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THE RADIO AMATEUR'S JOURNAL

KENWOOD

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NEW! Computer Interface!

"DX-cellence!"

TS-940S

The new TS-940S is a serious radio for the serious operator. Superb interference reduction circuits and high dynamic range receiver combine with superior transmitter design to give you no-nonsense, no compromise performance that gets your signals through! The exclusive multi-function LCD sub display graphically illustrates VBT, SSB slope, and other features.

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- **High stability, dual digital VFOs.** An optical encoder and the flywheel VFO knob give the TS-940S a positive tuning "feel."
- **Graphic display of operating features.** Exclusive multi-function LCD sub-display panel shows CW VBT, SSB slope tuning, as well as frequency, time, and AT- 940 antenna tuner status.
- **Low distortion transmitter.** Kenwood's unique transmitter design delivers top "quality Kenwood" sound.
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- **Built-in FM, plus SSB, CW, AM, FSK.**
- **Semi or full break-in (QSK) CW.**
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Interface IF-232C/IF-10B

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Here Now! TM-3530A 220 MHz

Power-Full...70 Watts!

TM-2570A/2550A/2530A/3530A

Sophisticated FM transceivers

Kenwood sets the pace again! The all-new "25-Series" brings the industry's *first* compact 70-watt 2-meter FM mobile transceiver. There is even an *auto dialer* which stores 15 telephone numbers! There are four versions to choose from: The TM-2570A 70-watt, TM- 2550A 45-watt, TM-2530A 25-watt and the TM-3530A 220 MHz, 25-watt.

- **First** 70-watt FM mobile (TM-2570A)
- **First** mobile transceiver with telephone number memory and auto-dialer (up to 15 seven-digit phone numbers)
- Direct keyboard entry of frequency
- Automatic repeater offset selection—**a Kenwood exclusive!**
- Extended frequency coverage for MARS and CAP (142-149 MHz; 141-151 MHz modifiable)
- 23 channel memory for offset, frequency and sub-tone
- Big multi-color LCD and back-lit controls for excellent visibility
- Front panel programmable 38-tone CTCSS encoder **includes 97.4 Hz** (optional)
- 16-key DTMF pad, with audible monitor
- Center-stop tuning—**another Kenwood exclusive!**
- Frequency lock switch
- **New** 5-way adjustable mounting system
- **Unique** offset microphone connector —relieves stress on microphone cord
- High performance GaAs FET front end receiver
- HI/LOW Power switch (adjustable LOW power)
- TM-3530A covers 220-225 MHz
- Digital Channel Link (optional)

Large heatsink with built-in cooling fan (TM-2570A)

DCL **Introducing... Digital Channel Link**

Compatible with Kenwood's DCS (Digital Code Squelch), the DCL system enables your rig to **automatically** QSY to an open channel. Now you can automatically switch over to a simplex channel after repeater contact! Here's how it works:

The DCL system searches for an open channel, remembers it, returns to the original frequency and transmits control information to another DCL-equipped station that switches **both** radios to the open channel. Microprocessor control assures fast and reliable operation. The whole process happens in an instant!

Actual size front panel

Optional Accessories

- **TU-7** 38-tone CTCSS encoder
- **MU-1** DCL modem unit
- **VS-1** voice synthesizer
- **PG-2K** extra DC cable
- **PG-3A** DC line noise filter
- **MB-10** extra mobile bracket
- **CD-10** call sign display
- **PS-430** DC power supply for TM-2550A/2530A/3530A
- **PS-50** DC power supply for TM-2570A
- **MC-60A/MC-80/MC-85** desk mics.
- **MC-48** extra DTMF mic. with UP/DWN switch
- **MC-42S** UP/DWN mic.
- **MC-55** (8-pin) mobile mic. with time-out timer
- **SP-40** compact mobile speaker
- **SP-50** mobile speaker
- **SW-200A/SW-200B** SWR/power meters
- **SW-100A/SW-100B** compact SWR/power meters
- **SWT-1** 2m antenna turner

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Dependable Duo!

TS-830S HF transceiver.

The "Pacesetter" has become a legend in DX and contest circles.

- Covers all 10 Amateur bands (50 kHz extended coverage).
- Wide receiver dynamic range, Junction FETs in the balanced mixer, MOSFET RF amplifier at low level, and dual resonator for each band.
- Variable bandwidth tuning (VBT). Varies IF filter passband width.
- Notch filter high-Q active circuit in 455-kHz second IF.
- Noise-blanker threshold level control.
- IF shift (passband tuning).
- 6146B final with RF negative feedback. Runs 220 W PEP (SSB)/180 W DC (CW) input on all bands.
- Built-in RF speech processor.
- SSB monitor circuit.
- Built-in digital display, (fluorescent tube), with analog dial.
- Narrow/wide filter selection on CW.
- RIT and XIT (transmitter incremental tuning).

Optional accessories:

- VFO-230 external digital VFO with five memories, digital display.
- VFO-240 external analog VFO.
- AT-230 antenna tuner/SWR/power meter.
- SP-230 external speaker.
- YG-455C (500 Hz) or YG-455CN (250 Hz) CW filter for 455 kHz IF.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter for 8.83 MHz IF.
- KB-1 deluxe heavyweight knob.

TS-530SP HF transceiver.

This "Cents-ational" HF transceiver is recognized worldwide for superior and dependable performance.

- 160-10 meters, LSB, USB, CW, all Amateur frequencies, including new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.
- Built-in digital display (six digits, fluorescent tubes), with analog dial.
- Narrow/wide filter selector switch for CW and/or SSB.
- Built-in speech processor, for increased talk power.
- IF shift tunes out interfering signals.
- Wide receiver dynamic range, with greater immunity to overload.
- Two 6146B's in final, allows 220 W PEP/180 W DC input on all bands.
- Advanced single-conversion PLL, for better stability, improved spurious characteristics.
- Adjustable noise-blanker, with front panel threshold control.
- RIT/XIT front panel control allows independent fine-tuning of receive or transmit frequencies.

Optional accessories:

- SP-230 external speaker with selectable audio filters.
- VFO-240 remote analog VFO.
- VFO-230 remote digital VFO.
- AT-230 antenna tuner/SWR/power meter.
- MC-50 desk microphone.
- KB-1 deluxe VFO knob.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter.
- YK-88SN (1.8 kHz) narrow SSB filter.

More information on the TS-830S and TS-530SP is available from authorized Kenwood dealers.

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CQ The Radio Amateur's Journal

ON THE COVER: CQ's Dick Ross, K2MGA, is shown taking full advantage of perfect antenna weather by tightening a few bolts on his beam. Photo by Larry Mulvehill, WB2ZPI

AUGUST 1986 **VOL. 42, NO. 8**

FEATURES

DEPARTMENTS

Zero Bias

AN EDITORIAL

Sometimes it's hard to explain to people or even to realize yourself that times have changed and are continuing to change. It's called the life process, and obviously it's hard to take an objective look at it when you're actively involved with it.

The times have changed with regard to the advent of the Novice license in the early '50s. WW II was over, and the Korean conflict was smoldering on. Surplus abounded, and there were probably more 522's on 2 meters than Gonset Communicators. At this point some of us are probably reflecting on those "good old days," and some of us just have a blank, puzzled look on our faces trying to figure out what a 522 is or was, let alone what a Gonset Communicator is or was. Today if you mentioned that you were running a 522, people would assume (and rightly) that whatever it was, it was manufactured by one of the big three and had a microprocessor, umpteen memories, and loads of bells and whistles. It's hard to explain.

That era was also the transition point for those growing up in a home with TV and those without TV. Prior to the time when every home had at least one TV set, there was something called *radio*. Radio offered not only music, but drama, comedy, quiz programs, and general entertainment. The only thing missing was pictures. You had to imagine what was going on and what the people looked like. If you wanted pictures, you went to the movies. Radio was an ideal medium for spawning amateur radio operators.

This is in a way trying to establish some sort of frame of reference. Those days are gone. Gone, too, are the hallowed halls of high school where future amateurs trod wearing log-log-decitrig slide rules on their belts alongside the leather mechanical pencil holders. It was rumored that some people even knew how to use those slide rules. There wasn't too much in the way of extracurricular activities besides sports (amateurs tended to be more cerebral and non-athletic), so if there was an amateur radio club, it certainly looked a heck of a lot more appealing than the Latin Honor Society. This of course predates all of the cultural enrichment programs available today. The only thing from that era that seems to be the same today, not having aged a bit, is Dick Clark.

Well, today, when we are all interested in preserving the future of amateur radio, most of us agree that we need an infusion of youth. This is not to say that we don't need everyone else who may be or could be interested in amateur radio. Young people today respond to a different frame of reference than in our day, and it's a bit futile at this point to try and clone ourselves. There are far more things to attract young people and occupy their time than we ever dreamed of. The high school student of today may not have the slide rule dangling from his belt; instead he or she may be carrying a mini pocket computer. The youngster who eventually may become interested in amateur radio may not even have any interest in science or dreams of an engineering career. Believe it or not, amateur radio may look like fun and an interesting thing to do for its own sake. Some people can be attracted to amateur radio without it becoming an obsession or compulsion. It's just something else the person does and enjoys as an adjunct to everyday living.

By the way, the same thing holds true for any age group we wish to interest in amateur radio. The person who hears about amateur radio for the first time probably doesn't know what amateurs do, and probably the only frame of reference that exists to them is CB. Is it the same? How is it different? Can you answer those questions without spending a great deal of time casting aspersions on both CB and CBers? We know it isn't the same thing. Why not just say no and go on to what it is? Why not pick out similarities as some sort of basis for understanding what it is that both services do or are supposed to do? You could even answer the question with a yes. They are similar to the extent that both CB and amateur radio involve talking to other people. The main thing is that you are communicating something to someone using their frame of reference. It doesn't do much to start off telling them about the 87 major controls and the 32 lesser controls on the new "XK Zomer" with 1598 memories included.

If there was a bumper sticker out there that said, "Ask Me About Amateur Radio" and you had one on your car, what would you say to someone who actually asked you? Those of you who have call-letter license plates must on occasion be asked what they mean. After all, it's too hard to pronounce. What do you say? We as individuals are the front line information source as to what amateur radio is all about. Our attitude and our willingness to help, again as individuals, will do more to increase the amateur population than any group effort.

What you say obviously should be within the context of what the person (of whatever age) understands. After all, it took considerable time for you to learn what you think you know. Frame it in a positive way so as to pique someone's curiosity. Are you prepared to be an Elmer? Sending someone to a club can prove to be a big turnoff as they are shunned by some old-timers who really want to keep things as they are. Are you willing in a sense to pay back for the time and effort someone put into you to get you where you are today? It's not an easy job, but think about it.

Another Secret Boon

Besides amateur radio as a best-kept secret, there exists within the US government another secret. This secret, however, is really out there in plain sight. I'm talking about the United States Government Printing Office. Not only do they have regional offices where you can go in anytime and browse through about 15,000 titles on just about anything you can think of, but they are currently involved in a new awareness program to make sure that you know they exist. The books are priced remarkably low and cover a multitude of interests. If you would like a copy of their new catalog featuring over 1000 titles, write to: New Catalog, P.O. Box 37000, Washington, DC 20013. Best of all, this new catalog is absolutely FREE. The catalog also tells you where you may be able to find a regional store near you.

I2MPQ Visits CQ

We had a visitor the other day, Mario Ambrosi, I2MQP. Mario is the Awards Director for the Associazione Radioamatori Italiani (ARI), the Italian equivalent of our ARRL. Mario was in this country on business and came to *CQ* to interview me for their magazine, *RadioRivista*. Mario is very involved with awards, DXing, and contesting. After our interview we had a long leisurely lunch (I have to admit I do like that custom.) and we talked about US amateurs and Italian amateurs in general. If you set aside the language barrier, we're pretty much the same with the same problems of growth, getting young people interested in amateur radio, and overcoming the "I've Got Mine" club. It turns out that there aren't as many Italian amateurs as I thought, but Mario offered, "Perhaps they're all on at the same time."

73, Alan, K2EEK

RS-232 Compatible

Goodbye to Packet Only Controllers

PAKRATT ™ Model PK-232

Late last year AEA broke new ground by introducing the first five mode amateur radio computer interface with Morse, Baudot, ASCII, AMTOR, and Packet...the PK-64. Now AEA has another breakthrough....the PK-232.

Five Mode Versatility

The PK-232 makes any RS-232 compatible computer or terminal the complete Amateur digital operating position. By using a simple terminal program any computer with a standard RS-232 I/O can connect directly to the PK-232 and be ready for operation in minutes. The internal autobaud program allows 300, 1200, 2400, 4800, and 9600 baud communication between the computer and the PK-232. All decoding, signal processing, and protocol software, for Morse, Baudot, ASCII, AMTOR, and Packet, is on ROM in the PK-232. The PK-232 is a Z-80A based system and has hardware HDLC using the Zilog 8530 SCC. The internal modem of the PK-232 can transmit Packet at baud rates of 300 and 1200, with the option of using an external modem for 2400, 4800, and 9600 baud.

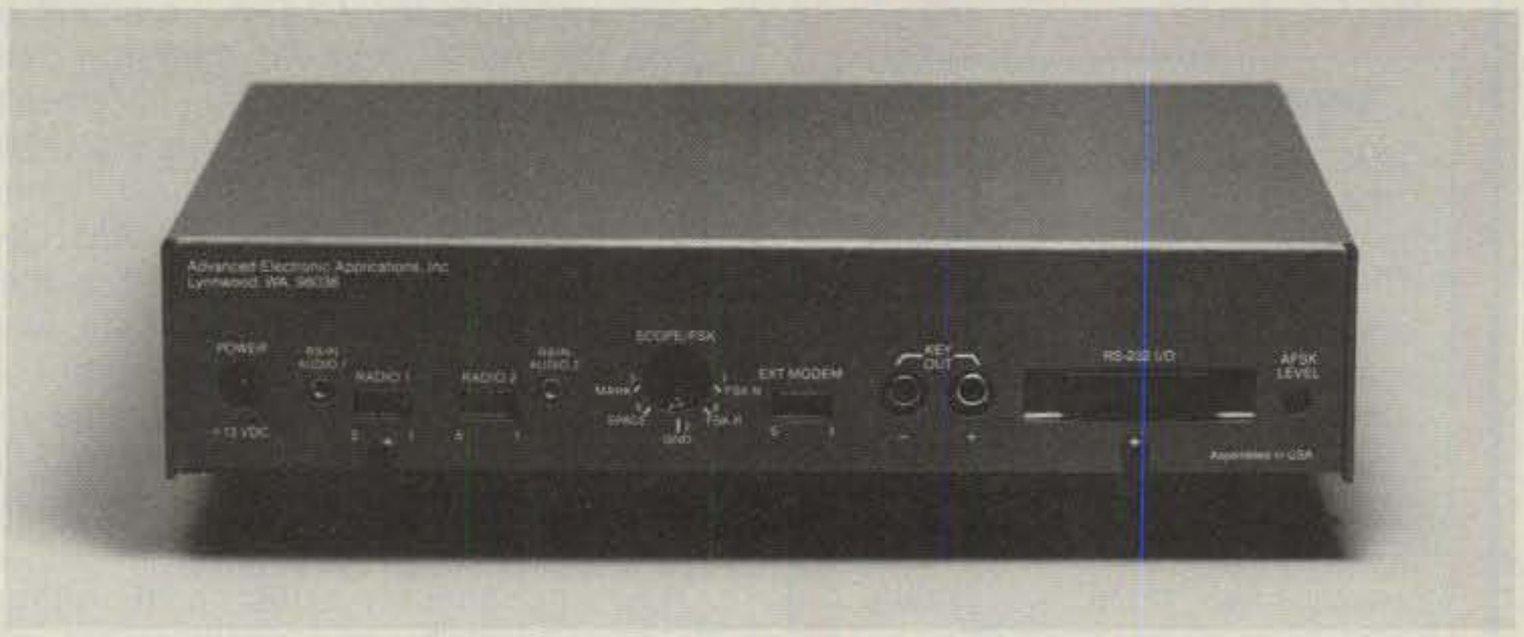
Prices and specifications subject to change without notice or obligation

An Operators Dream

With twenty-one front panel indicators it's easy to monitor operation. Separate indicators show operating mode, current operating status, and data carrier detect. A front panel switch allows selection of two separate radio connectors, no more switching cables when jumping from HF to VHF. The front panel threshold control adjusts squelch for both HF and VHF. The AEA standard discriminator style tuning indicator makes tuning easy in any mode and on any band.

Serious VHF/HF/CW Modem

The PK-232 also includes a no compromise VHF/HF/CW modem with an eight pole bandpass filter followed by a limiter discriminator with automatic threshold correction. Once the operating mode is selected the modem automatically selects the proper bandwidth, 200 hz for CW, 450 Hz for HF, or 2600 Hz for VHF. Transmitter tones are low distortion sine wave phase continuious AFSK. The PK-232 will receive wide shift RTTY signals, but only transmits 200 Hz shift on HF.



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Our Readers Say:*

No QRM, Maybe No Hobby

Editor, *CQ*:

Hugh Cassidy's DX column in the May 1986 issue contained some excerpts from a paper presented by NZART at the 6th IARU Region III conference. Basically, the paper was an attack on DXing and DXpeditions. While Cass parried the attack with his usual aplomb, I think the NZART paper represents a level of intolerance becoming all too frequent amongst amateurs. The real complaint is that DXing causes QRM. Contests also cause QRM. Certainly all of us at one time or another have been bothered by QRM from a DX pileup or a contest. Getting rid of those two activities would get rid of all that QRM, right?

Seems we hear that very cry at every sunspot minimum. With everybody crowded into one or two bands, it is natural to expect QRM levels to increase. But if we set a goal to reduce QRM by deleting contests and DXing, why not do it right and get rid of ragchewing, too. Who hasn't been bothered by the QRM from a couple of guys just chewing the rag? At least contests usually limit themselves to weekends, and DXers tend to hang out at the low end of the band. But ragchewers are everywhere, high and low, and they don't rest during the week. If we could get rid of ragchewing, think how clean the bands would be! And if we were to judge amateur activities by merit, I certainly would have trouble placing discussions of hernia operations ahead of working a contest or yelling in a pileup.

But why stop there? Other causers of QRM abound. It has been said that nets often just start up on a frequency even if there is already someone there. Get rid of them, too! How about all those funny sounds we hear: RTTY, SSTV, AMTOR, etc.? Most of us secretly believe that those modes never communicate with anyone; they just get on there to cause QRM. Since no one knows what they are saying anyway, they can QRM with total impunity, right? Out the door with them, too.

Let's not limit our quest to HF, either. Ever get near a big metropolitan area and key up the mic only to hear about 6 repeaters all ID back at you? What a mass of QRM. Let's scrap all repeaters!

So what is safe? Moonbounce, perhaps. No, I saw a QSL card once proclaiming the EME equipment was "2 × 8877 1kw—HI!" (And this from a country where a single 8877 would be illegal.) Since it is a well-known fact that high power causes QRM, we should disallow moonbounce also. In fact, we could just about leave those hardy few emergency-preparedness types, who never get on the air until disaster strikes. Of course, with all those frequencies not in constant use, it might be a little hard to keep any ham bands at all, but I guess we would have to make some sacrifices to rid the bands of QRM.

On the serious side, ALL transmitting activities cause someone QRM. QRM is the end result of using our ham bands, of enjoying our hobby. While none of us likes QRM, we must all learn to accept it as part of the game (as long as it is not deliberate QRM, of course). There will always be ragchewers; there will always be contesters and DXers. Being intolerant of another amateur's activities is no way to enhance your own preferences.

I think the NZART paper shows not only a gross intolerance for the activities of other amateurs, but presents a narrow-minded approach which can only be divisive to amateur radio. I think the authors of the NZART paper owe radio amateurs an apology, although I personally will accept a well-executed DXpedition to Peter I Island.

Dan Robbins, KL7Y
President, Alaska DX Association
Wasilla, AK

C6A Land—"No Problem"

Editor, *CQ*:

I enjoyed reading the article "It's Better in C6 Land" in the June issue. I hold a /C6A license. My XYL and I go to the Grand Bahama Island every year, and this past October I took my Yaesu FT757 GX and a 12 foot 3 band ¼ wave sloper antenna with me. It was great fun and very inexpensive. The only thing that differs between N4IFD/C6A and my trip was that I didn't have to leave a deposit on my gear and didn't have any problems at all bringing my equipment into this country. The only question asked of me was if I was going to take my gear back with me. I said yes, and that was it. So as they say in the Bahamas, "No problem." Hi Hi.

So keep up the good work, *CQ*, and I'll be looking forward to the next issue.

Charles E. Curtis, KA8OFP
New Lebanon, OH

CQ encourages its readers to send in for publication letters expressing your opinions, ideas, etc. We will print them as space permits, and we reserve the right to choose material as we see fit. Please address all correspondence to "Our Readers Say" care of CQ.

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CALL YOUR HAM DEALER AND SAY "SANTEC ST-20T please...."

You'll love the performance and the price!

Why say "Santec ST-20T" over all the 'others'? Because of the easy-to-program functions, features and benefits that the other guys don't have. Some of the other handhelds have copied some of the ST-20T features but no other handheld has all of our features. Santec was truly the first ham radio with the 'Battery Saver' feature. Santec is still the only handheld to offer the 24 Hour clock function. The SANTEC ST-20T is the ONLY HANDHELD with autodial of two seven digit telephone numbers (including star and pound). The ST-20T has opted for compatibility with other widely used battery and accessory styles while retaining our own individual styling and performance. Programs with one finger! Warranty coverage is the standard of the industry: 90 Days plus the Encomm, Inc. extended service period of two years AT NO EXTRA CHARGE TO THE END USER! Our service staff is the finest in the business and our customer service attitude the friendliest around. So do call your favorite ham radio dealer and say "I'd like a Santec ST-20T please . . ." you'll be glad you did.

- AUTO-DIALER and two seven-digit memories for phone numbers. Not an option!
- OFFSETS PROGRAMMABLE for M.A.R.S. and C.A.P. Program different offset into each memory.
- TEN MEMORIES for frequency, offset amount and direction, and subtone. Program any tone into any memory channel.
- EASY PROGRAMMING and operation. Use one hand (or one finger) to program.
- AUTOMATIC ENTRY OF STANDARD OFFSET AMOUNT. ST-20T knows the standard offset is 600KHz.
- FREQUENCY COVERAGE: 142–150.995 MHz.
- FOUR MODES OF SCAN.
- 24-HOUR CLOCK.
- SUB-AUDIBLE TONE ENCODER built in and programmable from front panel.
- LOCK OUT memories from scan.
- TOP-MOUNTED S-METER for D.Fing.
- 3.5–5 WATTS OUTPUT.
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Announcing

• **Amateur Radio Classes** – Chelsea Civil Defense will sponsor amateur radio evening classes at Chelsea High School starting September 11, 1986 for those interested in obtaining a Novice (basic level) ham license or a Technician/General license. For more information about amateur radio and classes, write to Frank Masucci, 136 Grove Street, Chelsea, MA 02150. Enclose your telephone number.

• **Grand Haven, Michigan** – The North Ottawa ARC will operate KA8USK aboard the U.S. Coast Guard Cutter *Mackinaw* as part of the Grand Haven Coast Guard Festival July 30 to Aug. 3. Suggested Frequencies: SSB 3.875, 7.265, 14.250; CW 7.050, 7.110, 14.050. Time 1700–0100Z. For Commemorative Certificate send QSL and 9 × 12 SASE (39¢) to NOARC, Box 44, Ferrysburg, MI 49404.

• **Columbus ARA Special Event** – From Aug. 1–17 the CARA will sponsor a special event from the Ohio State Fair. Anyone contacting W8TO on 80 through 10 meters, 11 a.m. to 9 p.m., is eligible for an award. Exchange is name, QTH, and RST. Send log extract or QSL and SASE to W8TO, Att: State Fiar Event Coordinator, 280 East Broad St., Columbus, OH 43215.

• **Canton, OH** – The Pro-Football Hall of Fame Greatest Weekend will be celebrated by the Canton ARC, W8AL. Operation on Aug. 2–3 from 1700–2200Z each day on SSB 14.270, 7270; CW 14.060, 7060. QSL card is available for all contacts. Send SASE to Randy Phelps, KD8JN, 1226 Delverne Ave., SW, Canton, OH 44710.

• **Oshkosh, Wisconsin** – The Fox Cities ARC will operate W9KKK 1300–2200Z Aug. 2–3 in conjunction with the 34th annual EAA International Fly-in Convention and Sport Aviation Exhibition. Suggested frequencies: 3.875, 7.250, 14.250. Send QSL and SASE via Dick Roll, W9TA, 933 Melissa St., Menasha, WI 54952.

• **Akron, Ohio** – "I Talked Derby." The Cuyahoga Falls ARC will have a special events station at Derby Downs, Akron, Ohio, for the All American Soap Box Derby, Aug. 7–8 from 2200–0300Z and Aug. 9 from 1300–1900Z. Evening frequencies are 7.250 ± and 3.940 ±; daytime frequencies are 7.250 ± and 14.270 ±. Call W8VPV. For an 8 × 10 certificate, send a 9 × 12 SASE with suitable postage to W8VPV, P.O. Box 614, Cuyahoga Falls, OH 44222. (Send by 9-15-86.)

• **CRAQ QSO Party** – Aug. 9 from 1800 UTC to 1800 UTC Aug. 10. Frequencies: 7080 kHz and 14280 kHz. Mode: CW and phone. QSL: A certificate confirming the QSO will be available. Operators are asked to send 5 IRCs with their own QSL to CRAQ, P.O. Box 2341, Quebec, Que., Canada, G1K 7P5.

• **Harmony, New Jersey** – The Penn-Jersey ARC will operate W2SJT to honor the Oxford Furnace from 1600 UTC on Aug. 9 until 1600 UTC Aug. 10. Operation will be on 2m, 450, and all HF bands. For certificate send QSL and 3 stamps (66 cents) to Ron Semonche, WB2TOJ, 263 W. Carlton Ave, Washington, NJ 07882.

• **Rochester, Minnesota** – The IBM Radio Club will operate special event station WDØGNK on

Aug. 16 to celebrate the 30th anniversary of the IBM Corp. in Rochester. Operation will be from 1400–2100Z at 14.240, 7.280 phone, 7.140 CW, and 146.22/82. Certificate for QSL and SASE via WD0GNK, IBM Radio Club, IBM Corp., Department 868, Highway 52 North, Rochester, MN 55901.

• **KC0CP from Oelwein, Iowa** – The Great Plains ARC will have a special-event station Aug. 16–17 in conjunction with Railroad Days in Oelwein, Iowa. Bands used will be 20 m at 14.235 + or −10 QRM, 40 m at 7.235 + or −- QRM, and 80 m at 3.970 + or −10 QRM. The call used will be KC0CP. For certificate send SASE and QSL to KC0CP, Box 203, Oelwein, Iowa 50662.

• **Waterford, Connecticut** – The Tri-City ARC will operate special event station KA1BB from the Waterford, CT I-95 weigh station. Mobile operators are especially encouraged to call. Operation will be from 1700Z Aug. 30 through 2300Z Sept. 1 on 14.295, 7.245, and 3.395 MHz phone and on 7.130 MHz CW. Talk-in to coffee stop on FM-146.52 direct and CB channel 19. QSL via Tri-City ARC, P.O. Box 686, Groton, CT 06340.

• **Old Pueblo Radio Club Special Event** – The Old Pueblo Radio Club will hold its 5th annual special event station from the OK Corral at Tombstone, AZ. W7GV will operate from 1300 UTC Aug. 30 to 2200 UTC Sept. 1. Frequencies: 21.380, 14.280, 7.280, 3.980 SSB; and 14.060, 7.130, 3.730 CW. QSL with an 8½ × 11 envelope and 40 cents postage to W7GV, P.O. Box 42601, Tucson, AZ 85733.

