not much greater than on 1296 MHz. There is some contribution to microwave tropospheric propagation by airborne dust and insects as is evidenced by clear air turbulence radars.

Scattering by Particles

When an RF field encounters a region of particles, some of the energy excites those particles and they re-radiate the energy. The amount of energy that is scattered increases with the density of particles. It also increases by the fourth power of the frequency. Recall that increasing frequency is the same as decreasing wavelength. Once the wavelength is as small as 10 times diameter of the particle, this fourth power factor begins to reduce. When the wavelength is the size of the particle and smaller, the scattering efficiency remains constant (does not increase with frequency), but the pattern of scattered energy changes. One common misconception is that scattering is the same as reflection. Actually, the scattering objects re-radiate the energy that enters them. This helps explain why there is forward scattering, and why polarization is maintained in most scattering situations.

Why is the Sky Blue?

Even the oxygen and nitrogen molecules that constitute air are particles that scatter electromagnetic radiation. These molecules are very small compared to the wavelength of light. Because blue is a higher frequency than red or yellow, more blue light is scattered by the air than other colors, and because it is scattered in all directions, no matter where we look the sky is blue. The gas molecules are too small to be useful scatterers at any but visible and shorter wavelengths (representing frequencies of 500,000 GHz and above).

What about Water Particles?

It appears that atmospheric water takes on a few ranges of particle sizes (rather than a continuum). Water vapor consists of individual molecules that have properties similar to other atmospheric gasses. Although the dew point is a precise indicator of the amount of water vapor in the air, we often use percentage of humidity to describe it. Humidity of 100% represents the maximum amount of water vapor that the air can hold at a given temperature without condensing into particles larger than single molecules.

Water particles that range from under 0.001 μm (a thousandth of a micro-meter) to 0.01 mm are called haze. Cloud particles range from 0.001 mm to 0.1 mm. At 10 and even 24 GHz, it is not practical to get useful scattering from clouds and haze—the return power levels are far too low for communications. (Scientific cloud radars that can accurately measure particles of these sizes operate at frequencies between 30 and 100 GHz.) When atmospheric water particles are in a size range from about 0.5 mm to 3 mm (drizzle to tropical downpour) we call it rain. These particles are too heavy to be kept aloft by random air motion, and fall to the ground. One could not choose a better frequency than 10 GHz for rain scattering. Drops are $^1/_{10}$ to $^1/_{60}$ of a wavelength—and so the heavier rainstorms give the best scattering returns and communications paths.

The author and others have used rain scatter for communications on 5 GHz, and have observed scattering on 3 GHz and 2 GHz, but with very low signal levels. Recall the fourth power law—at 5 GHz (about half the frequency) we would expect to receive $^1/_{16}$ the signal (½ to the fourth power)—representing 12 dB less received signal level than what we would receive at 10 GHz with the same antenna gain and power. At 3 GHz ($^1/_3$ of the frequency) we would expect to receive $^1/_{81}$ of the signal, or about 19 dB less signal than at 10 GHz. Rarely are rain scatter signals at 10 GHz 20 dB or more over the noise, and so it is only the strongest storms and the use of higher power that provide a useful communications path at 2 and 3 GHz.

Resources

To listen to some rain scatter, set your browser to **www.wa1mba.org/scatter.wav**.

A recent article in *DUBUS* magazine describes some technical details of rain scatter: G. Vollhardt, DL3NQ, "Rain Scatter on 10 GHz," *DUBUS*, 2/2002 Vol 31, pp 7-28.

How does Scattering Direct and Polarize Signals?

The directivity pattern from a typical rain scattering volume can be thought of just as if an antenna were placed at the center of the volume When the drops are on the order of $^1/_{10}$ wavelength and smaller (like rain at 10 GHz), the scattering plot is as shown in Figure 1. View these plots just like an antenna plot as seen from above. The incoming signal (the "illumination") arrives from the bottom of the figure, and the rainstorm is at the center. First, let's look at vertical polarization. Figure 1A shows that the scattering is almost completely isotropic—the same in all directions. In other words, imagine that we are looking down on a vertical antenna. The energy arrives from the bottom of the figure, and radiates from the scattering volume just the same as a vertical dipole antenna would radiate the energy if it were located at the center of the scattering volume.

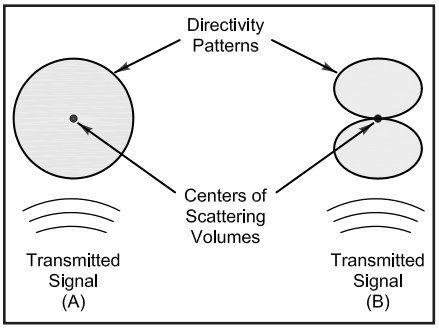


Figure 1—The directivity patterns for a signal emerging from a scattering volume as viewed from above. A—vertical polarization; B—horizontal polarization.

Tom Williams, WA1MBA ♦ wa1mba@arrl.org

Getting around Obstacles

We use horizontal polarization on narrow-band 10 GHz. Scattering for this condition follows the pattern shown in Figure 1B. This is the same pattern that a horizontal dipole would have if centered at the scattering volume, resulting in dramatic consequences for those trying rain scatter. Signals become very weak when the rain is at a point that causes the two stations to aim at 90° relative to one another. At shallower and greater angles, the signals increase, very much like they do for a horizontally polarized antenna. To maximize the likelihood rain scattering, rain cells that do not cause this 90° relation should be sought—see Figure 2.

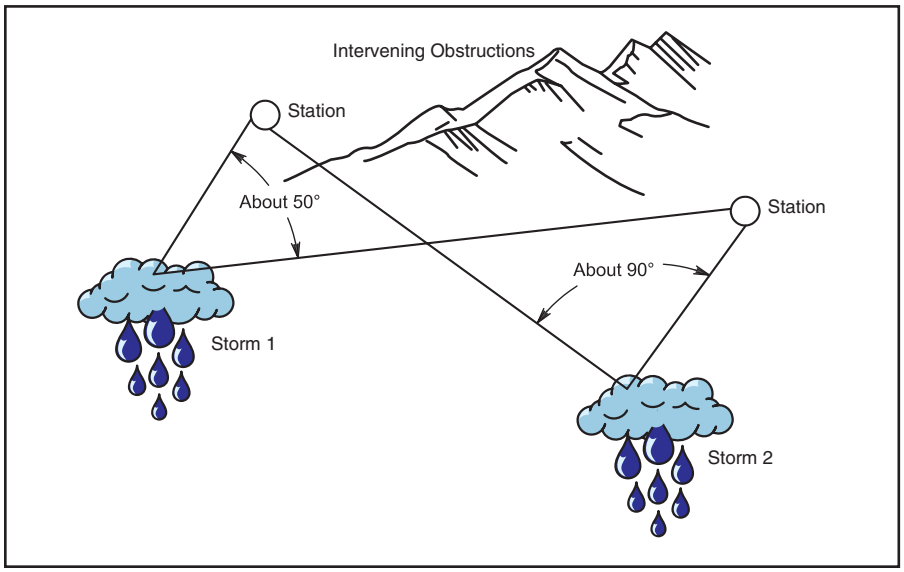


Figure 2—In this example, the two stations will have better signals using storm 1 because storm 2 creates a 90° angle.

How do Signals Sound?

One thing you will notice when using rain scatter is *Doppler shift*. This is the phenomenon whereby the frequency shifts if the path between the transmitter and receiver is shortening or lengthening. The rain in a storm is carried by winds, and so the scatterer is moving, causing the path length to change, and so the frequency shifts. In some violent storms the wind is strong enough to move a 10 GHz signal out of the pass-band! In most cases, CW notes become quite fuzzy sounding because the raindrops are moving at slightly different speeds and directions. Microwavers refer to the "Aurora" quality of rain scatter, similar in sound to aurora propagation on 2 meters—at times it can sound like strong noise. Hams exchange "59A" or "59S" RSTs, often to report this type of sound. The A stands for aurora and the S for scattering. When coordinating a rain scatter contact it is advisable to have the transmitting station send CW dashes, so that the receiving operator can distinguish the noisy signal from the background noise.

Can Snow Scatter?

Snow scattering is very much like rain scatter, and at 10 GHz has about the same scattering for the same equivalent rainfall rate. Most snowfall occurs at a slower equivalent rainfall rate than heavy rain, so only the heavier snowstorms are likely to have significant snow scattering. Nonetheless, the author and others have used snow scattering. At times is can be very effective at extending communications even though it is unlikely that hilltop expeditions would take advantage of this mode—it's cold enough at some of these heights even in the summer!

The majority of rain originates as snow because the cloud particles are super-cooled and the air temperature where the precipitation takes place is below freezing. This snow, in most rainstorms will pass through warmer air. As the snow falls through warmer air, the flakes become sticky and clump together to make very large and wet flakes. These become very strong scatterers, much stronger than the separate flakes above and stronger than the rain into which they melt below. Unfortunately, for communications, these layers are not very high in the storms, often only 500 to 1500 meters above the surface. So, although they are strong scatterers they do not support really long haul DX that the upper regions of thunderheads provide as the updrafts in them push their precipitants up to and beyond 8000 meters above ground.

How do I Operate Rain Scatter?

Rain may be a nuisance to operating, but it can be a welcome signal enhancer that lets you work around mountains and more than a hundred miles beyond normal range. So, what should hams do who want to try rain scatter? Of course, having two home stations make this kind of experimentation easy. If one or both stations are portable and you suspect that there are nearby weather events, give it a try. Most contacts in the upper bands are coordinated on the lower bands, typically on 144 MHz SSB. Although home operators may have access to on-line weather radar maps, some of the new third generation cell phones can also deliver this web data to portable operators as well. If storms are found, try to find directions that do not result in the dreaded 90° angle, and then have the strongest transmitter send CW dashes. If you want to operate voice, realize that SSB may be distorted beyond recognition, but narrow-band FM will work well if there is enough signal level. Long-haul rain scatter contacts are usually CW. QST

STRAYS

LEGACY CIRCLE

◊ The ARRL Legacy Circle is proud to recognize and thank ARRL members who have notified us that ARRL is included in their will or other estate plans. Recognition includes a Legacy Circle newsletter of gift planning information and updates on related tax issues. A planned gift of a bequest in your will, a trust, insurance policy or a gift of stock or other appreciated property can support the general operations of ARRL or a specific fund like the Defense of Frequencies Fund, the Education & Technology Fund, the Historic Preservation Fund or the W1AW Endowment. For information contact Mary M. Hobart, K1MMH, tel 860-594-0397 or e-mail **mhobart@arrl.org**.

QST congratulates...

◊ George Dowell KØFF, the only ham from the Ø call sign district to earn a 5-Band DXCC with 160, 17, 12 and 6-meter endorsements. He is also the recipient of the SETI League's Extra Terrestrial Century Club 25 award for verified contacts or reception of 25 natural or man-made radio signals from beyond the Earth's atmosphere, including satellites, lunar seismic transmissions, spacecraft and natural phenomena. Nice work, George!

I would like to get in touch with . . .

◊ anyone who monitored communications with Apollo space flights during the 1960s and '70s. —*Jim Oberg, Rte 2 Box 350, Dickinson, TX 77539; voice/fax 281-337-2838*

◊ anyone with information on John Westcott, who lived in Springfield, Ohio, and in New York City, and was licensed in 1921 as W8AGA. He also held K8DKG as well as a 2-land call that we don't have. He became a silent key in the 1980s. If you have any QSL cards from John Westcott or any information on him, please contact us at **w8aga@westcotthouse. org**.—*Matt Cline, KB8WFH, c/o Westcott House Foundation, PO Box 334, Springfield, OH 45502*

New Technician Class Question Pool Released by QPC; 2003 ARRL VEC Test Fee Set

Effective July 1, 2003, a new Element 2 Technician class question pool takes effect for examinations. VECs and VEs will have new test designs for use in exam rooms effective that date. All question pools can be found at **www.arrl.org/arrlvec/pools.html**.

The newly revised pool, released in December by the Question Pool Committee (QPC) of the National Conference of VECs, includes significant efforts to present the pool in a more friendly and understandable fashion for beginners; while maintaining appropriate emphasis on Safety, Rules and Operating Procedures. The Technician syllabus was completely revised during 2002 to allow for the revamping of the new pool.

General Pool Review up Next

Next up for review is the Element 3 General class question pool. A new syllabus for this pool is being developed as this is being written. Public input is invited on the syllabus, as well as on the General pool questions, answers or distractors. Input can be directed to the entire QPC via email to **qpc@arrl.org**, or to the individual committee members: Chairman, Scotty Neustadter, W4WW (**w4ww@arrl.net**); Fred Maia, W5YI (**fmaia@texas.net**), John Johnston, W3BE (**johnston.john1@worldnet.att.net**), and to Bart Jahnke, W9JJ (**w9jj@arrl.org**).

When submitting new question material, or suggesting changes to existing questions, please limit question length to 210 characters, and answer or distractor lengths to 140 characters (for new or existing questions being modified, please indicate the subelement reference number and topic, and existing question number if any, with your submission, eg, "**G1B01, Antenna structure limitations…**").

2003 ARRL/VEC Test Fee Set at $12

Starting January 1, the fee charged all applicants at ARRL VEC-coordinated Amateur Radio test sessions will increase from $10 to $12 for the year 2003. This fee is charged to anyone applying for a new amateur license or upgrading their operating privileges. Applicants failing an exam element at ARRL sessions where examiners permit retesting on the same exam element also must submit a retest fee of $12.

ARRL VE Reimbursement Goes to $6

Additionally, the maximum reimbursement ARRL VEC allows ARRL volunteer examiner (VE) teams to retain to directly offset their prudently incurred out-of-pocket expenses will increase from $4 to $6 in 2003 (this fee has remained at $4 per person served since 1991). "While the number of examinees has remained relatively unchanged in the past 24 months, our cost of doing business—and the expenses incurred by ARRL VEs—continues to rise," said ARRL VEC Manager Bart Jahnke, W9JJ. "An adjustment was needed in the 2003 test fee if we intended to maintain the same level of service that our VEs and VE teams have come to expect." Jahnke said that adjusting the reimbursement level for ARRL VEs who retain a portion of the fees to offset their out-of-pocket, exam-related expenses was also past due. *Note:* The FCC has mandated that test fees collected cannot exceed VEC program expenses.

New Club License Requests or Modifications of Club Address or Trustee

Any club with four or more members and that has a name, a document of organization, management and a primary purpose devoted to amateur service activities may seek to obtain a club call sign. Club call sign requests must be made by filing an application with an FCC-recognized Club Station Call Sign Administrator (eg, either ARRL, W5YI or W4VEC). There is no charge for this service.

All routine club license changes, except for call sign changes, can be submitted to a Club Station Call Sign Administrator (all Vanity call sign requests must go directly to FCC, per FCC Vanity filing procedures). Two signatures are required to make any club license changes (the signature of the trustee appointed by the club, and that of a responsible club official). Trustee changes are typically completed by the new trustee, as the new trustee must sign the application (the former trustee need not be involved in the process).

Club Station Call Sign Administrators can be contacted as follows:

ARRL VEC (**www.arrl.org/arrlvec/605ins.html#club**), 225 Main St, Newington CT 06111. Contact Bart Jahnke, W9JJ, 860-594-0300; e-mail **vec@arrl.org**.

W4VEC (**www.w4vec.com/**), 3504 Stonehurst Pl, High Point, NC 27265. Contact Jim Williamson, NQ4T, 336-841-7576; e-mail **w4vec@aol.com**.

W5YI VEC (**www.w5yi.org/**), PO Box 565101, Dallas, TX 75356-5101. Contact Larry Pollock, NB5X, 817-860-3800; e-mail **nb5x@w5yi.org**.

ARRL Spring and Fall National Exam Days

Spring National Exam Days (weekend)—Annually, the last full weekend in April, Saturday and Sunday April 26-27, 2003

Fall National Exam Days (weekend)—Annually, the last full weekend in September, Saturday and Sunday, September 27-28, 2003

If you are looking for information regarding exams to be held in your area, or the question pools, see that ARRL/VEC's Web site at **www.arrl.org/arrlvec/** or call 860-594-0300. For instructors and club info, contact the ARRL at 860-594-0200.

For assistance with publicizing your activities, see the ARRLWeb at **www.arrl.org/pio/** or contact Jennifer Hagy, N1TDY, at ARRL HQ (860-594-0328 or e-mail **jhagy@arrl.org**) for more information.

Question Pools

The current question pools and their four-year effective periods are as follows:

Current Technician class Element 2:	Expires midnight June 30, 2003
Current General class Element 3:	Expires at midnight June 30, 2004
Current Extra class Element 4:	Expires at midnight June 30, 2006
New Technician class Element 2:	Effective July 1, 2003 through June 30, 2007

Bart Jahnke, W9JJ ♦ ARRL VEC Manager ♦ bjahnke@arrl.org

AT THE FOUNDATION

New Annual Award to Honor Legendary Technical Writer

Some hams live on in our memories as "universal Elmers." Their gift with a pen allowed us to grasp a complex topic or "see" how something actually worked. Bill Orr, W6SAI, was one such writer. Foundation President Tom Frenaye, K1KI, explains the Terms of Reference (or perhaps "Terms of Reverence") for a new technical writing award to honor Bill:

The Bill Orr, W6SAI, Memorial Writing Award

Introduction

William I. Orr, W6SAI, was an engineer, educator and communicator of extraordinary ability. Over a period of 40 years he wrote and edited scores of technical books and articles of interest to Amateur Radio enthusiasts. His topics ranged from basic electronic theory to microwave communications to the theory, design, construction and magic of antennas.

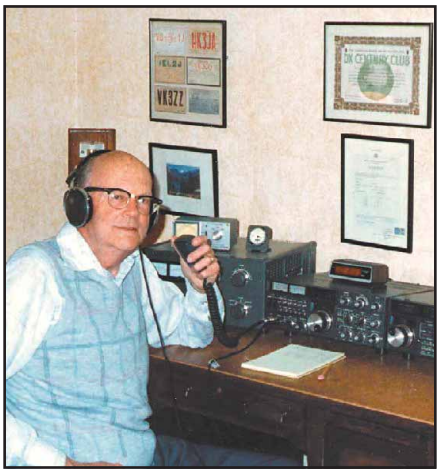
Whether explaining electronic theory or the intricacies of a microwave amplifier for EME communications, Bill had the ability to use a simple plain language in writing about technical subjects in a way that naturally attracted amateurs who had an interest in the topic but lacked a technical background in the area.

This fund was established through generous donations by Steve Cornell, K4AHA.

[Contributions of any size to this award fund are welcome.—Ed.]

Criteria

The Bill Orr, W6SAI, Technical Writing Award is awarded yearly to the *QST* author who writes an outstanding *QST* article or series of articles on new or existing technologies (or methods or means of amateur communication). The article should be written in an easily understood style, worthy of the Bill Orr "stamp of approval"—it should encourage interest and expand the knowledge and understanding of amateurs who may not have a strong technical background.



Along with amplifiers and transmitters, Bill Orr, W6SAI, wrote extensively about the early days of the amateur satellites.

Selection

The selection panel will be the ARRL *QST* editorial staff, who will recommend the winner from a review of the year's *QST* articles to the ARRL Foundation Board for final approval at their Annual Meeting (usually late January).

Award

The award will be an engraved plaque plus a check for $250 to be presented, if possible, at an ARRL convention.

Important Change to Scholarship Program

New in 2002 was the introduction of a scholarship-filing window—October 2002 to February 1, 2003. Don't waste any time! If you're a student, download an application at **www.arrl.org/arrlf/scholgen.html**, affix your transcripts and mail all by regular postal mail to ARRL Foundation Scholarship Program, 225 Main St, Newington, CT 06111.

Contributor's Corner

We wish to thank the following for their generous contributions to:

The Victor C. Clark Youth Incentive Fund
Muriel and Jim Smith, WA2GXS, in fond memory of William H. McGillick
Southern Pennsylvania Communications Group, in fond memory of Walter Bilous, Sr, KA2UIN
Richard Scott, W8FDN

The Central Arizona DX Association Scholarship Fund
Central Arizona DX Association

The Eugene "Gene" Sallee Memorial Scholarship Fund
Kennehoochie ARC—Georgia

The Chicago FM Scholarship Fund
Chicago FM Club

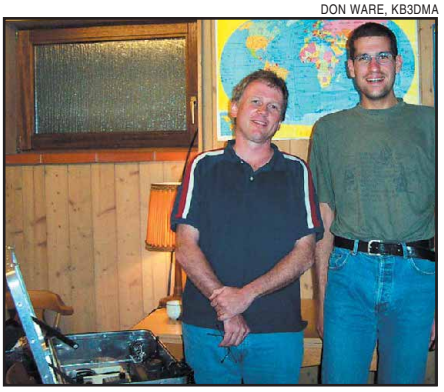
The General Fund
John V. Boehme, K4PRK
Carroll W. Swain, W7DU, in fond memory of Cormac Thompson, W7ACA
Chaparral ARC—Texas, in fond memory of Tom Rinn, K5TFW
Northern Illinois DX Association, in fond memory of Lou Williams, W9GSB
Robert L. Happel, N4LGX, in fond memory of Warren M. Higgins, AC4MZ
Agnes L. Sheldon, KØKLQ, in loving memory of Edwin L. Sheldon, WØNWM
William C. Mueller, W5VSD
Clarice Young, in loving memory of Richard "Dick" Young, KB4MUE
Central Arizona DX Association
John A. Murray, W3BAG
L'Anse Creuse ARC—Michigan, in fond memory of Donald M. Scott, WD8IKZ
S. Ron Windh, K6PIZ, in fond memory of Victor Persson, SM5KP
James and Marjory Prine, W5NUI and KB7DLT, in fond memory of William Johnston, Jr, KJ6DJ
OBP ARC—Missouri, in fond memory of John H. Davison, WØZFN
Andrew Family Foundation—Illinois
Steven G. Katz, N8WL, and Constance K. Barsky, WD8ODC, in fond memory of Anne Diamond, N9QFP

As received and acknowledged during the months of **September** and **October**

STRAYS

This past August I had the opportunity to meet Andre Maier, DH5TA, from Friedrichshafen, Germany. We first met via CW on 20 meters in 2000. Since then we've maintained a CW and e-mail friendship. While there I had the opportunity to work some surrounding countries on HF and also had some 2 meter repeater QSOs. Andre is also a paramedic and rescue diver in the Lake Constance area and was involved in the August airplane crash in that region. At lower left is his "portable" shack that he carries to different high-altitude locations.—*Don Ware, KB3DMA*

DON WARE, KB3DMA



Mary E. Lau, N1VH ♦ Secretary, ARRL Foundation Inc ♦ n1vh@arrl.org

YL Nets—Old and New

Since I became a ham in 1972, I've participated in many YL nets. Nine years ago I even ran a VHF YL net along with a newly licensed YL, Nancy Rosner, N2TKA, of Long Island, New York. She now has an Amateur Extra license and is webmaster and member of the board of directors of our local Amateur Radio club. What attracted us to start a YL net? Probably the same reason we are still active in the hobby—the desire to meet and talk to other YLs on the air. Many local clubs run YL nets, and there are many HF nets sponsored by the YLRL, CLARA and other national organizations.

One of the oldest YL nets around is the run by the YLISSB, the YL International Single Sideband System, on 14.332 MHz. They have hundreds of members, both men and women, all over the world. YLISSB System founder Vera M. Tallman, K4ICA, passed away in June 2001, but her ideals and their motto, "Dedicated to the building of friendship among all people via Amateur Radio," lives on in this organization.

The YLISSB is celebrating their 40th year and have created a special 40th Anniversary Award to encourage operating participation. This is in addition to the over 30 awards they already offer, ranging from the "YL/OM Team Award" for working 25 YL/OM teams to the "King Neptune" and "North Star Awards" for working members in other countries/continents. More details are available on their Web page, **www.qsl.net/yl-issb**. To receive the 40th Anniversary Award, contact 40 member YLs, 40 OMs, 40 TFOs (Top Flight Operators) and four of the current five Board Members (no dupes) between January 1 to December 31, 2003.

The YLISSB System also operates a QSL Bureau that can be used by any member. The next event is a QSO Party, which is open to nonmembers as well as members. The CW event is 0000Z Saturday, February 15 to 2400Z Sunday, February 16. The SSB is 0000Z Saturday, March 15 to 2400Z Sunday, March 16. Any HF band; no repeaters. The exchange is Call sign, RST, State or Country, YLISSB # (for members). You must have two 6-hour down times. The categories are Single Op, YL/OM team and DX/US partner and pending the number of logs, award certificates will be provided for DX high

score, Combo Phone/CW high score. For more information and to view and copy the worksheet go to **www.qsl.net/yl-issb/score**. Send all logs/scoresheets postmarked no later than April 30, 2003 to N4KNF or N4ZGH, 2160 Ivy St, Port Charlotte, FL 33952 or e-mail to **2hamsrus@comcast.net**.

YLs always like to get together, and the YLISSB is no exception. Their five-day cruise convention will be May 31-June 5, 2003 on the Royal Caribbean *Enchantment of the Sea*. It leaves from Fort Lauderdale, Florida and will stop in Jamaica and Georgetown, Grand Cayman. There are photos from their convention last year in Alaska on the Web page (**www.qsl.net/yl-issb**). For more information, contact Florence Reitzel, KU7F, 29633 235th Ave SE, Black Diamond, WA 98010.

From one of the Oldest to the Newest—YL Nets on IRLP

Ham radio and computers seem to be paring up in many different areas. IRLP, Echolink and I-link are some of the few new technologies that are popping up around the country. So it's not surprising that nets have moved into this area as well.

Last fall some women hams in Canada started a YL net using IRLP (Internet Radio Linking Project). It has been very successful and they are hoping to get more YL participation from all over the world.

"Everyone was so pleased and excited that so many YLs from different communities throughout BC [British Columbia] joined the IRLP YL Net! A few OMs even checked in to remark how pleased they were to hear so many YLs talking on air," said Elizabeth Baggoo, VE7TLK, in a recent email announcement on the YL reflector. "Two New Zealand hams were connected to the Vancouver Reflector at the start of the Net asking for information on how to connect to an Alaska Node. Now we are looking forward to having YLs outside of BC and Canada check in."

The IRLP YL net is held on the first and third Monday nights of the month at 0200 to 0300Z. To check in, you need to have a local "node" in your area - usually a VHF 2-meter repeater. They are listed at **www.irlp.org** and you should get permission from the trustee to use their repeater for the net before you get on the air. When you are ready to check in, put in the code 9000 and listen. There will be a message saying you are connected to the Vancouver Reflector in British Columbia, Canada. Use proper IRLP procedures (listen before transmitting and wait for the node to drop between transmissions—about 10 to 15 seconds).

One of the main central net controls is Elizabeth, VE7TLK. She monitors the net via the Web as well as on the air. She can see all the nodes that are connecting by going to **irlp.g4eid.co.uk/status/all_reflectors.html**. Elizabeth says another very informative Web site is **www.qsl.net/ylradio/spot.html**, which goes into detail on how you connect/disconnect as well as IRLP operational procedures. She and Glenna, VE7DSC, of Anmore, British Columbia, started this first International IRLP YL net in March 2002. A recent YL IRLP net had 19 check-ins and 7 nodes connected. In case the Vancouver Reflector is down, the backup reflector will be Fredericton (9310 to connect). If you have a local IRLP repeater in your area you can check in to this International YL net with a handheld or mobile.

The YLs in BC are very active and are having a YL conference on Saturday, April 26th in Salmon Arm, British Columbia. For more information visit the Web site at **www.ylradio.ca** (YL Conference Page).

Happy Holidays and 33.—*Diane, K2DO* QST

Diane P. Ortiz, K2DO ♦ PO Box 296, Bellport, NY 11713 ♦ k2do@arrl.org

COMING CONVENTIONS

NEW YORK CITY/LONG ISLAND SECTION CONVENTION

January 19, Oyster Bay

The New York City/Long Island Section Convention, sponsored by the Long Island Mobile ARC, will be held at the Eastwoods School, 31 Yellow Cote Rd; from Long Island Expressway take Exit 41, Rte 106 N to Rte 25A E, go 2 miles and turn left onto Yellow Cote Rd to School on left. Doors are open 9 AM to 4 PM. Features include "Ham Radio University 2003" (a day of education about Amateur Radio), technical education with forums about different aspects of Amateur Radio, Amateur Radio Clubs and organization tables area (reserve in advance, no charge), VE sessions. Talk-in on 146.85, 147.21. Admission is $2. Contact George Tranos, N2GA, Box 296, Bellport, NY 11713; 631-286-7562; **n2ga@arrl.org**; **www.hudson.arrl.org/nli/** or **www.limarc.org**.

MISSISSIPPI STATE CONVENTION

January 31-February 1, Jackson

The Mississippi State Convention (Capital City Hamfest 2003), sponsored by the Jackson ARC, will be held at the Mississippi State Fairgrounds Trade Mart Building, NE of the Coliseum; exit I-55 at High St (Exit 96B), go W to second traffic light, turn left into main entrance of Fairgrounds, Trade Mart is first building on left. Doors are open for dealer setup Friday at 1 PM, non-dealer setup at 3 PM, Saturday 7 AM; public Friday 5-8 PM, Saturday 8 AM to 4 PM. Features include flea market; dealers; forums (MARS, Baptist Ham Fellowship, APRS, ARES, QRP, DX, ARRL, satellite, traffic net meetings); Certification and Continuing Education Manager Dan Miller, K3UFG, from ARRL Hq; test bench; "Introduction to Ham Radio" (Friday, 6 PM); VE sessions (Saturday, 8 AM; all classes of FCC license and Level I and II of ECC, at the Trade Mart); RV camper space available on fairgrounds (hook-ups $15). Talk-in on 146.76. Admission is $5, under 13 free. Tables are $15 (non-dealer flea market), $20 (dealers). Contact Ron Brown, AB5WF, Box 55643, Jackson, MS 39296-5643; 601-956-1448; fax 601-982-3385; **ab5wf@arrl.net**; **www.jxnarc.org**.

FLORIDA STATE CONVENTION

February 1-2, Miami

The Florida State Convention (43rd Annual "Tropical Hamboree"), sponsored by the Dade Radio Club of Miami, will be held at the Dade County Fair and Exposition Center, 10901 SW 24th St (Coral Way); Florida Turnpike to SW 8th St Exit, go E on 8th St to SW 107th Ave, turn right onto 107th Ave, follow to SW 24th St, turn right, go to main parking entrance. Doors are open Saturday 9 AM to 5 PM, Sunday 9 AM to 4 PM. Features include swap and shop, major manufacturers, commercial booths, exhibitors, dealers, vendors, computers, forums (DX, ARRL, and more), organizational meetings, SFL Cabinet Meeting, VE sessions, on-site campground with full hookups ($30 per night; Frank Sullivan, NJ4S, 305-667-1047; **nj4s@arrl.net**). Talk-in on 147.0, 442.35 (94.8 Hz). Admission is $6 in advance, $8 at the door. Contact Evelyn Gauzens, W4WYR, 2780 NW 3rd St, Miami, FL 33125; 305-642-4139; fax 305-642-1648; **w4wyr@arrl.net**; or John Hall, WD4SFG, 305-226-5346; **wd4sfg@bellsouth.net**; **www.hamboree.org**.

NORTHERN FLORIDA SECTION CONVENTION

February 7-9, Orlando

The Northern Florida Section Convention (Orlando HamCation and Computer Show), sponsored by the Orlando ARC, will be held at the Central Florida Fairgrounds, 4603 W Colonial Dr (Rte 50); 3 miles W of I-4. Doors are open Friday noon to 7 PM, Saturday 9 AM to 5 PM, Sunday 9 AM to 2 PM. Features include swap tables, commercial booths ($225), vendors, tailgating ($15 plus admission), "Bring and Buy" area (only radio items permitted), RV camping with water and limited electricity ($18 per night), VE sessions, forums, Special Event Station, handicapped parking, free parking. Talk-in on 146.76, 147.015. Admission is $8 in advance, $10 at the door (good for the entire 3 days); under 12 free with paid adult. Tables are $25 in advance, $35 at the door. Contact Hal Prosser, KK1B, c/o 2003 Orlando HamCation, Box 547811, Orlando, FL 32854-7811; 407-365-2444; **hamcation@oarc.org**; **www.oarc.org**.

March 8

Western Washington Section, Puyallup

VIRGINIA SECTION CONVENTION

February 9, Richmond

The Virginia Section Convention (Richmond Frostfest), sponsored by the Richmond Amateur Telecommunications Society (RATS), will be held at The Showplace, 3000 Mechanicsville Tpke; I-95, Exit 75 to I-64 E, then Exit 192 (Rte 360), go ½ mile on left. Doors are open 8:30 AM to 3:30 PM. Features include Amateur Radio and Computer Show, electronics, indoor national and local vendors, major manufacturers, demonstrations of new products, flea market, forums, keynote speaker Riley "The Enforcer" Hollingsworth, handicapped accessible, refreshments. Talk-in on 146.88. Admission is $6 (online tickets: **tickets.frostfest.com**); special VIP tickets before Jan 25 for early admission and special entrance, reservations 804-330-3165. Tables are $20 (flea market), $40 (commercial booth space). Contact Pat Wilson, W4PW, 4416 New Kent Hwy, Quinton, VA 23141; 804-932-9424 or Frostfest Info Hotline 804-790-0077 (option 4); **w4pw@arrl.net**; **www.frostfest.com**.

Attention Hamfest and Convention Sponsors:

ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You're encouraged to register your event with HQ as far in advance as your planning permits. Hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register. Registering dates with ARRL HQ doesn't constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your division director. For conventions, approval must be made by your director and by the executive committee. Application forms can be obtained by writing to or calling the ARRL convention program manager, tel 860-594-0262. **Note:** Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance. QST

HAMFEST CALENDAR

Attention: The deadline for receipt of items for this column is the **1st of the second month preceding publication date**. For example, your information must arrive at HQ by **January 1** to be listed in the **March** issue. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in *QST* of prizes or any kind of games of chance such as raffles or bingo.

(Abbreviations: *Spr* = Sponsor, *TI* = Talk-in frequency, *Adm* = Admission.)

†Florida (Ft Myers)—Jan 11, 9 AM to 3 PM. *Spr:* Fort Myers ARC. Araba Shrine Temple, 2010 Hanson St; US 41 N or S to Hanson St, turn E onto Hanson St at light, Temple is 500 feet on right. Hamfest/Computer Show, VE sessions. *TI:* 146.88. *Adm:* $5. Tables: $15 (electricity $5 extra). Earl Spencer, K4FQU, 1735 Hanson St, Ft Myers, FL 33901; 941-332-1503; fax 941-334-9362; **k4fqu@juno.com**.

†ARRL Hamfest

Florida (Miami)—Feb 1-2, Florida State Convention. See "Coming Conventions."

Florida (Orlando)—Feb 7-9, Northern Florida Section Convention. See "Coming Conventions."

†Illinois (Collinsville)—Jan 25, 8 AM to 1 PM. *Spr:* St Louis Repeater Club. Gateway Convention Center, One Gateway Dr; Hwy 55/70 and Hwy 157. *TI:* 146.97, 146.94. *Adm:* advance $5, door $6. Tables: $20 (electricity $20 additional and in advance). Jim Glasscock, WØFF, Box 43044, St Louis, MO 63143; 314-503-8999; **w0ff@arrl.net**; **www.stlrepeater.org**.

†Illinois (St Charles/Chicago)—Jan 26, 8 AM to 1 PM. *Spr:* Wheaton Community Radio Amateurs. Kane County Fairgrounds, 525 S Randall Rd; enter off Randall Rd, just N of Rte 38. Ham Radio/Computer/Electronics flea market, commercial booths, major vendors, VE sessions, free parking. *TI:* 145.39. *Adm:* advance $6, door $8. Tables: $20. Make check payable to WCRA and send with business size SASE by Jan 1 to WCRA, Box QSL, Wheaton, IL 60189. Bruce Plantz, K9OZ, 630-604-0157; **info@wheatonhamfest.org**; **www.wheatonhamfest.org**.

†Indiana (Goshen)—Jan 12, 8 AM to 2 PM. *Spr:* Michiana Valley Hamfest Assn. Century Center Community Building, Elkhart County Fairgrounds, US 33 S in Goshen; from Goshen High School go E .8 mile to Fairgrounds Gate No 2. *TI:* 145.43. *Adm:* advance $5, door $6. Tables: $15 (includes 1 admission). Bob Denniston, KA9WNR, 21970 Kern Rd, South Bend, IN 46614; 574-291-0252 (7-11 PM EST).

†Kansas (LaCygne)—Feb 1, 9 AM to 1 PM. *Spr:* Mine Creek ARC. LaCygne Community Building on Broadway in downtown LaCygne; take US 69 to K152, go W 5 miles to town; or take K7 Hwy to K152, go E 8 miles to town, turn N on Broadway; 45 miles S of Kansas City. *TI:* 147.285. *Adm:* Free. Tables: $10. Ron Cowan, KBØDTI, Box 36, LaCygne, KS 66040; 913-757-4455; **kb0dti@arrl.net**.

†Louisiana (Hammond)—Jan 18, 8 AM to 3 PM. *Spr:* South East Louisiana ARC. University Center, 800 W University Ave; I-55 to Exit 32, go E 1¼ miles, University Center is on N side of road.

Gail Iannone ♦ Convention Program Manager ♦ giannone@arrl.org

Swap tables, dealer displays, forums, VE sessions, free parking. *TI:* 147.0. *Adm:* Free. Tables: swap $10; dealers $20 (first table; $10 each additional table). Forrest Clark, KD5PKS, Box 1324, Hammond, LA 70404; 504-451-1111; **trees@bellsouth.net**; or Bill Borstel, KB5SKW, 225-695-6414; **wborstel@hotmail.com**; **www.selarc.org**.

†Louisiana (Minden)—Jan 11, 8 AM to 2 PM. *Spr:* Minden ARA. Minden Civic Center, 520 Broadway St; from I-20 take Minden/Sibley Exit 47, turn N on US Hwy 371, go 1½ miles to US Hwy 79/80 E, turn right, go ¼ mile to Civic Center on right. Hamfest and Computer Show, VE sessions. RV parking, refershments. *TI:* 147.3, 145.43, 147.21 (94.8 Hz). *Adm:* $4, under 12 free. Tables: $5 (flea market), $10 (dealers). Bill Sullivan, KB5PKW, 6018 Fox Chase Trail, Shreveport, LA 71129; 318-687-6405; **kb5pkw@aol.com**; **www.bayou.com/~k5dlh/mara.html**.

†Maryland (Odenton)—Jan 26, 8 AM to 1 PM. *Spr:* Maryland Mobileers ARC. Odenton Volunteer Fire Department Hall, 1425 Annapolis Rd (Rte 175); 9 miles E of I-95/MD 175 interchange, midway between Baltimore and Washington, DC. VE sessions. *TI:* 146.805. *Adm:* $4. Tables: $10. Gary Johney, N3BYN, 1885 Poplar Ridge Rd, Pasadena, MD 21122; 410-437-4285; **n3byn@arrl.net**; **www.qth.com/mobileers/**.

Michigan (Flushing)—Jan 18. Clay Hewitt, KF8UI, 810-233-7889.

†Michigan (Hazel Park)—Jan 19; set up 5 AM; public 8 AM to 2 PM. *Spr:* Hazel Park ARC. Hazel Park High School, 23400 Highes St; I-696 to first exit E of I-75 (Couzens Dr), S on Couzens Dr, ½ mile to Woodward Hts, left on Woodward Hts, go 2 blocks and take right onto Hughes St. Swap and Shop, vendors. *TI:* 146.64 (100 Hz). *Adm:* $5. Tables: $14 (8-ft, must be ordered in advance; some 6-ft tables will be available at the door). Jeff Albrecht, N8WR, c/o HPARC, Box 368, Hazel Park, MI 48030; 248-642-3608; **n8wr@arrl.net**; **www.qsl.net/w8hp**.

†Michigan (Negaunee)—Feb 1; set up 8 AM; public 10 AM to 3 PM. *Spr:* Hiawatha ARA. Negaunee Township Hall, 42, M-35; 8 miles W of Marquette on US-41 to M-35, S on M-35, 1 mile to Township Hall. Swap and Shop, vendors, electronics, computers, refreshments. *TI:* 147.27. *Adm:* $4. Tables: $6. John Veiht, N8RSE, 906-228-9417; **n8rse@chartermi.net**; or Bob Serfas, N8PKN, 906-226-9782; **n8pkn@aol.com**; **www.qsl.net/k8lod/**.

Mississippi (Jackson)—Jan 31-Feb 1, Mississippi State Convention. See "Coming Conventions."

†Missouri (St Joseph)—Jan 18, 8 AM to 3 PM. *Sprs:* Missouri Valley and Ray-Clay ARCs. Ramada Inn, 4016 Frederick Blvd; Exit 47 off I-29, just 47 miles N of Kansas City. VE sessions, free parking. *TI:* 146.85, 444.925. *Adm:* advance $2 each or 3 for $5; door $3 each or 2 for $5. Tables: $15 each (with free ticket). Carlene Makawski, KAØIKS, 3704 Meadow Oak Ln, St Joseph, MO 64503; 816-279-3406; **nem3238@ccp.com**.

†Missouri (Willard)—Jan 11; set up Friday 5-9 PM, Saturday 6-8 AM; public 8 AM to 2 PM. *Spr:* 145.49 Repeater Club. Willard Recreation Center, 108 N State Highway Z; from I-44 and Highway 160 Exit go N for 6 miles to Willard; go to second traffic light, turn right (N), go 1 mile to Highway Z, continue N for ½ mile to Willard City Park and Recreation Center on left side of street. Amateur Electronics and Computer Show, vendors, VE sessions. *TI:* 145.49 (136.5 Hz). *Adm:* $3. Tables: $13 (first table; $7 each for second and more). Michael Blake, NØNQW, Box 246, Willard, MO 65781; 417-742-3955; **n0nqw@arrl.net**; **www.qsl.net/49ers**.

New Mexico (Albuquerque)—Jan 25. Tom Ellis, K5TEE, 505-291-8122.

†New York (Lockport)—Jan 25; set up 6 AM; public 7 AM. *Spr:* Lockport ARA. South Lockport Firehall, Transit Rd (Rte 78), corner of Ruhlman Rd. Hamfest/Auction, vendors, auction (11 AM), ARRL table, free parking, refreshments. *TI:* 146.82 (107.2 Hz). *Adm:* $5, under 12 free. Tables: $5 (8-ft). Duane Robinson, W2DLR, Box 142, Ransomville, NY 14131; 716-791-4096; **w2dlrham@aol.com**; **lara.hamgate.net**.

New York (Oyster Bay)—Jan 19, New York City/Long Island Section Convention. See "Coming Conventions."

†Ohio (Mansfield)—Feb 9, 6:30 AM to 3 PM. *Sprs:* InterCity ARC and MASER. Richland County Fairgrounds Buildings, 750 North Home Rd; from I-71 N or S, take Exit 176 (US Rte 30), turn W onto Rte 30, go 7.4 miles to Trimble Rd/Fairgrounds Exit, turn N onto Trimble Rd, turn left (W) onto Longview Ave, go to end of road, turn right (N) onto Home Rd, Fairgrounds entrance on right. Mid*Winter Hamfest/Computer Show, flea market, VE sessions, forums, League Night Banquet (Feb 8, 6:30 PM; featuring ARRL Hudson Division Vice Director and Technical Director for "Monday Night Football" Steve Mendelsohn, W2ML; call Bill Martin, N8TQ, 419-526-4661). *TI:* 146.94 (71.9 Hz). *Adm:* advance $5, door $6. Tables: $12 (advance only, by Feb 1). Dean Wrasse, KB8MG, 1094 Beal Rd, Mansfield, OH 44905; 419-589-2415 or 419-522-9893; **deanwrasse@yahoo.com**; **www.maser.org**.

†Ohio (Middletown)—Jan 11, 9 AM to 4 PM. *Spr:* DIAL RC. Miami University, Thesken Hall, Middletown Campus; from I-75 exit at SR 122 (Exit 32), go W toward Middletown; continue to Breiel Blvd, turn right (N), continue on Breiel to 6th traffic light; this is entrance to University, second building is Thesken Hall. 17th Annual SW Ohio Digital Symposium (there will be no flea market—this is a technical society conference/seminar only). *TI:* 146.61, 224.96, 444.825. *Adm:* Free. Hank Greeb, N8XX, 6580 Dry Ridge Rd, Cincinnati, OH 45252-1750; 513-385-8363; **n8xx@arrl.net**; **w3.one.net/~rkuns/swohdigi.html**.

†Ohio (Nelsonville)—Jan 19; set up 6 AM; public 8 AM to 1 PM. *Spr:* Sunday Creek AR Federation. Tri County Joint Vocational School, on State Rte 691; take Rte 33 E to Nelsonville, go through town to 5th light, turn right onto Rte 691, go about 1/8 mile just past the Ramada Inn to Vocational School. Hamfest/Computer Show, flea market, vendors, VE sessions (noon, on site), free parking, refreshments. *TI:* 147.15, 147.225. *Adm:* $5. Tables: $5 (first-come, first-served). Russ Ellis, N8MWK, 8051 Kochis Rd, Glouster, OH 45732; 740-767-2226; **n8mwk@frognet.net**; **www.hfradio.org/kc8aav/**.

†Ohio (New Philadelphia)—Jan 26; set up 6 AM; public 8 AM to 2:30 PM. *Spr:* Tusco ARC. New Towne Mall, 400 Mill Ave SE; Exit 81 off I-77 to SR 250, E to SR 416 Exit, at end of ramp turn left at light (under SR 250 bridge), turn right at first light, Mall is on left. Dealers, VE sessions (by appointment), free parking, refreshments. *TI:* 146.73. *Adm:* $4. Tables: $11 (reserve and pay in advance by Jan 20; bring your own extension cords). Gary Green, KB8WFN, 32210 Norris Rd, Tippecanoe, OH 44699; 740-922-4454; **kb8wfn@tusco.net**.

Oklahoma (Ada)—Feb 8. Charles Etier, KC5TGA, 580-436-4425.

Pennsylvania (Philadelphia)—Jan 8. Richard Moll, W3RM, 215-448-1139. (Auction-Fest)

†South Carolina (Charleston/Ladson)—Feb 1; set up Friday 5-9 PM, Saturday 6:30 AM; public 8:30 AM to 4 PM. *Spr:* Charleston ARS. Exchange Park Fairgrounds, 9850 Hwy 78; Exit 203 off I-26, College Park Rd. 30th Annual Hamfest/Computer Show, forums (ARRL, Natural Disasters, and more), VE sessions (on site at noon, walk-in basis only; Ed, KC4ED, 843-871-4368; **efrank@dycon. com**), campsites available with full hookups ($20 per night), acres of free parking, refreshments. *TI:* 146.79, 145.25, 147.045. *Adm:* $5, under 12 free. Tables: advance $6 (by Jan 17), door $8. Jenny Myers, WA4NGV, 2630 Dellwood Ave, N Charleston, SC 29405-6814; 843-747-2324; **brycemyers@aol.com**; **www.qsl.net/wa4usn/hamfest.htm**.

South Carolina (Greenwood)—Jan 11. Allen Kennemore, W4JAK, 106 Dorchester Dr, Greenwood, SC 29646.

Tennessee (Memphis)—Feb 8-9. Melinda Thompson, KE4DXN, 901-743-1949.

Texas (San Antonio)—Jan 11. Royce Taylor, KA5OHJ, 210-680-0432.

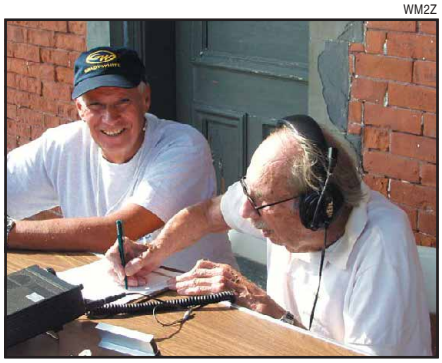
Virginia (Richmond)—Feb 9, Virginia Section Convention. See "Coming Conventions."

STRAYS

Members of the Peconic ARC survived a pirate attack from the HMS *Bounty* while operating their Special Event station at the 12th annual Greenport (NY) Museum Festival in September. The ship, constructed for the 1962 film, *Mutiny on the Bounty*, is being refurbished and has made Greenport, on the North Fork of Long Island, its home port. In spite of high noise levels that restricted operations to the 20-meter band, members of the Peconic ARC logged 162 contacts. The photo shows Warren Melhado, WM2Z (left) and John Rieger, K2JRR.