• **Schaumburg Septemberfest Station** – The Schaumburg ARC will operate club station WB9TXO from the grounds of the Schaumburg Septemberfest, 1600–2100Z August 31. Suggested frequencies are 7.286, 14.286, 21.386. For certificate send QSL to SARC, P.O. Box 94251, Schaumburg, IL 60194.

• **The following hamfests, etc., are slated for August:**

Aug. 2, **Upper Peninsula Hamfest**, Escanaba, MI. Contact Aileen Gagnon, WA8DHB, 9159 Bay Shore Dr., Gladstone, MI 49837.

Aug. 3, **Winchester Hamfest**, Clarke County Ruritan Fairgrounds, west of Berryville, VA. Contact Rob Kinsley, NT4S, at 703-869-5113, or SVARC, P.O. Box 139, Winchester, VA 22601.

Aug. 9, **WA9SNT ARC Swapfest**, Indianapolis, IN. Contact Dave Johnston, K9HDQ, c/o ITT Technical Institute, 9511 Angola Ct., Indianapolis, IN 46268 (317-875-8640).

Aug. 9, **Jackson County ARC Hamfest**, Ripley, WV. Contact Les Shockey, WB8SNO, RFD #2, Box 36, Sandyville, WV 25275.

Aug. 9–10, **Greater Jacksonville Hamfest & Northern Florida ARRL Section Convention**, Jacksonville, FL. Contact Jacksonville Hamfest Assn., P.O. Box 10623, Jacksonville, FL 32207 (904-350-9193).

Aug. 9–10, **Vermont, Burlington/Essex International Hamfest**, Essex Junction, VT. Contact Frank Sutter, 727 North Ave., Burlington, VT 05401 (home 802-863-5907; work 802-657-6793).

Aug. 10, **Hall of Fame Hamfest**, Louisville, OH. Contact Bill McNealy, WD8LFM, RR #1, Box 442, Bolivar, OH 44612 (216-874-3483).

Aug. 10, **Mid-Atlantic ARC Hamfest**, Warrington, PA. Contact MARC, P.O. Box 352, Villanova, PA 19085, or call Bob Josuweit, WA3PZO, 215-449-9727.

Aug. 10, **Lancaster & Fairfield County ARC Hamfest**, Lancaster, OH. Contact Lancaster ARC, Box 3, Lancaster, OH 43130.

Aug. 10. **Central Kentucky ARRL Hamfest**, Georgetown, KY. Contact Scott Hackney, KI4LE, 629 Craig Lane, Georgetown, KY 40324.

Aug. 10, **Grant County ARC Hamfest**, Marion, IN. Contact WB9EAP, Brooks Clark, 2202 South Boots St., Marion, IN 46953 (SASE).

Aug. 10, **Hamfesters Radio Club Hamfest**, Willow Springs, IL. Call 312-598-4802.

Aug. 10, **St. Cloud ARC Hamfest**, St. Cloud, MN. Contact SCARC, Box 141, St. Cloud, MN 56302.

Aug. 16, **Brantford ARC Fleamarket**, Brantford, Ontario, Canada. Contact Brantford ARC, P.O. Box 512, Brantford, Ontario, or call Gary, VE3MWL, 519-759-3354.

Aug. 16, **Electronics Extravanganza**, Brewster, NY. Contact R. Dillon, N2EFA, RFD #7, Noel Ct., Brewster, NY 10509.

Aug. 16–17, **W7DK Hamfair**, Tacoma, WA. Contact Grace Teitzel, AD7S, P.O. Box 45079, Tacoma, WA 98445, or call Eva Anderson, 206-564-8347.

Aug. 16–17, **Huntsville Hamfest**, Huntsville, AL. Contact Dave Givens at 205-883-2760.

Aug. 17, **Delmarva Hamfest**, Del. Tech Community College, west of Georgetown, DE. Contact Delmarva Hamfest, Rt. 2, Box 244G, Georgetown, DE 19947.

Aug. 17, **Tippecanoe ARA Hamfest**, Lafayette, IN. Contact Lafayette Hamfest, Rt. 1 Box 63, West Point, IN 47992.

Aug. 23, **Marshall County ARC Hamfest**, Argos, IN. Contact Bob Nellans, KB9DE, 219-892-5224.

Aug. 23, **Ramapo Mountain ARC Fleamarket**, Oakland, NJ. Contact Frank Lee, KA2ALS, 989 Crystal Lake Terrace, Franklin Lakes, NJ 07417 (SASE) (201-337-2290).

Aug. 23, **Finger Lakes Hamfest**, Trumansburg Fairgrounds, 12 miles NW of Ithaca, NY. Contact David Flinn, W2CFP, 866 Ridge Rd., Lansing, NY 14882 (607-533-4297).

Aug. 23–24, **1986 Roanoke Div. Amateur Radio Convention & Computer Fair**, Virginia Beach, VA. Contct Manny Steiner, K4DOR, 3512 Olympia Lane, Virginia Beach, VA 23452 (804-340-6105).

Aug. 23–24, **Computerfest '86**, Dayton, OH. Contact Mark Hanslip, 513-268-7225.

Aug. 24, **Bluefield Hamfest**, Brushfork Armory, 1 mile north of Bluefield, WV. Contact Jim Perdue, KC8NG, Rt. 5 Box 457, Bluefield, WV 24701.

Aug. 24, **Five County Swap-n-Shop**, Saginaw, MI. Contact Don, 517-893-3475.

Aug. 24, **Gloucester County ARC Hamfest**, Mullica Hill, NJ. Contact John, K2FJ, 609-589-2318.

Aug. 24, **CPRA Electronic Exhibit, Ham, Computerfest**, Camp Hill, PA. Contact Paul McDonnell, N3BKI, 717-697-1880 (12 noon to 8 p.m.).

Aug. 24, **St. Charles ARC Hamfest**, St. Charles, MO. Contact Eric Koch, NF0Q, 2805 Westminister, St. Charles, MO 63301 (314-946-0948).

Aug. 30–31, **Shelby Hamfest**, Shelby, NC. Contact John T. Ledford, N4GOQ, 3410 Oakcrest Dr., Shelby, NC 28150 (704-482-4507).

Aug. 31, **Lebanon Hamfest**, Lebanon, TN. Contact Mary Fanning, KA4GSB, 4936 Danby Dr., Nashville, TN 37211.

Aug. 31, **Bloomington Hamfest**, Bloomington, IN. Contact Bob Myers, K9KTH, 306 S. Fairview St., Bloomington, IN 47401 (SASE) (812-332-1105).

Sept. 7, **Fairfield County Hamfest**, Norwalk National Guard Armory, Norwalk, CT. Contact Fairfield Hamfest, P.O. Box 326, West Haven, CT 06516.

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N5RM comes up with a possible (though unlikely) new addition to the next Hy-Gain catalog. If one TH7DX Super Thunderbird antenna is good, why not have a flock of them perched on a 145 foot self-rotating tower?

The TH28DX

How To Construct (Or Think About) Four Stacked TH7DX Antennas On A 145 Foot Self-Rotating Tower

BY R.H. MITCHELL*, N5RM

When I retired a couple of years back, my wife and I contracted for a new house on our farm. That entailed 20 months of construction and pain. During the interim I was planning, designing, and working on antennas.

Originally I had intended to put up six 160 foot towers of Rohn 45 sections. The towers were to be arranged in a hexagonal configuration. From the towers, wire beams for 10 through 160 meters were to have been suspended. With the flick of a switch (or two)—presto—any of six directions on any band. I had already received 50 sections of Rohn 45 when sanity struck. My old associate and DXpedition partner, Dick, K5IU, and I both decided that in a very few years I would be too old to be climbing towers to repair and rerig wire beams. Therefore, it was time for replanning. I had some ideas and some hardware for the lower bands, but the antennas for 10, 15, and 20 were the subjects for some extensive dreaming.

Dick and I had been joking for several years about putting up a rotating tower, as I couldn't afford the legendary rotating hill. I had been renting—temporarily, we thought—a house in Greenville while our farm house was being built. There I put up a TH7DX beam to tide me over. It worked very well and one day inspiration struck. One phone call:

"Dick, what do you think about four TH7DX beams stacked on a rotating tower?"

"Great! How are you going to phase them?"

"Easy—phasing lines, relays, and transformers."

"Sounds great. What do you want me to do?"

"The mechanical design."

"Okay, tell me what you want."

(In real life Dick is a brilliant mechanical engineer in the oil-field exploration equipment design and manufacturing area. He holds multiple degrees and even more patents.)

Dick spent weeks studying anything he could find on rotating towers. Dennis, N5UA, had built up a good bibliography on the subject. Finally Dick decided that all the designs he had seen were too complicated or too expensive, or required towers that were far too expensive, or that the designs had been conceived by Mickey Mouse and were not safe near civilization.

In the meantime I had decided that the tower should be about 145 feet high to allow 35 foot spacing between beams. That meant about 4 feet of tower sticking out of the ground, about a foot allowance for "rotator things," and 140 feet of tower rotating above that. Bearings were to be at 35, 70, 105, and 140 feet. Each TH7DX beam was to be mounted 2 feet above its bearing.

Our first plan called for the use of commercially available ball-bearing races as the rings inside which we would rotate the tower. Unfortunately, the rings would have cost about $1600 each in quantities of one to four. In five or more quantities they were down to about $1150 each, which meant that I could buy five cheaper than four. However, bearing cost, with tax, would have been at least $6000. The next shock came at the machine shop where Dick priced the attachments necessary to make the ball-bearing races that attach to the tower and to the guy wires. That came out to about $1200 per guy level. This was going to run into money. That started the next redesign.

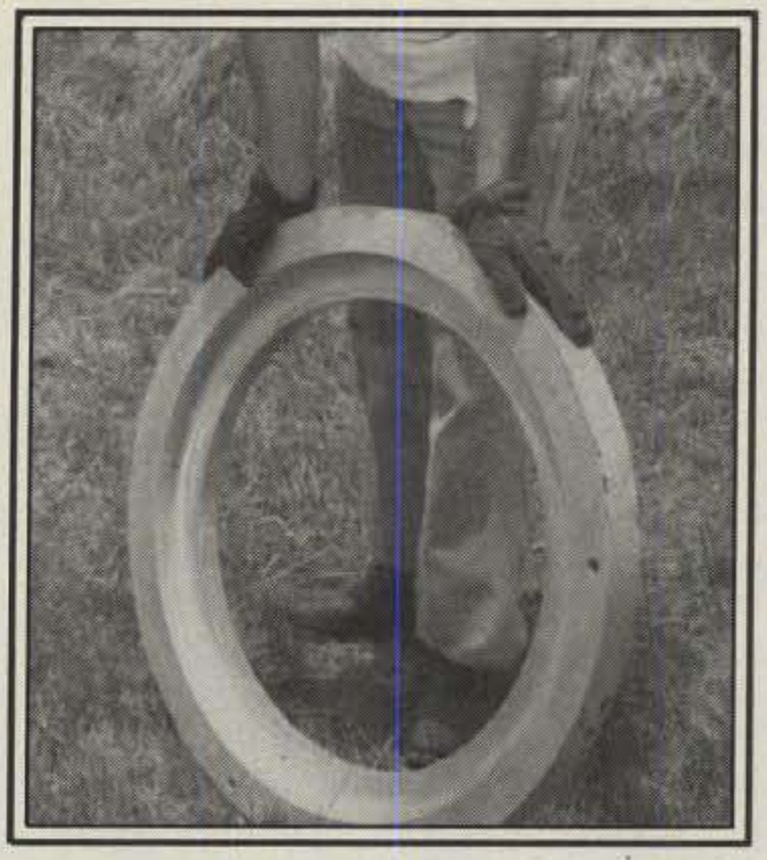

Fig. 1–One of four bearing rings. Note the machined cut for the cam followers to ride on and against.

Dick's next design, which was the one we used, called for the use of a machined 6061-T6 aluminum ring that was to be 2.5 inches thick, with an inner diameter of 23.6 inches, outer diameter of 32.13 inches, and with a 1.13 inch cut on the lower face from the inner diameter out to 27.73 inch diameter. This is shown in figs. 1 and 2. Dick had decided to use three cam followers as bearings at each guy attachment point to the tower legs. One cam follower rode under the aluminum

*Route 4, Box 99-J, Greenville, TX 75401

Fig. 2– A bearing ring with an attachment for a clevis.

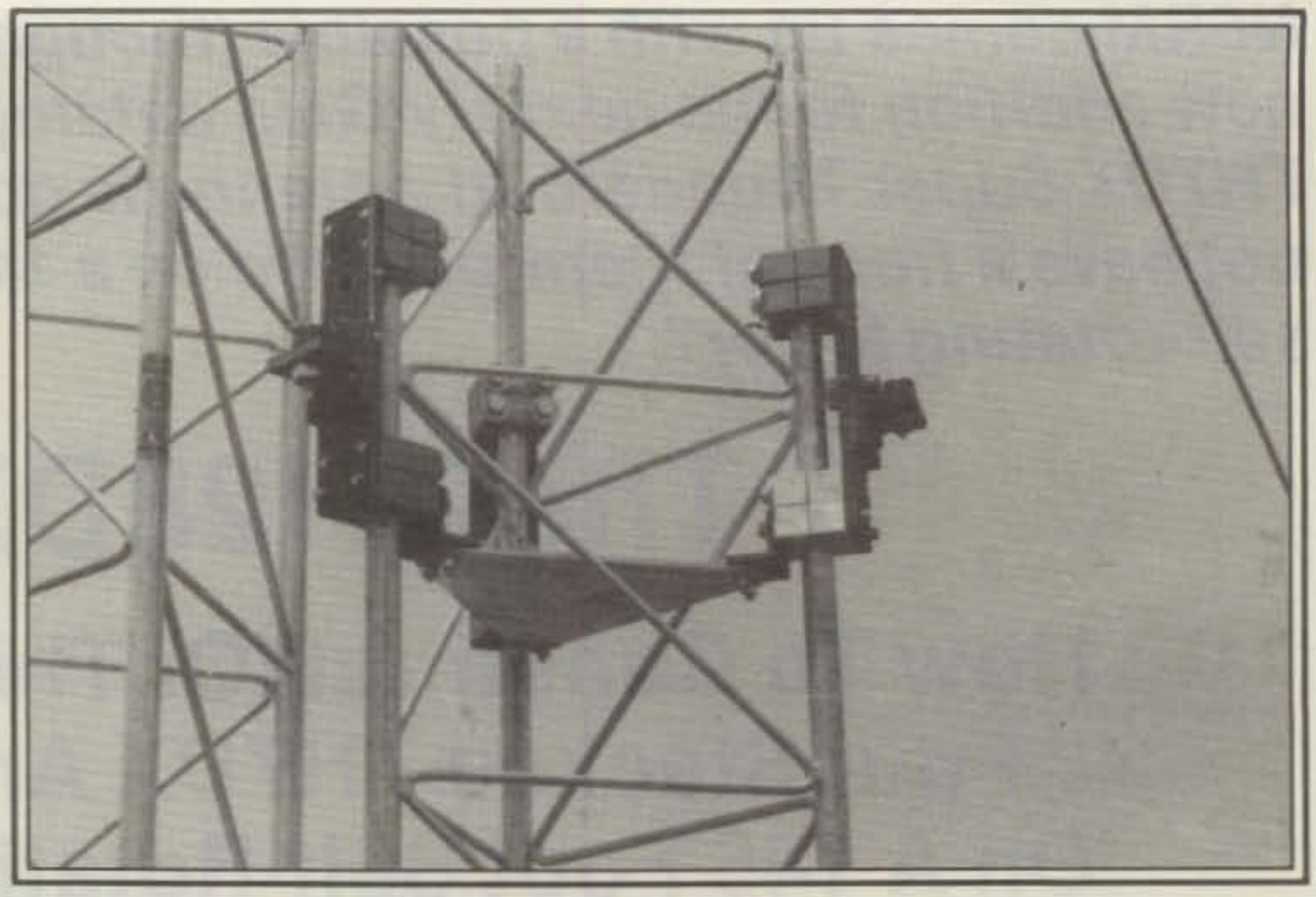

Fig. 3– The tower-mounted fittings for the cam followers. The under and sideways followers are shown installed. The mounting hole for the downward follower can be seen.

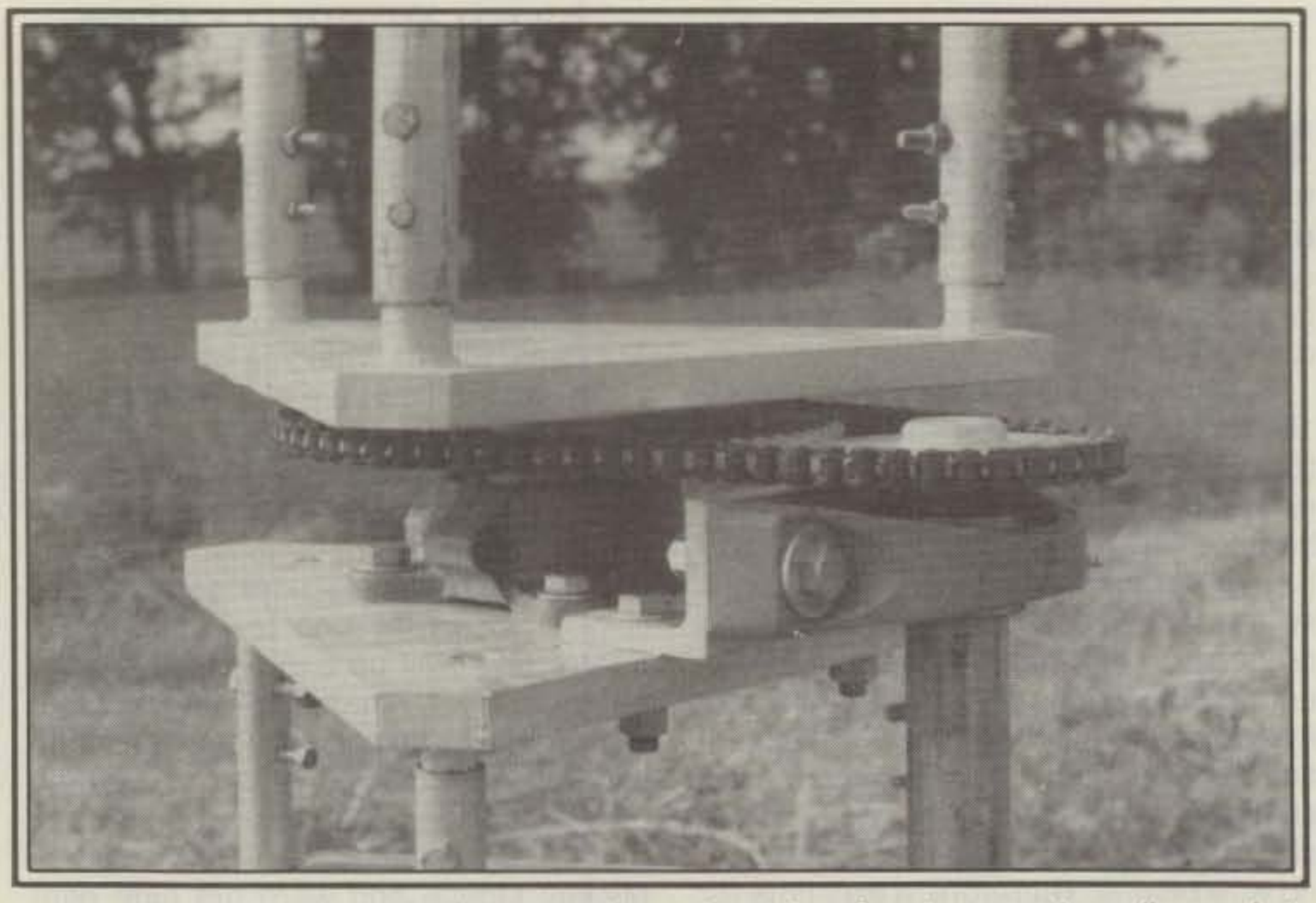

Fig. 4– This view shows the base top plate, thrust bearing, large and small sprocket, drive rod, and bottom plate for the rotating tower.

ring to hold it up. The second rode under the ring, pressing against the vertical surface of the cut, in order to hold the ring away from the tower (see fig. 3). The third cam follower rode on top of the ring to hold it down. (We later decided that this last was unnecessary. At $12 per cam follower, this would save about $150, if four guy levels were to be used.) We had all manner of fittings and attachments, but Dick and I assembled guy stations on all four pertinent tower sections in a few hours.

One word of caution on this approach: The aluminum ring has to be cut from a very large and expensive slab of aluminum. I found a friendly machinist who agreed to charge me only for the machine work and the actual weight of aluminum used. He was able to use the rest for other purposes. Few machinists are that friendly. We used about 80 pounds of aluminum per ring, plus the amount lost in the cut in the lower face.

Next Dick tackled the rotating system. He decided to use a plate mounted on top of the 4 foot stub, a thrust bearing mounted on that lower plate, then an upper plate which was fitted into the tower legs (see fig. 4). The upper plate has a sprocket mounted to it for a chain-drive rotational system (see fig. 5). The chain is driven by a sprocket one-half the size of the one on the tower plate. A large shaft mounted in a bearing transmits the torque to the small sprocket from the rotator mounted on a shelf below all this (see fig. 6). The Hy-Gain HDR-300 Rotator was selected. While it probably would have handled the rotating tower with no problem, I did not like the idea of all that whirling mass above the tower coming to a sudden stop from 1 RPM. This 2:1 gearing presented a new problem: What direction is the digital indicator in the HDR-300 going to show with that reduction? Well, if one takes a 500 ohm, 3-turn, precision potentiometer, substitutes it for the 1000 ohm potentiometer in the HDR-300, then adds approximately 250 ohms on either side of the new potentiometer, direction indication is perfect after minimal fiddling with values. Dick removed the limit arm from the rotator, of course. Now I have the normal 360-degree rotation and readout—plus the ability to go to about 430 degrees (70 degrees right of north) in right rotation, and minus 80 degrees (80 degrees left of north) in left rotation. This saves a great deal of time when I am in the general neighborhood of north and want to go from northeast to northwest, or vice versa, as the HDR-300 is south-centered.

The drive shaft with its bearing is shown in fig. 7. All of the parts, less rotator, for the rotating system are shown in fig. 8. When all these parts are tied together with the rotator, they make a neat package, as fig. 9 illustrates. Before erecting a tower on top of the thrust bearing, Dick added three threaded rods with washers, nuts, etc., to hold the plates apart. When the rods and nuts are tightened, the assembly is huskier than a continuous section of tower would be. In fig. 10, K5IU is adjusting the safety rods. A small level is placed on the upper side of the top plate for alignment.

Then we started assembling the tower. The frequently aforementioned K5IU and Greg, AA5C, did the climbing. Scotty, ND0P, and I were the ground crew with additional help from Gerald, K5GW, of Texas Towers. (See fig. 11.)

Erection went smoothly. Using the gin pole, Dick and Greg were able to handle the 80 pound doughnuts. The rings were

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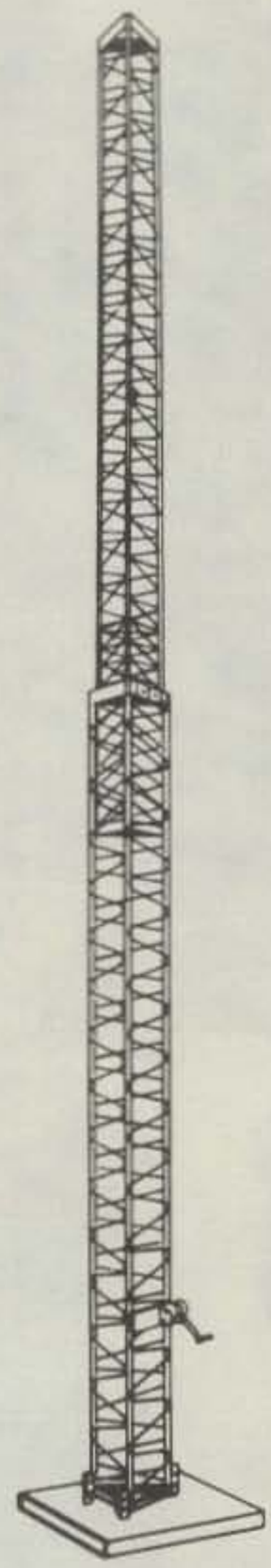

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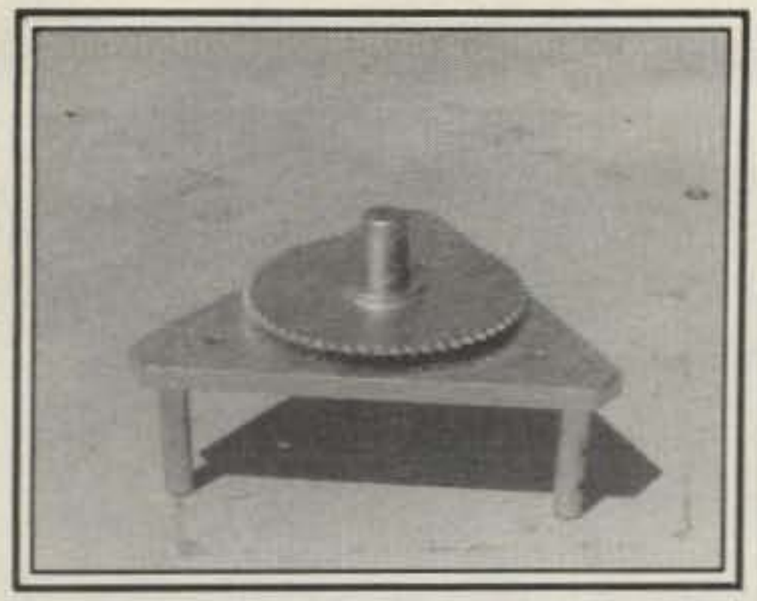

Fig. 5– The large sprocket is shown installed on the base plate (here it is shown inverted) of the rotating tower.

hoisted up, then lifted and dropped down onto the prepositioned cam followers. The first ring was attached to the guy wires, as shown in fig. 12, and three of us adjusted guy wires for verticality of the tower. In fig. 13 Dick is attaching the third guy station. When we got the last section up, we readjusted all guys using a surveyor's instrument called a theodolite to ensure verticality. Then we rested. The next week Dick came back with some cable, a pulley, and some clamps, and we made an aerial tramway system. His truck bumper was the base point, and the top point of the tramway was tied to the tower about 5 feet above the desired guy level. Greg and Dick got all four beams up and bolted to the same face of the tower. Two horizontally mounted angle-iron pieces were bolted at each of the four guy levels to the two legs on the desired side of the tower, and bolts from the Hy-Gain boom-to-mast fittings were run through the angle irons. Even though it rained, all four beams went up in one morning. Scotty and I were the wet ground crew.

All the mechanical design and construction worked beautifully. When the drive chain is removed, the total structure can be turned by hand by one man on the ground. In fact, one man can give the tower a twisting pull and get a turn or so of spin. The Hy-Gain HDR-300 turns the mast easily. Oddly, when rotation is stopped, the tower does not coast more than a degree or so with the brake off. Also, it does not drift in winds of about 30 MPH with the brake off. This is in marked contrast to the action of the HDR-300 on my 7 MHz beam. We speculated that possibly the 2:1 stepdown was responsible, but in reality, friction in the seals of the base bearing, cam followers, and drive shaft causes this. In any event, the TH28DX rotates—and stops—perfectly, even if slowly.

Dick made many calculations on the safety margin of the array. His last word on the subject was that this design had a 3-to-1 safety factor in a 100 MPH wind. Elements probably will start blowing away after that, so he didn't calculate further.

As I told Dick at the start of this project,

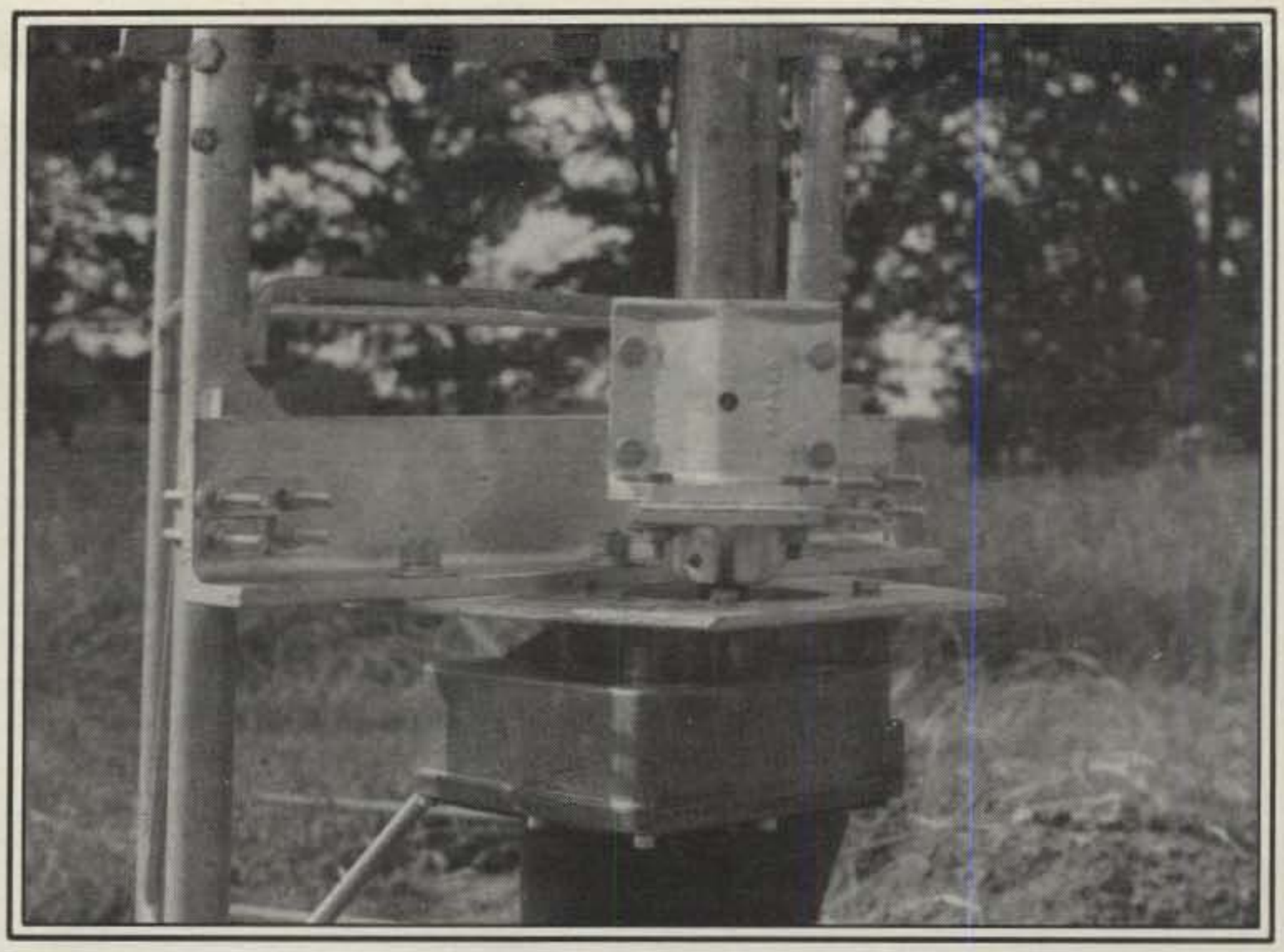

Fig. 6– These are the attachments to mount the Hy-Gain HDR-300 rotator and to couple the rotator to the drive shaft.

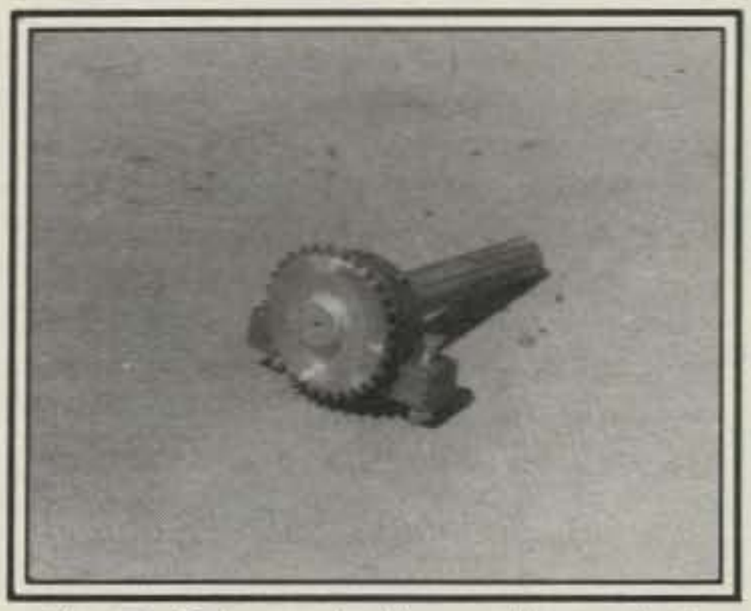

Fig. 7– Drive rod with small sprocket.

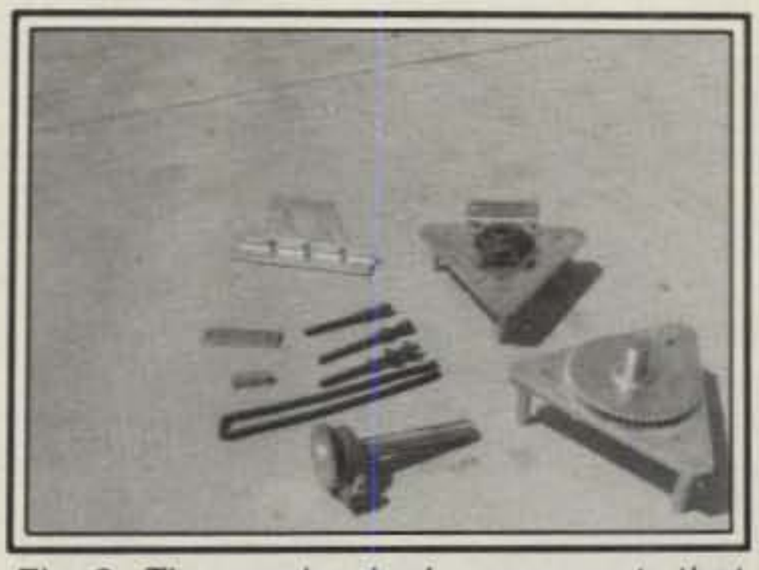

Fig. 8– The mechanical components that make up the antenna rotating system prior to assembly.

Fig. 9– The completed rotating system.

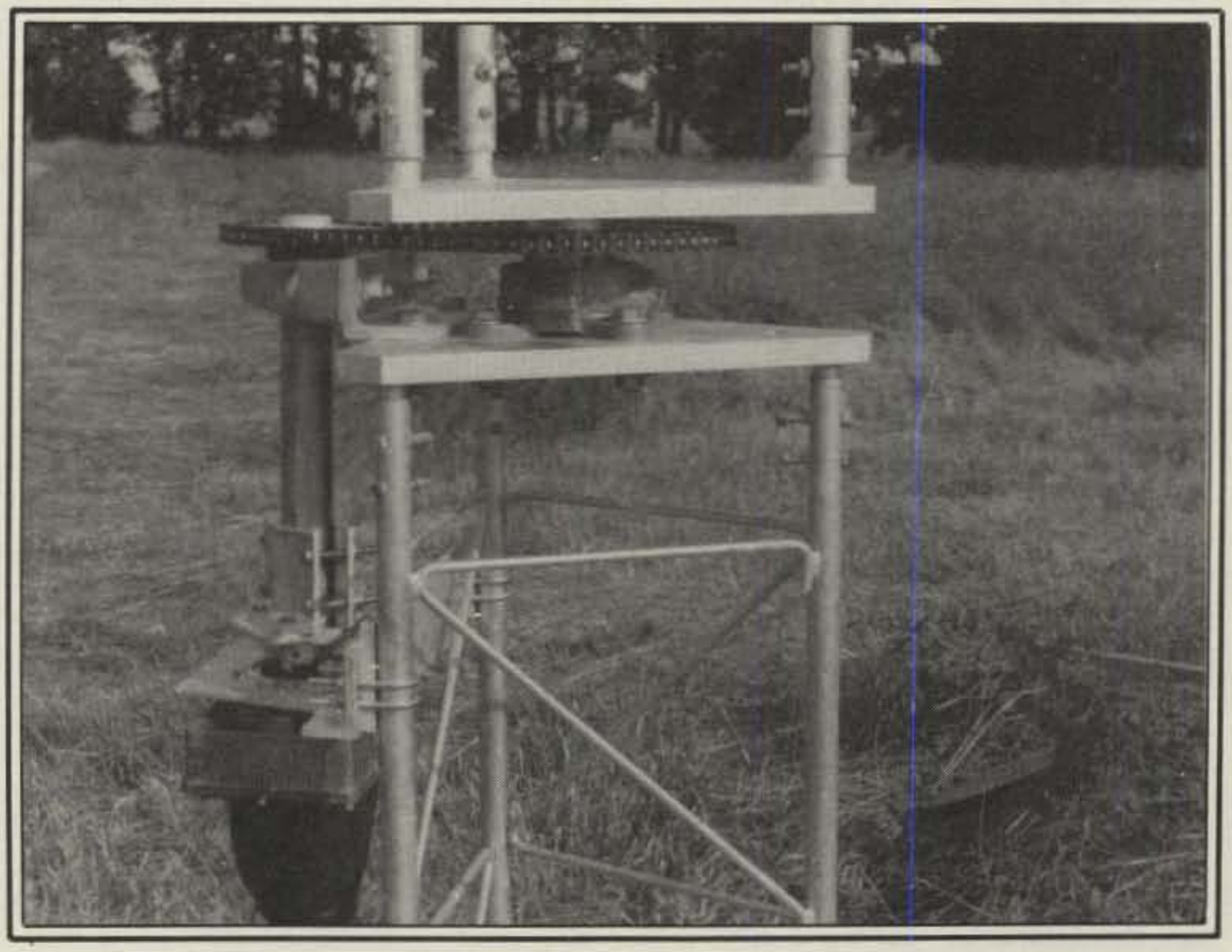

Fig. 10– Here K5IU adjusts the threaded safety rods.

Fig. 11– Gerald Williamson, K5GW, of Texas Towers, lends a hand.

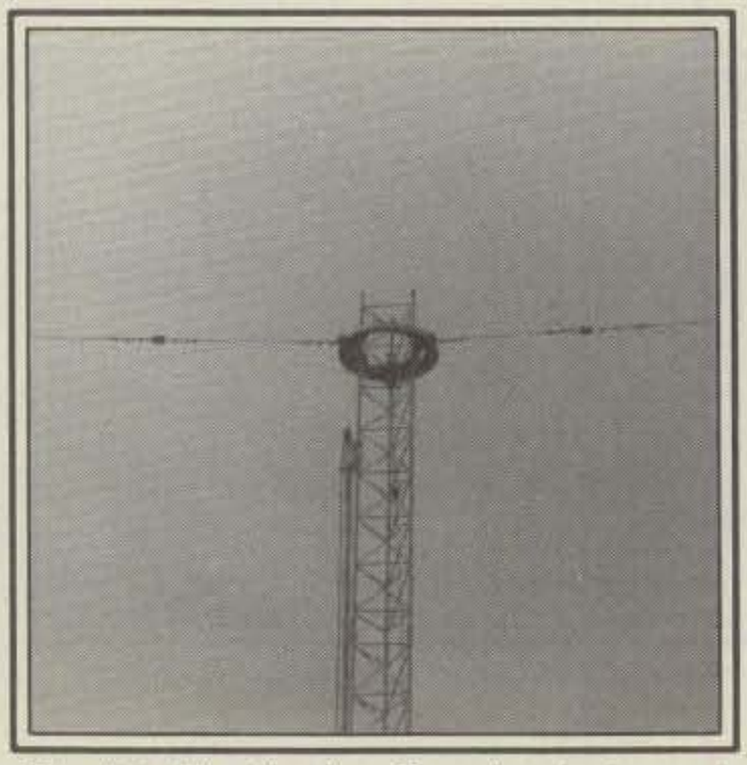

Fig. 12– The first bearing ring is shown in place with its guy wires attached.

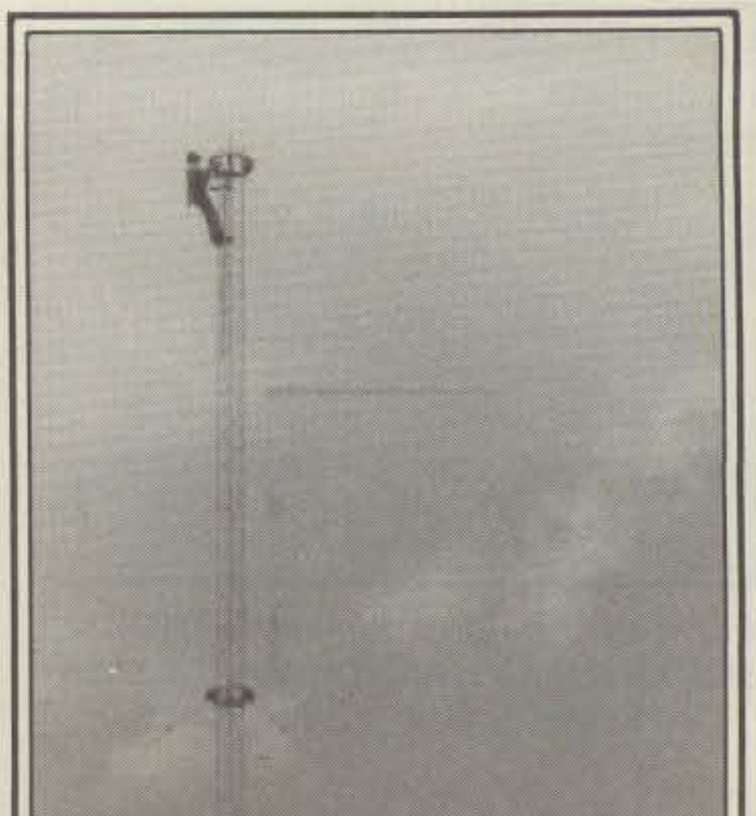

Fig. 13– K5IU is shown attaching the third guy ring.

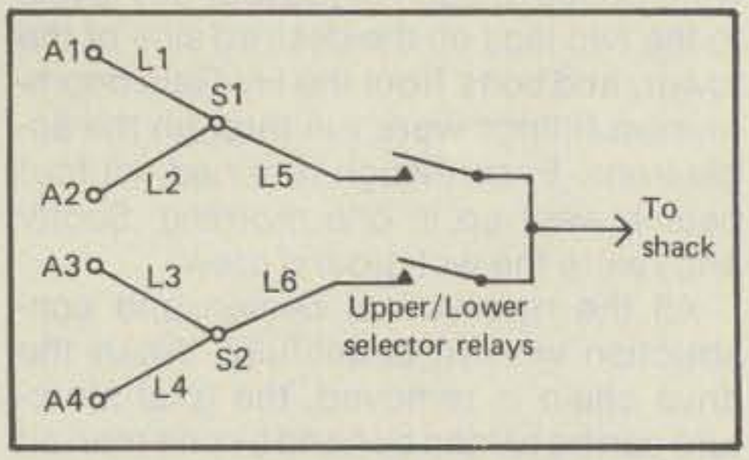

Fig. 14– A simplified basic phasing diagram for the TH28DX. S_1 and S_2 are detailed in fig. 16. The upper and lower selector relays are detailed in fig. 17.

the electrical design was easy once it was decided what we wanted to do. I originally contemplated having the ability to select any one, two, or all four of the TH7DX beams. After considerable thought—and finding that ceramic insulated relays were not as easy to come by as they had been—I settled for being able to select:

A. All four in phase.
B. Upper pair in phase.
C. Lower pair in phase.
D. Any of the above on 10, 15, or 20.

That got the control wiring down to one eight-wire cable, and the mechanical construction down to three boxes.

One option considered involved the use of 50 ohm, 75 ohm, and 37.5 ohm (two parallel 75 ohm) cables to do the matching. That would have involved a lot of cable and some possible added loss from mismatch in the cable.

Originally I had intended to use 50 to 25 ohm broadband toroidal transformers at the three 50 to 25 ohm intersections. After a couple of weeks of work I gave up on that, having been unable to make a transformer that approached a 1:1 SWR across all three bands.

Therefore, the system decided upon used 50 ohm phasing lines and 50 to 25 ohm L-nets where needed. Belden 9913 cable was used to minimize losses, while still retaining mechanical flexibility. The L-nets have a Q_0 between 250 and 300, while the circuit Q is one for a 2:1 impedance transformation level. Even at the maximum 2:1 SWR, losses in the Q-nets are less than one percent of applied power.

In fig. 14 each of the phasing lines, L1 through L6, is an electrical half wavelength on 14 MHz. (Calculated length came out very close to the grid-dipped length of 29 feet, 8 inches.) Thus, 50 ohms into the line produces a flat line. Where two lines are joined, the result is a 25 ohm load. Here, 50 to 25 ohm transformers are used to bring the impedance back up to 50 ohms, and the next lines are again 50 ohm flat lines.

Relay boxes, as shown in fig. 16, were mounted at the intersection of L1 and L2, and at the intersection of L3 and L4. The matching sections for the upper and the lower pairs are identical. Relays are DPDT "surprise" ceramic insulated antenna relays, with 24 volt DC coils. Size is about 2.75 inches long by 1.75 inches high and wide. The L-net coils are air-wound of number 14 tinned wire and are adjusted for a 1:1 SWR with a 25 ohm load on the output and a 50-ohm SWR bridge on the input. Capacitors are fixed ceramics, transmitting type, of 5000 volt rating.

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Pulse for Satellite Test station, Hughes Aircraft.

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Pulse for Laser Excitation, University of California

2,500 watts 27.12 MHz
to ignite Argon Torch Photo-Emissions Spectrometry — Switzerland

1,500 watts 40 MHz
same application as above — The Baird Corporation

2,000 watts 27.12 MHz
Mass Spectrometry, VG Isotopes, England

2,000 watts 13.56 MHz
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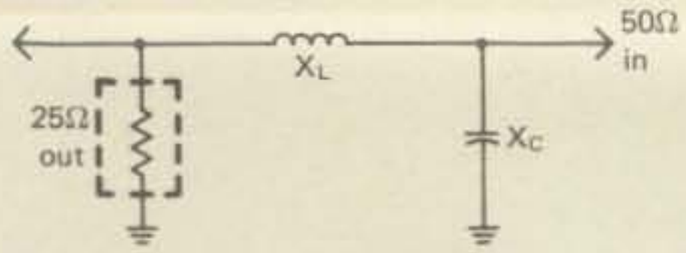


BAND	X_C = 50Ω	X_L = 25Ω
28 MHz	112pF	.14μH
21 MHz	150pF	.19μH
14 MHz	225pF	.28μH

Fig. 15– A diagram for an L network. The 25 ohm resistor at the output is only used for matching or test purposes and not left in the circuit. This resistor is used to determine the values of X_L and X_C.

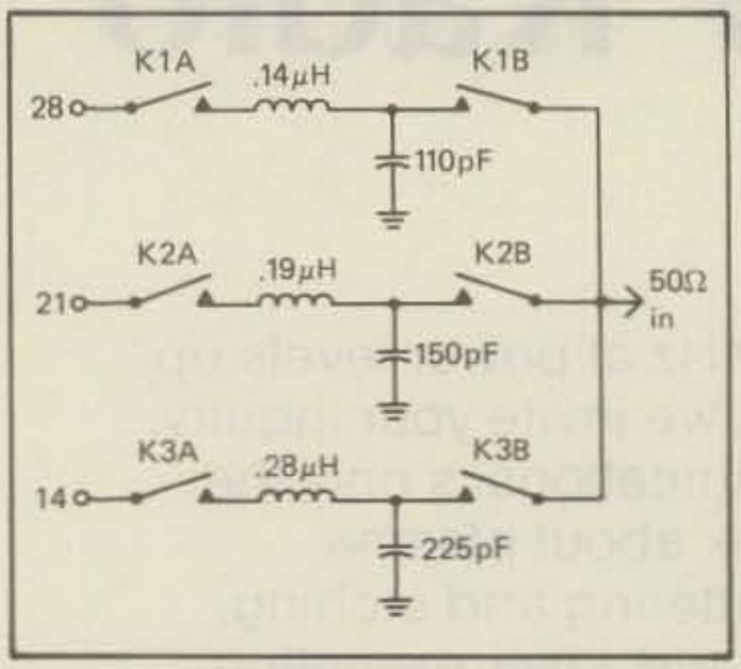
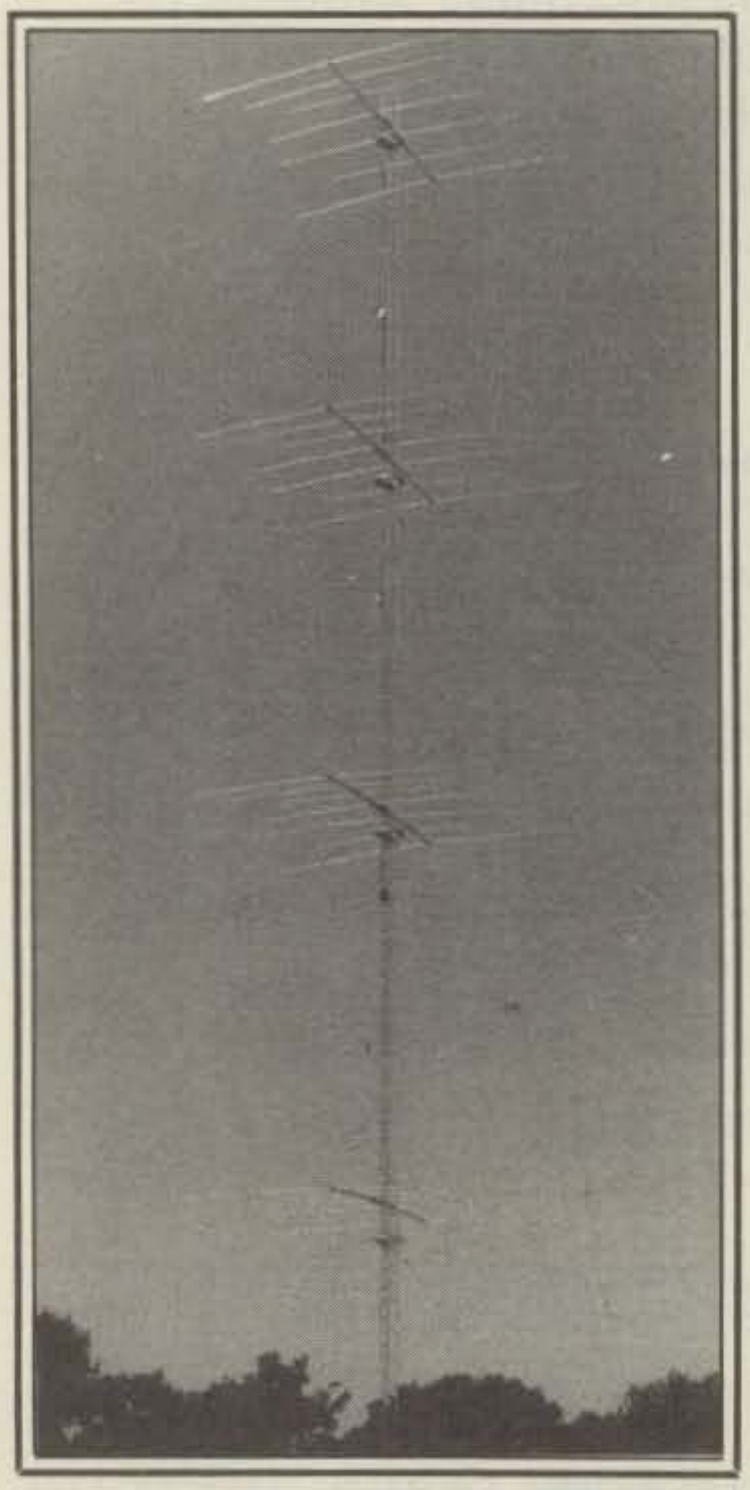


Fig. 16– The diagram for S_1 and S_2 as mentioned in fig. 14.



"Hello World!" This is what a TH28DX looks like coming at you.

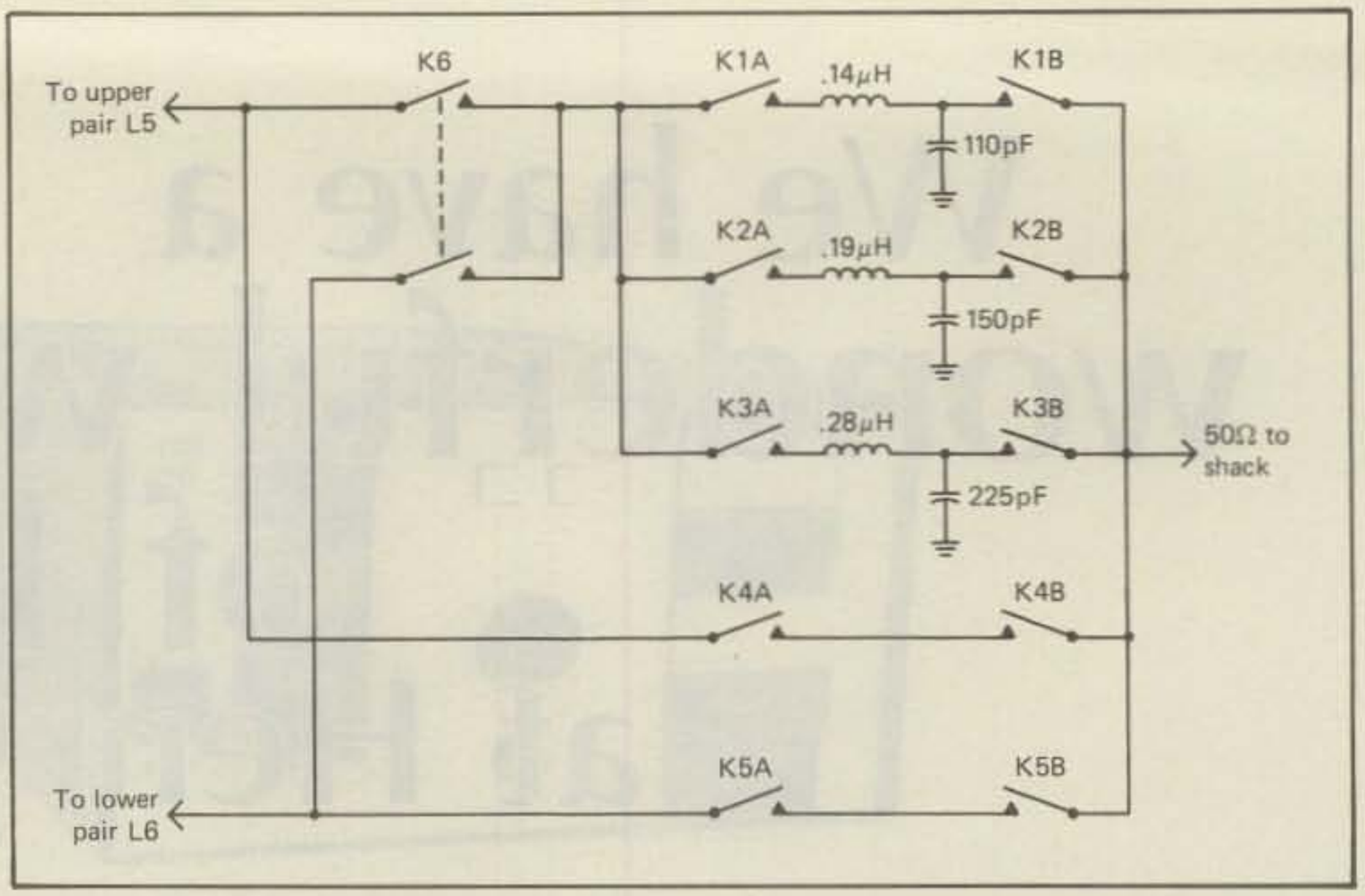


Fig. 17– The diagram for the upper/lower/combined selector relays including the band selectors.