WM2Z

WM2Z



SILENT KEYS

It is with deep regret that we record the passing of these amateurs:

W1AFO, Stanley W. Atkinson, Cranston, RI
W1BQS, Stanley C. Perkoski, Newington, CT
N1HP, Richard M. Corris, Hebron, CT
W1LZY, John F. O'Rourke, Cranston, RI
W1RCJ, Walter S. Woodward, Marlborough, MA
W1SQC, Wilbur H. Button, North Waterford, ME
**K2AXM, Robert M. Byrne, Bridgewater, NJ
K2CE, Kenneth L. King, Auburn, CA
NF2E, A. B. Gill, Yonkers, NY
N2FIF, Pasquale F. Perrotta, Lindenhurst, NY
N2GDV, Arthur B. Niebuhr, Lockwood, NY
KD2KQ, Steven Woodard, Apex, NC
K2KR, Merle W. Wynn, Melbourne, FL
WA2KXG, Charles P. Wright, Niagara Falls, NY
KA2MOO, George E. Pearson, Plattsburgh, NY
W2OZY, Jack E. Struthers, Hendersonville, NC
W2PL, R. R. Weeks, Cedar Rapids, IA
W2QWR, William H. Fee, Jackson, NJ
W2SWB, Ralph W. Emms, Lakeland, FL
K2TVB, Lester C. Burch, Lockport, NY
W2WAS, Joseph J. Lambias, Westbury, NY
WA2WFP, DeWitt V. Weed, Scotch Plains, NJ
KB2ZKH, William E. Sharp, Ocean City, NJ
W3ANN, Ann E. Irvine, Silver Spring, MD
W3HBC, Hilory B. Cox, Austin, TX,
W3KLP, Peter Soma, Muse, PA
*KJ3Q, Donald L. McDaniel, Saint Cloud, FL
KA3RCX, Eleanor R. Sartori, Upper Marlboro, MD
N3WX, Ronald E. Lentz, Pittsburgh, PA
*WA3YJA, John F. Strong, Annapolis, MD
WB4AJW, Raymond M. Ambrose, Sebring, FL
W4CJB, Ellie Waters, Pembroke, GA
WB4DCP, Jay W. Leonard, Clyde, NC
KF4DKA, William T. Wheat, Mckenzie, TN
W4DQF, Frank Golden, Wetumpka, AL
W4DTV, Noel B. Blackwood, Lincoln, AL
K4EJT, Elliott J. Taylor, Lisle, NY
KD4HQS, Robert D. Rodrick, Theodore, AL
KA4IKD, Virgil G. Morgan, Jasper, AL
K4IKR, William F. Christian, Huntsville, AL
KF4IPS, Weyman H. House, Dallas, GA
K4IQU, David J. Light, Huntsville, AL
WB4JUN, John Cunningham, Columbus, GA
WA4LPU, Clarence E. Pickett, Jacksonville, FL
AC4MZ, Warren M. Higgins, Louisville, KY
W4NBP, Boyd H. Forester, Orange City, FL
WD4PGY, Edward E. Bailey, Covington, KY
*N4PK, Paul E. Knupke, Largo, FL
*NN4S, Harold L. Vincent, Buckhead, GA
K4SWL, Paul Kinder, Henderson, KY
N4TBS, Michael G. McInerney, Sunrise, FL
W4TSM, George W. Nations, Mobile, AL
K4YJB, Harry L. Harbinson, Maiden, NC
N4YK, Edwin A. Blevins, Bristol, VA
W4YXZ, James E. Hall, Atlanta, GA
K4ZN, Charles R. Clark, Moncks Corner, SC
AD4ZS, Timothy A. Jones, Middlesboro, KY
W5BX, Felix G. Barreras, Socorro, NM
K5CKU, Robert L. Garrett, Hobbs, NM
NO5D, Donald L. Gordon, Meridian, MS
W5GLR, Jerry Hanner, Carrollton, TX
N5HOJ, Joe L. Fobbs, Fort Worth, TX
*WA5MJM, W. D. Bushnell, Pearl River, LA
W5OHF, James F. Baker, Austin, TX
W5QKR, Meredith L. Young, Hot Springs National Park, AR
W5SNR, Henry C. Reed, Albuquerque, NM
WB5Y, Norman Miller, Yazoo City, MS
W6DGW, Arthur C. Graue, Festus, MO
N6EGO, John E. Flanders, Ontario, CA
W6EMC, Louis M. Wyatt, San Jose, CA
NH6FL, William Agustin, Paauilo, HI
W6GIW, Edward L. Bewley, Turlock, CA
WD6HEN, Stanley C. Somers, San Leandro, CA
W6JAZ, L. J. Chamness, La Habra, CA
W6JWZ, Leo E. Fournier, Camarillo, CA
N6MXF, Joe R. Taul, Fresno, CA
W6MZP, Wilton W. Frank, Hamilton, MT
W6RNQ, Ronald J. Forestal, Wilsonville, OR
*W6TQG, John Germany, South El Monte, CA
WA6UKU, Anthony L. Juge, Anaheim, CA
WB6WQI, Edward B. Null, Vista, CA
K7AWI, Edward A. Marshall, Scottsdale, AZ
W7EQU, Edward C. Ferrel, Honolulu, HI
N7HEM, Marshall T. Meckley, Gardnerville, NV
K7NXO, Joan M. Ferrell, Port Ludlow, WA
K7RSO, Dallas B. Ledford, Goldendale, WA
K7UTT, Norma Grother, Yakima, WA
KC7UZX, Michael A. La Ferla, North Bend, WA
N7YPJ, Robert W. Kurth, Edmonds, WA
N7ZBU, David D. Lockard, Globe, AZ
N8AO, Roger F. Hathaway, Taunton, MA
KA8BMH, Richard Meador, Charleston, WV
*W8CSB, Carol S. Balko, Trenton, MI
WD8DLB, Katherine T. Schuster, Fairview Park, OH
W8ES, Frank R. Daley, Yarmouth Port, MA
W8FCJ, Marvin E. Ellsworth, Vermilion, OH
ex-W8GJX, Helen Schmock, Manistee, MI
W8KNT, R. A. Wetzel, Bloomfield Hills, MI
KA8PXD, Elmer E. Stamp, Manistee, MI
W8YGP, Marcus R. Clark, East Palestine, OH
WA8ZJT, Thomas H. Adams, Saint Joseph, MI
K9ACQ, Virgil L. Samsal, Sheboygan Falls, WI
WA9ERC, William S. Knopp, Merritt Is, FL
W9FJW, Lawrence Mehring, Bradenton, FL
KA9FVJ, Bill O. Wallace, Centerville, IN
WD9GCJ, Antonio Piccolo, El Paso, TX
N9HSA, James M. Bergeron, Saint Croix Falls, WI
K9IKQ, Gary A. Doty, W Terre Haute, IN
*WB9JKP, George R. Smith, Paxton, IL
KB9JRO, Dorothy L. Fox, Richmond, IN
NQ9L, David O. Capehart, Tennyson, IN
W9LP, Robert W. Beaupre, Madison, WI
W9LUY, Arley B. Hackney, Princeton, IL
N9QFP, Anne Diamond, Glenview, IL
K9TJM, Vaughn M. Wilson, Mount Vernon, IN
K9UIF, Walter R. Cummings, Hobart, IN
KBØAOU, Myron E. Shelton, Crary, ND
WØDP, Donald P. Wilkinson, Curtis, NE
WØENW, Gregory R. Hibbard, Sedalia, MO
WØGEE, John E. Anderson, Minneapolis, MN
WAØJSA, Larry L. Thomas, Raytown, MO
WAØLUT, Donald C. Erickson, Worthington, MN
*WØNWM, Edwin L. Sheldon, Aberdeen, SD
WBØOFF, Howard E. Holsti, Napoleon, ND
KØOZV, Harvey G. Gilmore, Belton, MO
KBØPR, Larry W. Jemison, Cedar Rapids, IA
WAØQJW, Don D. Dodge, Manhattan, KS
KØRII, Charles A. Black, Ames, IA
WØRV, Melvon G. Hart, Saint Louis, MO
AAØWL, Roy B. Hall, Fort Collins, CO
NØZIL, Richard A. Fentzlaff, Livingston, TX
VE3CVS, Erwin Schweigl, Brampton, ON, Canada
ZL2PB, H. B. Mclaren, Nelson, New Zealand

*Life Member, ARRL
**Charter Life Member, ARRL
‡Call sign has been re-issued through the vanity call sign program.

Note: Silent Key reports must confirm the death by one of the following means: a letter or note from a family member, a copy of a newspaper obituary notice, a copy of the death certificate, or a letter from the family lawyer or the executor. Please be sure to include the amateur's name, address and call sign. Allow several months for the listing to appear in this column.

Many hams remember a Silent Key with a memorial contribution to the ARRL Foundation or to ARRL. If you wish to make a contribution in a friend or relative's memory, you can designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund, or the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation Inc, 225 Main St, Newington, CT 06111. QST

Kathy Capodicasa, N1GZO ♦ Silent Key Administrator ♦ n1gzo@arrl.org

STRAYS

***QST* congratulates. . .**

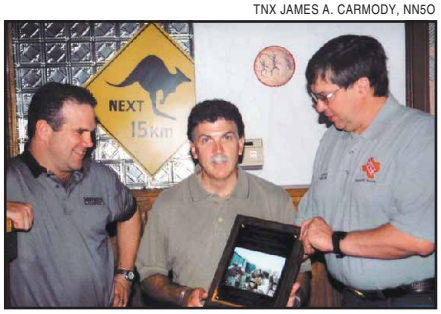
◊ John Stringer, GI3KDR, an ARRL member from Northern Ireland, a recent recipient of the Order of the British Empire for outstanding services to industry and commerce. John and his wife, Muriel, traveled to Buckingham Palace, where Queen Elizabeth II conferred the honor.

◊ Alex Vrenios, KX9I, of Phoenix, Arizona, an ARRL Life Member, on the publication of his new book, *Linux Cluster Architecture.*

◊ Scott Duckworth, KF4ZHD, of the McMinn County ARC in Athens, Tennessee, who was presented the Very Important Volunteer Individual (VIVID) award by the Athens City Council.—*Jeff Walker, K4BP*

◊ Kelly Taylor, VE4XT, of Winnipeg, Manitoba, an ARRL member who was named the top automotive writer in Canada and received the 2002 Automobile Journalists Association of Canada Journalist of the Year award, presented by Jaguar Canada.

TNX JAMES A. CARMODY, NN5O



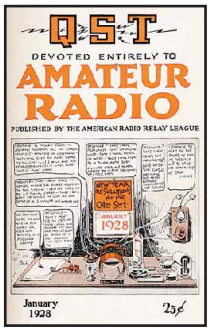
The Texas DX Society recently honored Outback Steakhouse for its "Mission Outback," which deployed people and food for 6400 US troops in Kandahar, Afghanistan. From the left, Outback Regional Manger Steve Miller and Houston restaurant owner Lyle Hart accept a thank you plaque from Buzz Jehle, N5UR, TDXS president.

◊ Dante Bonaquist, KC3HN, an ARRL member from Grand Island, New York, who recently received an Innovation Award from Praxair, Inc, where he is associate director of cryogenic technology.

◊ Boone County (Arkansas) Emergency Coordinator Joe Puett, N5QYC, who was instrumental in the recovery of a handheld radio that had been stolen from the US Forest Service.

75, 50 AND 25 YEARS AGO

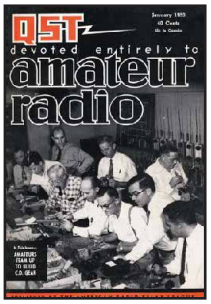
January 1928



♦ The cover artwork, by Clyde Darr, 8ZZ, shows "New Year Resolutions for the Ole Set," with the various pieces of ham apparatus making their own New Year Resolutions! The editorial reminds the reader that last year at this time, the future existence of Amateur Radio appeared doubtful. Now it reports that "…the story of our impending demise was greatly exaggerated. Hard work by the League, plus the support of the United States delegation to the International Radiotelegraph Conference, changed the picture dramatically. It is expected that the Federal Radio Commission will keep existing regulations in effect through 1928, and that new amateur regulations will be put in place by January 1929 in all the countries of the world."

Howard Allan Chinn of MIT describes "A General Purpose Device" that will operate as a 15 to 2500 meter portable receiver, audio and RF oscillator, amplifier and wavemeter. K. B. Warner, Secretary of the ARRL and IARU, presents "The Amateur and the International Radiotelegraph Conference," noting that the new ham bands (to go into effect in 1929) will be 1715-2000, 3500-4000, 7000-7300, 14,000-14,400, 28,000-30,000, and 56,000-60,000 kc. P. C. Lackey, 5AJ, and Dean Spencer, 5JU, discuss "This Amateur Phone Business." ARRL's A. L. Budlong, in "Municipal Ordinances on Radio Transmitting Unlawful!," reports that a court in Kentucky has rendered an opinion that local ordinances to limit or regulate Amateur Radio are "unlawful and unconstitutional."

January 1953



♦ The cover photo shows a radio club building 10-meter portable rigs, with the caption, "Amateurs team up to build C.D. Gear." The editorial takes a view of 1952, relating the many changes for Amateur Radio and the ARRL that took place in that watershed year.

In "Strays," a short report by Stew Perry, W1BB ("Mister Top Band"), tells the tale of medical doctor ZK1AN's sailing from New Zealand to Boston in his 48-foot ketch *Miru*. Ham radio kept Doctor Tom in touch with the world during the 10,000-mile voyage. In "Harmonic Radiation from External Nonlinear Systems," Mack Seybold, W2RYI, discusses sources, characteristics and methods of detection for this source of interference. By Goodman, W1DX, describes "A Good Four-Tube Superhet." Don Mix, W1TS, tells about "Simple Remote Tuning for the VFO." Lew McCoy, W1ICP, presents "A Novice 5-Watter" that uses a 6AG7 crystal oscillator and a 6L6 amplifier. "'Here's How!'—Detroit" is the cover story that describes 10-meter hand-held transceivers for AREC and RACES use, promising an early *QST* article. W1FH tells about the pileups that "ZD7A" caused when Arthur Hemsley, ZS6GV-ZS7B, put it on the air during October 1952.

January 1978

♦ The cover photo shows a repeater illuminated by a sunburst, with the caption, "Energy from the sun powers El Paso Repeater." The editorial discusses the recent update of the ARRL Code of Ethics, which has added a phrase about selling amateur equipment to unlicensed individuals—an effort to stop the sale of high-power amplifiers to illegal operators in the CB service.

The lead article, "The El Paso Solar-Powered Repeater," by Roy Gould, N5RG, tells about the recently completed 2-meter repeater built for use on a remote and almost inaccessible mountaintop. Spencer Allen, KØREC, describes "The Groundshade Antenna," an indoor 2-meter, gamma-matched, quarter-wave vertical mounted on top of a table lamp, using the metal lampshade frame as a counterpoise. Fred Merry, W2GN, presents "A 220-MHz Transmit Converter" to convert a 28-MHz signal to 220 MHz. Judith Gorski, *QST*'s editorial supervisor, writes about "The Women Among Us." Joel Kleinman, WA1ZUY, beats the drums for public-service participation, in "Public Service Begins with You." Joel also writes Part 1 of "A Brand-New OSCAR," telling about the eighth OSCAR satellite, soon to be in orbit. "Rain of Terror," by Don Myslewski, K3CHD, and Bob Halprin, K1XA, tell about the third Johnstown, Pennsylvania, flood, and how amateur emergency communication helped the disaster-relief efforts. QST

Al Brogdon, W1AB ♦ Contributing Editor

W1AW Schedule

PACIFIC	MTN	CENT	EAST	MON	TUE	WED	THU	FRI
6 AM	7 AM	8 AM	9 AM		FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
7 AM-1 PM	8 AM-2 PM	9 AM-3 PM	10 AM-4 PM	VISITING OPERATOR TIME (12 PM-1 PM CLOSED FOR LUNCH)				
1 PM	2 PM	3 PM	4 PM	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
2 PM	3 PM	4 PM	5 PM	CODE BULLETIN				
3 PM	4 PM	5 PM	6 PM	TELEPRINTER BULLETIN				
4 PM	5 PM	6 PM	7 PM	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
5 PM	6 PM	7 PM	8 PM	CODE BULLETIN				
6 PM	7 PM	8 PM	9 PM	TELEPRINTER BULLETIN				
6^{45} PM	7^{45} PM	8^{45} PM	9^{45} PM	VOICE BULLETIN				
7 PM	8 PM	9 PM	10 PM	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
8 PM	9 PM	10PM	11 PM	CODE BULLETIN				

W1AW's schedule is at the same local time throughout the year. The schedule according to your local time will change if your local time does not have seasonal adjustments that are made at the same time as North American time changes between standard time and daylight time. From the first Sunday in April to the last Sunday in October, UTC = Eastern Time + 4 hours. For the rest of the year, UTC = Eastern Time + 5 hours.

♦ **Morse code transmissions:**
Frequencies are 1.818, 3.5815, 7.0475, 14.0475, 18.0975, 21.0675, 28.0675 and 147.555 MHz.

Slow Code = practice sent at 5, 7½, 10, 13 and 15 wpm.

Fast Code = practice sent at 35, 30, 25, 20, 15, 13 and 10 wpm.

Code practice text is from the pages of *QST*. The source is given at the beginning of each practice session and alternate speeds within each session. For example, "Text is from July 2001 *QST*, pages 9 and 81," indicates that the plain text is from the article on page 9 and mixed number/letter groups are from page 81.

Code bulletins are sent at 18 wpm.

W1AW qualifying runs are sent on the same frequencies as the Morse code transmissions. West Coast qualifying runs are transmitted on approximately 3.590 MHz by K6YR. See "Contest Corral" in this issue. At the beginning of each code practice session, the schedule for the next qualifying run is presented. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send it to ARRL for grading. Please include your name, call sign (if any) and complete mailing address. The fee structure is $10 for a certificate, and $7.50 for endorsements.

♦ **Teleprinter transmissions:**
Frequencies are 3.625, 7.095, 14.095, 18.1025, 21.095, 28.095 and 147.555 MHz. Bulletins are sent at 45.45-baud Baudot and 100-baud AMTOR, FEC Mode B. 110-baud ASCII will be sent only as time allows.

On Tuesdays and Fridays at 6:30 PM Eastern Time, Keplerian elements for many amateur satellites are sent on the regular teleprinter frequencies.

♦ **Voice transmissions:**
Frequencies are 1.855, 3.99, 7.29, 14.29, 18.16, 21.39, 28.59 and 147.555 MHz.

♦ **Miscellanea:**
On Fridays, UTC, a DX bulletin replaces the regular bulletins.

W1AW is open to visitors from 10 AM until noon and from 1 PM until 3:45 PM on Monday through Friday. FCC licensed amateurs may operate the station during that time. Be sure to bring your current FCC amateur license or a photocopy.

In a communication emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

Headquarters and W1AW are closed on New Year's Day, President's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving and the following Friday, and Christmas Day. QST

CONTEST CORRAL

Feedback

The correct dates for the January VHF Sweepstakes are Jan 18-20.

The Society of Midwest Contesters has sponsored two additional plaques in the 2002 ARRL International DX Contest. For both CW and Phone, the SMC has sponsored the **Central Division Single Operator Low Power plaque.** In both cases the winner is **N4TZ**. Also, **JA3YBK** won a plaque sponsored by **Masahiro Kitagawa, JH3PRR**, as the winner of Asia Multioperator Unlimited Combined CW/Phone category.

In the 2002 ARRL Field Day results article, the photo on the bottom left on page 103 mistakenly identified NØAX as the person climbing the tower. The person on the tower is actually **Mark, KB7HDX**. The call of **W2DWC** was inadvertently entered as W2WDC. The GOTA call sign reported for **NC7X** should be **W7WIK.**

W1AW Qualifying Runs are 10 PM EST Thursday, Jan 9, and 9 AM EST Wednesday, January 22. The K6YR West Coast Qualifying Run will be at 9 PM PST Wednesday, January 8. Check the W1AW Schedule for details.

Abbreviations

SO—Single-Op, M2—Multiop—2 Transmitters, MO—Multi-Op, MS—Multi-Op, Single Transmitter, MM—Multi-Op, Multiple Transmitters, AB—All Band, SB—Single Band, S/P/C—State/Province/DXCC Entity, HP—High Power, LP—Low Power, Entity—DXCC Entity, HP—High Power >150 W, LP—Low Power >5 W and <150 W, QRP is <5 W.

No contest activity on 30, 17 and 12 meters. Refer to the contest Web sites for information about awards. Unless stated otherwise, regional contests only count QSOs with stations in the region. Publication deadline for Contest Corral listings is the first of the second month prior to publication. In order to publicize the maximum number of contests, readers will be referred to an earlier issue of *QST* if the rules have been published within the past year.

Jan 1

There are a number of short contests celebrating the New Year. For more information, view the Web sites for each contest.

ARRL Straight-Key Night—see p 94 of Dec 2002 *QST* or **www.arrl.org/contests/announcements/skn.html**.

New Year's Snowball Contest—sponsored by the Activity Group of Belarus (AGB)—**www.qsl.net/eu1eu/**.

HA Happy New Year Contest—sponsored by the Budapest Society of the Hungarian Radio Amateur Society and the Puskás Tivadar Radio Amateur Club—**radioklub.puskas.hu/ha5khc/web/**.

SARTG New Year RTTY Contest—sponsored by the Scandinavian RTTY Activity Group (SARTG)—**www.sartg.com**.

Jan 4-5

ARRL RTTY Roundup—1800Z Jan 4-2400Z Jan 5, see p 94 of Dec 2002 *QST*, or **www.arrl.org/contests/rules/2003/rtty.html**.

Kid's Day—Phone—sponsored by the Boring Amateur Radio Club from 1800Z to 2400Z Jan 4. Frequencies (kHz): 28350-28400, 21380-21400, 14270-14300, and 2-meter repeaters with permission of repeater control ops. Exchange: Name, age and favorite color. If the operator has changed, a station can be contacted again. For more information—**www.jzap.com/k7rat/**. No scores or logs are required—every participant is eligible to receive a colorful certificate. Send a 9×12 SASE to Boring Amateur Radio Club, 15125 SE Bartell Rd, Boring, OR 97009. See p 96 of Dec 2002 *QST* for more information.

Jan 10-12

North American QSO Party—CW—sponsored by the *National Contest Journal* from 1800Z Jan 11-0600Z Jan 12 on the 160-10-meter bands. Categories: SOAB and M2, 100 W power limit, operate a maximum of 10 hours (off times must be at least 30 min and M2 entries may operate the entire contest). Exchange: Name and SPC. Score: QSOs × States + Province + NA DXCC entities (count each once per band). For information—**www.ncjweb.com/naqprules.php**. Logs due Feb 11 to **cwnaqp@ncjweb.com** or Bruce Horn, WA7BNM, 4225 Farmdale Ave, Studio City, CA 91604. The same mailing address will be used for both modes of this contest.

Hunting Lions in the Air—CW/Phone—sponsored by the South African District 410B of the International Association of Lions Clubs from 0000Z Jan 11-2400Z Jan 12. Frequencies: 80-10 meters, work stations once per band regardless of mode. Categories: SOAB, MS. Exchange: RST and serial number, Lions club members also sign /L or LION and send name, district and club name. The Midrand Lions station ZS6LCM/L will act as the Melvin Jones Memorial club this year instead of W7YU. QSO Points: non-Lion station—1 pt, with Lions—5 pts, 25 points with ZS6LCM/L. Score: QSO points × number of Lions clubs worked (count only once). For more information—**www.sarl.org.za/public/contests/lionita.asp** or e-mail **rad.handfield-jones@pixie.co.za**. Logs due Feb 28 to **rad.handfield-jones@pixie.co.za** or to Lion Rad Handfield-Jones ZS6RAD, Lions Club of Midrand, PO Box 1548, Halfway House, 1685, South Africa.

DARC 10-meter Contest—CW/SSB—sponsored by the Deutscher Amateur Radio Club, from 0900Z-1059Z Jan 12. Frequencies (MHz): CW 28.000-28.200, SSB 28.300-28.700, work stations once only. Categories: SO-Mixed Mode and SO-CW for DL and non-DL. Exchange: RS(T) and serial number, DL stations add DOK code. QSO points: 1 pt/QSO. Score: QSOs × WAE and DXCC entities + DOK codes. For more information—**www.darc.de/referate/dx/fedcz.htm**. Logs are due Jan 31 to **dl8waa@darc.de** or Frank Steinke, DL8WAA, PO Box 1188, D-56238 Selters, Germany.

Midwinter Contest—sponsored by the Dutch YL Committee, CW from 1400Z-2000Z Jan 12, SSB from 0800Z-1400Z Jan 13. Frequencies (MHz): 80-10 meters, SSB 3.600-3.650, 7.080-7.090, 14.270-14.300, 21.270-21.300, 28.470-28.500. Categories: YL-SSB, YL-CW, OM-SSB, OM-CW, SWL. Exchange: RS(T) and sequence number, OMs start with 001 and YLs start with 2001. QSO Points: YL—5 pts, OM—3 pts. Score: QSO points × DXCC entities counted once per mode. Logs due Feb 28 to **jkoekkoek@freeler.nl** or PA3GQG-Contest Manager Midwinter Contest, Olmenplein 3, 6463 EV Kerkrade, The Netherlands.

Jan 18-20

ARRL January VHF Sweepstakes—1900Z Jan 18-0400Z Jan 20, see p 95, Dec 2002 *QST* or **www.arrl.org/contests/rules/2003/01vhfss.html**.

North American QSO Party—Phone—1800Z Jan 18-0600Z Jan 19 (see Jan 10-12). Logs due Feb 18 to **ssbnaqp@ncjweb.com** or Bruce Horn WA7BNM, 4225 Farmdale Ave, Studio City, CA 91604.

MI QRP January CW Sprint—1200Z Jan 18-2400Z Jan 19. Frequencies: 160-6 meters. Categories: SOAB with classes A (<250 mW), B (<1 W), C (<5 W), D (>5 W). Exchange: RST, SPC, and MI-QRP number or power output. QSO Points: MI-QRP members—5 pts, non-member W/VE—2 pts, DX—4 pts. Score: QSO points × SPC counted once per band. If homebrew RX or TX, multiply by 1.25. If both RX and TX are homebrew, multiply by 1.5. For information—**www.qsl.net/miqrpclub**. Logs to **n8cqa@att.net** or L. T. Switzer, N8CQA, 427 Jeffrey Ave, Royal Oak, MI 48073-2521.

070 PSKFest—sponsored by the Penn/OH DX Society (PODXS) from 0000Z-2400Z Jan 18. Frequencies: 80-10 meters. Categories: SOSB-QRP, SOAB-QRP,-MP (<50 W), -HP. Exchange: RST and SPC. QSO Points: 1 pt/QSO. Score: QSO points × SPC counted only once. For more information—**www.podxs.com/html/pskfest.html**. Logs due Feb 18 to **PSKFest@aol.com** or **spdomingue@aol.com** or Steve Dominguez N6YIH/7, 5657 Elkhorn Ave, Boise, ID 83705-2817.

Jan 25-26

CQ WW 160-Meter Contest—CW—sponsored by *CQ* Magazine from 0000Z Jan 25-2359Z Jan 26 (Phone is Feb 22-23). Exchange: RST and SPC. Categories: SO-QRP (<5 W) -LP(<150 W) -HP, MO categories. New rules—SO may operate only 30 hours and the DX window has been dropped. Enter as MO if packet or spotting nets are used. QSO Points: own entity—2 pts, same continent—5 pts, diff cont—10 pts, /MM stations count 5 pts, but no multiplier. Score: QSO pts × states + VE call areas (VYØ added this year) + DXCC entities (KH6 and KL7 count as DXCC only). For more information—**www.cq-amateur-radio.com/infoc.html**. Logs due by Feb 28 to **cq160@kkn.net** or CQ 160 Contest, 25 Newbridge Rd, Hicksville, NY 11801.