If variable air capacitors were used, adjustment would be much faster and would be easier with the antennas in final position. However, adjustment on the ground has been more than satisfactory.

So what does all that stuff do for the SWR? Hy-Gain advertises that the TH7DX has an SWR of 2:1 or less across all three bands. Each of the four beams that I bought, plus several others tested, met that specification. The SWR with the TH28DX on any of the three bands, in any of the three selections—"All Four," "Upper Pair," or "Lower Pair"—is as good as that of any one TH7DX across all three bands.

The question that is most asked, after amateurs get over the shock of seeing the tower and four beams rotate, is, "How much gain does it have?" I really don't know. My spacings are probably optimal for covering the three bands: one-half wavelength at 14 MHz, where I want the cleanest pattern; three-quarter wavelength on 21 MHz, where the spacing should be ideal for gain; and one wavelength at 28 MHz, which should not result in any real loss of gain. There will be some splitting in the vertical radiation pattern on 28 MHz, but it will be minor, especially at the higher angles.

Gerald, K5GW, had a computer program for patterning stacked beams and offered to run it for me. We only used the "All Four" configuration. We debated about what gain to use for the calculations. Hy-Gain gives gains of 8.0, 8.7, and 9.6 dBi[1], on 14, 21, and 28 MHz, respectively. I didn't believe these to be accurate. For once, I thought that an antenna manufacturer had been far too conservative, and that the numbers were more like dBd[2] numbers. An article in "Amateur Radio Profiles" gave gains of 9.7, 10.1, and 10.7 dBd[3]. Those are probably a bit optimistic. We decided to use gains of 10, 11, and 12 dBi. Schultz's product review of the TH7DX gave probable numbers in this general range.[4] Resultant vertical patterns at 0 to 40 degrees are shown in figs. 18, 19, and 20. To compute gain over a dipole, subtract 8 dB from the tables: 2 dB for conversion from isotrophic to dipole,

TH28DX—14 MHz
Vertical Radiation Pattern
(Assumed Gain 10 dBi for one TH7DX)

Angle (in degrees)	Power (in dBi)
0	–20.0
2	– 2.6
4	8.8
6	14.8
8	18.3
10	20.2
12	20.8
14	20.3
16	18.7
18	15.7
20	10.8
22	1.9
24	–20.0
26	–20.0
28	–20.0
30	–20.0
32	– 0.8
34	4.9
36	7.4
38	8.2
40	7.9

Fig. 18– The 14 MHz vertical radiation pattern for the TH28DX. The assumed gain for one TH7DX is 10 dBi. Note: In figs. 18, 19, and 20, gains beyond –20 dBi have not been "pulled" from the computer. Hence, where the figures show –20 dBi, gain over isotropic is –20.0 dBi or worse.

TH28DX—21 MHz
Vertical Radiation Pattern
(Assumed Gain 11 dBi for one TH7DX)

Angle (in degrees)	Power (in dBi)
0	−20.0
2	5.2
4	15.9
6	20.5
8	22.0
10	20.9
12	16.9
14	7.6
16	−20.0
18	−20.0
20	− 5.6
22	8.4
24	12.1
26	12.1
28	9.3
30	2.7
32	−19.5
34	−20.0
36	−20.0
38	−20.0
40	−20.0

Fig. 19– The 21 MHz vertical radiation pattern for the TH28DX.

TH28DX—28 MHz
Vertical Radiation Pattern
(Assumed Gain 12 dBi for one TH7DX)

Angle (in degrees)	Gain (in dBi)
0	−20.0
2	10.9
4	20.5
6	23.1
8	21.0
10	12.6
12	−20.0
14	−20.0
16	8.5
18	14.1
20	12.9
22	5.2
24	−20.0
26	−20.0
28	−20.0
30	−20.0
32	−20.0
34	−20.0
36	−20.0
38	− 6.0
40	2.2

Fig. 20– The 28 MHz vertical radiation pattern for the TH28DX.

and 6 dB for the assumed ground reflection factor. That shows maximum gains of 12.8, 14, and 15 dBd on 14, 21, and 28 MHz, respectively.

And the big question: "So, how well does it perform?"

A. The antenna is obviously a winner. On pileups to Europe I frequently break through the East Coast stations on 14 MHz SSB, even when I drop to 100 watts output. I have received reports of 60 dB over S9 from knowledgeable European amateurs. On 21 and 28 MHz the antenna does as well, considering the current sunspot cycle.

B. On comparison tests with K5IU on 14 MHz, the TH28DX outperformed his single TH7DX at 70 feet by 10 to 12 dB, although K5IU has a much better location than I have.

C. Behind my house I have a Cushcraft A4 beam 50 feet high. It works as well as any other 50 foot high tribander in this area. The TH28DX is normally 10 to 20 dB better than the A4. Occasionally, because of the extra height of the TH28DX, I hear loud signals on it that I cannot hear on the A4. During the last ARRL DX contest I tried to use the A4 as my "South American/Caribbean" antenna. Time after time when using the A4 I called stations to no avail, but when I turned the TH28DX on them, they returned on the first call.

A secondary question: "Is the pattern switching worthwhile?" Most of the time it is not. After thousands of checks, I find that I normally have the array set on "All Four." Occasionally, especially for long-path or for far-distant stations when the band is just opening or closing, the "Upper Pair" setting is 6 to 10 dB better. On short-skip switching to "Lower Pair" has shown as much as 20 dB improvement over "All Four" on all three bands. The 10 to 20 percent of the time that either "Upper Pair" or "Lower Pair" is considerably superior to "All Four" makes the couple of extra relays needed well worthwhile.

The last questions: "Would you do it over again, and what would you change?" I hope that I don't have to do it again. However, if I did, I would use Rohn 55 rather than Rohn 45. It is much sturdier and costs relatively little more. Then I would go to 190 feet or so of height and put in a couple of 7 MHz beams vertically spaced 120 feet or so. And, I would be able to save a great deal of work and chasing around after parts, machinists, etc. Dick, K5IU, has formed a company to manufacture the various hardware items that we labored on for so long. Just by calling him I could save the year that we spent on this project, as well as a good bit of money, as the guy-wire bearings have been redesigned by Dick.

However, when I point the TH28DX at Europe and listen to the pileups—on me—you bet I would do it again if I had to. This antenna may not compare with a few antennas in the world like a Finnish 48-element. But it can be built by a few amateurs in a fair-sized back lot much cheaper than one can build separate towers for each band—if one has the room for separate towers. And, oh, that GAIN!

Footnotes

[1]dBi or dBi over an isotropic radiator is the maximum theoretical gain based on an assumption that your antenna is 100% efficient. It is directive gain.

[2]dBd is power gain or gain referenced to a 100% efficient half-wave dipole.

[3]This undated copy of an article was a reprint picked up from a radio store counter in 1983.

[4]Schultz, John, "CQ Reviews: The Telex/Hy-Gain TH7DX Super Thunderbird Triband Beam," *CQ*, April 1986, p. 34.

CQ REVIEWS:

BY LEW MCCOY*, W1ICP

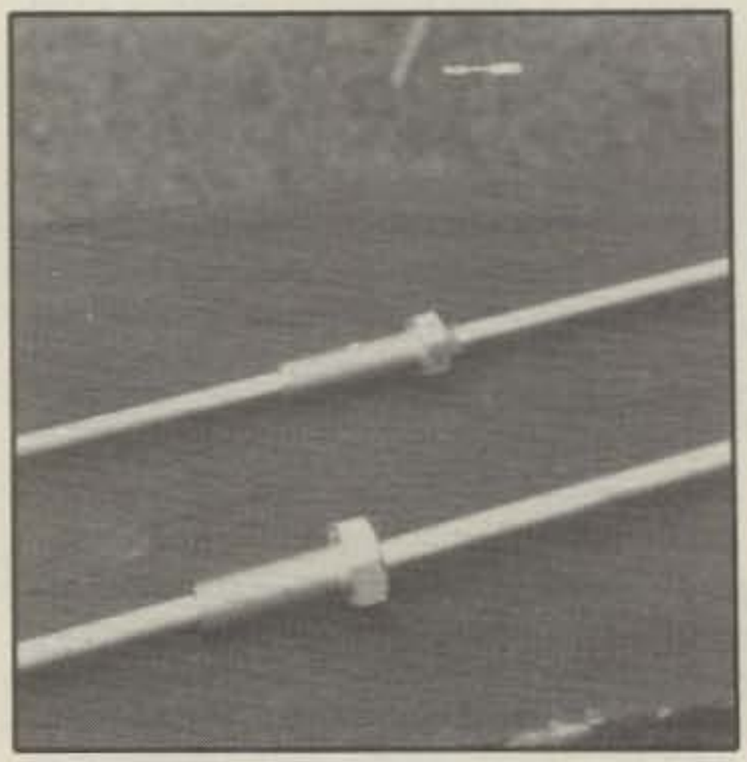
The MET NBS 144/7T Two Meter Yagi Antenna

During the 1950s, a long-lasting research program on Yagi design was undertaken by the United States Bureau of Standards, (NBS) under the auspices of Peter Vierbicke. This research was done to establish several points, the primary one to determine optimum performance. The results of the study were very good, as pointed out by the noted VHFer, Joe Reisert, W1JR, in a 1977 issue of *Ham Radio*. As far as is known, none of the NBS antennas were ever built and marketed by an American antenna manufacturer.

However, a British firm, Metalfayer (usually called MET), does produce an extensive line of NBS design Yagis for both 432 and 144 MHz. When I was in Miami at the Miami Show this year, Leeward Marketing Co. had a booth displaying the amateur line of MET Antennas. Naturally, being the antenna nut that I am, I had a long discussion with John Weatherly, G3KQL, the owner of Leeward. The result was that he sent me the MET 144/7T for a product review in *CQ*.

The basic NBS design consists of a driven element, and any number of directors, (depending on the desired gain), plus three reflectors, two of the same length and another that is slightly longer. These are installed in the form of a "curtain" as you can see from the photographs of the 7-element array. The antenna shown in the photos has a stated gain of 10.1 dB over a dipole. I see no reason to doubt those figures in the slightest. The front-to-back ratio is given as 22 dB with a beamwidth of 42 degrees.

This was, without a doubt, the easiest antenna I ever put together. In fact, I opened the shipping carton, read the instructions, and from opening the carton to completing the antenna, it took only 30 minutes. Shades of Field Day! Another point: The materials and construction methods are very, very good. As one can see from the photos, the elements have threaded center pieces. These center pieces are mounted through the square boom. They are then held in place with mounting nuts. The square boom measures ¾" × ¾", and the element installation holes are all predrilled. Also, all the elements are clearly marked as to their mounting order.



The elements of the beam have a center threaded mounting fixture. First slipped through the boom, the elements are mounted very quickly.

Here are some of the mounting parts and the gamma match before installation. The gamma goes together very easily (and fast).

The coax connecter is an N type and its bracket is mounted on the boom. I have shown the parts of the gamma match in one of the photos. You will note that the threaded gamma piece is permanently attached to the N connector. Again, this is very nice workmanship. The gamma rod has a threaded Teflon insert which screws onto the gamma piece coming from the N fitting. This provides a vernier-type adjustment of the gamma rod. The gamma rod is held in place by the adjustable gamma clip.

After I completed the antenna I mounted it in a temporary location, about 15 feet off the ground. I don't have any method of making precise gain measurements so I couldn't verify the manufacturer's numbers. However, those numbers are eminently fair and have no exorbitant advertising claims built in, so to speak. It is a fact of life that a good three-element monoband beam (not a trapped multiband beam) should produce 7 dB gain when measured over a half wavelength dipole. In order to double the power from such an antenna (or add 3 dB gain, which is twice power), one must double the size of the array. So to go from 7 to 10 dB, one must take a three-element beam and make it a six-element beam and in nearly all cases, double the length of the array also. Did you get that last statement completely clear? What do we need for 13 dB? Well that would mean doubling the size of our 10 dB array to get the additional 3 dB. Remember: Three dB doubles the power and in order to achieve that with a Yagi, you must double the size. The 144/7T adds what would be two directors and two reflectors to what would be a normal three-element array, so I would assume the 10 dB is pretty close to accurate.

As to the gamma adjustment, it was

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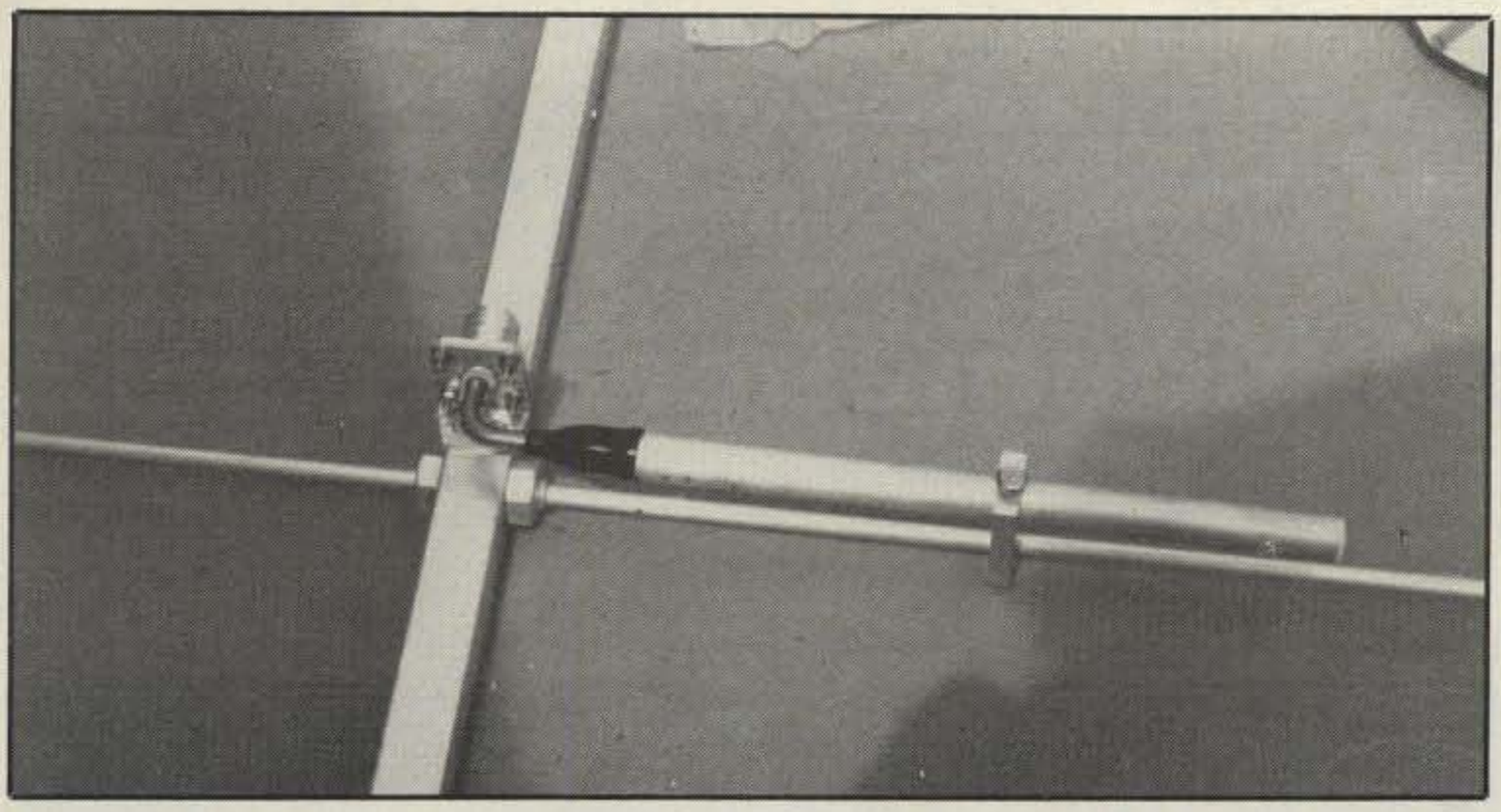
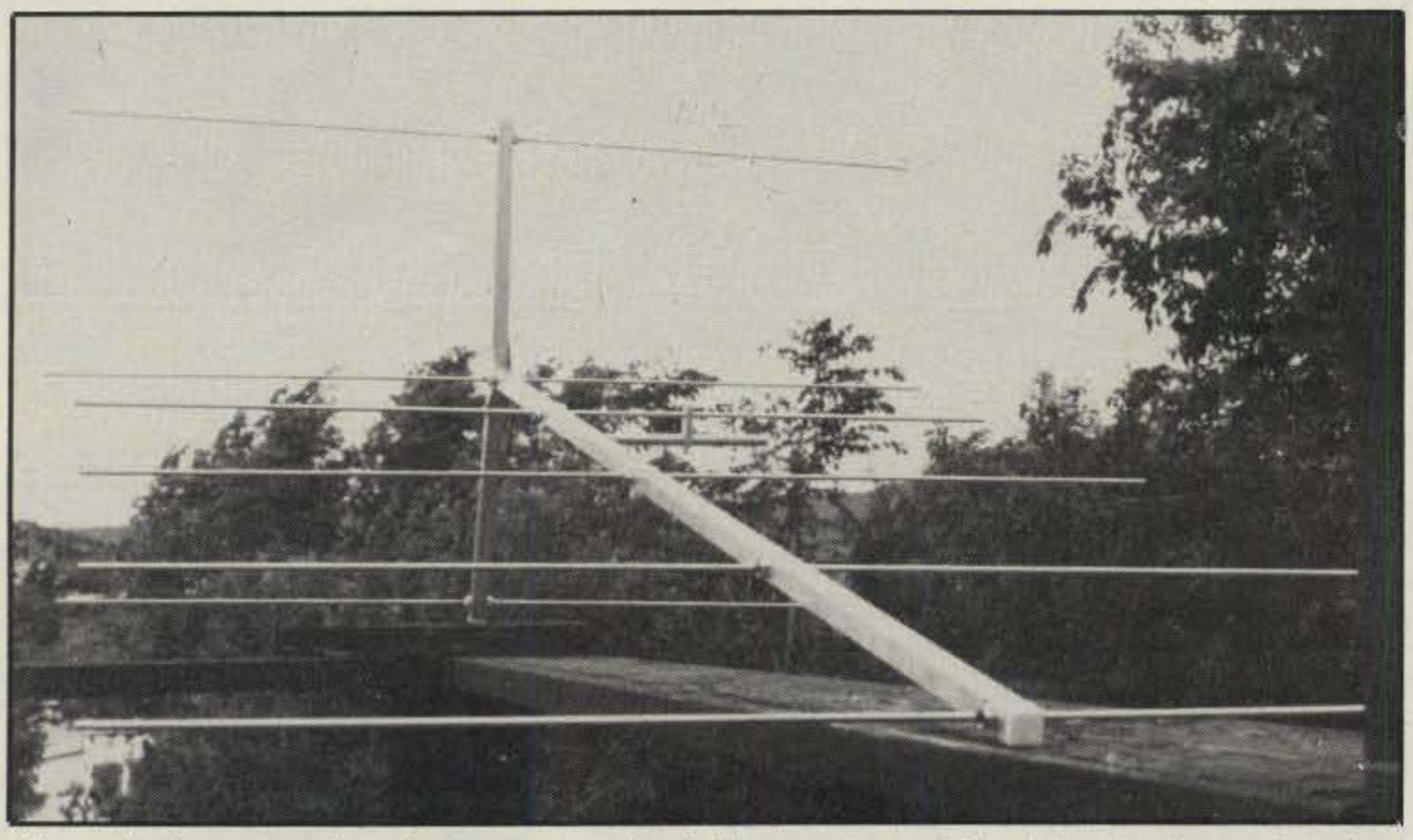


This shows the gamma rod with its N-type connector mounted on the driven element. Adjustment consists of setting the shorting bar and screwing the threaded gamma rod in or out of the piece attached to the N fitting.



Here is the complete beam, sans feed line, as it would look in a horizontal mode. Note the three-element reflector.

also quick and easy. I used an SWR bridge in the line. I set the bridge for reflected reading and then adjusted the gamma shorting bar for the lowest reading. Next, I adjusted the gamma rod itself. It only took a few tries going back and forth to get a one to one match.

All of my testing was done with the same beam mounted for vertical polarization on a non-conducting mast. One thing about my location, even though I am 6200 feet above sea level, I still have surrounding mountains at 10,000 feet. That leads to reflection and signal bounces from any 2 meter signal being received. There are several other 2 meter antennas that I could test against. All of these antennas show multipath reception on any distant signal. What I found was that the MET beam tended to give me better discrimination on received signals. In other words, I didn't have as much phase distortion on receive or transmit as with other beams. My guess is that it was because of the type of three-element reflector used in the MET.

The 144/7T is an excellent performer. I wouldn't hesitate to recommend it to anyone interested in 2 meter work. It can be mounted either for horizontal or vertical polarization with no problem at all, although the manufacturer (and yours truly) recommends a non-conducting mast if vertical polarization is used. The reason for using a non-conducting mast is that a metal mast tends to distort the true pattern of the beam.

There are many other models for 144 and 450, based on this antenna design, from MET. One, for example, is the 144/19T which has a claimed gain of 14.2 dB gain with a front-to-back ratio of 19 dB and a 30-degree bandwidth. The model I tested, the 144/7T, has a list price of $54.25. It, and catalogs, are available from Leeward Co., 1300 Pinetree Dr., Suite #9, Indian Harbour Beach, FL 32937 (305-777-4019). CQ

People climb mountains because they're there. Amateurs climb towers also because they're there and things that should be there aren't. Here's a novel idea supplied by WA6VNR to combine the thrills of both.

"Go Climb A Mountain (Tower)"

BY JOE HYPNAROWSKI*, WA6VNR

The only problem with owning a tower is that sooner or later it has to be climbed. Not being fond of heights or tower climbing, I was able to evade this frightening experience for some time by having a nice group of friends who didn't mind climbing and were always treated to a beer bust afterwards. However, there comes a time when no one is around, and you, the owner, must climb the monster to do repairs.

My fear of climbing to these heights is not lessened by the so-called safety belts sold. The typical safety belt, although providing a degree of safety, has one major drawback. If you have ever climbed with one and had to do any amount of sustained work while up on the tower, you will find that your body gets very tired. This is principally because regular belts do not support your legs and thighs, which are under constant strain while hanging on to the tower during sustained work.

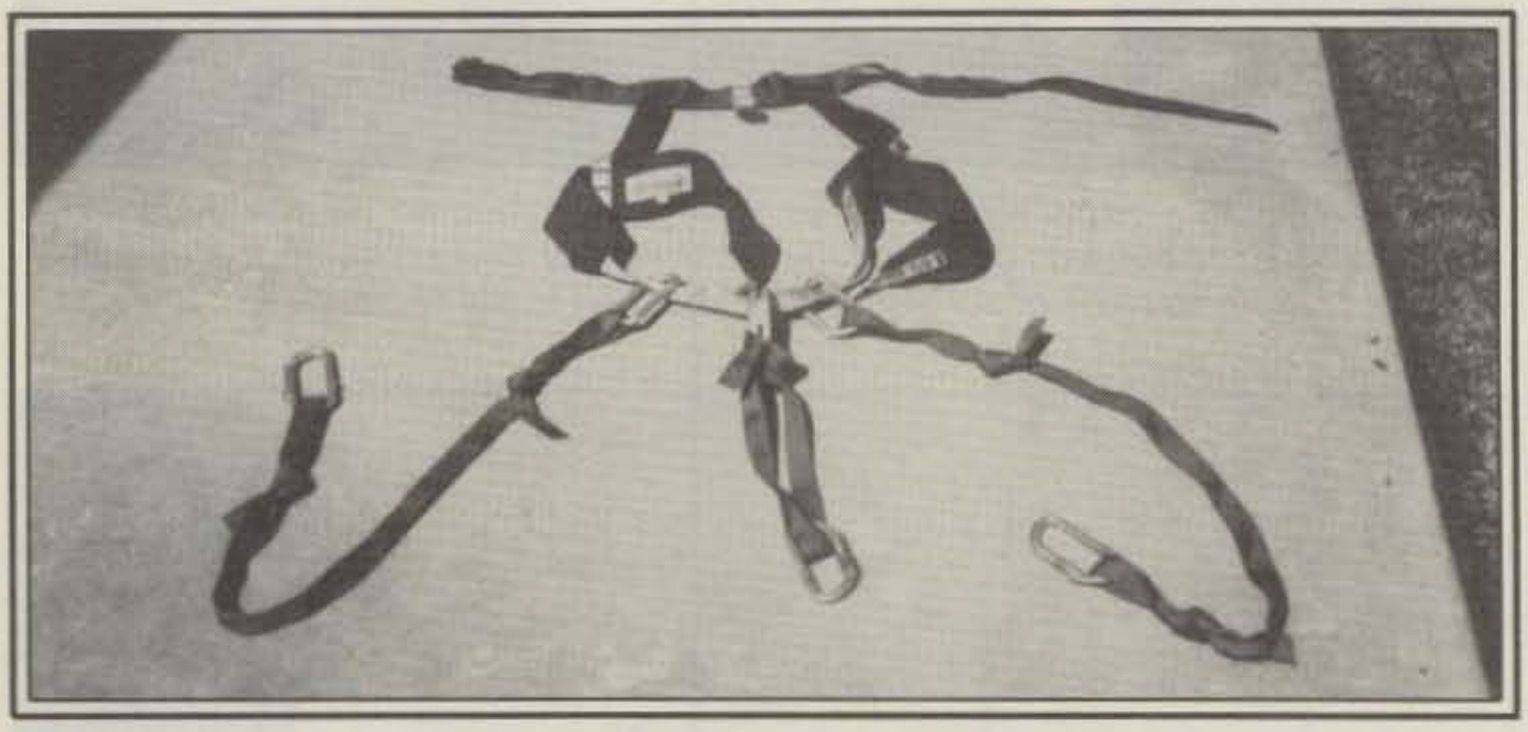
As with all great discoveries there must be a better way. This better-way philosophy made me come up with this improved safety harness idea.

I remembered an action film on mountain climbing in which the mountaineers used a sort of harness setup which seemed very comfortable. Climbing and sustained work at heights could be made a lot easier with this sort of arrangement.

I proceeded to visit my nearest mountaineering supplies store.[1] I explained to the very helpful sales people what I was going to do and hoped they would set me up with an arrangement to climb my tower and work on antennas with relative ease.

What we came up with is shown in the accompanying photos. The arrangement is described as follows: the "Basic Sit Harness" used in mountain climbing. It comes in various waist sizes. The 2 foot lengths of 2 inch tubular webbing are fitted at each end with one "D" shape carabiner clamp (four total). These are attached on to the "Basic Sit Harness" at the right and left leg/waist part sections. The extra safety section (optional) is a 1½ foot length of 2 inch webbing tied to the center of the harness fitted with a locking "D" shape carabiner. For maximum safety, be sure all carabiners are placed so the opening is away from the body. Any good mountain climbing supplies store should be able to outfit you in this arrangement.

This arrangement is very comfortable for climbing, provides maximum safety, and enables one to sustain long periods of tower work without strain on leg muscles. Friends of mine who own and use the traditional safety belts have tried my arrangement and reported that it is indeed a much better way in which to climb towers and work on antennas. The main



The basic mountaineering harness showing the three lengths of webbing attached with "D" shaped carabiners and the third (optional) safety webbing in the center.