REF French Contest—CW—sponsored by the Reseau des Emetteurs Francais, 0600Z Jan 25-1800Z Jan 26 (Phone is Feb 22-23). Contact French stations including Corsica, Overseas Territories and EU Council station TP2CE. Frequencies: 80-10-meters. Categories: SOAB, MS, and SWL. Exchange: non-French stations send RST and serial number, French send RST and department number or prefix. QSO Points: different continent—3 pts, 1 pt otherwise. Score: QSO points × departments and prefixes counted once per band. For more information—**www.ref.tm.fr**. Logs are due Mar 15 (CW) or Apr 15 (SSB) to **f5lbl@ref-union.org** or Reseau des Emetteurs Francais, REF Contest, BP 7429, 37074 Tours Cedex, France.

UBA Contest—Phone—sponsored by the Royal Union of Belgian Amateur Radio from 1300Z Jan 25-1300Z Jan 26. Frequencies: 80-10 meters, according to the IARU band plan. Categories: SOAB, SOAB-QRP, SOSB, MS; packet is allowed for all classes. Exchange: RST and serial number, ON stations add their province abbr. QSO Points: QSOs with ON stations—10 pts, with other EU—3 pts, outside EU—1 pt. Score: QSO points × ON provinces + ON prefixes + DXCC entities counted once per band. For more information—**www.uba.be**. Logs due 30 days after the contest to **berger@cyc.ucl.ac.be** or Michel Le Bon, ON4GO, UBA HF Contest Manager, Chée de Wavre 1349, B-1160 Bruxelles, Belgium.

BARTG RTTY Sprint—sponsored by the British Amateur Radio Teletype Group from 1200Z Jan 25-1200Z Jan 26. Frequencies: 80-10 meters. Categories: SO-Expert, SOAB, MO, and SWL. Operators with a Top Ten log in the past three years must enter as an Expert. Exchange: serial number only. QSO Points: 1 pt/QSO. Score: QSO points × DXCC entities + W/VE/JA/VK + continents counted only once. For more information—**www.bartg.demon.co.uk/**. Logs in Cabrillo format due Mar 1 to **ska@bartg.demon.co.uk** with the call and entry class in the subject line and the log included as an attachment or by mail to John Barber GW4SKA, PO Box 611, Cardiff, CF24 4UN, Wales, UK (only logs with 50 or fewer QSOs may be submitted as printed logs). QST

H. Ward Silver, NØAX ♦ 22916 107th Ave SW, Vashon, WA 98070 ♦ n0ax@arrl.org

SPECIAL EVENTS

Nazareth, PA: Christmas City ARC and Delaware-Lehigh ARC, WX3MAS. 1400Z **Dec 14**-0200Z **Dec 16**. Season's Greetings from the Twin Christmas Cities. 28.465 14.265 7.270 3.970. Certificate. CCARC/DLARC WX3MAS, Greystone Building, Gracedale Complex, RR 8, Nazareth, PA 18064-9211.

Atkinson, NH: Atkinson Amateur Radio Club, K1D. 0500Z **Dec 21**-0459Z **Jan 4**. Celebrating Kid's Day and Amateur Radio Awareness. 28.380 21.380 14.270 7.230. Certificate. Peter Schipelliti, W1DAD, 7 Dearborn Ridge Rd, Atkinson, NH 03811.

Eastham, Cape Cod, MA: Marconi Radio Club and Marconi Cape Cod Memorial Radio Club, KM1CC. 0001Z **Jan 11**-2359Z **Jan 19**. Marconi 100th Anniversary—Transatlantic Wireless. 21.039 14.039 21.360 14.260. QSL. Ranger Barbara Dougan, KB1GSO, Cape Cod National Seashore, 99 Marconi Site Rd, Wellfleet, MA 02667. **personal.tmlp.com/k1vv/w1aa/w1aa_1001.htm**.

US Air Force Academy, CO: Pikes Peak Radio Amateur Association, WØF. 0000Z **Jan 25**-1900Z **Jan 27**. Scout Winter Campout–FREEZOREE. 28.390 21.360 18.140 14.290. Certificate. Mike Anderson, WV7T, 4117 Bent Dr, Colorado Springs, CO 80909.

San Diego, CA: Challenger Middle School ARC, KI6YG. 1400Z-2100Z **Jan 28**. In remembrance—17th year after the *Challenger* tragedy. 28.350 21.335 14.275. QSL. Challenger MS ARC, 10810 Parkdale Ave, San Diego, CA 92126.

Certificates and QSL cards: To obtain a certificate from any of the special-event stations offering them, send your QSO information along with a 9×12 inch self-addressed, stamped envelope to the address listed in the announcement. To receive a special event QSL card (when offered), be sure to include a self-addressed, stamped business envelope along with your QSL card and QSO information.

Special Events Announcements: For items to be listed in this column, you must be an Amateur Radio club, and use the ARRL Special Events Listing Form. Copies of this form are available via Internet (**info@arrl.org**), or for an SASE (send to Special Requests, ARRL, 225 Main St, Newington, CT 06111, and write "Special Events Form" in the lower left-hand corner). You can also submit your special event information on-line at **www.arrl.org/contests/spevform.html**. Submissions must be received by ARRL HQ no later than the 1st of the second month preceding the publication date; that is, a special event listing for **Mar** *QST* would have to be received by **Jan 1**. Submissions may be mailed (Attn: Maty Weinberg), faxed (860-594-0259) or e-mailed (**events@arrl.org**) to ARRL HQ. QST

Maty Weinberg, KB1EIB ♦ Special Events ♦ events@arrl.org

NEW PRODUCTS

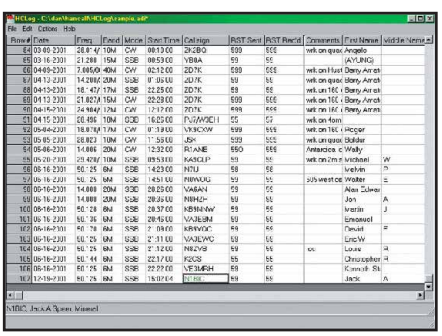
NEW HAM RADIO PAINT COLORS FROM TOTAL ELECTRONICS

◊ Restoring a classic transmitter? Homebrewing a matching accessory? Total Electronics has recently added several new colors to its extensive line of Amateur Radio and test equipment paint products. Colors for test equipment now include Tektronix Blue, HP Brown, Knight Kit Gray, Heathkit Blue and Gray, and B&K Beige and Cream/White. The paint is available in spray cans, 3-oz touch-up bottles, pints, quarts and gallons. Spray cans of Black Wrinkle paint are also available.

Prices: $6.95 (touch-up bottle); $9.95 (12-oz spray); $25.95 (quart). For more information about Total Electronics' line of paint and painting/silk screening services, contact Total Electronics at 1216 NC Hwy 54, Sweps Rd, Box 158, Swepsonville, NC 27359; tel/fax 336-229-5671; **ke4lgx@yahoo.com**, **www.nctotalelectronics.com**, **www.angelfire.com/nc/totalelectronics**.

BACK TO BASICS WITH *HCLOG*

◊ Computerized logging programs offer unparalleled power, but sometimes a simpler, back-to-basics approach is what's needed. With that in mind, *HCLog*, from Buckmaster Publishing, is designed to have the look and feel of a traditional paper log, with the flexibility and power of computerized searching and sorting.



HCLog features include adjustable layout, label printing, interoperability with Buckmaster's popular *HamCall* CD-ROM call sign database, complete sorting and printing capabilities, ADIF import/export and more.

Price: $19.95 plus $5 s/h (not required if product is downloaded). For more information, contact Buckmaster Publishing at 6196 Jefferson Hwy, Mineral, VA 23117; tel 540-894-5777, fax 540-894-9141, e-mail **info@buck.com**; **www.buck.com/hclog.html**. QST

FEEDBACK

◊ In the December "How's DX?" column, p 81, the caption for the FOØMIZ QSL card should have read, "Kan, JA1BK, operated first from the Marquesas Islands and then quickly thereafter from the Austral Islands along with Bob, W6RJ, and Rob, W6KR." Also, the FOØFI QSL card on p 80 was from the Austral Islands, not the Marquesas Islands.—*tnx JA1BK*

◊ In Figure 2D of "The EQ5+ Microphone Equalizer" [Dec 2002, p 43], the LEDs, D1-D21, are shown reversed.—*tnx W4KEB*

◊ The photo of W5JBP and K1TWF ["At the Foundation," Nov 2002, p 97] was taken by Gene Hastings, W1VRK.—*tnx K1KI*

◊ The photo of N3WO ["Up Front in *QST*," Dec 2002, p 20] was taken by Richard Stewart, K3ITH.

◊ Figure 2 of "The NØGSG DSP Radio Direction Finder" [Nov 2002, p 31], shows a switching situation in which ANT 1 and ANT 4 can be on simultaneously. That is not correct. The waveform drawing should be skewed so that the first switching pulse for ANT 4 completes its rise and fall transition before the second switching pulse of ANT 1 begins.—*tnx KS4RN* QST

By **Ned Stearns, AA7A**

Results, 2002 ARRL June VHF QSO Party

E-skip, tropo and the merry month of June.

The ARRL June VHF QSO Party is a unique activity in the Amateur Radio contesting experience. There are numerous reasons why this contest has a loyal following from the VHF contester and casual operator alike. This June contest is held in the middle of the northern hemisphere's sporadic E season that, in some years, offers productive openings on the lower VHF bands to satisfy the entrant's desire for large QSO totals and resultant high scores. A VHF contest in the temperate summer months enables access to optimum VHF operating locations on mountains and hinterlands to lure Rovers and Single Operator Portable station operators. Also, this contest is held during the summer months when students and families are more likely to operate from vacation spots away from the usual locations.

This contest is different from the September and January ARRL VHF contests in another way. The June contest does not feature a club competition. In the June contest, the competition pits rover against rover, single operator against single operator and operating team against operating team. Winners in a head-to-head competition can be determined by the amount of pre-contest preparation, the skill and ability to maximize contacts or multipliers in openings, and the ability to make tactical decision in changing bands conditions. In many regards, however, the number of operators within range of nominal VHF/UHF propagation determines contest scores. And, quite often, there is the element of luck in being in a location that is blessed with bountiful VHF propagation during the contest period.

Regional competitions offer the ability for operators in various areas of the country to compete with their local peers. This may not completely "level the playing field" but it does promote competition between contestants that have similar propagation and VHF participant activity levels. One would be hard-pressed to assemble a Multioperator contest station in central Kansas that would realistically compete with W2SZ/1 on Mount Greylock in Western Massachusetts. However, that same station in central Kansas would probably not whine about being bested by NØUK, a perennial favorite (and 2002 leader) in the Midwest Region.

All VHF/UHF bands through 2304 are covered on this tower at N2BJ in Illinois.

Expanded June VHF QSO Party Results on the ARRL Web

Interested in more in-depth coverage of the final results? Check out the ARRL Contest Results Web site at **www.arrl.org/contests/results**.

Need a Printout of the Complete Results?

ARRL members without Internet access may obtain a printout in Adobe Acrobat PDF format of the complete line scores by sending a self-addressed, stamped envelope to ARRL Contest Results, 225 Main St, Newington CT 06111. Please be sure to include the contest name and year.

The low level of sporadic E propagation significantly affected the 2002 June VHF QSO Party competition. For all operating classes except the multioperator, scores are dominated by the QSO and grid counts accumulated on the lower VHF bands. In many parts of the country, however, there were virtually no openings noted. Stations that rely on this mode of propagation in the June contest to amass a winning score are missing from the regional leader tables. Some call signs rarely seen on the top of the heap are evident this year pointing out that there are strong competitors in all regions ready to take advantage in the opportunities presented in this contest.

Summary of 2002 June VHF QSO Party Competition

A total of 673 logs were submitted in the 2002 event. This number is virtually unchanged from last year. There was a slight increase in the number of low power, single operator logs. This category has grown to 318 log entries in 2002 from 253 in 2001. The high power category has tailed off dramatically from 243 log entries in 2001 to 157 in 2002. In general, the number of single operator logs (high power plus low power categories) is very nearly the same in this year's competition from 2001.

There was a 33% increase in the number of Limited Multioperator logs in 2002 over last year. In part, this was due to changes in operating category by some traditional multioperator stations into the limited class, but not entirely due to that effect. The Limited Multioperator category is wide open to competition in all regions.

The number of Multioperator category log entries is off 10% this year. A reduction in the number of multioperator stations raises an alarm in the minds of some operators of the higher VHF bands. A

Top Ten

Single Operator, Low Power

WB1GQR	154,068
K1UHF	127,798
KB8U	116,025
AF1T	94,170
NØLL	65,667
W1PM	60,024
N9DG	59,498
KC8CCD	51,471
K8WW	48,776
WA3EOQ	48,642

Single Operator, High Power

K1TEO	481,399
K1RZ	354,530
AA2UK	323,680
K3DNE	235,879
W4RX	234,210
WB9Z	223,486
W2FU	206,540
K2SMN	171,644
K4QI	164,944
KMØT	151,105

Single Operator Portable

K9PW	144,384
K9AKS	65,685
AF4HX	60,495
K6MI	29,256
W4RXR	15,392
N3EG	15,120
W9GKA	7,865
N8XA	6,837
KQ6EE	6,160
KA6AMD	5,890

Limited Multioperator

K8GP	1,118,676
K3YTL	619,487
W4IY	526,990
AA4ZZ	376,259
K2BAR	341,124
W3SO	332,904
N2NK	220,032
W4NH	210,984
NØQJM	171,798
K8CC	169,855

Multioperator

W2SZ	2,763,726
W3CCX	984,960
N3EMF	983,723
N2PA	488,348
K1WHS	334,152
NØUK	235,599
W9ICE	210,930
WW8M	207,669
N8KOL	111,600
N7LQ	82,128

Rover

ND3F	311,344
W3IY	258,579
N2JMH	123,571
N6TEB	107,610
W6TOI	107,244
N7CFO	104,830
W7DHC (+op)	80,682
VE3NPB	67,158
WA2IID	59,415
KC3WD	54,055

very high percentage of the microwave band contacts involve a multioperator station on at least one end. A further decline in the number of multioperator stations could impact the activity on these critical bands in this contest.

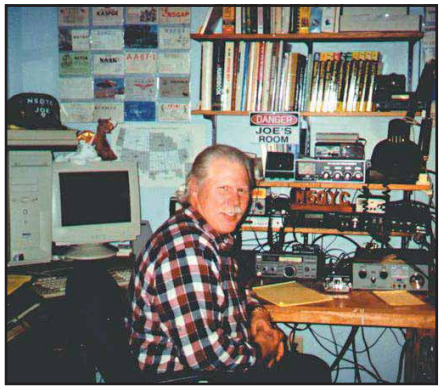
The number of Single Operator Portable log entries remained about the same in 2002 as in last year's competition. This category continues to be an attractive alternative to operators looking for an open competition category.

There was a 47% increase in the number of rover logs this year. This is clearly a positive trend that will hopefully continue. This increase in rover activity occurred despite dramatic restriction to forestlands in the west and southwest due to the sustained drought and resultant tinder-dry forests.

Overall National Results

This year's top honor for Single Operator Low Power is WB1GQR. He placed third nationally in 2001 and has worked his way to the top this year. It is no secret how he accomplished this feat. From the New England Region, grids are geographically limited but VHF activity in these limited numbers of grids is high. WB1GQR was the QSO total leader in the nation on 50, 144 and 222 MHz bands, which is a sound approach to winning this operating category.

K1TEO repeats as top operator in the high power category. His efforts have established a new watermark for the High Power category (established in 2000). K1TEO either led or placed extremely high on the list of QSO leaders on all of the lower VHF bands in his effort to lead this operating category.



Joe, N5QYX, EM36, says, "You don't have to be a 'big gun' to have fun in VHF/UHF contests!"

K9PW, after winning Single Operator Low Power in 2001, moved his focus to the Single Operator Portable category in 2002. He has established a new standard in this category that will be hard to beat.

There was a spirited competition in the Limited Multioperator category in 2002. In bold moves, both K8GP and K3YTL moved from Multioperator category from 2001 into the Limited category and dominated the competition. The Grid Pirates (K8GP) took top honors in 2002 with an amazing score of 1.12M points. This is the first time since its inception in 1991 that the 1-meg mark has been broken in this operating category. K8GP operators either led or were second in QSO totals on the lower four VHF bands *and* were the multiplier leaders on every one of the lower four bands in the multioperatorcategories.

W2SZ/1 repeats as number one in the Multioperator category. Their effort to accumulate 2.76 million points establishes yet another new standard for this operating category. This year's effort netted nearly 3000 QSOs from 50 MHz to 300 GHz.

The rover competition is always interesting in the June VHF QSO Party. This operating category has been won from every ARRL Region since it was added as an operating category in 1991. ND3F edged out W3IY in this year's Rover category competition. ND3F (national rover leader in 1995 and 1996) amassed 311,344 points this year to set a new scoring record for rovers in the June VHF QSO party.

Regional Results

Single Operator, Low Power

Northeast Region—The principal competition in this region is between Vermont Contest Radio station WB1GQR and Del, K1UHF. Despite subpar conditions, WB1GQR established a new Northeast Region record in the relatively new Single Operator Low Power category from this year's effort. Total QSOs made by WB1GQR was the key to success in this close competition.

Southeast Region—Dave, K8WW, a somewhat recent transplant from Ohio to Tennessee led the pack by a substantial margin in this region. An impressive 6 meter effort was principally responsible for his score.

Central Region—KB8U easily outdistanced himself from the competition from central Michigan. Russell has recently rebuilt his antenna system from an ice storm and seems to have done the job correctly.

Midwest Region—Larry, NØLL, participated in his 83rd (approximately) consecutive VHF contest this year. As in many of his past efforts, Larry again shows his mastery of the VHF/UHF bands and posted the leading score for Low Power in the Midwest Region.

West Coast Region—A very close competition took place in this category in the West Coast region. The principal, head-to-head battle took place between N6MU and VE7DXG. N6MU edged out the pack to take this region for the second straight year. VE7XF, NN7J and KC6TEU also posted competitive scores from this region. The West Coast region stretches across more degrees of latitude than any other and, historically, the southernmost stations tend to dominate. The E-skip drought this year appears to have had more impact on the southern-tier stations, leaving the door open to northern operators.

Single Operator, High Power

Northeast Region—The competition in the Northeast region, top to bottom, is undoubtedly the toughest in this contest. Jeff, K1TEO, has repeated as top gun in this category this year. His 481,399 points set a new mark, not just in this region, but in the nation for this category. K1TEO's results were achieved by both high QSO counts on most bands in addition to high multiplier tallies on nine VHF/UHF bands. K1RZ and AA2UK also produced significant scores from the Northeast Region.

Southeast Region—W4RX repeats as Southeast Region leader in the Single Operator High Power category. W4RX led by a wide margin over K4QI who also produced a substantial score from North Carolina.

Central Region—WB9Z produced an outstanding score from Illinois. He easily outscored K8MD to lead the Central region.

Midwest Region—KMØT repeats as

VE2ZP set up their Limited Multioperator station on high ground near Ottawa.

The N3EMF operators include W2XX, N2GDY, W2IX, N2DVQ, N3EMF, WB2NVR, WB2NHC, WB2BTJ, N2FMC, N2GCZ, N2GKM and N2DHH.

Midwest leader in the High Power category. Mike did not eclipse his score from last year but took advantage of the available propagation to easily outdistance himself from his competitors in the southern states of this region.

West Coast Region—In similar fashion as other regions, the northern-tier operators reign supreme in the West Coast region. N7AU edged out significant efforts from both K7RAT (N6TR, Tree, operator) and NU7Z.

Single Operator Portable

Northeast Region—With all of the incredible scores from this region, it is curious why more operators do not enter this category in the Northeast. In this year's contest, K2QO set up shop on high ground in FN02 and outscored N1DJB.

Southeast Region—AF4HX repeats this year as leader of the Southeast region with an impressive score from North Carolina.

Central Region—Pete, K9PW, made an impressive display of his VHF/UHF operating prowess in this year's event. He had led impressive single operator low power efforts over the past two years from home. This year, he moved into the Single Operator Portable category and not only won the region but also established regional and national record setting scores in the process.

Midwest Region—Curt, K9AKS, takes his Single Operator Portable activity to the Midwest in this year's contest. Curt made a last minute decision to operate from Iowa instead of his usual location in Wisconsin, where he had led the Central region for the past two years. This year's effort from Curt has established a new category record in the Midwest region.

West Coast Region—K6MI repeats as the West Coast Single Operator Portable champ.

Limited Multiop

Northeast Region—K3YTL returns to the Limited Multioperator category this year and headed the pack in the competitive Northeast. The Murgas Amateur Radio Club, K3YTL, was the leader in this category in the Northeast in 1999 and 2000. This year's effort has established a record score from this active contest club. Significant scores were also placed on the board from K2BAR, W3SO and N2NK from this region.

Southeast Region—The "Grid Pirates," K8GP, switched from Multioperator to Limited Multioperator this year and made a huge impact in the process. K8GP broke the 1-million point barrier with impressive efforts on every band they activated. Their efforts established a new standard for this category that will be difficult to match.

Central Region—The VHF contest operation at K8CC continues to improve. A strong effort from Dave's team bested the efforts of last year's Central Region leader, NI9E.

Midwest Region—The monster station of South Dakota, NØQJM (or W7XU in some years) put an impressive station to work to lead the pack in the Midwest region.

West Coast Region—VE6JW took full advantage of propagation and took West Coast region. This marks the very first time in the June VHF competition that a station from Canada has had a leading score in a multioperator category. Congratulations to the team at VE6JW!

Multioperator

Northeast Region—W2SZ continues to set new standards in this category. This team has put up the top score in the Northeast for eight of the past nine years, and seven years in a row. Their 2.76M point effort establishes a new Multioperator category record for the June VHF QSO Party. Outstanding efforts were also evident by the substantial scores from W3CCX and N3EMF.

Southeast Region—NW5E snuck in a leading score in this region in the Multioperator category.

Central Region—W9ICE barely edged out WW8M in a highly competitive region. W9ICE repeated as the Central region leader in 2002.

Midwest Region—The team at NØUK repeated as Midwest champs and easily outdistanced the competition.

West Coast Region—The team at N7LQ had placed second for too many years in a row. This year, they persevered and produced the top score in the West Coast in the Multioperator category.

Rover

Northeast Region—ND3F submitted an outstanding score and led both the Northeast region and the nation. His score set an all-time June VHF QSO Party record in the Rover category.

Southeast Region—W3IY submitted personal best rover score this year. W3IY's effort established a new record in the Rover category in the Southeast.

Central Region—VE3PNB ruled the rover class again this year in the Central region.

Midwest Region—NØDQS's efforts this year led him to win the Midwest region.

West Coast Region—This year's competition resulted in an incredible three-way competition between N6TEB, W6TOI and N7CFO in the West Coast Rover category. When it was all over, N6TEB barely edged out W6TOI by an equivalent of about three QSOs.

The 2003 ARRL June VHF QSO Party will be contested June 14-16. We look forward to seeing you on the air with lots of QSOs through the E-skip and tropo in the merry month of June. QST

The 17th Annual School Club Roundup: 2003

By Lew Malchick, N2RQ

School Club Roundup (SCR) is sponsored by the Council for the Advancement of Amateur Radio in the New York City Schools (CAAR/NYCS), the ARRL and its Hudson Division Education Task Force to foster contacts with and among school radio clubs. The SCR is a great way to get young operators on the air. Very often a new operator will be intimidated by the fear of not knowing what to say to the stranger on the other side of the radio. The exchange info helps to overcome this fear in a low pressure contest format. Operators are encouraged to take some time to chat beyond the contest exchange.

ALLAN CAMERON

Students from Carl Hayden High School Radio Club in Phoenix, Arizona, participate in School Club Roundup every year!

Rules

1. **Object:** All stations exchange QSO information as below with as many other stations as possible, especially school clubs.

2. **Contest Period**: Start 1300 UTC Monday, February 10 and end 0100 UTC Saturday, February 15, 2003. Operate no more than 24 of the possible 108 hours with a maximum of 6 hours in any 24-hour period. Logs must clearly show on and off dates and times (off periods must be at least 30 minutes).

3. **Entry Classes**: Single transmitter only:

(I) Individual or Single Operator (non-club);

(C) Club or multioperator group (non-school);

(S) School club or group (grades K-12, colleges and universities). Any station or group operating at a school for the contest period.

4. **Exchange**: Your call sign, RS (T), class ("I", "C" or "S"), US state, Canadian Province or DXCC entity. (Multioperator stations must use only one call sign during the contest.)

5. **Scoring**: Stations may be contacted once each on phone and CW (packet, RTTY and other modes count as CW). No repeater contacts except satellite and "real time" packet. Each phone QSO = 1 point and each CW QSO = 2 points.

Multiplier: [Number of US States plus Canadian Provinces plus DXCC entities] plus 2× ["C" class QSOs] plus 5× ["S" class QSOs]. School stations get a multiplier of 5, which should make them the most desirable stations to work. Contacts with Marty, KA2NRR, will also count as a 5× multiplier. (KA2NRR was the founding chairman of the CAAR/NYCS and creator of the contest that became the SCR.)

Final Score: Multiply QSO points by multiplier. Please use our Entry form to avoid errors. (See 6.)

Suggested frequencies: All amateur bands except 30, 17 and 12 meters are permitted. On VHF and UHF, repeaters are not to be used. The national calling frequency, 146.52 MHz, may not be used.

6. **More info**: Sample 2003 log, entry forms and the latest version of SCR-LOG written by AD8B can be downloaded from **groups.yahoo.com/group/SCR-L/**. You can also subscribe to the reflector by sending e-mail to **scr-l-subscribe@yahoogroups.com**. KC7MOD's logging software *LogIt!* can be found at **www.asu.edu/clubs/amateur_radio_society/logit/index.html**. Also, check **www.arrl.org/contests**.

Address questions to **SCR-L@yahoogroups.com** or **n2rq@arrl.net**.

7. **Reporting**: You should clearly list the call sign used, entry class, type of school, return address (where you want inquiries and certificate sent), phone number, e-mail address, number of operators/loggers and number of hours. Logs must include exchange information, bands and signature of all operators (and authorized club official or trustee and address, phone number and e-mail). Dupe check sheets are *required* for entries over 100 QSOs. (Computer entries on disk are preferred. Use SCR-LOG or follow the ARRL format. Please include a printed entry sheet and instructions including file names and formats. If you are not sure if we can handle your files, e-mail **n2rq@arrl.net**.) Mail entries to School Club Roundup, c/o Lew Malchick, N2RQ, Brooklyn Technical HS, 29 Fort Greene Pl, Brooklyn, NY 11217. Entries must be postmarked not later than 30 days after contest ends (March 17, 2003).

8. **Awards:** 8.5×11-inch certificates for the top three entries in each class, elementary, middle, high school and college/university. DX will be listed separately following US entries in each category. A certificate is issued for any station contacting 10 or more school clubs.

Lew Malchick, N2RQ, is the chairman of CAAR/NYCS. You can reach him c/o Brooklyn Technical HS, 29 Fort Greene Pl, Brooklyn, NY 11217; **n2rq@arrl.net**.

Phone (kHz)	*Novice Phone*	*CW (kHz)*	*Novice CW*
1855-1865		1800-1810	
3850-3880		3530-3580	3685-3705
7225-7255		7030-7080	7110-7130
14,250-14,280		14,030-14,060	
21,300-21,330		21,050-21,080	21,110-21,130
28,550-28,580	28,350-28,400	28,050-28,080	28,110-28,130

STRAYS

Last September, ARRL President Jim Haynie, W5JBP (left), was the guest speaker at the monthly meeting of the Fannin County Amateur Radio Club in Bonham, Texas. According to club secretary David Reeder, WA0URJ (right), Jim gave a fascinating talk on important Amateur Radio issues currently before the FCC. The Fannin County Amateur Radio Club is ARRL affiliated and is quite active in ARES and various community events.

PROMOTING FIELD DAY

◊ Starting last year, the Greater Norwalk (CT) ARC mailed postcards inviting over 400 local hams to our Field Day. Some who responded were newcomers and some inactive old-timers. All were given a chance to get on the air and make a few contacts. This appears to be a nice way to get local hams involved while spreading word of club activities among nearby hams. The postcard also listed other upcoming events as well as our Web site, **www.gnarc.org**.—*Jay Kolinsky, NE2Q*

By **Dan Henderson, N1ND**
Contest Branch Manager

2002 ARRL August UHF Contest Results

Ask anyone who participates in any UHF/SHF contest what things go into making it a success, and you will get a wide array of answers. However, there are a couple of common threads that will be mentioned by most respondents. When listening to many of the over 150 participants in the ARRL 2002 August UHF Contest—the 25th anniversary year of this contest—you will quickly get a sense that it takes a special breed of amateur to spend the time, money and effort to operate on these underutilized amateur bands.

Regular ARRL VHF contests, such as the January VHF Sweepstakes or June and September VHF QSO Parties, hold a ready advantage. The fact is that with the availability of equipment these days, it is relatively easy to get on using at least the 50 MHz and 144 MHz VHF bands. And while technology and affordable handheld transceivers allow most every ham easy access to FM operation on the lowest of the UHF bands, it requires a commitment, and at times some resources, to venture into UHF/SHF contesting in any semi-meaningful way. Your 432 MHz handheld may whet your appetite for a few QSOs while operating from a mountaintop or other favorable locale. But in order to develop your skills and increase your fun, you learn quickly that SSB and CW are the bread and butter needed to survive and flourish while contesting in these frequency ranges.

As in real estate, a lot of UHF/SHF activity boils down to Location – Location – Location! The nature of operation on these frequencies places a premium on being near a pool of operators who are active on these bands. (Let's face it: you don't stumble across too many random QSOs on 10 GHz!) The good news is that there were entries received from operators in all 15 ARRL Divisions and from Canada. However, entries were received from only 49 ARRL/RAC sections—about 61%. So while there is interest in various parts of the country, there's room for lots of growth in these areas of our spectrum allocation. You will notice that activity is higher in divisions or sections where there are strong VHF/UHF special interest clubs (such as the Mount Airy VHF Club in EPA, or the New England Weak Signal Group). Also areas with higher population densities tend to show greater interest (such as the Los Angeles section or the Chicago area of the Illinois section).

If your life-blood for contesting requires QSO rates of over a hundred an hour, then perhaps the ARRL August UHF contest isn't for you. Veteran VHF/UHF Rover Bill Seabreeze, W3IY, shared that "The beginning of the UHF contest was scary...didn't hear any signals for the first 12 minutes. Finally K4QI showed up, and broke the silence in FM15." Imagine starting the first quarter-hour of any major HF event without moving the rate meter! Such is the patience required to be a top-draw operator on these bands. You can rest assured that as activity picked up, Bill's apprehensive feelings abated. In the end, Bill took a solid third place finish in the overall Rover category. Bill summed up his overall experience quite well when he wrote "The QSOs are more challenging, and less frequent than in the VHF contests, but the satisfaction of working guys on 10 GHz is hard to describe. It's amazing how well things can work on this band with a little effort

Gene, NØDQS, hit the road both days but encountered severe storms. Perhaps he has a future as a storm chaser as well as rover...

Top Ten

Single Operator Low Power

KB8U	51,888
WA3GFZ	35,955
AF1T	35,226
W3KJ	27,219
W1PM	25,110
W1BQ	15,912
VE3SMA	13,923
W6TOI (KE6HPZ, op)	11,340
NØURW	10,716
AA1YN	9,894

Single Operator High Power

WW8M	261,171
AA2UK	213,921
K1TEO	160,758
KMØT	54,288
W2FU	52,530
K1GX	52,428
AA3GN	48,861
K8MD	41,055
W3RJW	35,457
N2BJ	34,968

Multioperator

W2SZ	906,153
N3EMF	293,880
N2PA	179,772
NU7Z	22,686
WA3UGP	11,712
WB4WEN	4,914
AG4V	4,257
N1LDY	3,180
KE6TDP	144

Rover

W7GHZ	407,484
N7MX	405,504
W3IY	119,616
K1DS	60,840
N1JEZ	47,436
WA2IID (+KB2SSS)	29,988
NØDQS	29,295
NE8I	21,924
NØIO (+KCØDEF)	12,540
N2JMH (+KC2IDT)	9,999

Need a Printout of the Complete Results?

For complete contest results online, please visit **www.arrl.org/contests/results**.

ARRL members without Internet access may obtain a printout of the complete line scores by sending a self-addressed, stamped envelope to ARRL Contest Results, 225 Main St, Newington CT 06111. Please be sure to include the contest name and year.

Multiplier and QSO Totals

Band Key: C = 222, D = 432, 9 = 902, E = 1296, F = 2304, G = 3456, H = 5760, I = 10 GHz, J = 24 GHz, K = 47 GHz, P= Light

Multiplier Totals

Single Operator Low Power

KB8U	CD9EF	92
W1PM	CD9E	62
AF1T	CD9EFI	57
VE3SMA	CD9EFG	51
WA3GFZ	CD9EFGHL	51

Single Operator High Power

WW8M	CD9EFGHIJK	153
AA2UK	CD9EFGI	139
K1TEO	CD9EFGI	117
K8MD	CD9EF	85
W2FU	CD9EFGHI	85

Multioperator

W2SZ	CD9EFGHIJ	229
N3EMF	CD9EFGHI	155
N2PA	CD9EFGHIJ	142
NU7Z	CD9EFGHIJ	38

Rover

N7MX	CD9EFGHI	128
W7GHZ	CD9EFGHI	126
N1JEZ	CD9EFGI	67
W3IY	CD9EFGHI	64
K1DS	CD9EFGHIL	60
WA2IID (+KB2SSS)	CD9EFGHI	51

QSO Totals

Single Operator Low Power

WA3GFZ	CD9EFGHL	138
AF1T	CD9EFI	124
KB8U	CD9EF	121
W3KJ	CDEFG	116
W1PM	CD9E	107

Single Operator High Power

WW8M	CD9EFGHIJK	298
K1TEO	CD9EFGI	262
AA2UK	CD9EFGI	262
K1GX	CD9EFGHI	149
AA3GN	CD9EFG	144

Multioperator

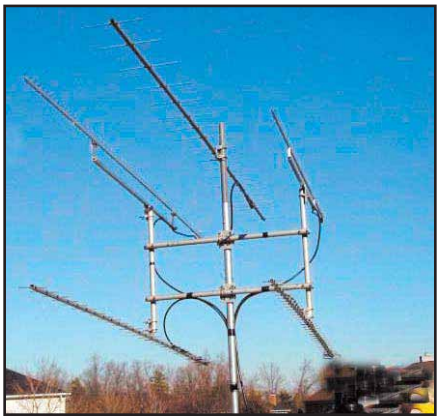
W2SZ	CD9EFGHIJ	597
N3EMF	CD9EFGHI	335
N2PA	CD9EFGHIJ	243
NU7Z	CD9EFGHIJ	105
WA3UGP	CD9EFGH	62

Rover

W7GHZ	CD9EFGHI	419
N7MX	CD9EFGHI	412
W3IY	CD9EFGHI	345
K1DS	CD9EFGHIL	163
NØDQS	CD9EFGHI	141

Entries by Section

AL	3	ME	1	QC	2
BC	1	MI	6	SB	1
CO	6	MN	6	SCV	2
CT	5	NC	3	SFL	2
EB	4	NFL	1	SNJ	1
EMA	4	NH	4	SV	3
ENY	4	NLI	1	TN	4
EPA	13	NM	1	VA	8
EWA	3	NNJ	2	VT	2
GA	1	NTX	2	WI	3
IA	4	NV	2	WMA	2
ID	1	OH	2	WNY	3
IL	9	OK	2	WPA	4
KS	1	ON	3	WTX	1
KY	1	OR	2	WV	1
LAX	8	ORG	2	WWA	7
MDC	2				



Ever wonder why Bill, W3IY, is able to light up the ether? Probably has a lot to do with his Wave Launcher for 432-3456 MHz.

and perseverance."

Roving is always a challenge, and one made more difficult when there are fewer operators on the air. An interesting story emerged from the Northwestern Division where Mike Pinault, W7GHZ, and Martin Hibbs, N7MX, worked each other across 14 grids to finish 1-2 in the overall Rover competition. Both managed to work numerous QSOs with other operators along their route to help get those grids in additional logs. In all, eight of the top ten rover operators from the 2001 contest managed to reappear in the 2002 rover standings. This underscores the commitment and consistency that these talented operators demonstrate. Rovers from eight ARRL divisions managed to make the Top Ten box.

What a difference a year makes, well, at least to Russ Dwarshuis, KB8U. In 2001, his score of 51,798 was a good enough effort to take home second place overall. In 2002, he added 90 points and took home top honors in the Single Operator Low Power category. Russ worked five bands from his QTH (222, 432, 902, 128 and 2304) and had a total of 121 QSOs and 92 multipliers. His multiplier advantage was able to offset the great effort of Paul Sokoloff, WA3GFZ, who had three more bands and 17 more QSOs, but trailed in the multiplier department. Operators from five ARRL Divisions and Canada were found among the category top ten stations.

After having piloted his station to a second place finish in the Multioperator category in 2001, Donald Wilke, WW8M, jumped to the Single Operator High Power category in 2002 with even better results. Using ten bands, Donald took top honors in the category with an outstanding score of 261,171. Bill Lentz, AA2UK, finished with a strong second place score of over 200k while using seven bands. Also bettering the top 2001 category score was Jeff Klein, who utilized seven bands on his way to 160k points. Stations from five ARRL Divisions made appearances in the category top ten box.

Traditionally there has been a minimal amount of activity in the Multioperator category in the August UHF Contest. In the past eight years, the number of Multioperator entries has ranged from five (2001) to eighteen (1999). In 2002, nine entries were received in the category. But among all aspects in any area of this contest, there is pretty well one tradition that stands alone: the dominance of the W2SZ Mount Greylock Multioperator team. In the 25 years that this contest has been held, the operators at W2SZ have won 23 times, including the previous four years. In fact in 1993 and 1998, the only two years that they did not win the category, they finished in second place. It would be pretty much impossible for anyone to lay claim to any stretch of domination in amateur radio contesting that would top the Mount Greylock efforts in this event.

The real feel for this contest is expressed in the comments of the participants. A newcomer to the event, Paul, WA3GFZ, commented that "This was my first August UHF contest and I really enjoyed it. The lack of intense activity made it possible to hear the 'weak ones,' which are trampled during the big contests. This started out as a casual participation for me, but soon turned into a serious effort." His enthusiasm was shared by another newcomer to the event, Dan Milder, NØURW, who offered, "This was my first time in this UHF contest. What a blast! I was flat out amazed how fantastic this contest could be. In the past not having any equipment for this contest left me out of the loop. I now have 222 and 432 MHz. Big thanks to all the rovers! You made it really, really fun and challenging!"

And it isn't just the newcomer who enjoys this event. We found these comments posted to the ARRL On-line Soapbox (**www.arrl.org/contests/soapbox**) by long-time enthusiast Bill Lentz, AA2UK: "What a contest. I don't know where to start! I more than doubled my highest score in 1998. After a long rest from contesting, the new station is really working well." Be sure to visit this site and read comments from other participants and view some of the interesting photographs they share.

The 2003 ARRL August UHF Contest is scheduled for the weekend of August 2-3. You don't have to be the ultimate technical whiz to participate and have fun. There is *lots* of room in the UHF/SHF spectrum on which you can participate. Start planning now to join in the fun. QST

NEW BOOKS

THE LOW FREQUENCY EXPERIMENTER'S HANDBOOK

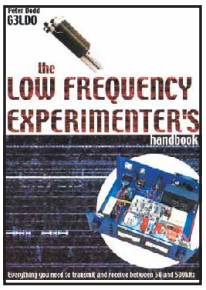
By Peter Dodd, G3LDO

Published by the Radio Society of Great Britain, Cranborne Rd, Potters Bar, Herts EN6 3JE, United Kingdom. 8¼×11¾ inches, 112 pages, B&W illustrations. Available from the ARRL: **www.arrl.org/shop/**, *tel (toll free in the US) 888-277-5289. $32; ARRL Order No. RLFS.*

Reviewed by Steve Ford, WB8IMY

◊ With an allocation at 136 kHz on the horizon, American amateurs have shown an increasing interest in low frequency (LF) technology. Our overseas brethren have a major head start on us. They've been enjoying Amateur Radio on 136 kHz for a couple of years now.

Peter Dodd, G3LDO, is one of the most active proponents of LF amateur activity. In *The Low Frequency Experimenter's Handbook*, Peter has gathered a wealth of practical information. It's fair to say that *The Low Frequency Experimenter's Handbook* is one of the few books available on this subject that concentrates so much useful detail in one place.



The intent of the book is to give amateurs the guidance they need to become active on LF as quickly as possible. As always, the first step is to listen, so Peter presents several LF receive converter designs, most of which convert 136 kHz to 14 MHz for reception on common HF rigs. The book includes schematics, construction tips and more. The only snag is that US amateurs may have to find equivalents for "European" transistor types, but with that information easily available on the Web, it isn't a serious problem. The book goes on to present designs for preamps, active receiving antennas and noise-canceling devices (high noise levels are an ever-present problem at LF).

For transmitting, *The Low Frequency Experimenter's Handbook* offers several transmitter designs (mostly CW) ranging from 1 W up to 400 W. There is even a description of a 1-kW 136-kHz amplifier.

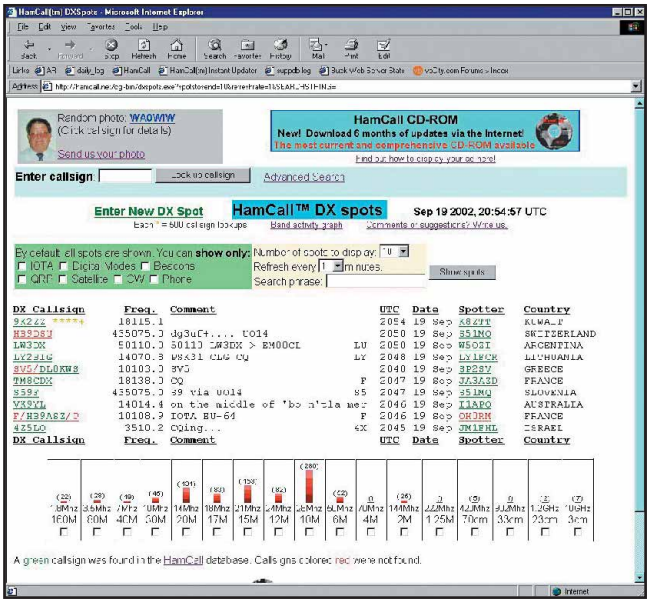
A chapter is devoted to antenna projects—including a limited-space design. That may sound like an oxymoron at LF, but it depends on your definition of "limited space." *The Low Frequency Experimenter's Handbook* wraps up with a chapter on test equipment and various communication modes such as QRSS (extremely slow CW), Hellschreiber and PSK31.

The Low Frequency Experimenter's Handbook is an excellent resource for hams looking for new territory to explore at the low end of the electromagnetic spectrum. Even though American amateurs do not yet have transmitting privileges at LF, we can certainly listen, experiment and prepare. QST

NEW PRODUCTS

INTERNET-BASED DX SPOTTING SERVICE POWERED BY *HAMCALL*

◊ Buckmaster's newest Web-based service, the *HamCall* DX spots Web page, is said to offer convenience and insight to active DXers worldwide. The site collects current (real-time) DX spots from DX Summit and a variety of sources and presents them on one page with extensive filters, controls and search capabilities. Every spotted call sign is automatically referenced in the *HamCall* database, and information about the listed call signs is immediately available by clicking on a link. Users can enter new DX spots directly on the page to share with others, and a band activity graph is displayed so users can quickly know which bands are open and active.

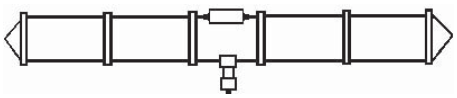


At press time the product is in beta testing on an unrestricted basis and is open to all users. After final testing is complete the page will be available to registered *HamCall* users (owners of the CD-ROM) on an unrestricted basis and to others without the live links and other enhanced features.

For more information contact Buckmaster Publishing at 6196 Jefferson Hwy, Mineral, VA 23117; tel 540-894-5777, fax 540-894-9141, **info@buck.com**, **hamcall.net**.

BROADBAND FOLDED DIPOLE ANTENNAS FROM BARKER & WILLIAMSON

◊ Need a single antenna that covers 160 through 10 meters with an SWR of less than 2:1 across the entire frequency range? Check out the family of no-tune, frequency agile, self-terminated, folded dipoles from Barker & Williamson. Originally designed for commercial or military radio systems that link automatically on a wide variety of frequencies, the antennas are suitable for short-range NVIS emergency communications, MARS, ARES, RACES and all-around hamming.



The BWD-1.8-30 covers 1.8 to 30 MHz continuously, needs no tuner and can be set up as a dipole or as an inverted V. Other features include low received noise, automatic static bleed-off, 14-gauge Copperweld or stainless-steel conductors and a 2-kW PEP ICAS power rating. The 90-foot-long antenna is ready to go right out of the box, with no taps, nothing to tune and nothing to adjust.

For easy installation check out B&W's Model FDMK Folded Dipole Mounting Kit, which contains everything required to mount (permanent or pulley) B&W's complete line of folded dipole antennas in flat-top or inverted-V configurations. The mount allow, attachment to poles, masts, trees, towers or ropes.

Price: $219 (BWD-1.8-30); $39 (FDMK Mounting Kit). For more information, contact B&W at 603 Cidco Rd, Cocoa, FL 32926; tel 321-639-1510; fax 321-639-2545; **custsrvc@bwantennas.com**, **www.bwantennas.com**.

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- 101 alphnumeric memories

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- 200 alphnumeric memories
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IC-V8000 2M Mobile Transceiver
- 75 watts
- ICOM DMS scanning
- CTCSS/DCS encode/decode w/tone scan
- Weather alert
- Weather channel scan
- 200 alphanumeric memories
- Backlit remote control mic

IC-756PROII All Mode Transceiver
- 160-6M @ 100W
- 32 bit IF DSP
- Enhanced 5 inch color TFT w/spectrum scope
- Selectable IF filter shapes for SSB & CW
- Enhanced Rx performance
- SSB/CW Syncronous tuning
- Multiple DSP controlled AGC loops
- Advanced CW functions
- 101 alphnumeric memories

IC-T7H 6W, Dual Band Transceiver
Dual Bands at a Single Band Price!
- 2M/70CM
- 70 alphnumeric memories
- 6W output
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- Auto repeater
- Easy operation!
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IC-T90A Triple Band Transceiver
- 6M/2M/70CM @ 5W
- Wide band rx 495kHz - 999.999MHz**
- 500 alphnumeric memories
- Dynamic memory scan
- Backlit keypad & display
- CTCSS/DTCS encode/decode w/tone scan
- Weather Alert

IC-2720H Dual Band Mobile
Remote Mounting Kit Included
- 2M/70CM
- VV/UU/VU
- Wide band RX inc. air & weather bands
- Dynamic Memory Scan
- CTCSS/DTCS encode/decode w/tone scan
- Independent controls/each band
- DTMF Encode
- 212 memory channels

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IC-746PRO All Mode 160M-2M
- 10-2M @ 100W
- 32 bit IF-DSP+ 24 bit AD/DA converter
- Selectable IF filter shapes for SSB & CW
- 102 alphnumeric memories

IC-V8 2M Transceiver
Commercial Grade Rugged
- 5.5W output
- 107 alphnumeric memories
- Customizable keys
- Auto repeater
- PC Programmable
- CTCSS encode/decode w/tone scan
- Drop-in trickle charger included

IC-2100H 25N 2M Mobile Transceiver
- Cool dual display
- 50 watts
- CTCSS encode/decode w/tone scan
- Backlit remote control mic
- Mil spec 810, C/D/E*[1]
- Auto repeater
- 113 alphnumeric memories

IC-207H Dual Band Mobile
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- 182 memories
- CTCSS encode/decode w/ tone scan
- Remote head capable
- Auto repeater

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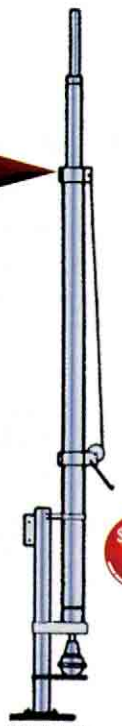

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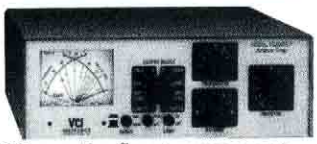

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VC-300M
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The VC-300M *Mobile* Antenna Tuner is compact, lightweight, easy-to-operate and is our most economical tuner.

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Backlit dual movement meter simultaneously monitors Power and SWR. Covers 1.8 to 30 MHz. Handles 300 Watts SSB PEP, 200 Watts continuous, (150 Watts on 1.8 MHz). 7.25x8.75x3.6 inches. Weighs 3.4 lbs.

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PM-30, $79.95, for 1.8 to 60 MHz. Displays forward and reflected power and SWR simultane ously on dual movement Cross-Needle meter. True shielded directional coupler assures accuracy. Backlit meter displays peak or average powe in 300/3000 Watt ranges. First-rate construction includes scratch-proof case/front panel. 5.3x5.75x3.5 inches. SO-239 connectors.