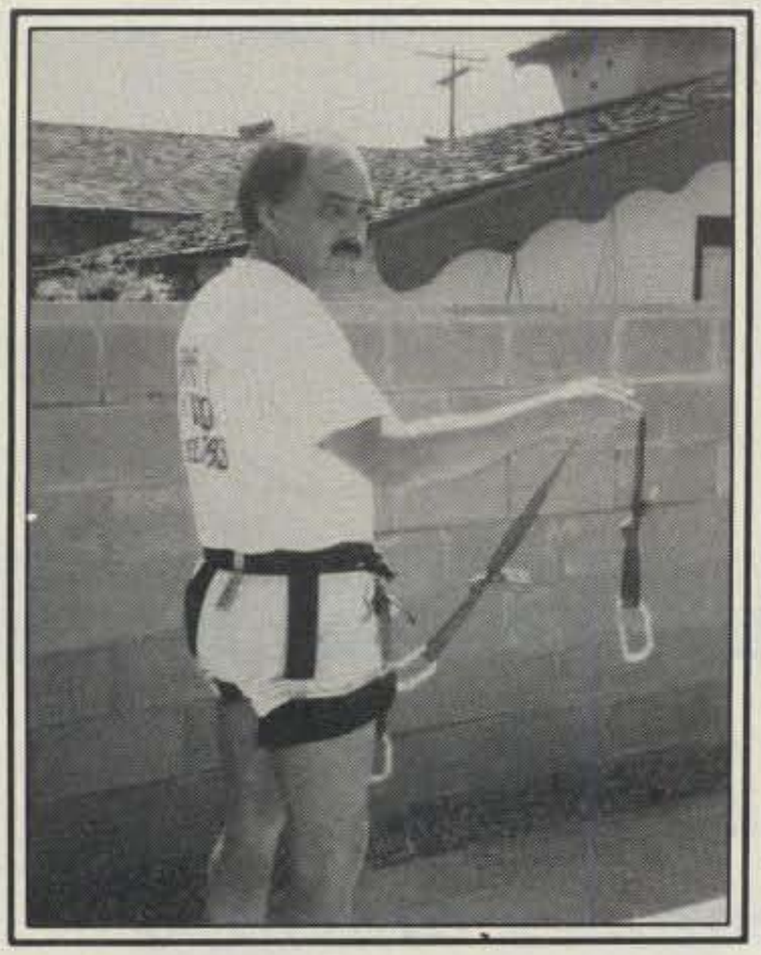
At 50 feet there is no strain, no pain, and no hands.

Climbing is a breeze.

**3785 Mt. Blackburn Ave., San Diego, CA 92111*

[1]In the unlikely event that you do not have a local mountaineering supplier handy, the company from which I purchased the climbing system is Adventure 16, Wilderness Camping/Mountaineering Outfitters, 4620 Alvarado Road, San Diego, CA 92111.

The front view of the harness showing how it is worn. The right and left webbing (with carabiners) attaches to the tower or around the tower.



This side view shows the thigh and leg support.

reason is due to the fact that this arrangement provides a sort of basket and enables you to "sit-in" the harness, thereby relieving strain on the leg muscles.

Safety-wise, I believe it is even safer than the traditional belt because it locks you up at both right and left sides, thereby avoiding a spinning wheel effect in case you do miss a step and slip. I added the third safety clamp in the middle strictly as extra protection and don't believe it is absolutely necessary.

An added feature to this harness is that it is not that expensive—about $75.00.

Now, folks, armed with all this information, you should have no reason not to get up there and fix your antennas or put up that monster beam. CQ

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Since October 28, 1982, the rules have allowed for baud rates up to 19.6K. Of course, we've all been operating at 1200 baud with Bell 202 (1200 baud) standard tones. However, the bandwidth of our radios is fully capable of running up to 2400 baud, giving us congestion relief. Our phase shift modem (PSK) takes advantage of the bandwidth available and the reasonable linearity of the audio channels, and it is designed with the V.26TER CCITT specification in mind. To add to your TNC or trade for a new KPC-2400, see facing page.

KPC-2400

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KPC-2400 Features

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When we set out to design the KPC-2400 ™, we wanted it to be compatible with existing units, and it is. The KPC-2400 features both the KPC-2 modem for 300 baud HF and 1200 baud VHF work, and a new phase shift keying (PSK) modem for 2400 baud operation. All modes are software selectable with HBAUD command!

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The KPC-2400 of course, retains the version 2 software with multiple connects, and we've included an on-board memory diagnostic routine too.

Suggested Retail $329.00

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The 2400 TNC Modem will be available in late June. You may order the 2400 TNC Modem through a Kantronics dealer or directly through Kantronics, using check, money order, Visa or Mastercard. *Suggested Retail $149.00 (includes shipping)*.

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You may also schedule your exchange by calling the Kantronics order desk and giving your Visa or MC number. Just call (913)842-7745 between 9-12, 1-4 (Central Standard Time) Monday-Friday, and we'll take it from there.

To guarantee a quick turn-around time, Kantronics is *scheduling ALL exchanges*, and assigning authorization numbers. Any unit returned to the factory without prior scheduling and authorization number will not be given priority placement.

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To schedule your KPC-2400 exchange, please fill out the information below and mail this form, including $149.00 payment (shipping included) to **Kantronics, 1202 E. 23rd Street. Lawrence, KS 66046.** You will be notified by mail of your authorization number, and scheduled exchange date. **DO NOT RETURN YOUR UNIT WITH THIS FORM.** This form is being used to SCHEDULE returns.

When it is time to return your unit, please DO NOT SEND BACK ANY CONNECTORS, CABLES OR POWER SUPPLIES. Send back only the unit itself. Any cables, connectors, or power supplies received will not be returned. You will receive a new manual and a 9-pin connector with your new KPC-2400.

Name _____ Call Sign _____

Address _____

City _____ State _____ Zip _____

Phone( ) _____ Date _____

Unit to be exchanged (check one) _____KPC-1 _____KPC-2

Serial Number _____

Payment (check one) _____Check or Money Order

_____VISA

_____Master Card

VISA or Master Card Number _____

Exp. Date _____

Any unit returned to the factory without payment, authorization number and prior scheduling will not receive priority placement.

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Okay, you know the buzzwords. But do you know what they mean? It's really not that difficult, as you'll find out by reading W1ICP's three-part series on the Transmatch.

The Unexpurgated Transmatch—Part I

BY LEW MCCOY*, W1ICP

W1ICP has been associated with Transmatch articles, antenna articles, and feedline articles for probably more years than anyone else writing today. The interest never seems to wane. In fact, the interest increases once you start to read some of his material. This is the start of a three-part series on the Transmatch. Part II will go into building your own Transmatch, and I might add, quite a substantial one. This series was prompted by the tremendous response to the February article by W1ICP both by mail and at every hamfest we've attended. One of our advertisers, Radiokit, will be making a kit of parts available for the Transmatch.

—K2EEK

The article I wrote in the February 1986 issue of *CQ* about whether or not to use a Transmatch brought in a flood of mail and apparently posed as many questions as it answered. I felt a follow-up was worthwhile, considering the amount of new questions raised. In fact, there were so many questions a three-part article is required. If you don't have that issue, I suggest getting a copy and reading the article first. (The issue is available from *CQ* for $2.50 postpaid.)

I pointed out that if you are using coaxial feed to your antenna, and your SWR is much over 2 to 1, then a Transmatch is required. To review a little, most modern equipment (transmitters) will not work into an antenna load that departs very far from 50 ohms, or a 1 to 1 matched condition. If the load goes over 1.5 to 1, one starts to encounter loading problems. Second, it is always better to use a resonant antenna system, and there are really no exceptions to that statement. Note I say **system**, which means both the **feedline** and the **antenna** being tuned to resonance. This is probably the most important use of the Transmatch in a station. A Transmatch will also provide a small amount of selectivity on receiving and improve the reception gain. Also, as I pointed out, resonant antennas are nice to have but also impossible to have! We QSY up and down the band changing frequencies, and no antenna, outside of a dummy-load type, will stay near a 1 to 1 match or in resonance.

Another point: Resonant antennas are no better performers than nonresonant ones as long as the "antenna system, the antenna, and the feedline" are tuned to resonance. All this makes a very interesting, and I suppose arguable, point: Coax-fed, multiband dipoles without something to keep them in resonance leave quite a bit to be desired. However, using a Transmatch permits one to resonate such a "system."

One subject I didn't go into was coaxially-fed antennas and what happens when a high SWR exists on the line and a Transmatch is used. Several people wrote and asked about that problem because they had heard it was not a good idea to use a Transmatch under these conditions. Along the same lines, some wrote and asked about using a balun at the antenna because some balun manufacturers warn about using their balun with a Transmatch in the system. They caution the balun might burn out. Likewise, some trap-type antenna manufacturers warn about the same thing—using a Transmatch could cause the traps to blow.

Coaxial Feedline—Some Problems

I need, at this point, to introduce some sugar-coated feedline theory, so I'll try to make this as simple as possible. All transmission lines have losses—some more than others. Coaxial lines are the most lossy. The loss in the line is determined by the spacing of the conductors, the size of the conductors, the dielectric material used to separate the conductors, and, I would like to add, the quality of the conductors and dielectric.

On any feedline, losses will increase as the frequency is raised. For example, RG-58, a very popular feedline, has a loss on 80 meters of less than one decibel (0.6 dB) per 100 feet of line. However, this same line goes up to around 6 decibels loss at 2 meters, 144 MHz! Also, these are the losses under matched conditions, 1 to 1 SWR. I should add that these losses increase dramatically as the SWR goes up! The voltage rating for RG-58/U is about 1900 volts. Incidentally, the voltage for 1 kilowatt in a matched (1 to 1 SWR) 50 ohm line is about 220 volts. Keep that number in mind; it is important in order to answer some of the questions.

The above figures are for a reliable manufacturer's line. There is a lot of junk line around where very little outer braid conductor is used, the dielectric material is terrible, and so on. That's what I meant by the quality factor. The amateur must be a wise shopper and not be drawn into so-called bargains. I am not going into all the other types of coax available. The various handbooks are recommended for more information.

Now suppose we have a dipole cut for the center of the 80 meter band, at 3750 and fed with RG-58/U, and we are running 1000 watts output. With luck the match will be close to 1 to 1 (but not likely) at 3750. However, at the band edges the SWR is likely to go clear up past 10 to 1! There is so much reactance present at the transmitter end of the coax that there is just no way to get power into the line except near 3750, where the match is reasonable and reactance is minimal. So, let's put in a Transmatch and tune out that reactance—just as McCoy preaches. If we tune out the reactance, the RF power is going to flow into the coax and to the antenna to be radiated. So where is the clinker?

In the first place, standing wave ratio (SWR) is the ratio of the maximum voltage in the line to the minimum voltage (or maximum to minimum current). Because of the reactance we couldn't get the power into the line without using a Transmatch. Now we can. What about 220 volts and a really high SWR? That can become a rather high voltage! You have probably just blown out the line because of the voltage going so high or the high

*Technical Editor, CQ, 200 Idaho St., Silver City, NM 88061

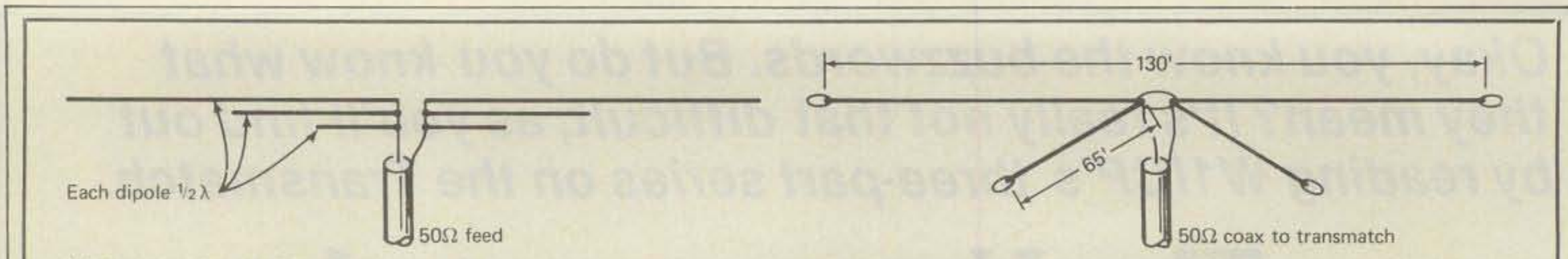

Fig. 1– At (A) is the Mor-Gain type of antenna. Dipoles cut for each band are brought to a common feed, and the impedance stays near 50 to 70 ohms. I have only shown three dipoles, but in actual practice there could be more. At (B) is a simple coax-fed dipole system to be used with a Transmatch. The feed impedance will be close enough to a match of 50 ohms on all bands so that the coaxial feedline won't suffer from excessively high SWR losses.

current points in the line causing overheating and actually melting the line. Think of the line as a resistor to which you managed to feed too much power and it blew up. Because of the high reactance present with a bad load, the normal "modern" transmitter will not put power into the load. However, with a good Transmatch we permit the power to flow to the antenna, and this can set up some very high voltage or current points in the line.

Going one more step, suppose we tune up that same 80 meter dipole on 40 meters. The antenna then becomes a full-wavelength antenna. The feed impedance becomes about 4000 ohms, and the SWR (50 ohm line) goes to 80 to 1! The losses are horrendous under such conditions. (However, the same antenna using open-wire line, which for all practical purposes is lossless, works fine with minimum power loss!)

This information answers the question why some amateurs or some antenna manufacturers and balun makers say one should not use a Transmatch with coax. To all this I say a big loud "Hogwash—Cowdip," and if this wasn't a family magazine, something worse. Stop and really consider what I have just told you. I have posed the worst possible conditions—using RG-58/U (as a matter of fact, I consider this line great for audio purposes but not RF!). Not only that, I used the RG-58/U in a manner in which no amateur with any brains would, running the limit of power in a badly mismatched condition and then forcing the system to try to accept my high power. There is no reason why I could not have set the same problem but used a much better grade of coax, one that would handle higher voltages and so on. Then, there is a real justification for using the Transmatch with a coax-fed system. Everyone thinks of tuned feeders when using a Transmatch and at the same time only considers twin lead or open-wire feeders. There is no reason for not "tuning" coax line as long as one understands the loss limitations. The logical thing to do is to make a multiband antenna system that stays "close" to 50 ohms impedance. This isn't easy, but some coax-fed multiband antennas will stay somewhere below four or five to one across their multiband range. Such an antenna could be used with a Transmatch to good advantage.

I am not going to go into a discussion of balun and antenna manufacturers. You should have learned enough from the above to answer your own questions. One thing I will add, though, is some information for those building their own traps or coaxial baluns. To make capacitors for traps, sections of coaxial line are excellent. However, use coax that has **high voltage** handling abilities. Foam-filled is really not that great because as you will see from the transmission line charts in the various handbooks, the voltage ratings for foam are rather low. Make sure that all electrical connections are well made and will stand high voltages. (The highest voltages in an antenna system can occur at the traps.) Of course, all of the above is based on how much power you run. If less power is used, then adjustments can be made accordingly. For myself, I am from the old school that believes in overkill. I want to make sure the stuff I build will not give me any problems at some later date.

Insulated Open-Wire Line

Several people wrote and asked about the efficiency of the insulated type 450 ohm "open-wire" line versus line that has the conductors spaced a few inches apart. The "true" open-wire line is the most efficient, but for myself, I wouldn't be at all reluctant to use the insulated type. (In fact, that is what I am using now.)

Some Other Multiband Antennas

One commercial antenna system—the Mor-Gain antenna—should be covered because I received several requests for it. This is a coax-fed multiband system that uses half-wavelength dipoles for different bands all brought to a common feed—as in fig. 1.

I am familiar with the antenna because I described several similar systems back in the early 50s. The main question I received was would this antenna be greatly different from the single-wire multiband dipole I described in my article. There is no real significant difference as far as I can see. There would be some pattern changes, but nothing to effect the overall efficiency of the antenna. The Mor-Gain has inherently low SWR simply because its feed impedance is close to 50 ohms on all bands. I say "close" and for a fact, I would use a Transmatch with the system. Like I said in that original article, I prefer to look at a matched system at all times.

For that matter, a reasonably good multiband antenna for coax feed and a Transmatch would be an 80 meter dipole in parallel with a 40 meter one as in fig. 1 at (B). A single half-wavelength dipole has a center impedance of about 70 ohms, the exact impedance depending on its distance above ground. Connecting different dipoles in parallel, as we do in this multiband antenna, keeps the impedance on each band relatively reasonable as far as the feed match is concerned. Coax can be tuned in this case without excessive losses. This is an easy antenna to make and would have no seriously high SWR on any band from 80 through 10, so no high voltages or extra losses would exist on the line if a Transmatch were used. Don't misunderstand me here, though. I would still prefer a single good-size dipole, one-half wavelength or more in total length at the lowest band, with open-wire feeders. You just can't beat such an antenna for a really good all-band system.

Also, I didn't exactly praise the G5RV antenna in my article and accordingly took some flak from amateurs who swear by it. My argument is really quite simple. It, like any multiband antenna, is not resonant on every frequency. It can't be. Also, the low SWR claimed is not on every band. The match depends on installation, and whether or not the antenna is horizontal or inverted-Vee or used as a sloper. It could still require a Transmatch. In fact, some people recommend a Transmatch. If I compare the G5RV to the multiband dipole that I described—the one of indeterminate length, fed with low-loss feeders and a Transmatch—there is no comparison. The antenna system I described can be used on 160 and on up and

always presents a perfect 1 to 1 match to the rig on all bands and all frequencies. Now tell me if there is any comparison. And don't forget, I am talking about a dipole that can be as short as 60 feet overall! However, remember what I said in that first article. McCoy's Rule states: "If the thing works, leave it alone!" (And that includes the G5RV or any other antenna you may have.)

Dipole Lengths

I got several questions about the overall length of the antenna because some amateurs were confused by the term *dipole*. I said that if it were me, I would try to keep the overall length to one-quarter wavelength on the lowest frequency—in other words, at least 60 feet long as a minimum for 80 meters. However, and this is important, that same 60 feet will work on 160 assuming your Transmatch tunes that band. How well it will work is a question I cannot answer, except that on a scale of 1 to 10, I would give it a 4 or 5 on that band.

Also, some amateurs asked about dropping the ends of the dipole to make the overall length longer. I cannot say whether it would be better or not, but it should be simple to try it for yourself.

Wire—What Size?

Several questions pertained to what size and kind of wire could be used for antennas or open-wire feeders. For myself, I prefer No. 12 copper wire for antennas. However, that preference has no real significance, because I am sure, for example, that No. 18 copper-clad steel wire is just as good. The wire size is of no real importance. Many amateurs have to have invisible antennas because of housing restrictions. Any wire strong enough to support its length would be suitable for this purpose. No. 26 enamel is quite commonly used with rubber bands for insulators!

Open-wire feeders can be made with almost any kind of wire. Stranded copper wire is fine as long as there are no loose pieces that could short out one conductor to the other.

TVI and All Those Good Things

I received several queries about TVI if one used a feedline other than coax, or used open-wire feed, for example. This is really not an easy question to answer. Keep in mind that a TV set and its feedline have no respect for the kind of antenna and feed system you use. The argument that vertical polarization causes more TVI than horizontal has gone on for years. I don't agree, and I have years of experience with the subject. A strong RF field around your station and the neighbor's TV (or your own) is bound to exist no matter what your antenna and feed system happen to be. Bear in mind that a TV feedline runs here and there, both horizontal and vertical, to get to the set, so it has no respect for polarization. On the transmitting side, the argument goes that RF stays inside coax so that only the antenna radiates. This is fine and in most instances true. However, any feedline is not supposed to radiate, and that certainly includes open-wire line. To answer the basic question I would have to say that I have used both coax and open-wire line for many years. I really can't differentiate between the two as far as interference is concerned, and Lord knows I have had plenty of TVI in my day! The answer is to have a clean transmitter with a low-pass filter on the transmitter and a high-pass filter on the TV set.

RF Bites—Or What Bit Me?

Still another letter chided me for not mentioning RF mike or key bites when open-wire feeders are used. Again, this is not just a case of using open-wire feeders. However, when one uses an antenna that is a single dipole in a multiband mode, under some conditions it is possible to get more than normal RF around the shack. For some reason it appears to be that microphones and keys get RF on them because their leads may just be long enough to be resonant and RF is coupled to the leads. While the amount of RF is not dangerous, it can be unexpected—and shocking—to say the least! Good grounding of all radio equipment in the shack is a must in this case. Also, if open-wire feeders are used, then changing the length of the feeder can sometimes eliminate the RF problem. This changes the system characteristics and can change your system from voltage to current fed, the latter being the best in this case.

This is the end of Part I. Parts II and III will appear in upcoming issues.

Ingenuity and necessity often bring interesting results. KX6DS shows us how he picked up his 160 total by using both.

A Short Vertical Antenna For 160 and 80 Meters

BY JOHN D. (DAVE) SUBLETTE*, KX6DS

In January 1985 I received the long-awaited permission to operate on 160 meters from KX6, Marshall Islands. I have enjoyed operating on that band since 1968, making many friends and enjoying the extra thrill that comes from working DX on "Top Band." I was ready to go on the air immediately, having anticipated the day by having a Butternut vertical in place with the 160 resonator tuned and ready to go. I only had to wait until sunset. I never knew it took so long for the sun to set as it did that day.

To say the reception I got from the 160 gang was enthusiastic would be an understatement. During January my country total rose quickly to 15, then 20. Participation in the *CQ* WW DX 160 CW contest helped a lot. I was having a ball.

As good as things were, I felt that they could be better (what amateur doesn't?). I was struggling to make QSOs when the band conditions seemed to be good. In short, I could not work everything I was hearing. This is not to say that the Butternut wasn't working. It is perhaps the finest multiband vertical available today. However, a 26 foot vertical is very short in terms of wavelengths at 160 meters. A short antenna can only work so well. There is no substitute for having a full-size antenna. If a full-size one is not possible, one must at least put up the biggest "short" antenna possible.

The design of this antenna evolved to meet a variety of needs, the primary one being a more strongly radiated signal! I'm sure that a better design could be had, but keep in mind that Kwajalein is a long way from the nearest hardware store. I built it from what I could get my hands on. I relied heavily on the ARRL *Antenna Book*, information from the Butternut folks on evaluating ground systems[1], and experience. I made several thousand QSOs from KX6DS on 80 and 40 meters,

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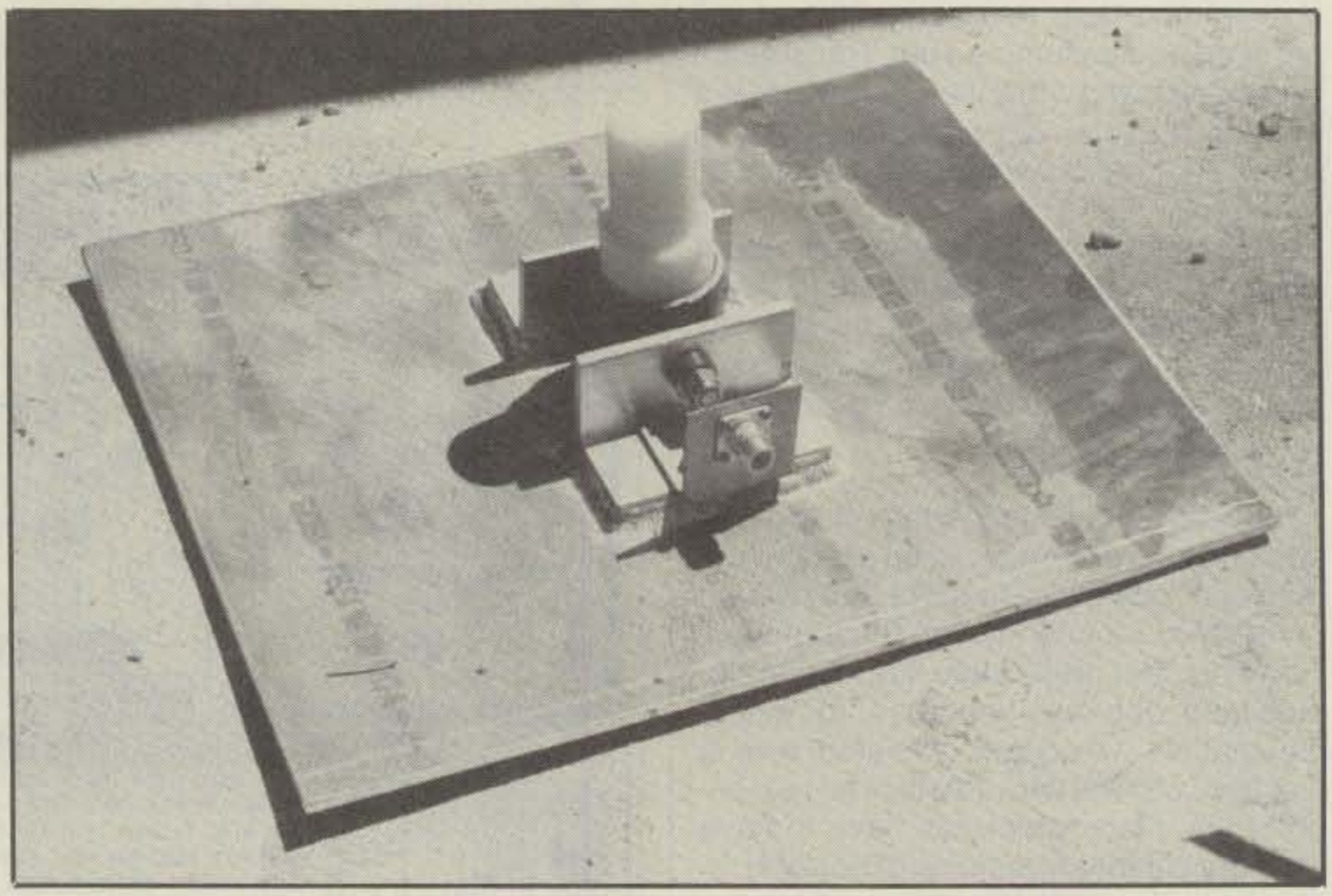

Fig. 1– The base-plate assembly. The plate is made from ½ inch thick aluminum. The hinge assembly is heliarced to the plate. The base insulator is made from a length of nylon stock.

during which I compared the operating efficiency of the Butternut and other types of antennas.

The first decision to be made was how big the new antenna should be. A full-size antenna was not possible. The 26 foot high Butternut was too short on 160. The answer was somewhere in between, but where? I had observed that the Butternut was a very good antenna on 80 meters, comparing favorably with a folded Marconi and a sloping quarterwave single-wire vertical. I concluded that if I could get a vertical as tall in number of wavelengths on 160 as the Butternut was on 80, I would have an antenna that was "good enough." Scaling the Butternut design resulted in a 52 foot vertical. I settled for a 45 foot vertical with an 8 foot diameter "top hat" at the 40 foot level.

The base, shown in fig. 1, is made from a piece of half inch thick aluminum plate. There is a hinge to allow the antenna to be winched up using a pulley and rope attached to the nearby pole that supports my TH7. The base insulator was made from a piece of nylon turned down on a lathe to fit inside the antenna and base mount. There are threaded holes around the perimeter of the base to which the ground radials are connected. An "N" type connector (visible in the photograph) is mounted on the base to accept the feed line. The completed assembly is mounted on two 8 foot four by fours which distribute the weight of and give some lateral stability to the antenna, since it is mounted on the roof. In fig. 2 the antenna and base are shown prior to final assembly and erection.