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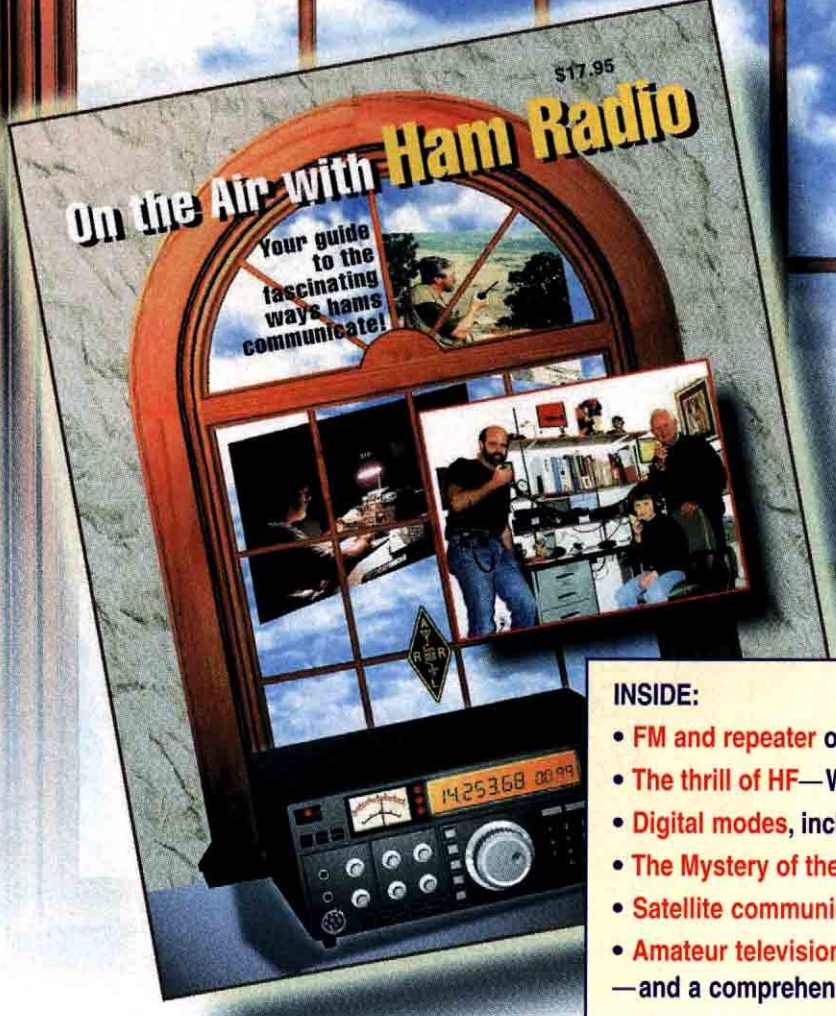

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KENWOOD

TH-D7A(G) Explore APRS opportunities with an HT built for the future. (middle) This 5W FM dualband (2M, 440MHz) is equipped with a TNC and provides the radio enthusiast with a range of data communications options. Along with simple packet, use the D7A(G) along with APRS and a GPS unit to send positioning data. Transmit coordinates to a friend, who can pinpoint the location. 4.75"h x 2.25"w x 1.5"d, 12 oz ... **$424.95**

TH-G71A Sharp Distinction: The brighter side of handy communications. (right) This FM dualbander (144/440MHz) boasts an illuminated keypad and LCD, high-performance antenna, and a stylish yet ergonomic design. The 5W G71A also offers convenience with its memory name function, menu mode, PC compatibility and 200 memories. 2.31"w x 4.44"h x 1.44"d, 11.6 oz **$249.99**

TH-F6A Unique features the competition is still scratching their heads over. The FM 144/220/440MHz F6A offers dual-channel RX capability, 16-key pad, multi-scroll key, 5W, and no fewer than 435 memories. Other attractive features include built-in ferrite bar antenna for AM, backlit LCD, lithium-ion battery, and a MIL-STD design. 2.3"w x 3.44"h x 1.18"d, 8.8 oz..... **$324.95**

TM-261A Fully equiped, supremely user-friendly 2M mobile. The 261A puts out an impressive 50 Watts with mid- and low-power settings. For quick access, essential data can be stored in 62 "memory name function" memory channels. Other features include DTSS selective calling, multi-scan capability, and a case built to MIL-STD. 5.5"w x 6.56"h x 1.56"d, 2.2 lbs **$149.99**

TM-G707A The essence of ease. From the extra-large panel to Kenwood's Easy Operation mode, the G707A is extraordinarily user-friendly. In addition to its regular profile, it can store four others for instant recall. This 50W/35W, FM dualband (144/440MHz) offers 180 multi-function memories with name function to identify each. 5.5"w x 1.56"h x 7.44"d, 2.65 lbs **$289.99**

TM-V7A Cool Blue: The look of mobile communication. The V7A 144/440MHz FM transceiver marks a departure in ergonomic design with its easy-to-operate control panel and reversible LCD. The "5-in-1" programmable memory, 50/35W, DTSS and pager functions, and dual receive on one band make it a pace-setter. 5.5"w x 1.56"h x 7.44"d, 2.65 lbs **$409.95**

TM-D700A Harnessing APRS®, GPS and SSTV. This FM 144/440MHz mobile features a built-in TNC offering options including simple packet. However, the brightest spot of the 50/35W D700A is its ability to enable APRS® without a computer. It also has 200 memories, dual receive, built-in CTCSS/DCS, and DX cluster monitoring. 5.5"w x 1.58"h x 7.68"d, 3 lbs **$589.95**

TS-50S Compact milestone. One of the most compact HF (160-10M) transceivers, the 50S can be mounted in a vehicle, taken on DXpedition, or installed as a base station. Despite its compact dimensions it packs a hefty 100W punch. Features include DDS with "fuzzy" control, AIP, and dual VFOs. 7.06"w x 2.38"h x 9.19"d, 6.4 lbs **$679.95**

TS-570D(G)* Affordable DSP without compromise. High-end technology doesn't mean a high-end budget. With 16-bit DSP, untouchable digital filtering, heavy-duty transmitter design, and central frequency control system, the 570D(G) provides powerful 160-10M operation. 10.63"w x 3.75"h x 11"d, 15 lbs..... **$1079.95**

TS-570S(G)* Same as the 570D(G), with 6M **$1249.95**

TS-2000* Distinctive by design, packed for performance. The all-mode, HF, 2M, 6M, 70cm 2000 is serious about DSP. Its advanced digital technology converts analog waveforms into digital data, enabling such digital processing as IF filtering, slope tune, auto notch and AGC. 10.63"w x 3.75"h x 12.5"d..... **$2124.99**

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IC-T7H Powerful output and ample receive audio. (left) A 6W amp circuit provides superior transmit on both VHF and UHF when 13.5 V DC is supplied. In addition, a full 500mW of AF is output from the speaker – easy to copy in noisy environments. Separate CTCSS tone encoder and encoder/decoder are standard. Single push action makes it simple. This 2M/440MHz meets MIL SPEC. 2.25"w x 4.34"h x 1.06"d, 10 oz..... © **$179.95**

IC-T90A Surprisingly compact, full featured. The T90A 50/144/440MHz HT offers wideband receive with 5W of power. It features 555 alphanumeric memories with Icom's new DMS scanning technology. The T90A also provides DTCS/CTCSS, DTMF encode, PC programmability and weather resistance. 2.53"w x 3.44"h x 1.16"d, 8.47 oz..... © **$249.95**

IC-V8 Quality, simplicity, anywhere. (right) This 144MHz FM transceiver's front panel and chassis are constructed of tough polycarbonate and die-cast aluminum for durability. The 5.5W V8 offers a 16-button keypad and 100 alphanumeric memories. CTCSS, DTCS and DTMF encoder are standard. 2.13"w x 5.19"h x 1.38"d, 12.3 oz © **$119.95**

IC-2100H-25N Durable 2M rig with superior RX IMD, performance. The 2100H25N offers 50W on transmit, extending its range. It also features CTCSS tone enc/decode, tone scan and 100 alphanumeric memories. It can be remote controlled using the new backlit mic. 5.5"w x 1.56"h x 7.09"d, 2 lbs, 10 oz © **$149.95**

IC-2720H Twice the versatility, twice the fun! The 2M/440MHz, 50/35W 2720H offers simultaneous receive capability, independent controls for each band, and Dynamic Memeory Scan with 212 memories. It also features CTCSS and DTCS, wideband receive, weather alert, auto repeater, remote control microphone, and compact remote control head. Mount controller to main unit with the optional MB-85. 5.5"w x 1.56"h x 7.38"d, 3 lbs (main)..... © **$379.99**

IC-207H Dual at single band price. Dualband capabilities of the 2M/440 FM 207H are provided one band at a time through a switching system. The 50/35W unit also features a detachable panel, tone squelch, 9600bps packet, ultra high speed scans, and 182 memories. 5.5"w x 1.56"h x 7.31"d, 2.6 lbs..... © **$249.95**

IC-718 Origin of the HF transceiver. With performance found in the HF all-band 718, such as wide dynamic range, high S/N ratio, and full duty operation, making distant contacts is easy. Experience its combo of the latest RF and digital technology. 9.44"w x 3.75"h x 9.41"d, 8 lbs, 6 oz..... FREE UT106 until 1/31/03 © **$549.95**

IC-706MKIIG Base station features, mobile size. The 160-10M + 6M, 2M, 70cm Mark II G is constructed for stable, quality output with low IMD and spurious emissions. It features tone squelch, DSP, auto repeater, and 107 alphanumeric memories. 6.56"w x 2.28"h x 7.88"d, 5 lbs, 6 oz.... FREE RMK706 until 1/31/03 © **$779.95**

IC-746PRO 32-bit DSP takes you even higher. All-mode operation, 100W, 102 alphanumeric memories, and a multi-function LCD are impressive in the HF/50/144MHz 746PRO. Its floating point DSP and 24-bit AD/DA converter make it a must-have. Also has memory keyer, built-in antenna tuner and digital noise reduction. 11.3"w x 4.7"h x 12.5"d, 19 lbs, 13 oz. Includes FREE PS-125, for a Limited Time © **$1699.95**

IC-756PROII A leap forward for the digital revolution. An all-mode, HF, 50MHz transceiver designed to include customer-suggestions. The PROII not only offers a 32-bit Floating DSP, but also has built-in 24-bit AD/DA converter, enhanced backlighting, selectable IF shape, adjustable noise blanker, and improved audio fidelity. 13.38"w x 4.38"h x 11.19"d, 21 lbs, 1 oz..... Includes FREE PS-125 until 1/31/03 © **$2769.95**

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YAESU

VX-150 Designed to perform under the most difficult conditions. (middle) This 2M 5W HT provides exceptional receiver performance with clean, clear transmit. Built to withstand outdoor use, the 16-key 150 is constructed to MIL-STD standards, with high-output, commercial-grade speaker and Omni-Glow™ keypad. 4.3"h x 2.3"w x 1"d, 11.5 oz..... © **$109.99**

FT-50RD/41B Commercial-grade, military spec. (right) It's rugged, reasonably priced, and simple to operate. Boasting 5W, the 50RD covers 144 and 430MHz while also offering the "widest" band receive allowable. Perfect for outdoor activities. Built with 112 memories, DCS/CTCSS encode, and ARTS. 2.2"w x 3.9"h x 1.2"d, 11.5 oz © **$203.95**

VX-7R/VX-7RB The first submersible amateur handhelds. (left) Protected against water by gaskets and weatherproofing techniques, the 50/144/430MHz, 5W 7R/7RB are rated for 30 minutes of submersion at 3 feet. Tough magnesium bodies make them ideal for the outdoors. They include dual/wide-band receive, color status strobe, and "internet" key for access to the new WIRES™ system. 7RB sports a black case. 2.4"w x 3.5"h x 1.1"d, 9.2 oz.. **$344.95**

FT-1500M A masterpiece of RF engineering. This 144MHz FM mobile is the quietest and most efficient radio transceiver ever built. 50-tone CTCSS encode/decode, direct keypad frequency entry, alphanumeric memory, 50 Watts of output power, and 6-pin mini-DIN data port are just the start. 5"w x 1.4"h x 4.9"d, 2.2 lbs © **$139.99**

FT-2600M Powerful, reliable, and certified Mil-Spec. Not only is the 2600M built for mechanical and thermal stability, with extended receive, you can monitor weather, public safety and other land mobile communications. 60 Watts of true FM power on 2 meters provides excellent coverage and enhanced clarity. The 2600M's features include 175 memories, CTCSS/DCS, and SmartSearch™. 6.3"w x 1.6"h x 6.3"d, 2.9 lbs ..... © **$159.95**

FT-8900R Leading the way in FM mobile design. (left) Quite simply, the 29/50/144/440MHz 8900R has no peer among mobile transceivers. This quad bander offers leading edge features like VHF/UHF full duplex, cross band repeat, independent operation on two bands, and six "Hyper Memory" keys to store configuration settings. The 8900R also provides 50W (35 on 440MHz), access to internet linking systems, over 800 memories, CTCSS/DCS, built-in duplexer, and versatile scanning. 5.5"w x 1.6"h x 6.6"d, 2.2 lbs..... **$429.95**

FT-897 All-in-one portable base. The all-mode, multi-band 897 features high output 100W (HF/6M), 50W (2M), 20W (70cm), rugged construction, 200 memories, and optional internal power supply and external antenna tuner. 7.87"w x 3.15"h x 10.3"d, 8.6 lbs..... **$1019.95**

FT-100D* The smallest full-featured HF/VHF/UHF transceiver. With frequency coverage from HF to UHF, built-in DSP, and 100W HF/50MHz output (50/20W on 2M/430MHz), the 100D keeps you in touch with the world, at home or away. It also features a 500Hz crystal filter, high-stability oscillator, CTCSS decoder, and high-quality speaker. 6.3"w x 2.1"h x 8"d, 6.6 lbs..... © **$779.95**

FT-840* Performance forward. Blending high performance digital frequency techniques with operating convenience, the 840 is a base station that beginners and seasoned operators will appreciate. In addtion to 100W on 160-10M, the 840 adds a choice of two optional remote auto antenna tuners and a wealth of functions. 9.4"w x 3.7"h x 9.6"d, 12 lbs ..... © **$549.99**

MK V FIELD* Reach the HF Summit! The Mark V Field brings the technology of the 1000D and Mark V to you in a 100W, self-contained design. This HF all-mode features Class-A (25W) PA operation, interlocked digital bandwidth tracking, a variable RF front-end filter and the ergonomics of the Mark V along with an auto antenna tuner and internal switching-regulator power supply. 16"w x 5.3"h x 13.7"d, 33 lbs ..... © **$1999.95**

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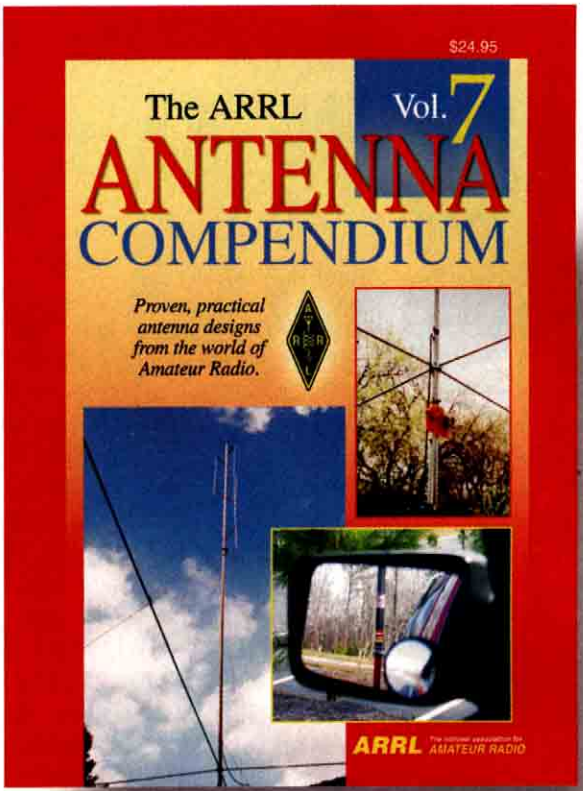

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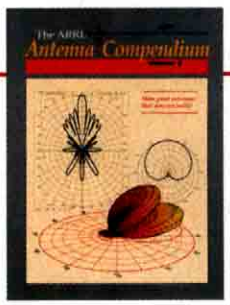

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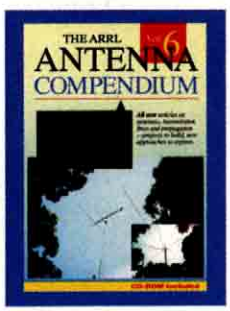

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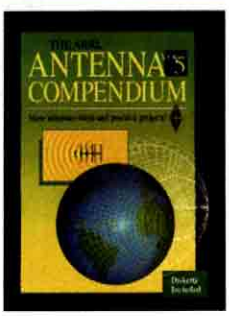

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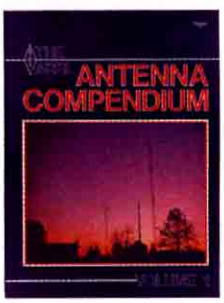

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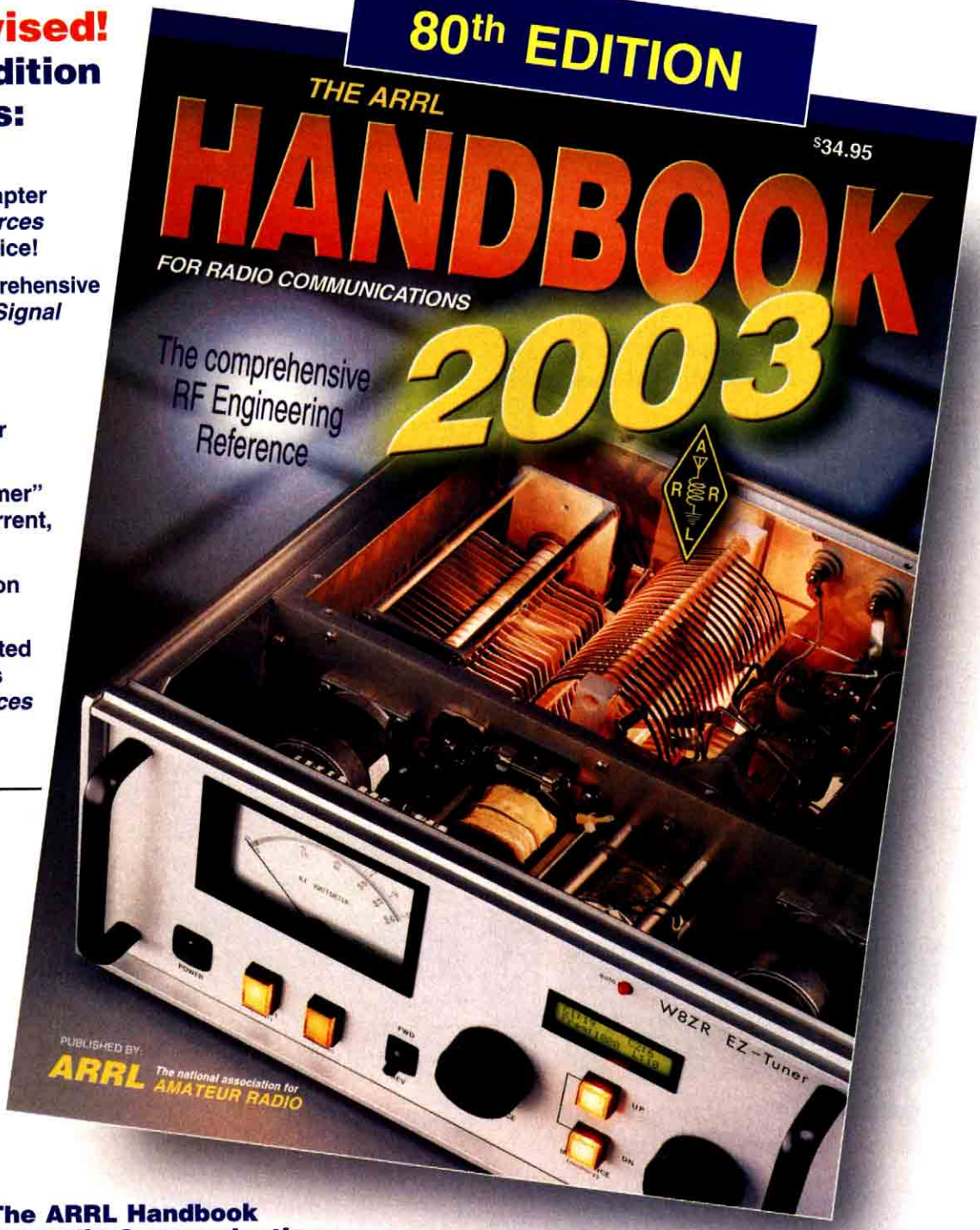

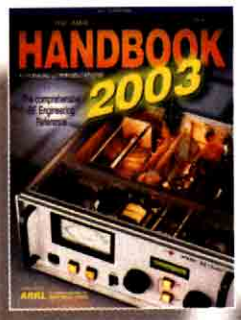

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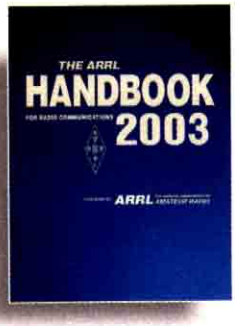

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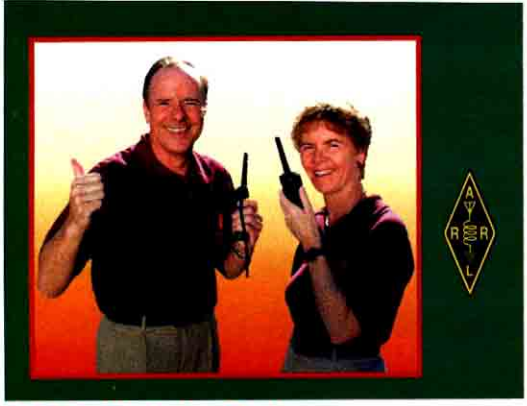

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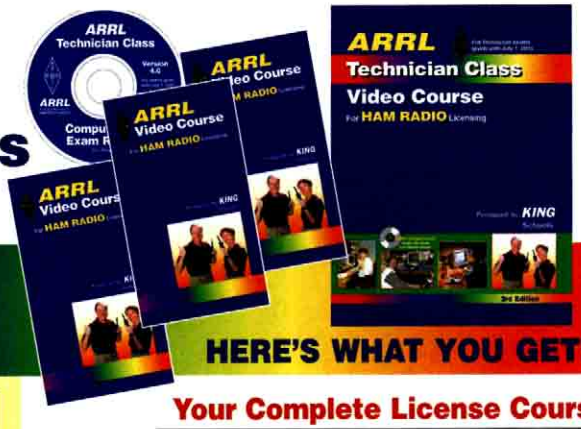

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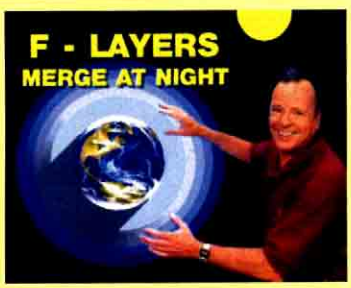

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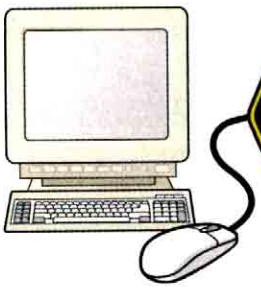

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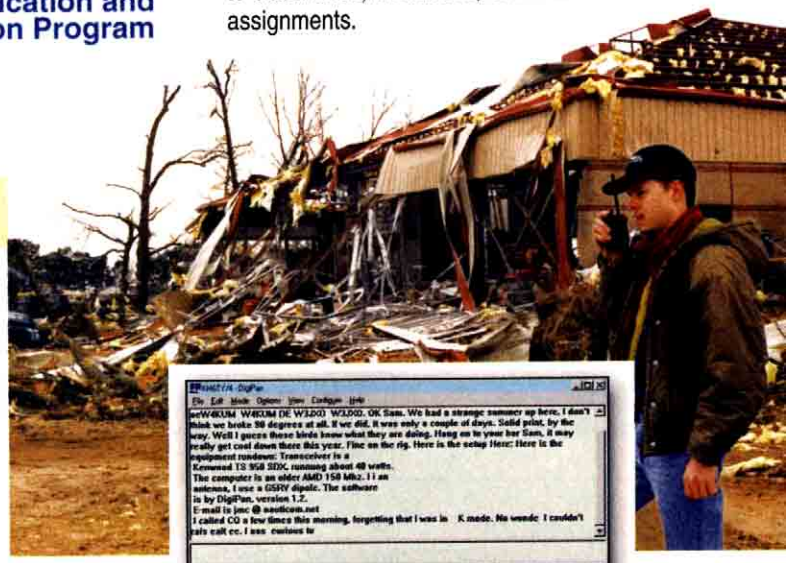

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A CARIBBEAN **ANTIGUA** West Indies Ham QTH with general coverage transceiver and 7 towers with antennas. Constant electricity. Contact Roy 954-801-6061 or 954-962-4723, or Sam WT3Q 717-355-2925 for details.

A CUSTOM HOME AND ANTENNA FARM: Newly constructed hilltop home on 20 forested acres in Southwestern New Mexico. Secluded, but still very close to town, this area is rated in the top ten places to retire in the country. Mild four-season climate, with the Gila National Forest in your back yard. Great antennas on separate towers for phenomenal signals, with a large ham shack for contesting. <http://www.na5s.com> or call: 505-534-8300.

AFRICAN DX SAFARIS Led by ZS6WPX. Check out www.dxsafari.s5.com

BLUE RIDGE MT. VA. - Beautiful mountain top location - Floyd, VA. www.va-mountainland.com KK4WW 1-540-763-2321

BORNEO/9M6AAC - http://www.qsl.net/9m6aac

CARIBBEAN FAMILY HAM VACATION: Curacao PJ2T station and house; two bedrooms, 100 foot oceanfront, SCUBA, beach, snorkeling nearby; three kW stations, 11 Yagis, three towers. ghoward@kent.edu, WØCG http://asgard.kent.edu/ccc

COLORADO CHALET with ham gear, www.lostcreekcabin.com. WØLSD Buena Vista, CO.

CONDO FOR SALE. Cape Coral, FL. Fully furnished, HF/VHF antennas installed, 2BR/2Baths, heated pool, boat dock. Asking $159,900. Call: (239) 540-7725, e-mail: edwardyoder@earthlink.net

DALLAS AREA: 2500 square foot two story, nice floor plan, great shape, 220 and 25A 110 in shack, tribander. $179K. K5QT 972-691-0822

DXshack FG, J6, 3W, XU, XW TRX+kWAMP+Beam ANT & Bed. URL: // qth.com/dxshack email: xu2a@fsinet.or.jp

FOR SALE SOUTH FLORIDA Custom 4BDR / 2 ½ bath on lake, pool, US Tower 433/HD KLMKT34A $184.000. Available May 2003. Call ON4TZ (954)749-7746. Details see www.voyage-magazine.com/guy/selling.html

MFJ *Sound Card-to-Rig* Interface

Use sound card and rig for all digital modes!

Plug and Play -- includes software, all cables, AC power supply . . . RFI-proof . . . Isolation transformers -- no hum, noise, distortion . . . Operate PSK-31, packet, APRS, AMTOR, RTTY, SSTV, CW, Meteor Scatter, others . . . Use as Voice Keyer, CW Contest Memory Keyer . . . Monitor On/Off Switch . . .

MFJ1275/M/T
$99.95

New! *Includes AC power supply, RS-232 cable!*

Plug this new MFJ-1275/M/T sound card interface between your transceiver and computer and enjoy operating all digital modes.

Everything you need is included -- software, audio cables, RS-232 serial cable and AC power supply.

Provides fully automatic operation with audio and push-to-talk control. It matches sound card audio, eliminates ground loops and provides microphone override.

Models available for all transceivers with 8-pin round, 8-pin modular (RJ-45) or 4-pin round microphone plugs.

Operate PSK-31, packet, APRS, AMTOR, RTTY, SSTV, CW, high speed CW Meteor Scatter and many others. Also use as Contest Voice Keyer and CW Contest Memory Keyer.

Digital Modes or Normal Operation

Select the ON digital mode -- all connections are made between your rig and computer for instant digital operation.

Select BYPASS normal mode -- your transceiver and computer connections are restored for their normal operation.

Audio Isolation Transformers

Audio isolation transformers and relay eliminate ground loops, audio hum, noise and distortion.

RFI-Proof

Extensive RF suppression and line isolation eliminates RF feedback problems.

Automatic Microphone Override

Transmit mic audio at any time by pressing PTT to override digital modes -- great for SSTV and Contest Voice Keyer.

More Impressive Features

Serial port -- lets computer control radio to override/interrupt digital transmissions.

VOX Control -- lets you use VOX control when not using computer serial port control.

Level Controls -- for transmitter drive and for receiver-to-sound card drive level. No need to adjust microphone gain or sound card level when you change modes.

Stereo or Mono Audio Input -- A front panel switch selects left, right, or both sound card audio output channels to accommodate various programs.

Off-the-air recording -- for replaying or for use with spectrum analyzer programs.

Monitor on/off switch lets you have a normal QSO and receive SSTV pictures at the same time in the *"monitor on"* position. This is great for modes like SSTV and Voice Keyer operation that may require listening to receive audio during operation.

Rugged Construction -- All aluminum cabinet and surface-mount construction gives you years of trouble-free service.

Use any Transceiver

Internal jumpers program microphone wiring for any brand or model radio -- no soldering required. Order **MFJ-1275** for 8-pin *round* mic plug. Order **MFJ-1275M** for 8-pin *modular* mic (RJ45) plug.

NEW! Order MFJ-1275T, for *4-pin round* mic plug, for Ten-Tec and others.

Plug and Play!

Everything you need is included --audio and RS-232 cables, AC power supply and a CD with a collection of the most popular amateur radio software to operate PSK-31, RTTY, SSTV, PACKET, AMTOR, CW, HSCW Meteor Scatter, Contest Voice Keying and other modes. Use 12 VDC or 110 VAC.

No Matter What™ Warranty

Protected by MFJ's famous *No Matter What™* one year limited warranty. MFJ will repair or replace (at our option) your MFJ-1275/M/T *no matter what* for one full year.

Try it for 30 Days

Order from MFJ and try it -- no obligation. If not delighted, return it within 30 days for refund less shipping.

New! *Super* Sound Card Interface

MFJ-1279/M/T
$129.95

This *super* sound card interface has all of the features of the MFJ-1275 ***plus . . .***

- **Auxiliary Input Jack:** Lets you switch your sound card from MFJ-1279 so you can use your sound card for something else. No more plugging/unplugging!
- **Direct CW/FSK Keying Jack:** Allows direct CW or FSK keying operation.
- **Headphone Jack:** Use your stereo headphones so you won't disturb your XYL (also turns off external speaker).
- **Footswitch:** Use footswitch or other for PTT (push-to-talk) when not using VOX.

Plug and Play! Includes software CD, RS-232 and audio cables, AC power supply.

Order MFJ-1279 for 8-pin round mic, MFJ-1279M for 8-pin modular (RJ-45) mic, MFJ-1279T for 4-pin round mic.

Add "X" suffix for 220VAC.

New! *Basic* Digital Interface

MFJ-1273B
$59.95

Plug and Play! Has sound card, radio, speaker, RS-232 jacks. Includes: software CD and RS-232, audio, mic cables. No external power needed. Has no mic jack or mic switch. **Order** MFJ-1273B for 8 pin round mic, MFJ-1273BM for 8-pin modular (RJ-45) mic, MFJ-1273BT for 4-pin round mic.

DSP Sound Card Programs

MFJ-1296, $129.95. *RadioCom4* integrates PSK31, SSTV, FAX/Sat FAX, RTTY, SITOR, DSP audio filters and radio control.

MFJ-1298, $199.95. *RadioCom5* -- all features of *RadioCom4* plus DSP Audio Filter analyzer, Spectrum Analyzer, Dual Scope Display, Sound Recorder, Time and Frequency Management, Frequency Analyzer, 3D Scanner, Satellite tracking, Rig Control for over 80 radios, more! **Free demo at:** ***www.mfjenterprises.com/freedemo.php***

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HAM'S DREAM—LAKE WORTH, FL: Unique. Antenna farm on 3+ wooded, fenced acres. 100 ft. Rohn 45 + 50 ft. crank-up towers with 15 and 20 Meter Mono-banders + VHF beams. C.B.S. home, all pecky cypress & pine interior with Mexican tile floors. 1 BR western-style cottage with shop. E-mail vaughnsimon@att.net for pictures. Call 561-686-5635.

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NORTHERN AZ QTH Ham operators paradise on 40 acres, tree covered and fenced. Four bedroom, two bath 2254 sq. ft. home, three car garage, Heritage™ Steel building 44 x 22. Three tower bases ready for self supporting towers, also two telephone poles 1000 foot apart. $215,000.00 928-6007-2611 w7src@winlink.org bootsie@starband.net

QTH of KW5V on 1+ acre of rural Texas hill country subdivision just outside Austin. 70' guyed tower with 204BA plus vertical and wire antennas. All underground feeds to 3/2/2 1640 sq. ft. house with huge shaded patio and hot tub. Separate ham shack/hobby room with 220v. $160,000. Pictures at TexasDiscountRealty.com or email to sbosbach@austin.rr.com

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BROADCAST MICROPHONES and accessories (call letter plates, stands) wanted: early carbon, condenser, ribbon, dynamic models. Cash or trade. James Steele, Box 620, Kingsland, GA 31548. 912-729-6106. jsteele@k-bay106.com; http://www.k-bay106.com/mics.htm

CLASSIC RADIOS, bought & sold. Radiofinder. 734-454-1890 finder@radiofinder.com www.radiofinder.com

MFJ DX Beacon Monitor

Get *up-to-the-minute* worldwide DX band conditions in *minutes* on 14, 18, 21, 24, 28 MHz bands using the International Beacon Network of 18 worldwide beacons!

MFJ DX Beacon Monitor lets you instantly see on world map which beacon you're hearing on your transceiver . . . No need to copy 22 wpm CW . . . Positively identify beacons even if CW is weak, fluttery or distorted . . . Tells you where to point your antenna . . . Fascinates visitors . . .

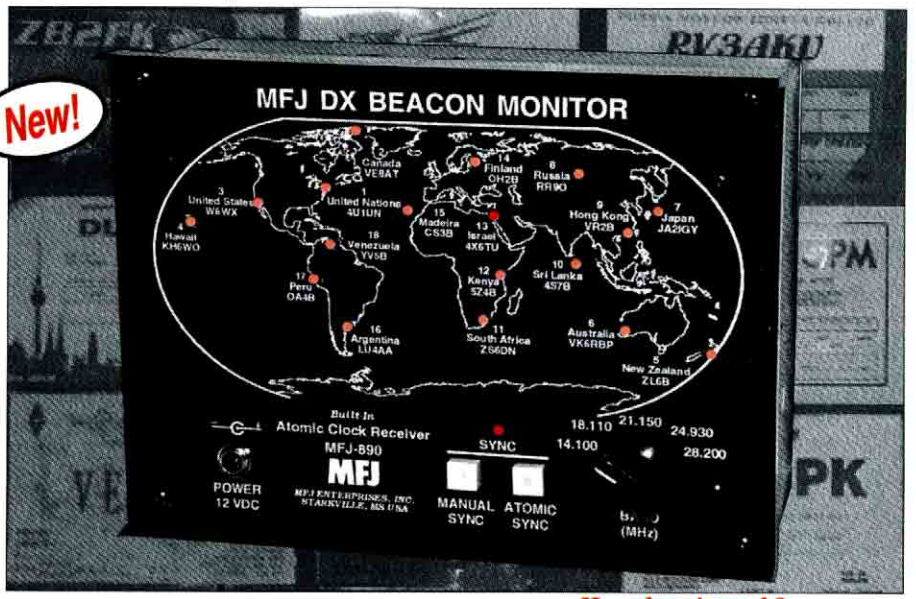
MFJ-890
$99.95

Get up-to-the-minute worldwide DX band conditions in minutes on 14, 18, 21, 24, 28 MHz bands using the International Beacon Network of 18 beacons throughout the world!

MFJ's new* DX Beacon Monitor *lets you instantly see which beacon you're hearing on your transceiver -- an LED lights up on its world map to show you the beacon location and where to point your antenna.

It's fascinating to hear and watch each beacon location light up as they become active across the world.

It's great for DXers, contesters, ragchewers and SWLers.



The International Beacon Network

The *International Beacon Network* provides a reliable source of signals for determining HF propagation 24 hours a day.

It consists of 18 beacons evenly located throughout the world.

Each beacon transmits on 14.1, 18.11, 21.150, 24.93 and 28.2 MHz.

The transmit sequence moves westward from New York across North America, Asia, Pacific to Africa, Europe and South America.

On each frequency, each beacon transmits for ten-seconds -- its call sign at 22 wpm CW and a one-second dash at 100 Watts and three one-second dashes at 10, 1, 0.1 Watts.

When each beacon completes a transmission it goes silent on that band and switches to the next higher band.

For more information see Oct/Nov, 1994, Sept, 1997 *QST* and Jan 1999, Sept/Dec 2001, Jan 2002 *Practical Wireless* of U.K.

How are band conditions?

Tune to a beacon frequency. If band conditions are good, you'll hear each beacon identifying in Morse and four dashes each at a lower power level.

The more beacons you hear, the more open the band is to different parts of the world.

The more dashes you hear per beacon, the better the quality of propagation and the more robust the band is. If you hear the 100 milliwatt dashes from many beacons you know *the band is wide open!*

In just three minutes you'll know how band conditions are worldwide.

It's interesting to see how propagation vary from day to day -- what beacons you can hear and at what power level.

You may find that the band is wide open but nobody is on.

Which band is best to reach a particular part of the world?

By storing the beacon frequencies in your transceiver's memory, you can quickly check all five bands to see which band has the best propagation to a particular part of the world.

MFJ DX Beacon Monitor lets you instantly see on world map which beacon you're hearing

You don't have to copy CW at 22 wpm to identify a beacon.

When you *hear* a beacon, an LED instantly lights up on a world map to show you its location. **You** can positively identify each beacon -- even if the signal is weak, and the CW is fluttery or distorted.

The world map display also tells you where to point your antenna.

How does it work?

The transmit sequence of the beacons are precision timed using GPS (Global Positioning Satellites).

The *MFJ DX Beacon Monitor* duplicates this precision timing sequence and lights an LED to show which beacon is transmitting. A microprocessor and a *built-in WWVB atomic clock receiver* provides ultra precise synchronization. Has manual sync for use *anywhere* in the world. MFJ-890 is not a beacon receiver that receives beacons directly.

The MFJ-890 is a self-contained stand-alone unit. It requires no antenna and no connection to your transceiver or receiver. 6¾Wx5¼Hx3D inches. Uses 12 VDC or 110 VAC with optional MFJ-1315, $14.95.

Free MFJ-890 Instruction Manual

Visit *http://www.mfjenterprises.com*

No Matter What™ Warranty

Protected by MFJ's famous *No Matter What*™ one year limited warranty. MFJ will repair or replace (at our option) your MFJ-890 *no matter what* for one full year.

Try it for 30 Days

Order from MFJ and try it -- no obligation. If not delighted, return it within 30 days for refund less shipping.

MFJ-464 CW Reader with built-in Keyer

MFJ-464
$179.95
(Keyboard, paddle not included.)

Plug this new MFJ CW Reader with built-in Keyer into your transceiver's speaker/phone jack and key jack.

Now you're ready to compete with the world's best hi-speed CW operators -- and *they won't even know you just passed the code test!*

Sends and Reads 5-99 WPM. Automatic speed tracking. Large 2-line LCD shows send/receive messages. Use single or iambic paddle or computer keyboard. Easy menu operation. Front panel speed, volume controls. 4 message memories, type ahead buffer, read again buffer, adjustable weight/sidetone, speaker. RFI proof.

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TELEGRAPH KEYS wanted by collector. Bugs and unusual or unique straight keys or sounders, and tube electronic keyers. Also pre-1950 callbooks. Vince Thompson, K5VT, 3410 N. 4th Ave., Phoenix, AZ 85013. 602-840-2653.

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W4QCF MANUALS and **Museum** www.w4qcfmanuals.com

WANTED: pre-1925 battery radios, crystal sets, and vacuum tubes. Also early telegraph keys and pre-1900 electrical apparatus. Jim Kreuzer, N2GHD, 1541 Bronson Road, Grand Island, NY 14072. 716-773-4999. wireless@pce.net

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100 QSL CARDS $9.50 postpaid. We also print Color QSL cards, Eyeball cards ETC. Send stamp for Sample. Vaso Nagl, KD4WVK, 832 Woodcraft Drive, Nashville, TN 37214.

AFFORDABLE QSL CARDS, available in small quantities with lots of options. Parma Graphics, K2BKA, 5 Rondout Harbor, Port Ewen, NY 12466. 845-339-1996.

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#1 AMATEUR CALLSIGN CD-ROM. "HamCall" contains world wide callsigns with lat/long, grid square, e-mail addresses and much more. Six months FREE Internet updates. Check/Visa/MC. $50, $5 ship/handling. Buckmaster, 6196 Jefferson Hwy., Mineral, VA 23117. 800-282-5628, http://www.buck.com/haminfo.html

MFJ *Speech Intelligibility* Enhancer

. . . makes barely understandable speech highly understandable!

MFJ-616
$169.95

"What did you say?" Can you hear but . . . just can't always understand everything people are saying?

As we get older, high frequency hearing loss reduces our ability to understand speech. Here's why . . .

Research shows that nearly *half* the speech intelligibility is contained in 1000 to 4000 Hz range, but contains a miniscule 4% of total speech energy.

On the other hand, the low frequencies, 125 to 500 Hz have most of the speech energy (55%) but contribute very little to intelligibility -- only 4%.

To dramatically improve your ability to understand speech, you must:

First, drastically increase the speech energy above 500 Hz, where 83% of the speech intelligibility is concentrated.

Second, drastically reduce speech energy below 500 Hz where only 4% of speech intelligibility lies.

The MFJ-616 splits the audio speech band into four overlapping octave ranges centered at 300, 600, 1200 and 2400 Hz. You can boost or cut each range by nearly 20 dB.

A balance control and separate 2½ Watt amplifiers let you equalize perceived loudness to each ear so both ears help.

By boosting high and cutting low frequencies and adjusting the balanced control, speech that you can barely understand become highly understandable!

Even if you *don't* have high frequency hearing loss, you'll dramatically improve your ability to understand speech. You'll get an edge in contesting and DXing and enjoy ragchewing more.

Here's what *QST* for April, 2001 said . . . *"I expected a subtle effect at best, but I was astonished . . . The result was remarkably clean, understandable speech without hissing, ringing or other strange effects . . . made a dramatic improvement . . ."*

Immuned to RFI. Has phone jack, on/off speaker switch, 2 inputs, bypass switch. 10Wx2½Hx6D". Needs 12 VDC.

MFJ-1316, $19.95. For 110 VAC operation. Provides 12 VDC/1.5 Amps.

MFJ-72, $58.80. *All-in-one MFJ-616 Accessory Pack.* Includes MFJ-392 headphones, two MFJ-281 speakers and MFJ-1316 power supply. ***Save $7!***

Try it for 30 Days

Order from MFJ and try it -- No obligation. If not delighted, return it within 30 days for refund less shipping.

MFJ Contest Voice Keyer

Transformer-coupled -- No RFI, hum or feedback . . . 75 seconds total, 5-messages . . . Records received audio . . .

MFJ-434
$179.95

Let this *new* microprocessor controlled MFJ *Contest Voice Keyer*™ call CQ, send your call and do contest exchanges for you in your own natural voice!

Store frequently used phrases like "CQ Contest this is AA5MT", "You're 59" . . . "Qth is Mississippi" . . . Contest by pressing a few buttons and save your voice.

Record and play back five natural sounding messages in a total of 75 seconds. Uses *eeprom* -- no battery backup needed.

You can repeat messages continuously and vary the repeat delay from 3 to 500 seconds. Makes a great voice beacon and calling CQ is *so* easy.

You can also record and play back off-the-air signals -- great help if you didn't get it right the first time! No more "*Please repeat*".

A playing message can be halted by the *Stop Button*, your microphone's PTT/VOX, remote control or computer.

Has jack for remote or computer control (using CT, NA or other program). Lets you select, play and cancel messages.

Your mic's audio characteristics do not change when your MFJ-434 is installed.

All audio lines are RF filtered to eliminate RFI, audio feedback and distortion. An audio isolation transformer totally eliminates hum and distortion caused by ground loops.

It's easy to use -- just plug in your 8 pin mic and plug the MFJ-434 cable into your transceiver. Internal jumpers let you set it to your rig. Use your mic or its built-in mic for recording.

Built-in speaker-amplifier. Speaker/phone jack. Use 9 Volt battery, 9-15 VDC or 110 VAC with optional MFJ-1312D, $14.95. 6½Wx2½Hx6½D in.

MFJ-73, $29.95. MFJ-434 Remote Control with cable.

60 dB Null *wipes out* noise and interference

MFJ-1026
$179.95

Wipe out noise and interference *before* it gets into your receiver with a 60 dB null!

Eliminate all types of noise -- severe power line noise from arcing transformers and insulators, fluorescent lamps, light dimmers, touch controlled lamps, computers, TV birdies, lightning crashes from distant thunderstorms, electric drills, motors, industrial processes . . .

It's *more effective* than a noise blanker! Interference much stronger than your desired signal can be completely removed without affecting your signal.

It works on *all modes* -- SSB, AM, CW, FM -- and frequences from BCB to lower VHF.

You can null out strong QRM on top of weak rare DX and then work him! You can null out a strong local ham or AM broadcast station to prevent your receiver from overloading.

Use the MFJ-1026 as an *adjustable phasing network.* You can combine two antennas to give you various directional patterns. Null out a strong interfering signal or peak a weak signal at a push of a button.

Easy-to-use! Plugs between transmitting antenna and transceiver. To null, adjust amplitude and phase controls for minimum S-meter reading or lowest noise. To peak, push reverse button. Use built-in active antenna or an external one. MFJ's exclusive *Constant Amplitude Phase Control*™ makes nulling easy.

RF sense T/R switch automatically bypasses your transceiver when you transmit. Adjustable delay time. Uses 12 VDC or 110 VAC with MFJ-1312D, $14.95. 6½x1½x6¼ in.

MFJ-1025, $159.95. Like MFJ-1026 less built-in active antenna, use external noise antenna.

MFJ *tunable* Super DSP filter

MFJ-784B
$249.95

Only MFJ gives you *tunable* and *programmable* "brick wall" DSP filters.

You can continuously *tune* low pass, high pass, notch and bandpass filters and continuously *vary* bandwidth to pinpoint and eliminate interference.

Only MFJ gives you 5 factory pre-set and 10 programmable pre-set filters you can customize. **Automatic** notch filter searches for and eliminates multiple heterodynes. Advanced adaptive noise reduction silences background noise and QRM.

Free MFJ Catalog

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1.8-170 MHz *plus* 415-470 MHz
MFJ HF/VHF/UHF Antenna Analyzer

All-in-one handheld antenna test lab lets you quickly check and tune HF, VHF, UHF antennas anywhere. Covers 1.8-170 MHz and 415-470 MHz

Measures: SWR…Return Loss…Reflection Coefficient…Antenna Resistance(R), Reactance(X), Impedance(Z) and Phase Angle(degrees) . . . Coax cable loss(dB) . . . Coax cable length . . . Distance to short or open in coax . . . Inductance . . . Capacitance . . . Resonant Frequency . . . Bandwidth . . . Q . . . Velocity Factor . . . Attenuation . . . Has: LCD readout . . . frequency counter . . . side-by-side meters . . . Ni-MH/Ni-Cad charger circuit . . . battery saver . . . low battery warning . . . smooth reduction drive tuning . . . One year No Matter What™ warranty . . .

NEW

MFJ-269 **$359.95**

You can instantly get a complete picture, check and tune any antenna from 1.8 to 170 MHz and 415 to 470 MHz -- an MFJ-269 exclusive -- with this rugged easy-to-use handheld antenna test lab! You can measure virtually every antenna parameter.

You won't believe its capability and versatility. This rugged handheld unit literally replaces a workbench full of expensive delicate test equipment.

SWR Analyzer

You can read SWR, return loss, reflection coefficient and match efficiency at any frequency simultaneously at a single glance.

Complex Impedance Analyzer

Read Complex Impedance (1.8 to 170 MHz)as series equivalent resistance and reactance (Rs+jXs) or as magnitude (Z) and phase (degrees). Also reads parallel equivalent resistance and reactance (Rp+jXp) -- *an MFJ-269 exclusive!*

Coax Analyzer

You can determine velocity factor, coax loss in dB, length of coax and *distance to short or open in feet (it's like a built-in TDR).*

CoaxCalculator™ lets you calculate coax line length in feet given electrical degrees and vice versa for any frequency and any velocity factor -- *an MFJ-269 exclusive!*

Use any Characteristic Impedance

You can measure SWR and loss of coax with *any* characteristic impedance (1.8 to 170 MHz) from 10 to over 600 Ohms, including 50, 51, 52, 53, 73, 75, 93, 95, 300, 450 Ohms -- *an MFJ-269 exclusive!*

Inductance/Capacitance Meter

Measures inductance in uH and capacitance in pF at RF frequencies, 1.8-170 MHz.

Frequency Counter/Signal Source

You can also use it as a handy frequency counter up to 170 MHz and as a signal source for testing and alignment.

Digital and Analog displays

A high contrast LCD gives precision readings and two side-by-side analog meters make antenna adjustments smooth and easy.

415 to 470 MHz Range features

Just plug in your UHF antenna coax, set frequency and read SWR, return loss and reflection coefficient simultaneously. You can read coax cable loss in dB and match efficiency.

You can adjust UHF dipoles, verticals, yagis, quads and others and determine their SWR, resonant frequency and bandwidth.

You can test and tune stubs and coax lines. You can manually determine velocity factor and impedances of transmission lines.

You can adjust/test RF matching networks and RF amplifiers without applying power.

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Super Easy-to-Use

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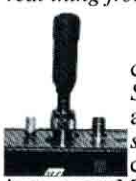
Use 10 AA Ni-MH or Ni-Cad or alkaline batteries (not incl.) or 110VAC with MFJ-1315, $14.95.

MFJ SWR Analyzer Accessories

MFJ-39C, $24.95. Tote your MFJ-269 anywhere with this *genuine* MFJ custom carrying case. Has back pocket with security cover for carrying dip coils, adaptors and accessories. Made of special foam-filled fabric, the MFJ-39C cushions blows, deflects scrapes, and protects knobs, meters and displays from harm.

Wear it around your waist, over your shoulder, or clip it onto the tower while you work -- the fully-adjustable webbed-fabric carrying strap has snap hooks on both ends.

Has clear protective window for frequency display and cutouts for knobs and connectors -- use your MFJ *SWR Analyzer™* without ever taking it out of your case. *Authentic MFJ leather logo distinguishes the real thing from imitators!*



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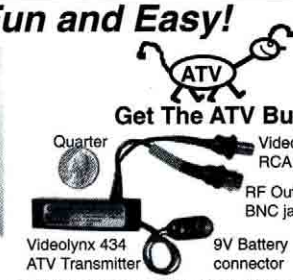

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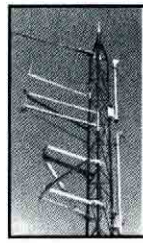

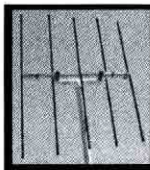

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10 Bands -- 1 MFJ Antenna!

Full size performance . . . No ground or radials

Operate 10 bands: 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with one antenna Separate full size radiators . . . End loading . . . Elevated top feed . . . Low Radiation Angle . . . Very wide bandwidth . . . Highest performance no ground vertical ever . . .

Operate 10 bands -- 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with this MFJ-1798 vertical antenna and get *full size performance* with no ground or radials!

Full size performance gives high efficiency for more power radiated. Results? Stronger signals and more Q-5 QSOs.

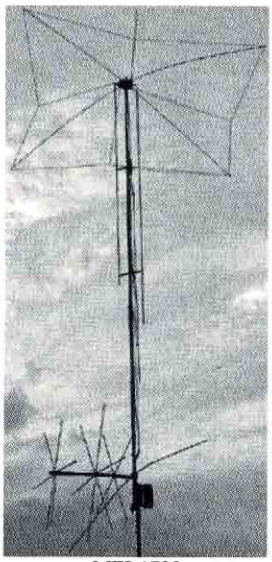
Full size performance also gives you exceptionally wide bandwidths so you can use more of your hard earned frequencies.

Full size performance is achieved using separate full size radiators for 2-20 Meters and highly efficient end loading for 30, 40, 75/80 Meters.

Get very low radiation angle for exciting DX, automatic bandswitching, omni-directional coverage, low SWR. Handles 1500 Watts PEP SSB.

MFJ's unique *Elevated Top Feed*™ elevates the feedpoint *all the way to the top* of the antenna. It puts the maximum radiation point high up in the clear where it does the most good -- your signal gets out even if you're ground mounted.