The antenna itself is made from two 20 foot pieces of schedule 40 6061-T6 aluminum pipe, 1½ inch and 1¼ inch diameter, respectively. I wanted seamless pipe for strength. If you consult the dimension tables for aluminum pipe, you will see

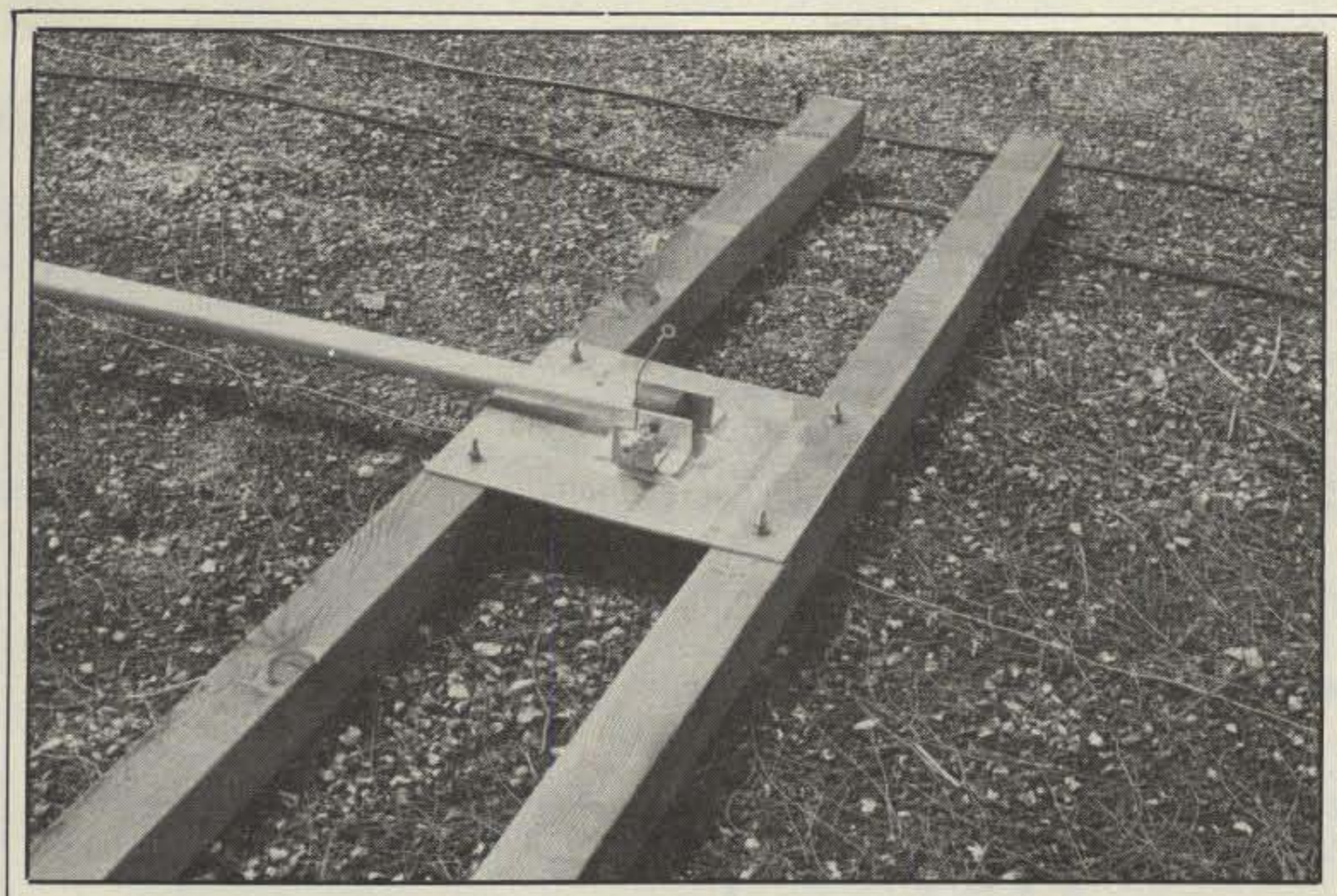

Fig. 2– The base plate is bolted to two 8′ × 4″ × 4″ pieces of lumber. Here the antenna is shown prior to final assembly and erection.

that the smaller diameter pipe will not fit into the larger one. I knew that, but remember what I said about the nearest hardware store. Because I could not get the optimum materials, I used what I could get. I filed the smaller pipe by hand so that it would fit into the larger one. The top section of the vertical, shown in fig. 3, was made from smaller tubing and ¼ inch aluminum plate. The five top-hat radials are made from ¼ inch aluminum tubing and bolted into place. Some heliarcing, visible in the photograph, is required.

The antenna is resonated on 160 by using the Butternut 160 adapter that goes with the HF6 vertical. I modified it by cutting three turns off of the coil. This is necessary because the extra length of the 45 foot top-loaded vertical requires less inductance to resonate it. One of the neat features of the Butternut is that the loading coil is automatically bypassed by its capacitor when the antenna operates on a higher band. I added a smaller coil in series with the 160 resonator to make the antenna resonant on 80 meters. Both the 160 and 80 meter coils are tunable, so any desired portion of the band may be used. The schematic diagram of the antenna is shown in fig. 4.

After the antenna is lifted to the vertical, it is held up by two sets of noninductive guys at 90 degree intervals. As previously mentioned, the antenna is mounted on the roof, which is 33 feet by 84 feet. The roof is 10 feet above ground and flat. There are 60 ground radials laid out under the antenna. Due to the size of the roof, they can be only 35 feet long.

The feedpoint impedance of any short antenna will be very low.[2] This antenna appears to have about 15 to 20 ohms impedance, including ground resistance. The matching circuit is shown in fig. 4. I chose to use an auto transformer made from 16 turns of number 12 wire wound around two t-200 torroidal cores. The feedline is connected across the entire winding. The antenna is connected to one of the turns in the interior of the coil.

The tuning and matching procedure is simple. First, resonate the antenna to the desired operating frequency on each band by adjusting the appropriate coil. Then move the antenna feedpoint tap on the autotransformer from turn to turn, starting at the grounded end of the winding, until the SWR is minimum at resonance. Be sure to check the SWR on both bands, as a compromise might be necessary to keep SWR to a usable range on

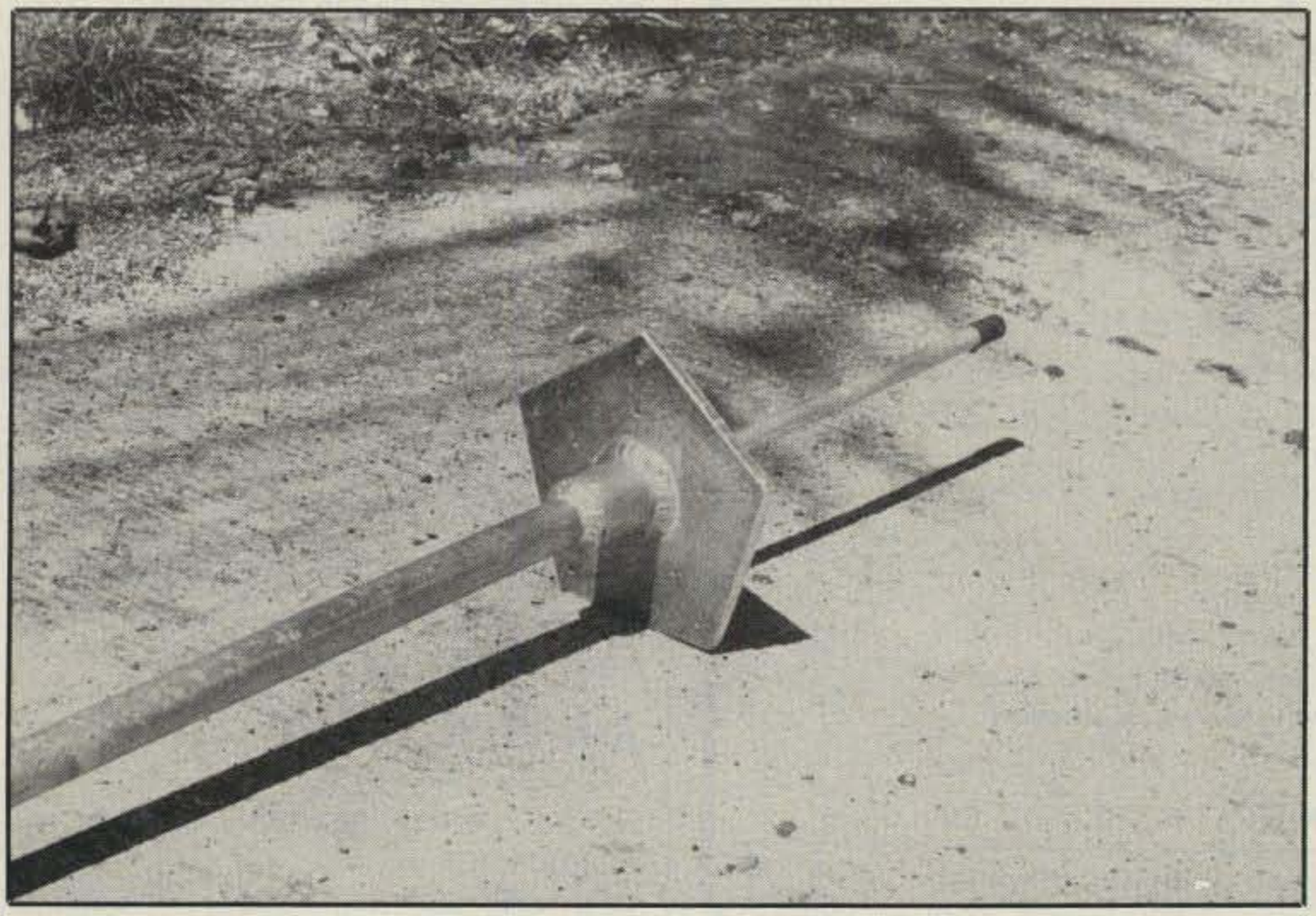

Fig. 3– The top section of the antenna. The five-sided heavy-duty aluminum plate is heliarced to the vertical section. The five top-hat radials, made from ¼ inch aluminum tubing, are bolted in place.

both bands. An alternate matching circuit that I tried successfully was the beta match. I chose the autotransformer because it took less turns of wire and was smaller and neater in appearance.

At this point it is appropriate to say a few words about SWR bandwidth of short verticals. A nice wide bandwidth does not mean that the antenna is working well. It more than likely means that the ground losses are greater than they should be. In this case more radials are needed. If only short radials can be used, as in my case where the roof limits the length, the more radials the better. Raising the ground radial system, and thus making it a counterpoise, will also improve the efficiency of the ground radial system. This was explained in a previous article.[3] The reactive component of the antenna impedance also affects the SWR bandwidth.

As the frequency of operation is moved away from resonance, the change in SWR is caused by a change in the reactive portion of the antenna's impedance. Short antennas have large reactive components that change rapidly with frequency, resulting in a narrow SWR bandwidth. Using a larger diameter of wire or tubing will reduce the reactive part of the impedance. If a choice is available, building the antenna out of larger diameter material will yield a wider SWR bandwidth.

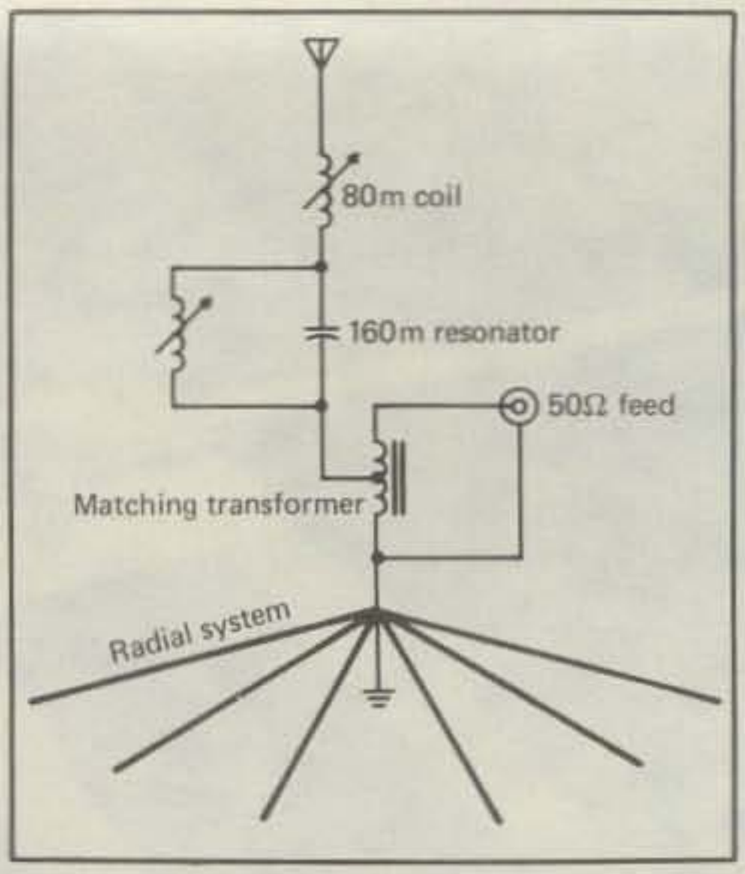

Fig. 4– Schematic diagram for the short vertical antenna for 160 and 80 meters. See text for details.

The antenna works well. The SWR at resonance is less than 1.4:1 on each band. The 2:1 SWR bandwidth of this antenna is 25 kHz on 160 meters and 125 kHz on 80 meters. I have made about 750 QSOs on 160 with this antenna. The last 25 of my 60 DXCC countries were worked on it. QSOs of 2500 miles to JA with 100 watts are routine. I frequently make QSOs to W6 (5000 miles) with 100 watts, and occasionally I make QSOs to W8 or W3 with 100 watts. The antenna is consistently 3 dB better than a quarter-wave folded Marconi fed against the same ground system as the new antenna. (The performance of the Marconi suffers from its being jacknifed severely in order to get it into the available space.) On 80 the antenna shows signal strength about 5 dB less than a full-size quarterwave vertical mounted at water's edge at KX6BU. I have worked Europeans on both 80 and 160 with the antenna, which is the acid test in my opinion. It is very difficult to work Europe on any band from KX6.

In summary, this is not an article which tells step by step how to make this particular antenna. It does point to several *principles* which, if followed, should help you design a short vertical antenna that works as well as possible at your QTH. Good luck and good DX.

References

[1]"Notes on ground systems," Butternut Electronics (supplied with the HF6V instructions).

[2]*The ARRL Antenna Book*, 14th Edition, Chapter 2, pp. 22–27.

[3]Frey, John A., "The Minipoise," *CQ*, August 1985, pp. 30–32, 36, 39.

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Volumes have been, and still can be, written about the "care and feeding" of coaxial cable. In this brief article W4FA tries to highlight for newcomers just a few simple but important points regarding the installation of coaxial cable.

Hints on the Use of Coaxial Cable

BY JOHN J. SCHULTZ*, W4FA/SV

Most amateur radio stations use coaxial cable to feed an antenna system. When it is used properly, coaxial cable can be an efficient means of conveying power from a transmitter to an antenna. Also, because coaxial cable is shielded, it can be routed around or through the metallic structures one finds on many buildings without affecting its efficiency. This is not true, for instance, for so-called open-wire or twinlead transmission lines, which if they are placed near metallic objects can become electrically unbalanced with a resultant loss of transmission efficiency.

One should be aware of some general characteristics of coaxial cables if they are to be used to the best advantage. Power and frequency considerations are the most obvious ones. Table I shows the power-handling capability of three common types of coaxial cable. The values shown assume that the cable is properly impedance matched to the antenna, installed correctly, etc. The values will also vary somewhat from manufacturer to manufacturer, but not by a great deal. For most amateurs who use a 100 watt class transceiver, any one of the cables has sufficient power-handling capability. However, if one were to run a considerable amount of power, particularly on VHF bands, careful attention would have to be given to choosing a cable capable of handling the power. Table II shows, for a 30 meter length of cable, how much power is delivered to the antenna terminals using a transmitter having 100 watts of output power. Again, it is assumed that the cable has been installed properly, impedances are properly matched, etc. The figures in Table II may come as quite a surprise to some radio amateurs—both newcomers as well as old-timers. This is because almost all textbooks present coaxial cable attenuation in terms of decibels rather than in the more practical form of Table II.

Band (meters)	RG-58U	RG-59U	RG-8U
2	170	250	700
6	325	500	1500
10 to 160	430	700	2000

Table I– The maximum safe, continuous power-handling capability (in watts) of common coaxial cables. Ratings apply only if the cable is operating under matched conditions (near unity SWR) and at an ambient temperature of 60° C or less.

Band (meters)	RG-58U	RG-59U	RG-8U
2	23	33	56
6	46	52	72
10	54	63	79
15	60	68	83
20	68	74	85
40	76	81	89
80	83	85	93

Table II– This table shows the power (in watts) that a 30 meter length of cable would deliver at the antenna terminals when the transmitter output is 100 watts. The power "lost" in the cable is due to its attenuation characteristics, which increase with frequency. Also, if the cable is not used under matched conditions, there will even be more loss.

What Table II dramatically illustrates is how different types of coaxial cable attenuate RF energy in relation to the operating frequency. For instance, if one uses a 100 watt output transmitter on 10 meters and a 30 meter length of RG-58 to the antenna, the power delivered to the antenna will be only 54 watts. On 2 meters it would be only 23 watts! The power loss has absolutely nothing to do with SWR or impedance matching. It is an inherent characteristic of coaxial cable due mainly to dielectric loss. The loss is directly related to the length of the cable being used. For instance, if a 15 meter length of cable was being used in the example given, the power lost in the cable would be halved.

So what can one do about the situation? One could choose a coaxial cable with less loss if one felt that the price of the lower loss cable was justified. For instance, in the example just given, if one used RG-8 instead of RG-58, Table II shows that the power delivered to the antenna on 10 meters would be 79 watts and 56 watts on 2 meters. The difference between having 54 and 79 watts delivered to an antenna on 10 meters is probably not very significant (although some amateurs would argue the point), for if 10 meters were to "open" for DX, small differences in radiated power would not matter very much. On the other hand, the difference between having 23 or 56 watts delivered to an antenna on 2 meters can significantly affect the ability to work DX contacts. There is also a more subtle factor involved on the VHF bands such as 2 meters. A lossy coaxial cable will also degrade receiver performance. This factor may be even more important than the loss of transmitted power on VHF.

The main point is that one should be aware that any coaxial cable has some inherent power loss, and one must balance this factor against other factors when try-

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ing to upgrade the performance of an amateur radio station. For instance, it would almost be silly to first go to great lengths to increase the power output of a transmitter when a long length of coaxial cable is needed to an antenna versus first trying to use coaxial cable to the antenna that has the lowest possible loss.

As far as installation is concerned, coaxial cable is generally very easy to use. It can be routed outside buildings, inside walls, around metallic objects, etc. However, one cannot simply install coaxial cable without some care and expect it to perform properly. The most common installation faults related to coaxial cable revolve around poor connections, moisture entering the cable, and the use of extremely sharp bends. Connections are best made by using commercially available coaxial connectors and by following the instructions manufacturers supply for the use of such connectors, or by the use of instructions contained in various radio textbooks. One can get by with fairly crude connections on the lower frequency HF bands and when using low power, but the situation becomes completely different when one uses high power or operates on 15/10 meters or the VHF bands. Arcing can easily occur when using high power with poor coaxial connections, and to lose half the power output of a low-power VHF transmitter due to poor coaxial connections is not unusual. "Splices" in cable should definitely be avoided unless the economies of the situation allow no other choice.

Moisture can do a great deal of damage to a coaxial cable, and it is a danger that is not always easily recognized. If moisture enters a coaxial cable, the shield braid corrodes, the individual fine strand wires which constitute the shield become insulated from each other, and the effectiveness of the shield braid is totally ruined. If the cable is used in a situation where it is continually flexed (e.g., with a rotatable beam antenna), the shield may simply break and open up altogether. Even small nicks or cuts to the outer plastic jacket of a cable can allow a great deal of moisture damage to take place. Such areas of damage are easily overlooked; they appear minor on the surface, but nonetheless they allow the entrance of considerable moisture over a period of time. Even the smallest of nicks or cuts, once they are discovered, should be sealed with tape or some type of epoxy cement.

In most cases, the greatest danger point for moisture is that it enters at the antenna end of the cable. Even if one uses commercial coaxial connectors to connect a cable to an antenna, it should be recognized that most connectors in common use are *not* the waterproof type. They must be sealed with some sort of tape, heat-shrink tubing, cement compound, or similar waterproof material such as Coax-Seal™. And don't forget the simple idea of a rain run-off loop where a coaxial cable connects to an antenna. Fig. 1 illustrates the idea. Such a rain run-off loop may not completely prevent moisture from entering the end of a coaxial cable, but it will certainly minimize the extent of such damage.

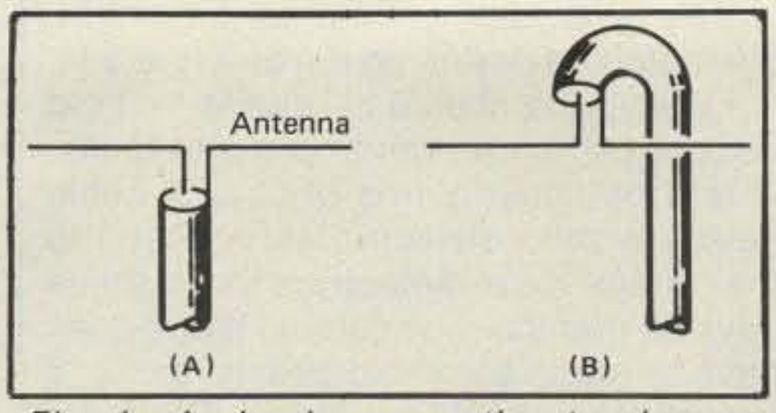


Fig. 1– A simple precaution to observe when installing coaxial cable is not to install it as shown at (A), since moisture from rain can enter the end of the cable. It should be installed as shown at (B), and a sealant should be used to completely prevent moisture from entering the end of the cable.

Coaxial cable is very flexible, but it was never meant to be bent around like hook-up wire! If the cable has a very sharp bend in it, the dielectric material between the inner conductor and the shield will be strained. The dielectric will tend to crack at the point of the bend as the cable gets older. If the cable is subject to temperature and moisture extremes, such as in outdoor service, the cracking progress can be considerably accelerated. In general, coaxial cable should never be bent such that the radius of the bend is less than 10 times the diameter of the cable. In installations where the cable is continually flexed, such as a rotatable beam installation, the minimum bend radius should be 20 to 30 times the diameter of the cable.

Coaxial cable was also never meant to be self-supporting for any great lengths. The distortion of the cable produced by draping long lengths of it will ultimately affect its electrical characteristics. If one does have to drape a long length of cable between, for instance, a low building and the roof of a very tall building, a so-called "hanger" wire should be used. This is usually a wire-like guy wire which is pulled taut, and the coaxial cable is attached to it at intervals of a meter or so by means of electrical tape or plastic cable ties.

Another point one should be aware of with coaxial cable is that under some circumstances it can "disguise" a poor match between an antenna and a transmission line. This subject is a bit complicated and will not be treated in any detail. However, one should be aware of it if one is using a really long length of cable on a higher frequency band. Take as an example the use of 30 meters of RG-58 on 10 meters. The mismatch between the antenna terminals and the antenna end of the coaxial cable can be off by a factor 5 (SWR 5:1), but the mismatch as indicated by an instrument connected between the transmitter output terminals and the transmitter end of the cable would be indicated as being off by only a factor of 2 (SWR 2.0:1). The point to be made here is that if one has to use a really long length of coaxial cable, the match between the antenna and the cable should initially be checked by temporarily placing an SWR meter at the *antenna* terminals. If a bad mismatch is indicated, it should be cor-

rected by adjusting the antenna length, the matching device on the antenna, etc.

Finally, one should be aware that old coaxial cable can develop many faults. This is particularly true of coaxial cable having a solid dielectric as opposed to the "foam" type dielectrics found these days on many newer cables. If one does have to reuse some old coaxial cable, a few checks should be made. The most obvious check is just a visual one. Cut away a bit of the outer jacket of the cable at both ends and make sure that the shield braid is shiny and flexible. If the braid is discolored or brittle, moisture has gotten into the cable and it may be useless. If the end checks are satisfactory, check the entire length of the cable for any cuts in the jacket which might have allowed water to enter. A simple ohmmeter can be used to determine that no drastic electrical fault such as an open or short is present.

The most insidious fault that old cable can develop is increased attenuation. The fault is insidious in that the cable might appear to be in perfectly fresh, clean shape. However, chemical changes could have taken place in the dielectric to increase attenuation. Exact attenuation measurements require sophisticated instruments, but there are at least two checks which can be done with commonly available instruments. If one has a wattmeter, one can terminate the far end of the cable being tested in a dummy load of the same impedance as the cable. Then use the wattmeter to measure the power being delivered into the cable by a transmitter and the power the cable delivers to the dummy load. The difference between the two powers represents the power lost in the cable due to attenuation for the length of cable tested. If it seems to be significant, one then has to do a bit of math by converting the power differences into decibels and seeing how the decibel loss compares to what a manufacturer or textbook specifies as being correct for the type and length of cable tested.

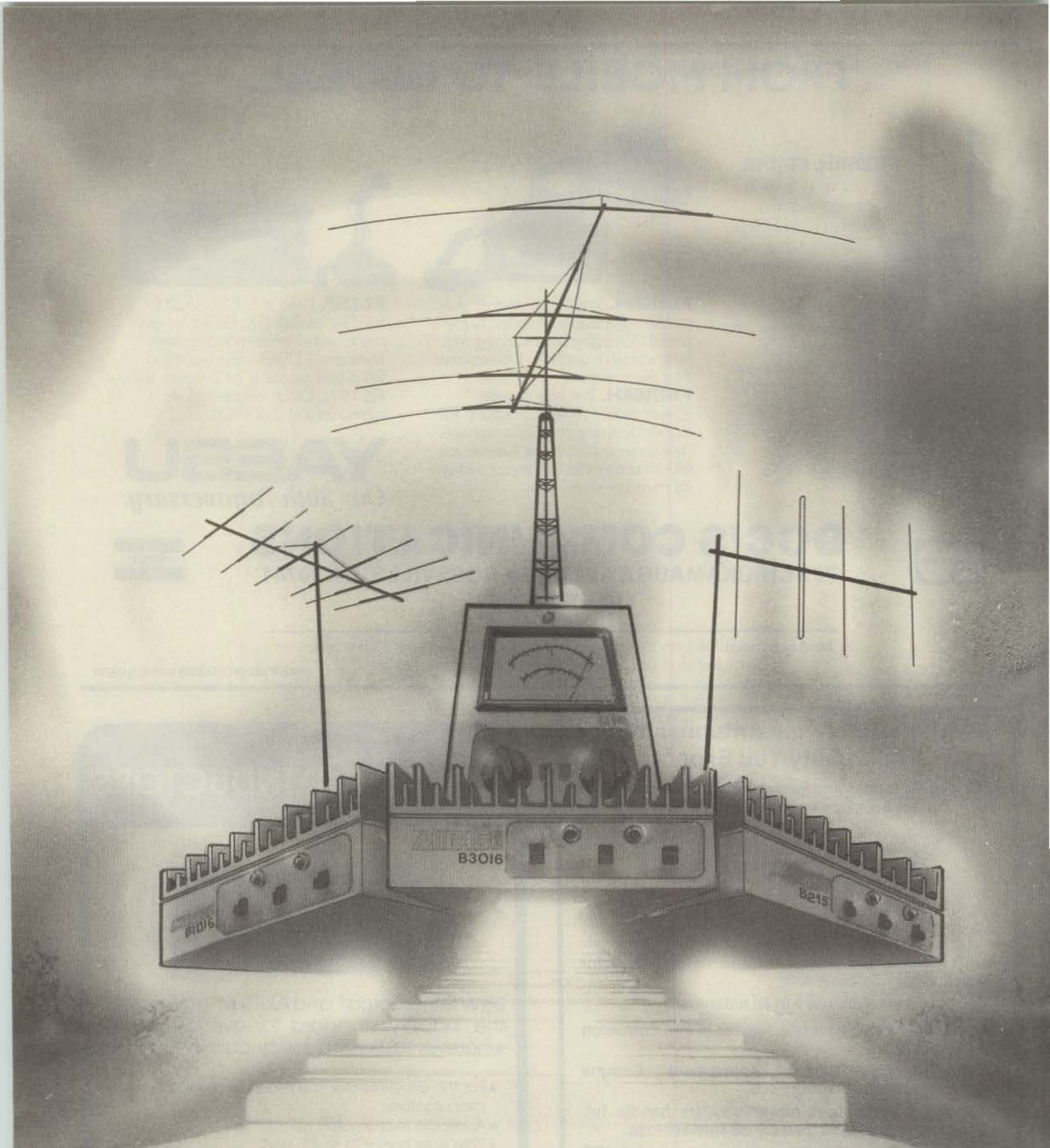
SWR Reading at Transmitter Output	Loss in Length of Cable Tested
3.0:1	0 dB; no power loss in cable
2.5:1	1.3 dB; 16 watts lost in cable
1.9:1	2.0 dB; 37 watts lost in cable
1.5:1	4.0 dB; 60 watts lost in cable
1.3:1	6.0 dB; 75 watts lost in cable

Table III– The relationship between SWR readings and cable loss when a cable being tested is terminated in a resister producing an artificial SWR of 3.0:1. The "watts lost" refers to the situation if the cable were used with a 100 watt output transmitter. Although the cable test as described in the text is a simple and approximate one, it only makes sense to do it if one has a reasonably well-calibrated SWR meter.

The simplest possible attenuation check involves only the use of an SWR meter at the transmitter and a *carbon* resistor to simulate a 3:1 SWR at the far end of the cable being tested (a 150 ohm resistor for 50 ohm cable, for example). If the cable has zero loss, the SWR meter at the transmitter will indicate an SWR of 3:1. In reality, however, the SWR read will be something less, according to the attenuation of the cable, as shown by Table III. If the SWR read 1.5:1, the cable would have about 4 dB loss. The latter test is best done, by the way, with a solid-state transmitter having a "no-tune" output. With a tube-type transmitter one would first have to adjust the output loading and plate tuning controls using a 50 ohm dummy load.

Neither test is meant to be super exact and each test is only valid for the frequency used and the length of cable used. Nonetheless, if either test indicates a significant power loss, one should be suspicious of the cable tested and obtain confirmation of its usefulness.

All of the foregoing may make it appear that coaxial cable is difficult to use or install. That is really not the case. Good coaxial cable, carefully installed, will provide many years of dependable service. However, there is no reason to nullify the benefit of having a good antenna system by too hastily choosing or installing a coaxial cable transmission line.



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CIRCLE 135 ON READER SERVICE CARD

CQ REVIEWS:

The Microlog Morse Coach

A Morse Code Tutoring Program For the Commodore 64 Computer

BY DAVE INGRAM*, K4TWJ

Fig. 1– The Microlog Morse Coach is a fully self-contained cartridge system which plugs into a Commodore 64 computer. All information and prompts are screen displayed and backed up by an instruction pamphlet.

Contrary to possible first impressions, Morse Coach isn't a previously undiscovered form of early western frontier travel. Nor is it a technique concocted by old Samuel (FB) himself for sending messages without wires. Morse Coach is, rather, a cleverly designed Morse code proficiency program which plugs directly into the "game" port of a popular Commodore 64 home computer. After the self-contained cartridge is snapped into the computer's rear socket, three different forms of "modes" of code study and a variety of monitor screen colors can be keyboard selected. The overall results are a Morse learning system that can be equally used by a lone individual in an isolated area or a group of prospective amateurs studying together to become proficient in Morse code itself. Hopefully, also, the idea of mating a simple game-type cartridge with one of today's inexpensive home computers will inspire youngsters and attract more individuals into our exciting world of communications. Why would anyone care to waste time with a Pac Man® game when this genuine Morse program is available, right? Yes indeed!

A Closer Look

After sliding the Morse Coach cartridge into a Commodore 64 and switching on the computer, a menu with five choices is displayed on the monitor's screen. The first selection, or "alphabet" mode, assumes no prior knowledge of Morse code and begins instruction with only four characters sent in random order. Additional characters are added according to one's learning rate. The included manual explains the "learning sequence" of characters, plus how to "jump around" in that sequence at daily start-ups for bypassing reviews if desired. Any speed between 10 and 99 words per minute is continuously selectable. The popular method of learning code at the proper dot/dash ratio, then merely reducing time between characters to improve speed, is used. This proven technique minimizes learning plateaus many people experience around 7 words per minute. In reality the Morse Coach's sequence works as follows. A character is initially transmitted via the monitor's/TV's speaker, and you type its corresponding letter on the computer's keyboard. An incorrect response yields a "No, I sent ——; you typed ——," then the transmitted example is repeated for clarity (and cleverly reinserted later to keep you alert). A proper answer yields a "Yes,, that's right" on the display. You have a reasonable, but not long time for each response. I personally found this mode helpful in learning typing. It's good those computer keys are marked!

The Coach's second and third modes are useful after learning Morse code. A "practice" mode can be set to send random groups of five characters with letters and numbers intermixed. Responses can be keyboard entered (and later evaluated on a graph) or copied by hand on a notepad. The latter is compared to what the program calls "raw data" whenever desired or after a run. There, an on-screen display is used for checking copy. If that method reminds you of the way an amateur might teach a newcomer Morse code, you're right. Sometimes it's difficult to realize this is a computer program rather than a human instructor. The Coach's third mode is a speed test. The main difference between this mode and "practice" in user response is strictly via keyboard and the monitor screen shows "failed" after a 15 percent error rate. The "practice" mode will complete a code run regardless of any errors or user response.

Using the Coach

Being an incurably devoted amateur and a true CW enthusiast, I naturally evaluated the Morse Coach program from several points of use. As an initial opinion, I think it's a gem for both newcomers learning the code from scratch and present amateurs thinking of convenient ways to improve their Morse copying abilities. Both letters and numbers are intermixed in the study, and the random sequencer prevents memorizing the text. The "alphabet mode" adds new characters into Morse study in a sneaky but effective manner, and I suspect an unfamiliar person could learn Morse within a couple of days of spare time using this system. (I don't think many people could learn the whole alphabet in one day. Learning curves drop noticeably after two hours.)

The Morse Coach program seems attractive for group training in two ways. A

*Eastwood Village No. 1201 So., Rt. 11, Box 499, Birmingham, AL 35210

number of students can hand-copy text and compare results with screen-displayed answers. Also, several students can use the "practice" or "test" modes right at the computer's keyboard, and each person's results will be stored in memory. The latter function merely requires entering a name before a "run." One aspect I noticed here is that if you're going for high speed (such as Extra class 20 wpm), you must also know how to type fast. Otherwise, it's back to hand-copying! The Morse Coach program also seemed to "top out" around 40 or 45 words per minute. That is, the dot/dash ratios became almost 1 to 1 rather than the usual 3 to 1. I doubt, however, if many beginning amateurs would find that objectionable. Below 40 wpm the Coach is superb.

Conclusion

All aspects considered, the Morse Coach seems like an ideal code-traning idea. It's useful for any and all code classes, schools with electronic clubs, isolated individuals, and volunteer examining groups across the land. Possibly it will also inspire more newcomers to further investigate amateur radio overall. That would be the ultimate reward for any new and low-cost product. For more information on Morse Coach, contact Microlog Corp., 18713 Mooney Drive, Gaithersburg, Maryland 20879. CQ

CQ REVIEWS:

The Butternut HF4B Butterfly Beam

BY LEW MCCOY*, W1ICP

Butternut Electronics has been noted for excellent vertical antennas, using outstanding design techniques to produce a multiband vertical that is a very good performer. They have now aimed their talents at a multiband beam, and the result is again an excellent antenna. I have tested the antenna for well over a year and have been very impressed with its performance. One of the unusual features in the design of the HF4B is that it is relatively small considering that it covers 20 meters with fair gain and good front-to-back ratios. How big is it?

Good Things in Small Packages

The Butterfly beam, so called because it looks like two butterflies in flight and of course is made by Butternut, has a "wingspan" (element width) of 12½ feet and a boom length of only 6 feet. In fact, it would look like a TV antenna up on the average building. It covers the 14, 21, 24, and 28 MHz bands. The manufacturer's stated gain is 3 dB on 20, 4.5 dB on 15, and 5 dB on 10 and 12 meters. I have no way of checking gain figures because it requires an extensive antenna range. However, theoretically the manufacturer's gain figures are certainly honest, and I wouldn't question them. A full-size 2-element array on 20 meters would produce 4.5 to 5 dB gain (over a dipole), and certainly Butternut with their 3 dB gain figure is more than reasonable. By using the "Butterfly" technique on the elements—in other words, increasing the antenna's effective aperture—gain and broadbanding are realized. When one sees that this is a small antenna and can be mistaken for a TV installation but still has outstanding performance, it becomes an attractive package for the apartment or condominium dweller.

Front to back is rated at 18 dB maximum on 20 meters and 15 dB on the other bands. All of my tests were made with the antenna mounted on an ordinary TV rotator and the antenna installed at 30 feet above ground. I did many "A-B" tests against a full-size beam at 65 feet. And that full-size beam has over 7 dB gain on 20 and higher gains on the higher bands, so with the height and all, the big beam had definite advantage. More about those tests in a moment.

The HF4B only weighs 16 pounds and is easily rotated by a lightweight TV rotater. The instructions are clear and precise, and from start to finish it took me about three hours to get the antenna up on a tower/mast. I have included two drawings from the manual of the driven and reflector elements to give you an idea of what they look like.

Note that there are no traps of any kind in the antenna. Note also from the drawings that there are definite matching settings for the desired portion of each band. Resonance on each

Here is the HF4B ready to be installed. The antenna is so light that it is very easy to manage and work on.

band is obtained by matching stubs and half loops—frankly, an ingenious method. In my installation I was able to reach the antenna to make matching adjustments. I installed a small transmitter near the antenna and an SWR indicator in the coax feedline. Butternut supplies SWR curves and suggests that your matched antenna resemble their curves. Of course, they correctly point out that each installation has its own peculiarities. My curves didn't match theirs, but were better. On 20 meters the SWR was never higher than 2 to 1 at any place in the band and was mostly less than 1.5 across the band. On 15, 12, and 10 meters I was flat—no worse than 1.2 to 1 across all three bands. (Frankly, I expected this with the "Butterfly"-type elements because they tend to be very broadbanded).

My Tests

I have long felt that in any product review the reader is mainly interested in how the piece of equipment performs on a practical basis. Therefore, I always try to emphasize that point. I made scores of contacts, both DX and stateside, on all the bands using the "A-B" tests I mentioned above. I did not tell the station on the other end what I was using because I was afraid it might influence his report.

*Technical Editor, CQ, 200 Idaho St., Silver City, NM 88061

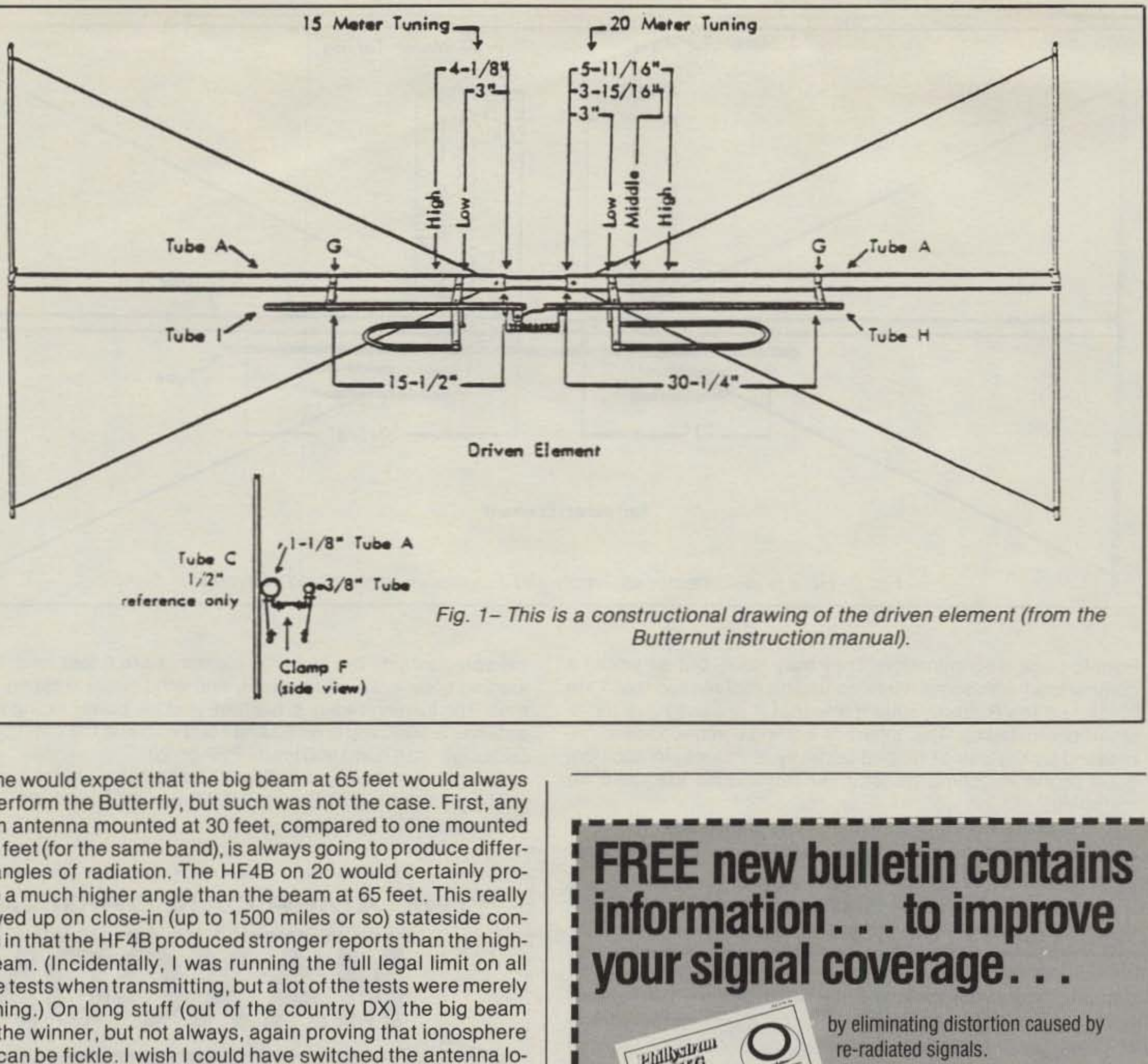

Fig. 1– This is a constructional drawing of the driven element (from the Butternut instruction manual).

One would expect that the big beam at 65 feet would always outperform the Butterfly, but such was not the case. First, any beam antenna mounted at 30 feet, compared to one mounted at 65 feet (for the same band), is always going to produce different angles of radiation. The HF4B on 20 would certainly produce a much higher angle than the beam at 65 feet. This really showed up on close-in (up to 1500 miles or so) stateside contacts in that the HF4B produced stronger reports than the higher beam. (Incidentally, I was running the full legal limit on all these tests when transmitting, but a lot of the tests were merely listening.) On long stuff (out of the country DX) the big beam was the winner, but not always, again proving that ionosphere skip can be fickle. I wish I could have switched the antenna locations, but that was just too much of a job! All of the above concerns 20 meters only, because this is where the angles are so pronounced.

On 15 and the higher bands, the two beam heights produce some complicated angles of radiation, and it wasn't as easy to differentiate between the beams, except to say that the bigger beam was consistently better (but only slightly). My conclusion is quite simple: For the average amateur who isn't trying to be the world's greatest DXer, the HF4B is outstanding.

There are a few more observations that should be made concerning the HF4B as a "small" beam—particularly compared to some other small beams. Anytime that one reduces the size of an antenna the radiation resistance in the feed goes lower and lower. For example, a half-wavelength dipole has a radiation resistance of close to 70 ohms. As you make that antenna smaller, the resistance drops. For example, an 80 meter mobile whip has a radiation resistance of less than 1 ohm. Also, when you put dipoles into a beam configuration, the radiation resistance also drops. (A three-element beam with elements spaced on the order of one-tenth wavelength has a feed resistance of only a few ohms.) A very low impedance feed is always an unhealthy condition because of the inherent losses. Good matching techniques are needed.

Further, many amateurs are misled by small rotary beams because they argue that their antennas have directivity and

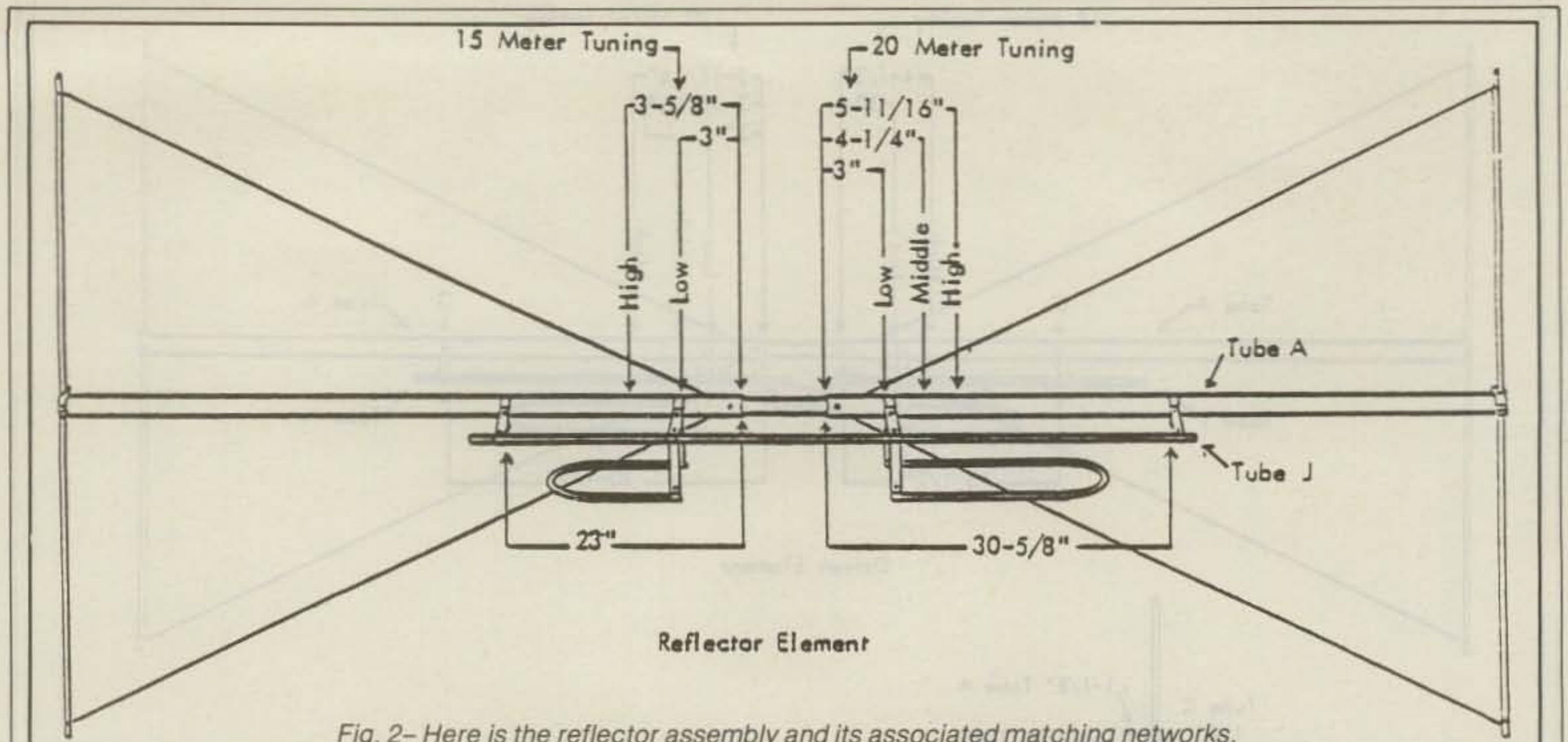

Fig. 2– Here is the reflector assembly and its associated matching networks.

front-to-back discrimination. They may have, but so would a dummy load with some wires on it! The real reason that I am "high" on the Butterfly antenna is that it doesn't have these small beam faults. The inherent antenna impedance is increased by the use of fanned butterfly elements. In addition, good sound matching transformer techniques are used for matching.

There are a few more vital statistics I should add. The vertical spreaders on the butterfly elements are 6 feet long. Wind loading area is 3.5 square feet, and wind survival rating is 80 mph. The turning radius is 6.9 feet, and the power rating to the antenna is 1000 watts on 20 and 1500 watts on the other bands (although I ran it at 1500 watts PEP on 20).

List price of the beam is $249.00, and it is manufactured by Butternut Electronics Co., 405 E. Market St., Lockhart, Texas 78644 (512-398-7117). CQ

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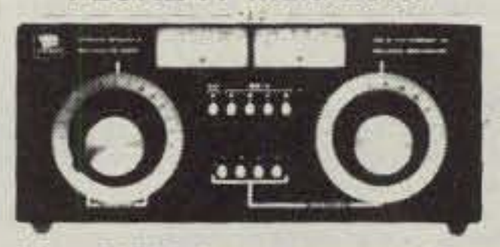

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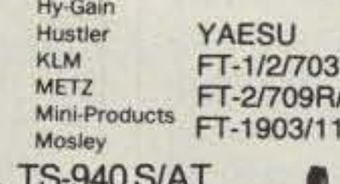

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CQ SHOWCASE

Yaesu AD-2 Duplexer

Yaesu Electronics Corporation has announced the AD-2 Duplexer for the FT-2700RH dual-band FM transceiver and FT-726R VHF/UHF all-mode transceiver. The AD-2 provides for semi- or full-duplex VHF/UHF crossband operation with a single 2 meter/70 centimeter dual-band antenna. The one antenna may serve for both transmitting (on one band) and receiving (on the other band) simultaneously. Band-to-band isolation is more than 50 dB. At high power (up to 50 watts) there is minimal insertion loss of either transmit power or receive sensitivity, maker says.

The specifications include passbands 140–150 MHz and 400–450 MHz; maximum power 50 watts; insertion loss VHF less than 0.3 dB and UHF less than 0.5 dB; impedance 50 ohms; VSWR less than 1.2:1; and receive isolation 50 dB. For more information, contact Yaesu Electronics Corporation, P.O. Box 49, Paramount, CA 90723, or circle number 100 on the reader service card.

Davle Tech Inc. Wire Wrapping Tool

The Model BJW-3 is a battery-powered wire wrapping tool. A specially designed bit compresses insulated wire against the wrap post in such a way that the post edge cuts through the insulation and makes contact with the wire conductor. This allows the user to wrap directly from a wire reel or spool without precutting and prestripping, and makes it possible to wire continuous strings across any number of points with a single continuous insulated wire. The string may be ended at any point with a built-in cut-off mechanism. The BJW-3 is operated by two rechargeable nickel cadmium batteries (not included) and features a rugged ABS housing and hardened steel components.

The tool is lightweight, compact, and comes complete with a specially designed bit and sleeve, and a 100 foot (30m) spool of 30 AWG (0,25mm) wire. Refill spools are available in 100 foot (30m) lengths and in four colors (blue, red, white, and yellow). For more information, contact Davle Tech Inc., 2-05 Banta Place, Fair Lawn, NJ 07410, or circle number 104 on the reader service card.

ICOM IC-48A 440 MHz Mobile

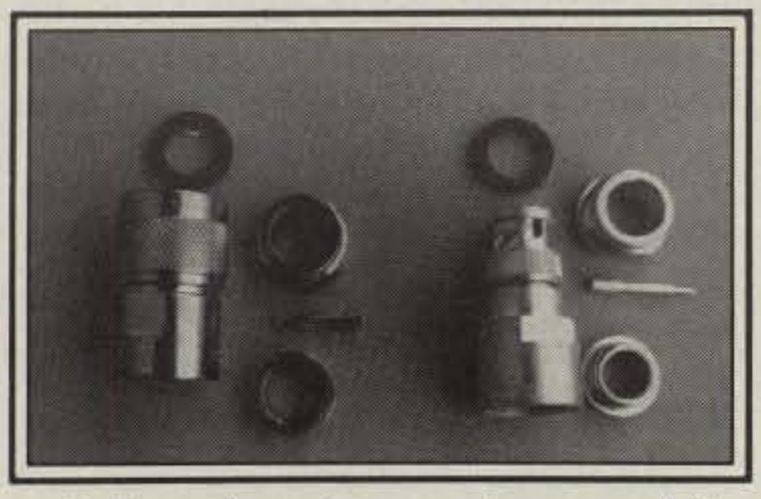
ICOM has announced the IC-48A 440 MHz compact mobile which features 440–450 MHz frequency coverage, large LCD readout, 21 memory channels, scanning of the entire band or the memory channels from the provided HM-12 mic, 11 front-panel controls, and internal speaker. Size of the unit is 5¼" D× 5½"W× 2"H. Options include the IC-HM14 DTMF mic, PS-45 13.8V 8 amp

power supply, UT-29 tone squelch unit, SP-10 external speaker, HM-16 speaker mic, and HS-15/HS-15SB flexible boom mic and PTT switch box.

For more information, contact ICOM America, Inc., 2380 116 Ave. NE, Bellevue, WA 98009-9029, or circle number 107 on the reader service card.

Nemal Connectors

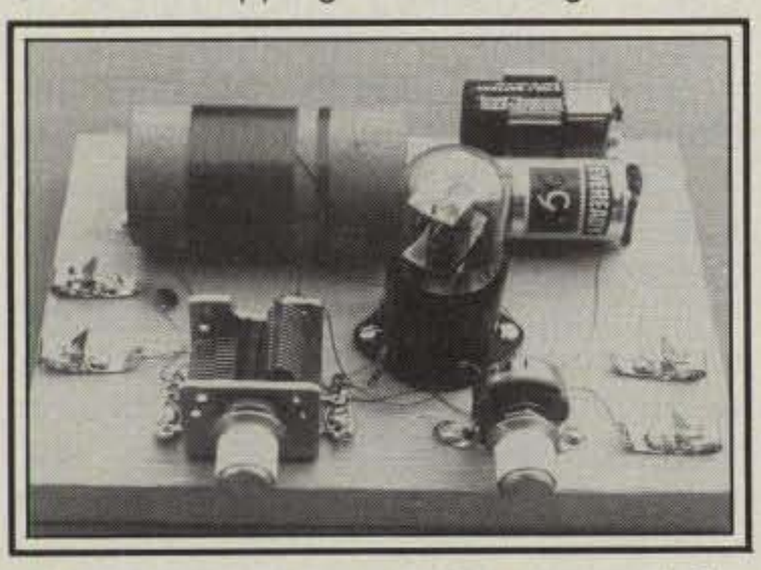
Nemal Electronics has introduced a line of connectors designed to fit the Belden 9913 and 8214 type cables. The connectors are available from stock in both type N (part No. NE720) and BNC (part No. NE860) series and will accommodate the 9½ to 11 gauge center conductors in these and other similar cables.



Both series of connectors meet the electrical and mechanical requirements of Mil-C-39012 and incorporate silver-plated contacts and teflon insulation. Each connector is fully compatible with all other standard connectors in its series. For additional information contact Nemal Electronics International, 12240 NE 14th Ave., North Miami, FL 33161, or circle 103 on the reader service card.

AES One-Tube Radio Kit

A new One-Tube Radio Kit providing the experimenter or antique radio buff the opportunity to experience early radio construction and operation is available from Antique Electronic Supply. The kit comes complete with breadboard, tube, and other parts. Batteries and headphones are optional. The kit, as well as a 20-page catalog covering tubes, parts, books, etc., for radio collectors and experimenters, is available for $16.95 plus $3.00 for shipping and handling.



For further information, contact Antique Electronic Supply, 688 W. First St., Tempe, AZ 85281, or circle number 101 on the reader service card.

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

It's not the summer doldrums as far as contest activity is concerned, but except for the DARC CW European Contest and the JARL CW All Asian there is no real DX competition during August.

Discount the SEANET SSB Contest. The published rules in last month's column were reported as being okay by Rich Ricca, K2BDY/DU7, but little or no other information was available. This year's activities will probably be handled by the Indonesian group, and no date has been set for the traditional convention, when the awards will be presented.