It's easy to tune because adjusting one band has minimum effect on the resonant frequencies of other bands.



MFJ-1798
$289.95
Ship Code F

Self-supporting and just 20 feet tall, the MFJ-1798 mounts easily from ground level to tower top -- small lots, backyards, apartments, condos, roofs, tower mounts.

Separate Full Size Radiators

Separate *full size* quarter wave radiators are used on 20, 17, 15, 12, 10 and 2 Meters. On 6 Meters, the 17 Meter radiator becomes a 3/4 wave radiator.

The active radiator works as a stub to decouple everything beyond it. *In phase* antenna current flows in all parallel radiators.

This forms a very large equivalent radiator and gives you incredible bandwidths.

Radiator stubs provide automatic bandswitching -- absolutely *no loss* due to loading coils or traps.

End Loading

On 30, 40, 75/80 Meters, end loading -- the most efficient form of loading -- gives you highly efficient performance, excellent bandwidth, low angle radiation and automatic bandswitching.

MFJ's unique *Frequency Adaptive L-Network*™ provides automatic impedance matching for lowest SWR on these low bands.

Tuning to your favorite part of these bands is simple and is done at the *bottom* of the antenna.

No Ground or Radials Needed

You don't need a ground or radials because an effective counterpoise that's 12 feet across gives you *excellent* ground isolation.

You can mount it from ground level to roof top and get awesome performance.

No Feedline Radiation to Waste Power

The feedline is decoupled and isolated from the antenna with MFJ's exclusive *AirCore*™ high power current balun. It's wound with *Teflon*® coax and can't saturate, no matter how high your power.

Built to Last

Incredibly strong solid fiberglass rod and large diameter 6061 T-6 aircraft strength aluminum tubing is in the main structure.

Efficient high-Q coils are wound on tough *low loss* fiberglass forms using highly weather resistant *Teflon*® covered wire.

MFJ's Super High-Q Loop™ Antennas

MFJ-1786
$379.95
Ship Code F

MFJ's *tiny* 36 inch diameter loop antenna lets you operate 10 through 30 MHz *continuously* -- including the WARC bands!

Ideal for limited space -- apartments, small lots, motor homes, attics, or mobile homes.

Enjoy both DX and local contacts mounted vertically. Get both low angle radiation for excellent DX and high angle radiation for local, close-in contacts. Handles 150 watts.

Super easy-to-use! Only MFJ's super remote control has *Auto Band Selection*™. It auto-tunes to desired band, then beeps to let you know. No control cable is needed.

Fast/slow tune buttons and built-in two range Cross-Needle SWR/Wattmeter lets you quickly tune to your exact frequency.

All welded construction, no mechanical joints, welded butterfly capacitor with no rotating contacts, large 1.050 inch diameter round radiator -- not a lossy thin flat-strip -- *gives you highest possible efficiency.*

Each plate in MFJ's tuning capacitor is welded for low loss and polished to prevent high voltage arcing, welded to the radiator, has nylon bearing, anti-backlash mechanism, limit switches, continuous no-step DC motor -- gives smooth precision tuning.

Heavy duty thick ABS plastic housing has ultraviolet inhibitor protection.

NEW! **MFJ-1788, $429.95.** Same as MFJ-1786 but covers 40 Meters-15 Meters continuous. Includes super remote control.

MFJ-1782, $339.95. Like MFJ-1786 but control has only fast/slow tune buttons.

MFJ-1780, $249.95. *Box Fan* Portable Loop is about the same size (2x2 foot) as a box fan, complete with handle. Covers 14-30 MHz. Control has fast/slow tunes.

MFJ Portable Antenna

MFJ-1621 **$89.95** Ship Code A

MFJ-1621 lets you operate in most any electrically free area -- apartment, campsite, hotel, the beach, etc. DXCC, WAZ, WAC, WAS have been won with MFJ-1621! Work 40, 30, 20, 17, 15, 12 and 10 Meters with a telescopic whip that extends to 54 inches. Mounted on a sturdy 6x3x6 inch cabinet. Built-in antenna tuner, field strength meter, and 50 feet of RG-58 coax cable. Handles 200 Watts.

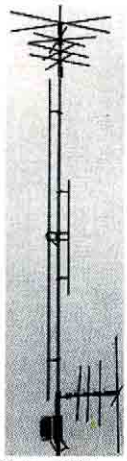
MFJ's G5RV Antenna

MFJ-1778, Ship Code A **$39.95**

Covers all bands, 160-10 Meters with antenna tuner. 102 feet long, shorter than 80 Meter dipole. Use as inverted vee or sloper to be more compact. Use on 160 Meters as Marconi with tuner and ground. Handles full legal limit power. Add coax feedline and some rope or other nonconductor and you're *on the air!*

MFJ halfwave vertical

6 bands: 40, 20, 15, 10, 6, 2 Meters . . . No radials or ground needed



MFJ-1796
$209.95
Ship Code F

Only 12 feet high and has a tiny 24 inch footprint! Mount anywhere -- ground level to tower top -- apartments,small lots, trailers. Perfect for vacations, field day, DXpedition, camping.

Efficient end-loading, no lossy traps. Entire length is always radiating. Full size halfwave on 2/6 Meters. High power *air-wound* choke balun eliminates feedline radiation. Adjusting 1 band has minimum effect on others.

MFJ-1792, $169.95. Full size 1/4 wave radiator for 40 Meters. 33 feet, handles 1500 Watts PEP. Requires guying and radials.

MFJ-1793, $189.95. Like MFJ-1792 but has full size 20 Meter 1/4 wave also.

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TECH TALK

IC-706MKIIG - You can take it with you!

A increasing number of today's amateurs are enjoying personal portable operations with battery-powered HF/VHF gear, and with good reason. It is a convenient way to stay in touch with radio friends both locally and worldwide, and it is also ideal for emergency preparedness. You, too, can join this action. Just start with the right transceiver (Icom's IC-706MKIIG is top choice), compliment it with the proper battery, then quick-assemble your own "backpack portable"station.

POWER PACKED PORTABLE. Although widely recognized as a do-it-all mobile transceiver, Icom's popular IC-706MKIIG also stands above the crowd as a total performance portable rig with every imaginable operating asset. It works all modes and HF bands, 6 meters, 2 meters and 70cm plus receives all the international shortwave broadcast bands, VHF public service, marine and NOAA weather bands. It scans, has 107 memories, speech compressor, SWR metering, DSP noise reduction and hetrodyne notching and much, much more. The IC-706MKIIG's big advantage, however, is its fully adjustable output of 5 watts to 100 watts. That ensures cool and conservative operation during usual "low power times," and plenty of backup power for reliable communications during emergencies. This transceiver delivers results you can count on—in any situation!

IC-706MKIIG
Photo and pack courtesy of Cutting Edge Enterprises

POWERING UP. Using the IC-706MKIIG portable centers around mating its input current demands with battery capacity, then estimating operating times between recharges. As a helpful guide, some "how to do it" tips follow. The IC-706MKIIG typically draws 4-5 amps average on SSB and 8.5 amps peak on CW for 10 watts output, 7-8 amps average on SSB and 11 amps peak on CW for 20 watts output, and 11-12 amps average on SSB and 18-19 amps peak on CW for 100 watts output. Receive current is 1 amp at half volume (measurements on 20M CW are courtesy of Icom America). A popular gel cell 13 volt battery typically has a current capacity of 8 Ampere-Hours (Ah). That is, an ideal 8 Ah battery can deliver 8 amps for one hour—or 4 amps for two hours, or 2 amps for four hours, etc. before fully discharging.

If an IC-706MKIIG is powered by an 8 Ah battery, it can receive for an accumulated/total time of four hours (1 A x 4 hrs. = 4 AH) and transmit 20 w SSB for a total of about 30 minutes (8 A x .5 H = 4 Ah). Alternately, it can receive for six hours and transmit for about 15 minutes (6 Ah + 2 Ah). Substitute Ah figures to fit your own needs, then go portable with confidence. It's that easy!

BACKPACK HF. Thanks to custom rig carry packs with back straps, vertical antenna support loops, lower gel cell pouch and cutouts for cables, putting together your own "station in a bag" is a cinch. Have fun, and good luck "Packing" from Icom!

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Jerry Kloss, NØVOE, sure is!

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Jerry and guide dog, Kerwin.

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SP-220	222	<.9	20 Adj.	650/200W	250.00
SP-7000	70cm	<.9	20 Adj.	500/100W	250.00
SP-23	1296	<.9	18	100/10W	360.00
SP-13	2304	1.2	18	50/10W	380.00
LNA	144	<.4	18	NA	220.00
LNA	432	<.5	18	NA	220.00
SLN	1296	<.4	30	NA	290.00
SLN	2304	<.4	30	NA	290.00

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432-9WL/432-13WL	$175/229
440-18/440-21ATV	$125/145

Satellite Antennas

2MCP14/2MCP22	$175/229
436CP30/436CP42UG	$229/269

ROHN TOWER

25G/45G/55G	$89/189/239
25AG2/3/4	$109/109/139
45AG2/4	$209/225
AS25G/AS455G	$39/89
BPC25G/45G/55G	$75/99/110
BPL25G/45G/55G	$85/109/125
GA25GD/45/55	$68/89/115
GAR30/GAS604	$35/24
SB25G/45/55	$39/89/109
TB3/TB4	$85/99

Please call for more Rohn prices

US TOWER

MA40/MA550	$849/1399
MA770/MA850	$2359/3649
TMM433SS/HD	$1139/1379
TMM541SS	$1499
TX438/TX455	$979/1579
TX472/TX489	$2459/4579
HDX538/HDX555	$1269/2269
HDX572MDPL	$5899

Please call for help selecting a US Tower for your needs. Shipped factory direct to save you money!

COMET ANTENNAS

GP15, 6m/2m/70cm Vertical	$149
GP6, 2m/70cm Vertical	$139
GP9, 2m/70cm Vertical	$179
B10NMO, 2m/70cm Mobile	$36
SBB224NMO, 2m/220/70cm	$69
SBB2NMO, 2m/70cm Mobile	$39
SBB5NMO, 2m/70cm Mobile	$55
SBB7NMO, 2m/70cm Mobile	$75
Z750, 2m/70cm Mobile	$55
Z780, 2m/70cm Mobile	$69

Much more Comet in stock–call

M2 ANTENNAS

50–54 MHz

6M5X/6M7	$209/299
6M7JHV/6M9KHW	$259/469

HO LOOPS

6M/2M/222/432	$95/45/45/45

HF ANTENNAS

10/15M4DX, 4 Element	$389/439
20M4DX, 4 Element 20m	529
KT36XA, Triband Beam	$1249

More M2 models in stock–please call

GLEN MARTIN ENGINEERING

Hazer Elevators for 25G

H2, Aluminum Hazer, 12 sq ft	$359
H3, Aluminum Hazer, 8 sq ft	$269
H4, HD Steel Hazer, 16 sq ft	$339

Aluminum Roof Towers

RT424, 4 Foot, 6 sq ft	$159
RT832, 8 Foot, 8 sq ft	$239
RT936, 9 Foot, 18 sq ft	$389
RT1832, 17 Foot, 12 sq ft	$519
RT2632, 26 Foot, 9 sq ft	$869

UNIVERSAL ALUMINUM TOWERS

4-40'/50'/60'	$539/769/1089
7-50'/60'/70'	$979/1429/1869
9-40'/50'/60'	$759/1089/1529
12-30'/40'	$579/899
15-40'/50'	$1019/1449
23-30'/40'	$899/1339
35-30'/40'	$1019/1569

Bold in part number indicates windload capacity. Please call for other Universal models. Shipped factory direct to save you money!

DIAMOND ANTENNAS

D130J/DPGH62	$79/139
F22A/F23A	$89/119
NR72BNMO/NR73BNMO	$39/54
NR770HBNMO/NR770RA	$55/49
X200A/X3200A	$129/210
X500HNA/X700HNA	$229/369
X510MA/X510NA	$189/189
X50A/V2000A	$99/149
CR627B/SG2000HD	$99/79
SG7500NMO/SG7900A	$75/112

More Diamond antennas in stock

MFJ

259B, Antenna Analyzer	$219
269, Antenna Analyzer	$299
941E, 300W Antenna Tuner	$109
945E, 300W Antenna Tuner	$99
949E, 300W Antenna Tuner	$139
969, 300W Antenna Tuner	$169
986, 3KW Antenna Tuner	$289
989C, 3KW Antenna Tuner	$309
1798, 80–2m Vertical	$249
1796, 40/20/15/10/6/2m Vert.	$189

Big MFJ inventory–please call

COAX CABLE

RG-213/U, (#8267 Equiv.)	$.36/ft
8X-MINI, Mini RG-8 Foam	$.19/ft
RG-213/U Jumpers	Please Call
RG-8X Jumpers	Please Call

Please call for more coax/connectors

TIMES MICROWAVE LMR® COAX

LMR-400	$.59/ft
LMR-400 Ultraflex	$.89/ft
LMR-600	$1.19/ft
LMR600 Ultraflex	$1.95/ft

TOWER HARDWARE

3/8"EE / EJ Turnbuckle	$11/12
1/2"x9"EE / EJ Turnbuckle	$16/17
1/2"x12"EE / EJ Turnbuckle	$18/19
3/16" / 1/4" Preformed Grips	$5/6

Please call for more hardware items

HIGH CARBON STEEL MASTS

5 FT x .12" / 5 FT x .18"	$35/59
10 FT x .18" / 11 FT x .12"	$129/80
16 FT x .12" / 16 FT x .18"	$119/179
20 FT x .25	$315
22 FT x .12" / 21 FT x .18"	$149/235

GAP ANTENNAS

Challenger DX	$289
Challenger Counterpoise	$29
Challenger Guy Kit	$19
Eagle DX	$299
Eagle Guy Kit	$29
Titan DX	$329
Titan Guy Kit	$29
Voyager DX	$409
Voyager Counterpoise	$49
Voyager Guy Kit	$45
Quick Tilt Ground Mount	$75

LAKEVIEW HAMSTICKS

9106 ... 6m	9115 ... 15m	9130 ... 30m
9110 ... 10m	9117 ... 17m	9140 ... 40m
9112 ... 12m	9120 ... 20m	9175 ... 75m

All handle 600W, 7' approximate length, 2:1 typical VSWR ... $24.95

HUSTLER ANTENNAS

4BTV/5BTV/6BTV	$129/169/199
G6-270R, 2m/70cm Vertical	$169
G6-144B/G7-144	$109/179

Hustler Resonators in stock–call

ANTENNA ROTATORS

M2 OR-2800PDC	$1249
Yaesu G-450A	$249
Yaesu G-800SA/DXA	$329/409
Yaesu G-1000DXA	$499
Yaesu G-2800SDX	$1089
Yaesu G-550/G-5500	$299/599

ROTATOR CABLE

R62 (6, #18)	$.32/ft.
R81/82	$.25/.39
R84	$.85/ft

PHILYSTRAN GUY CABLE

HPTG1200I	$.45/ft
HPTG2100I	$.59/ft
PLP2738 Big Grip (2100)	$6.00
HPTG4000I	$.89/ft
PLP2739 Big Grip (4000)	$8.50
HPTG6700I	$1.29/ft
PLP2755 Big Grip (6700)	$12.00
HPTG11200	$1.89/ft
PLP2758 Big Grip (11200)	$18.00

Please call for more info or help selecting the Phillystran size you need.

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HUGE ICOM DEALS ★ HUGE YAESU DEALS

IC-756PRO2 ..... In Stock!

The Icom IC-756 PRO2 is an all mode HF and 6m transceiver featuring 32-bit digital signal processing, automatic antenna tuner, 100 watts RF output, digital twin PBT, 5" multifunction color TFT LCD display with band scope function, built-in CW and SSB memory keyers, and more. Supplied with a hand mic and DC power cord.

PW-1 ..... New Lower Price!

The Icom PW-1 is a 1000 watt solid state linear amplifier for HF and 6m operation, featuring a high power automatic antenna tuner, built-in power supply, and a removable front control panel, and more.

IC-746PRO ..... In Stock!

The Icom IC-746PRO is an all mode HF/6m/2m trasceiver with 32-bit IF level DSP. The radio features a built-in auto tuner, built-in RTTY demodulator and decoder (reads out on the radio's LCD display), auto notch, digital twin PBT, and more. Supplied with up/down hand mic and DC power cord.

IC-910H ..... In Stock!

All-mode 2m/70cm dual band transceiver, featuring dual data inputs, CTCSS encode/decode, CW keyer, satellite mode, scan, sweep display function, optional 23cm module, optional DSP, and more. Supplied with up/down hand mic and DC power cord.

FT-1000MP-V ..... Yaesu Special!

Competition class HF DSP transceiver with auto tuner, 200 Watts RF output, and more!

FT-1000MP-V Field ..... New!

Low power (100W) version of the FT-1000MP-V, with built-in power supply.

FT-920 ..... Yaesu Special!

All mode HF/6m XCVR featuring DSP, auto tuner, built-in power supply, and more. With up/down hand mic and DC power cord.

Quadra System ... Lower Price!

Solid state 1 kW autotuning amplifier.

FT-897 ..... Now In Stock!

"Backpack" all-mode HF/6m/2m/70cm XCVR offering 100 watts of output power! The radio can be run from optional internal batteries with reduced output of 20 watts, or an optional internal power supply can be installed instead. An optional bolt-on external auto tuner is also available. The FT-897 is a truly self-contained portable!

FT-847 ..... Yaesu Special!

Great all-mode XCVR covering HF/6m/2m/70cm! The radio is perfect for satellite operation, and features DSP, CTCSS tone encode/decode, and more. Supplied with up/down microphone and DC power cord.

IC-706MK2G ..... Icom Special!

The Icom IC-706MK2G is a compact HF/6m/2m/70cm all mode transceiver with digital signal processing, automatic repeater offset, built-in CW keyer, built-in CTCSS tone encode/decode/scan, 107 memory channels and more. A detachable front panel offers convenient mounting, even in compact vehicles.

IC-718 ..... New Lower Price!

The Icom IC-718 is an all mode HF transceiver featuring a front panel mounted speaker, IF shift, optional DSP module, multiple scanning modes, noise blanker, RIT, and more.

IC-2720H ..... New!

Dual band 2m/70cm FM XCVR. Features removeable control panel, CTCSS tone encode/decode/scan, cross band repeat, 1200/9600 bps data jack, dual RX, extended RX, 212 memory channels, and more. Supplied with DTMF hand microphone, mounting brackets, and power cord.

IC-V8000 ..... New, In Stock!

Great 75W 2m mobile XCVR. Features CTCSS tone encode/decode/scan, 207 memories, front panel mounted speaker, and more. Supplied with a DTMF hand mic, mounting bracket, and DC cord.

FT-8900R ..... New, In Stock!

Quad band mobile XCVR covers 10m/6m/2m/70cm, with cross-band repeat.

FT-90R ..... Great Low Price!

Ultra-compact 2m/70cm mobile XCVR.

FT-2600M ... New Lower Price!

Rugged 2m mobile, built to MIL-STD 810.

FT-7100M ..... Great Low Price!

Great 2m/70cm dual band mobile, 45/35 Watts, removable front panel, and more!

FT-100D ..... Yaesu Special!

Ultra-compact all mode XCVR for HF/6m/2m/70cm.Features DSP, CW memory keyer, tone encode/decode, 200 memories, VOX, and more. Supplied with a DTMF hand mic, DC power cord and mounting bracket.

FT-817 ..... Now In Stock!

A truly tiny self-contained all mode HF/6m/2m/70cm QRP XCVR featuring tone encode/decode, 200 memories, VOX, and more! With hand mic, DC cord and bracket.

IC-T7H ..... Icom Special!

Small 6W 2m/70cm, with full CTCSS tone.

IC-T2H Sport ..... Great Price!
IC-Q7A ..... Icom Special!
IC-V8 ..... New!
IC-W32A ..... In Stock!

IC-207H ..... Great Low Price!

A great 2m/70cm dual band mobile XCVR, featuring CTCSS tone encode/decode, 182 memories, removable control panel, and more. With a back-lit DTMF hand mic, mounting bracket, and a DC power cord.

IC-2100H ..... Great Low Price!

Rugged 2m mobile XCVR with CTCSS tone encode/decode/scan, DTMF paging/squelch, 113 memory channels, and more.

IC-PCR1000 ..... Icom Special!
IC-R8500/R75 ..... In Stock!
IC-R2/R3/R10 ..... In Stock!

G-2800DXA $1089

Heavy duty antenna rotator handles 34 sq. ft. of antenna load, and features 450° rotation, preset and variable speed.

G-1000DXA $499
G-800SA/DXA $329/409
G-450A $249
G-5500 ..... $599
G-550 ..... $299

FT-50RD ..... New Lower Price!
VR-120 ..... Yaesu Special!
VR-500 ..... Yaesu Special!
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VX-5R ..... Yaesu Special!
VX-150 ..... Yaesu Special!
VX-7R ..... Now In Stock!

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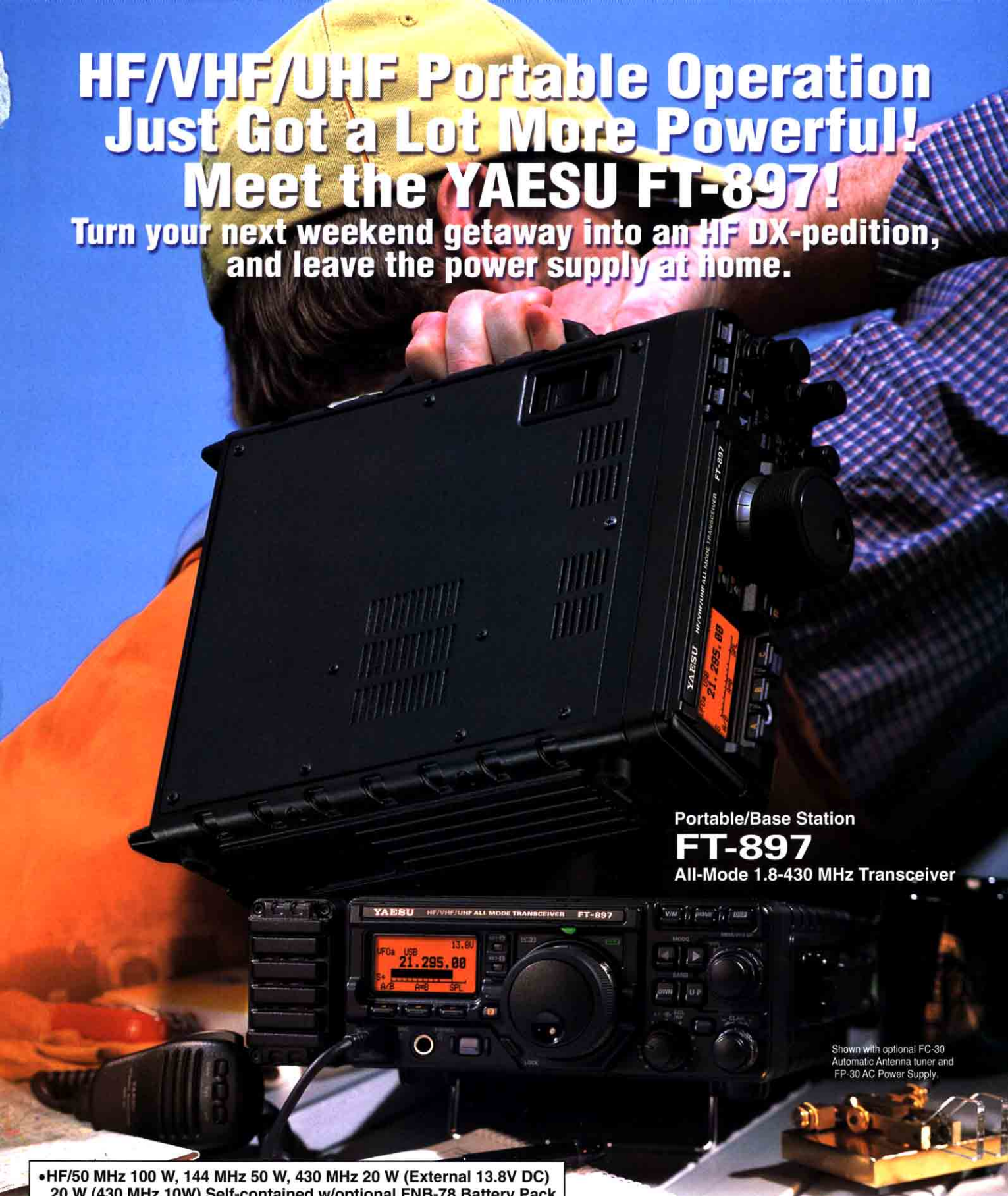

Portable/Base Station

FT-897

All-Mode 1.8-430 MHz Transceiver

Shown with optional FC-30 Automatic Antenna tuner and FP-30 AC Power Supply.

- **HF/50 MHz 100 W, 144 MHz 50 W, 430 MHz 20 W (External 13.8V DC) 20 W (430 MHz 10W) Self-contained w/optional FNB-78 Battery Pack**
- **SSB/CW/AM/FM/Digital Modes**
- **Optional FP-30 Internal Power Supply and FC-30 Antenna Tuner**
- **Built in DSP**

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Specifications subject to change without notice. Some accessories and/or options may be standard in certain areas. Frequency coverage may differ in some countries. Check with your local Yaesu Dealer for specific details.

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TM-331A
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TM-742AD/642AD
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TM-G707A
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TM-V7A
2 meters & 440 MHz

TM-D700A
2 meters & 440 MHz

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HF All Mode or HF + 6m All Mode

TS-870S w/DSP
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TS-B2000
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