The DARC CW, the most popular of the European contests, is sure to provide plenty of activity. This year's contest will be directed by Herb Ade-Thurow, DL2DN, the new WAEDC Manager. Connie Wollner, DJ1QQ, the previous manager who handled the affair for many years, became a Silent Key a few months ago.

Conditions permitting, the All Asian CW might be worth a try. Rules for that one are the same as they have been these past many years and can be found in the June issue. There's plenty of time to get your log to the JARL. November 30th is the deadline.

The New Jersey and New Mexico state parties in the middle of the month fill the remaining weekends. The Alaskans, who normally have their party in August, failed to send their announcement.

I was very sorry to hear that Andrew Malashuk, W1PM, one of the early *CQ* Contest Committee men, passed away the early part of June. I'll have more to say about Andy in next month's column.

Not much else to report, so we will keep this month's comments at a minimum, too.

Deadline for the November announcements is August 15th, and September 15th for the December issue.

73 for this time, Frank, W1WY

Calendar of Events

	Aug.	2-3	ARRL UHF Contest
	Aug.	9-10	European CW Contest
*	Aug.	16-17	SEANET SSB Contest
	Aug.	16-17	SARTG RTTY Contest
	Aug.	16-17	New Mexico QSO Party
	Aug.	16-18	New Jersey QSO Party
†	Aug.	23-24	All Asian CW Contest
	Sep.	3-5	YLRL "Howdy Days"
	Sep.	13-14	European Phone Contest
	Sep.	20-21	CRRL Can-Am Contest
	Sep.	20-21	Scandinavian CW Activity
	Sep.	27-28	Scandinavian SSB Activity
	Oct.	4-5	IRSA World Championship
	Oct.	4-5	VK/ZL/Oceania SSB
	Oct.	11-12	VK/ZL/Oceania CW Contest
	Oct.	11-12	Pennsylvania QSO Party
	Oct.	12	RSGB 21/28 MHz SSB
	Oct.	12-13	Illinois QSO Party
	Oct.	15-17	YLRL Anniv. CW Party
	Oct.	18	RSGB 21 MHz CW Contest
	Oct.	18-19	Boy Scouts Jamboree
	Oct.	18-20	CARTG RTTY Contest
	Oct.	**25-26**	**CQ WW DX Phone Contest**
	Oct.	29-31	YLRL Anniv. SSB Party
	Ot.25	-Nv.1	Cayman Is. Pirates Week
	Nov.	8	ALARA YL/OM Contest
	Nov.	8-9	European RTTY Contest
	Nov.	15-16	AOEC 160 Meter Contest
	Nov.	**29-30**	**CQ WW DX CW Contest**

** Covered last month.*
† See June issue.

14 Sherwood Road, Stamford, CT 06905

European DX Contest

C.W.: Aug. 9–10 Phone: Sept. 13–14
0000Z Saturday to 2400Z Sunday

This is the 31st annual contest sponsored by the DARC. The activity will be between European countries and the rest of the world on all bands 3.5–28 MHz.

Following are updated rules, including two new features. U.S. states will now count as a multiplier, and QSO dupe sheets will now be required for each band on which 200 or more contacts are made.

Only 36 hours out of the 48-hour contest period may be used by single-operator stations. The 12 hour off periods may be taken in one, but not more than three, periods anytime in the contest and must be indicated in the log.

Classes: Single operator and multi-operator single transmitter, both all bands. Multi-operator stations are allowed to change bands one time only within a 15 minute period. A quick band change and return is allowed to work a new multiplier.

Exchange: RS(T) plus a QSO number starting with 001. In addition, W/K stations will include their state (i.e., 599011 MA).

Scoring: One point per QSO and one point for each QTC reported.

Multiplier: The multiplier for non-European stations is determined by the number of European countries worked on each band (WAE list). Europeans will use the ARRL DXCC list. In addition, each call area of the following countries will be considered a multiplier: JA, PY, VE/VO, VK, ZL, ZS, and UA9*0*. *Each W/K state will also be considered a multiplier.*

The multiplier on 3.5 MHz may be multiplied by 4, on 7 MHz by 3, and on 14/21/28 MHz by 2.

Final Score: Total QSO points, plus QTC points, times the sum total multiplier from all bands.

QTC Traffic: Additional point credit can be realized by making use of the QTC traffic feature. A QTC is a report of a confirmed QSO that took place earlier in the contest and was later sent back to a European station. It can only be sent from a non-European station back to a European. The general idea is that after a number of Europeans have been worked, a list of these stations can be reported back during a QSO with another station. An additional, one point credit can be claimed for each station reported.

A QTC contains the time, call, and QSO number of the station being reported (i.e., 1300/DL2DN/134, which means that at 1300Z you worked DL2DN and received #134).

A QSO can be reported only once and not back to the originating station.

A maximum of 10 QTCs to a station is allowed. The same station may be worked several times to complete this quota. Only the original contact, however, has QSO value.

Keep a uniform list of QTCs sent; (3/7 indicates that this is the 3rd series of QTCs sent and that 7 QSOs are being reported).

Awards: Certificates to the top scorers in each class in each country and areas listed in the multiplier. Continental leaders and stations having at least half the score of the continental leader will also be honored.

Disqualification: Violation of the rules of the contest, unsportsmanlike conduct, or taking credit for excessive duplicate contacts will be deemed sufficient cause for disqualification.

Logs: It is suggested that you use the official DARC or equivalent forms. Figure 40 contacts to the page, and use a separate sheet for each band. A large-size SAE and IRCs will get you a supply.

All entrants are now required to submit cross-check dupe sheets for each band with 200 or more QSOs. A penalty of three contacts will be deducted for each duplicate QSO that is removed by the committee.

Mailing deadline is September 15th for CW and October 15th for Phone. All entries go to: The WAEDC Contest Committee, P.O. Box 1328, D-8950 Kaufbeuren, West Germany.

MFJ TUNERS

This may be the world's most popular 3 KW roller inductor tuner because it's small, compact, reliable, matches virtually everything and gives you SWR/Wattmeter, antenna switch, dummy load and balun — all at a great price!

Meet "Versa Tuner V". It has all the features you asked for, including the new smaller size to match new smaller rigs-only 10¾"Wx4½"Hx14 7/8"D.

Matches coax, balanced lines, random wires—1.8 to 30 MHz. 3 KW PEP —the power rating you won't outgrow (250pf-6KV caps).

Roller inductor with a 3-digit turns counter plus a spinner knob for precise inductance control to get that SWR down to minimum every time.

Built-in 300 watt, 50 ohm dummy load, built-in 4:1 ferrite balun.

MFJ989B **$329.95**

Lighted Cross-needle Meter reads SWR, forward and reflected power all in one glance. Has 300 and 3,000 watt ranges. Meter light requires 12 VDC.

6 position antenna switch (2 coax lines, through tuner or direct, random/balanced line or dummy load). SO-239 connectors, ceramic feed-throughs, binding post grounds.

Deluxe aluminum low-profile cabinet with sub-chassis for RFI protection, black finish, black front panel with raised letters, tilt bail.

MFJ's Fastest Selling TUNER

MFJ-941D **$99.95**

MFJ's fastest selling tuner packs in plenty of new features. New styling! Brushed aluminum front. All metal cabinet. **New SWR/Wattmeter**! More accurate. Switch selectable 300/30 watt ranges. Read forward/reflected power.

New antenna switch! Front panel mounted. Select 2 coax lines, direct or through tuner, random wire/balanced line or tuner bypass for dummy load.

New airwound inductor! Larger more efficient 12 position airwound inductor gives lower losses and more watts out. Run up to 300 RF power output.

Matches everything from 1.8 to 30 MHz! dipoles, inverted vee, random wires, verticals, mobile whips, beams, balanced and coax lines.

Built-in 4:1 balun for balanced lines. 1000 V capacitor spacing. Black. 11 x 3 x 7 inches. Works with all solid state or tube rigs. Easy to use anywhere.

MFJ's 1.5 KW VERSA TUNER III

MFJ-962B **$229.95**

Run up to 1.5 kw PEP and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire.

Lighted Cross-needle Meter reads SWR, forward and reflected power in one glance. Has 300 and 3,000 watt ranges. 6 position antenna switch handles 2 coax lines, wire and balanced lines. 4:1 balun. 250 pf, 6 kv variable capacitors. 12 position ceramic inductor switch. New smaller size matches new rigs: 10¾ × 4½ × 14⅞ inches. Flip stand for easy viewing. Requires 12V for light.

MFJ's Best VERSA TUNER

MFJ-949C **$149.95**

MFJ's best 300 watt tuner is now even better! The MFJ-949C all-in-one Deluxe Versa Tuner II gives you a tuner, cross-needle SWR/Wattmeter, dummy load, antenna switch and balun in a new compact cabinet. You get quality conveniences and a clutter-free shack at a super price.

A new cross-needle SWR/Wattmeter gives you SWR, forward and reflected power—all at a single glance. SWR is automatically computed with no controls to set. Has 30 and 300 watt scale on easy-to-read 2 color lighted meter (needs 12 V).

A handsome new black brushed aluminum cabinet matches all the new rigs. Its compact size (10 x 3 x 7 inches) takes only a little room.

You can run full transceiver power output—up to 300 watts RF output—and match coax, balanced lines or random wires from 1.8 thru 30 MHz. Use it to tune out SWR on dipoles, vees, long wires, verticals, whips, beams and quads.

A 300 watt 50 ohm dummy load gives you quick tune ups and a versatile six position antenna switch lets you select 2 coax lines (direct or thru tuner), random wire or balanced line and dummy load.

A large efficient airwound inductor—3 inches in diameter—gives you plenty of matching range and less losses for more watts out. 100 volt tuning capacitors and heavy duty switches gives you safe arc-free operation. A 4:1 balun is built-in to match balanced lines.

Order your convenience package now and enjoy.

2 KW COAX SWITCHES

MFJ-1702 **$19.95**

MFJ-1702. $19.95. 2 positions. 60 dB isolation at 450 MHz. Less than .2 dB loss. SWR below 1:1.2.

$29.95 MFJ-1701

MFJ-1701, $29.95. 6 positions. White markable surface for antenna positions.

MFJ's Smallest VERSA TUNER

MFJ-901B **$59.95**

MFJ's smallest 200 watt Versa Tuner matches coax, random wires and balanced lines continuously from 1.8 thru 30 MHz. Works with all solid state and tube rigs. Very popular for use between transceiver and final amplifier for proper matching. Efficient airwound inductor gives more watts out. 4:1 balun for balanced lines. 5 x 2 x 6 inches. Rugged black all aluminum cabinet.

MFJ's Random Wire TUNER

MFJ-16010 **$39.95**

MFJ's ultra compact 200 watt random wire tuner lets you operate all bands anywhere with any transceiver using a random wire. Great for apartment, motel, camping operation. Tunes 1.8-30 MHz. 2 x 3 x 4 inches.

MFJ's Mobile TUNER

MFJ-945C **$79.95**

Designed for mobile operation! Small, compact. Takes just a tiny bit of room in your car. SWR/dual range wattmeter makes tuning fast and easy. Careful placement of controls and meter makes antenna tuning safer while in motion.

Extends your antenna bandwidth so you can operate anywhere in a band with low SWR. **No need to go outside and readjust your mobile whip.** Low SWR also gives you maximum power out of your solid state rig—runs cooler for longer life.

Handles up to 300 watts PEP RF output. Has efficient airwound inductor, 1000 volt capacitor spacing and rugged aluminum cabinet. 8x2x6 inches. Mobile mounting bracket available for $5.00.

ORDER ANY PRODUCT FROM MFJ AND TRY IT-NO OBLIGATION. IF NOT SATISFIED, RETURN WITHIN 30 DAYS FOR PROMPT REFUND (less shipping).
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CIRCLE 31 ON READER SERVICE CARD

1985 All Asian CW Contest
North American Results

U.S.A.			WA6FGV		27,146
1.9 MHz			**NN7L**		**15,276**
W0ZV		**105**	**K1ZM**		**14,880**
			K6EID		14,546
3.5 MHz			W3GM		12,668
N7AM		**6,696**	KB7G		11,220
W6BIP		**4,176**	**N5JB**		**10,880**
W7DRA/7		198	AJ6V		7,938
			W7YF		5,508
7 MHz			KY7M		5,247
W6KP		**42,042**	K1KI		5,151
K6NA		40,326	W5PWG		3,071
N6AW		37,725	KQ1F		2,418
K5NW		**19,530**	W6OUL		1,938
K6CL		682	W5OB		1,107
K1XM		**588**	K7LXC		357
KV9S		**332**	W5NR		72
14 MHz			**Multi-Opr.**		
W5FO		**9,116**	**NR5M**		**135,024**
N6IC		**6,204**	**N6ADI**		**100,492**
K4RZ		**5,658**	K5LZO		99,756
K9RHY		**4,687**	K6ZM		91,296
WD8IXE		**3,344**	**W0RSG**		**35,616**
K3TW		**2,592**			
W8EX		2,232	**Canada**		
K0RWL		**2,201**	**14 MHz**		
N4MM		2,030	**VE2AEJ**		**551**
WA8YTM		1,035	**VE3EWY**		**532**
K2JT		**836**			
KA2BBZ		735	**All Band**		
W2HG		494	**VE8RCS**		**6,136**
K4BAI		378			
KW2J		238	**Dom. Rep.**		
W5EIJ		144	**14 MHz**		
KR1R		**108**	**HI0A**		**30**
W1END		72			
W5TVX		29	**Jamaica**		
W6IFC		18	**All Band**		
W1OPJ		9	**6Y5HN**		**165**
All Band			**Panama**		
W6TMD		**112,882**	**7 MHz**		
K3ZO		**27,540**	**HP1XKR**		**280**

Certificate winners in boldface.

WAE Country List: C31, CT1, CT2, DL, EA, EA6, EI, F, FC, G, GD, GI, GJ, GM, GM Shetland, GU, GW, HA, HB9, HB0, HV, I, IS, IT, JW Bear, JW, JX, LA, LX, LZ, M1, OE, OH, OH0, OJ0, OK, ON, OY, OZ, PA, SM, SP, SV, SV Crete, SV Rhodes, SV Athos, TA1, TF, UA13456, UA2, UA Franz Josef Land, UB5, UC2, UN1, UO5, UP2, UQ2, UR2, Y2, YO, YU, ZA, ZB2, 1A0, 3A, 9H1, 4U1 Geneva, 4U1 Vienna.

SARTG RTTY Contest

Three Periods GMT
0000–0800 & 1600–2400 Sat., Aug. 16
0800–1600 Sun., Aug. 17

This is the 16th annual contest sponsored by the Scandinavian Amateur Radio Teletype Group. Use all bands 3.5 through 28 MHz. The same station may be worked on each band for QSO and multiplier credit.

Classes: Single operator, multi-operator single transmitter, and SWL.

Exchange: QSO no., signal report.

Points: QSOs with own country, 5 points. With other countries on same continent, 10 points. With other continents, 15 points. The U.S., Canada, and Australia call areas count as separate countries for scoring.

Multiplier: Each DXCC country and each W/K, VE/VO, and VK call area. A multiplier will not be considered unless the claimed station appears in at least five logs, or a log is received from that station.

Final Score: Sum of QSO points from all bands times the sum of the multiplier from each band.

SWL's use same scoring but based on sum of stations and messages copied.

Awards: Certificates to the top-scoring stations in each class in each country and each call area of the U.S., Canada, and Australia.

Use a separate sheet for each band, and include a summary sheet showing the scoring, comments, and other essential information, and your name and address in block letters.

Logs must be received by October 10th and go to: Contest Manager, Jorgen Dudahl-Lasjon, OZ1CRL, Egebjergvej 90, 4500 Nykohing Sj, Denmark.

(There were 44 single operator entries in the 1985 contest: W2KHQ, 24,500 pts. placed 15th; KB2VO, 24,025 pts. placed 16th; K6WZ, 18,170 pts. placed 24th; WA6WGL, 9,020 pts. placed 30th; WA4UBD, 2,340 pts. placed 35th; WA7EGA, 56,350 pts. placed 4th worldwide out of 5 multi-operator entries.)

New Jersey QSO Party

2000Z Sat. to 0700Z Sun. Aug. 16–17
1300Z Sun. to 0200Z Mon. Aug. 17–18

This is the 27th annual party sponsored by the Englewood ARA. Phone and CW are part of the same contest, the same station may be worked on each band and mode, and NJ stations may contact in-state stations for QSO and multiplier credit.

Exchange: QSO no., RS(T), and QTH. County for NJ, ARRL section or country for others.

Scoring: NJ stations score 1 point for W/K and VE/VO contacts, and 3 points for DX. Multiply total by ARRL sections worked (maximum of 74). KP4, KL7, KH6, etc., are 3-point contacts and section multipliers.

Out-of-state stations multiply total NJ QSOs by number of NJ counties worked (maximum of 21).

Frequencies: 1810, 3535, 3900, 7035, 7135, 7235, 14035, 14280, 21100, 21355, 28100, 28610, 50–50.5, and 144–146. Try phone on even hours, 15 on odd hours, and 160 at 0500 UTC.

Awards: Certificates to the top scorers in each NJ county, ARRL section, and DX country. Second-place awards if four or

more logs are received from that section. Also Novice and Tech., and mobile awards.

Use UTC time, indicate the multiplier only the first time it is worked, include a QSO check sheet, and include a summary sheet showing the scoring, etc. Send a large SASE if you wish a copy of the results.

Stations planning activity in NJ are requested to advise the EARA by August 1st so that coverage of all counties may be planned.

Logs must be received no later than Sept. 13th and go to: Englewood ARA, P.O. Box 528, Englewood, NJ 07631-0528.

New Mexico QSO Party

1600Z Sat. to 2100Z Sun., Aug. 16–17

Sponsored by the Albuquerque DX Assn., the format is somewhat different from the usual state QSO party. Following rules are verbatim, so come to your own conclusion.

Stations may be worked once on each band and mode, mobiles on each band and mode in each county.

Classes: Class A—Inside NM but outside home county. Class B—All other NM stations and those outside NM.

Exchange: RS(T) and QTH. County for New Mexico; state, province, or country for others.

Scoring: CW contacts count 3 points, SSB 2 points.

Multiplier: NM counties (maximum 33), VE provinces (maximum 12), DXCC countries (except W/K and VE), and US states (maximum 47).

Final Score: Total QSO points from all bands times sum of the multiplier as indicated above. Class A stations multiply total by 3, Class B by 2.

Frequencies: CW—1810 and 55 kHz up from bottom of each band 3.5–28 MHz. SSB—1845, 3945, 7280, 14280, 21380, and 28580 MHz.

Awards: Certificates to winners in each state, province, DX country, and NM county. Plaques to overall winners in New Mexico and out of state. Additional awards possible if returns warrant.

Include a summary sheet and dupe sheet if your log shows more than 200 contacts.

Mailing deadline is September 30th and logs go to: New Mexico QSO Party, Att: Bob Thanisch, KN5D, P.O. Box 997, Corralles, NM 87048.

YLRL "Howdy Days"

1400Z Wed. to 0200Z Fri., Sept. 3–5

This activity is for YL's, and scores will be based on contacts between YL's only. All licensed women operators throughout the world are invited to join the party.

All bands and modes 10 through 80 meters may be used. Only one contact with the same station is permitted regardless of the band. Crossband and net contacts do not count. Use only 24 hours out of the 36 hour contest period, and indicate the breaks in your log.

Score 2 points for each YLRL member worked; 1 point if it's with a non-member. Therefore, members should identify themselves in the exchange. There is no multiplier; just add the QSO points.

Suggested Frequencies: CW—3555, 7055, 14055, 21195, 28195. SSB—3955, 7255, 14295, 21395, 28595. (Plus or minus 15 kHz.)

The top-scoring YLRL member will receive her choice of a YLRL pin, charm, or stationery. The non-member winner will receive a one-year membership in the YLRL.

Submit your original log, no carbon copies. Indicate if you are a member, score your log, and sign the summary sheet.

You are expected to delete all duplicate contacts. For each duplicate contact that is removed by the committee, a penalty of three additional and equal contacts will be removed from your score.

Logs must be received by October 6th and go to: Mary Lou Brown, NM7N, 504 Channel View Drive, Anacortes, WA 98221.

ANTENNA/TOWER SALE!

hy-gain

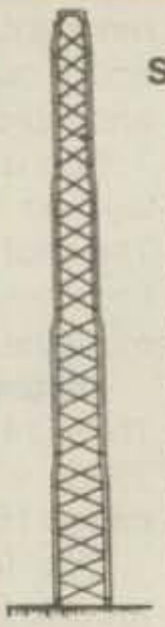
CRANKUP SALE!

All Models Shipped Factory Direct—Freight Paid*!

Check these features:
- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
HG37SS	37 ft	9 sq ft	$CALL
HG52SS	52 ft	9 sq ft	$CALL
HG54HD	54 ft	16 sq ft	$CALL
HG70HD	70 ft	16 sq ft	$CALL

Masts—Thrust Bearings—Other Accessories Available—Call! Prices Shown Are Your Total Delivered Price In Continental U.S.A.!



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Self Supporting Towers On SALE!
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- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save $
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	164	$329
HBX48	48 ft	10 sq ft	303	$429
HBX56	56 ft	10 sq ft	385	$499
HDBX40	40 ft	18 sq ft	281	$399
HDBX48	48 ft	18 sq ft	363	$489

*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.

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Guyed Tower Packages

- World Famous Rohn Quality and Dependability
- Rugged high wind survival-provides safe installation
- Multi purpose towers satisfy a wide range of needs
- Complete packages include: guy hardware, turnbuckles, guy assemblies, w/torq bars, concrete base, rotor plate and top section per manufacturers specs.

Packages shown below are rated for wind zone "B" (86 mph wind). Zone "C" (100 mph wind) design prices slightly higher. All tower packages shipped freight collect from our Plano, TX warehouse, in stock for prompt delivery.

	Model 25G	Model 45G	Model 55G
50'	$ 579	1079	1439
60'	639	1209	1609
70'	689	1329	1759
80'	849	1479	1929
90'	919	1749	2089
100'	989	1899	2259
110'	1189	2019	2639
120'	1259	2179	2819

US TOWER CORPORATION

These rugged crankup towers and masts now available from Texas Towers!

Check these features:
- All steel construction
- Hot dipped galvanized
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- No guys needed

Coax arms, Thrustbearings, Masts, Motor drives, Remote controls, Hinged bases, rotor bases, & raising fixtures also in stock—

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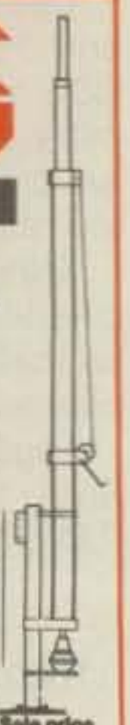
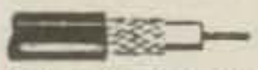


Model	Min. Ht.	Max. Ht.	Ant. load*	Sale price
MA40 mast	21'	40'	10 sq ft	$ 549
MA550 mast	22'	50'	10 sq ft	899
TX438	22'	38'	18 sq ft	829
TX456	22'	56'	18 sq ft	1249
TX472	23'	72'	18 sq ft	2059
HDX555	22'	56'	30 sq ft	1879
HDX572	23'	72'	30 sq ft	3229

Note - US Towers Shipped Freight Collect From Visalia, CA Factory

**Note—towers rated at 50 mph to EIA specifications*

RG-213U



$.29/ft $279/1000 ft
Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X

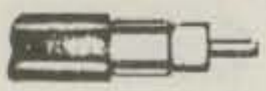
$.19/ft $179/1000 ft

- RG8X—95% Bare Copper Shield
- Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10 MHz	30 MHz	150 MHz	450 MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	5.8
RG-58/U	52	1.4	1.9	6.0	12.5
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HARDLINE/HELIAX™



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⅞" LDF5-50 Andrew Heliax™	$3.99/ft

select connectors below.

HARDLINE & HELIAX™ CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Alum	$19	$19	$19	$25
½" Heliax™	$25	$25	$25	$25
⅞" Heliax™	$49	$49	$49	$49

AMPHENOL CONNECTORS

Silver PL259 ..... $1.25

UG21B N Male ... $2.95 UG23D N Female .. $2.95

Antenna Wire & Accessories

Solid Copperweld	12 ga. $.12/ft	14 ga.	$.10/ft
Stranded Copper	14 ga. $.10/ft	16 ga.	$.09/ft

¼ mile 18 ga copper-clad steel wire $30
6 inch heavy-duty end insulator ..... $3.00/ea.
Dog-bone insulator $.79 Coax seal $2.50

Van Gorden

1:1 Balun ..... $11 Center Insulator $6
Dipole Kits D80 $31.95/D40 $28.95
Short Dipole Kits SD80 $35.95/SD40 $33.95
All-band Dipole w/ladder line $29.95
G5RV all band antenna $49.95

ALPHA DELTA

DX-A 160-80-40 Sloper $49

CUSHCRAFT

A3 3-el Tribander Beam	$229
A4 4-el Tribander Beam	$299
A743 & A744, 30/40 mtr KIT for the A3 & A4	ea. $79
R3 20, 15, 10mtr Vertical	$275
AV5 80-10mtr Vertical	$109
D40 40mtr Dipole	$159
40-2CD 2-el 40 mtr Beam	$299
A50-5 5-el 6 mtr Beam	$85
215 WB NEW 15-el 2 mtr Beam	$85
230 WB NEW 30-el 2 mtr Beam	$229
4218 XL 18-el 2 mtr Beam	$105
3219 19-el 2mtr Beam	$99
220B 17-el 220MHz Beam	$99
424B 24-el 432MHz Beam	$85
ARX2B 2mtr Vertical	$39

hy-gain

Discoverer 2-el 40-mtr Beam	
Discoverer 3-el Conversion Kit	
EXPLORER-14 SUPER-SPECIAL	
QK710 30/40 mtr. Add-On-Kit	
V2S 2-mtr Base Vertical	
V4S 440MHz Base Vertical	
TH5MK2S Broad Band 5-el Triband Beam	
TH7DXS 7-el Triband Beam	
TH3JRS 3-el Triband Beam	
205BAS 5-el 20-mtr Beam	
155BAS 5-el 15-mtr Beam	
105BAS 5-el 10-mtr Beam	
204BAS 4-el 20-mtr Beam	
64BS 4-el 6-mtr Beam	
12 AVQ 20-10 mtr Vertical	
14 AVQ 40-10 mtr vertical	
18 AVT/WB 80-10mtr Vertical	
18HTS 80-10 mtr Hy-Tower Vertical	
23BS 3-el 2 mtr Beam	
25BS 5-el 2 mtr Beam	
28BS 8-el 2 mtr Beam	
214BS 14-el 2-mtr Beam	
2BDQ 80/40 mtr Trap Dipole	
5BDQ 80-10 mtr Trap Dipole	
BN86 80-10 mtr KW Balun W/Coax Seal	

HUSTLER

6BTV 80-10 mtr Vert	$129	5BTV 80-10 mtr Vert	$109
4BTV 40-10 mtr Vert	$89	G7-144 2-mtr Base	$119
G6-144B 2-mtr Base	$89		

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
2KW Super	$20	$22	$25	$29	$39

Bumper Mounts - Springs - Folding Masts in Stock!

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- Full Legal Power 80/10 Meters
- Optional Stub Tuned Radial Kit Model STR II $29
- Optional Roof Mounting Kit Model RMK II $49 (includes STR II)
- Optional 160 Meter Resonator Kit Model TBR 160 $49

HF2V 80/40 Meter Vertical Antenna $129 Delivered (Continental USA)

- Optional 160 Meter Resonator Kit Model TBR 160 $49

HF4B "Butterfly" $189. (del. cont. USA)

- Covers 10, 12, 15, 20M
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- Light Weight, Only 17 lbs.
- Use with TV Rotor

Free Shipping On Butternut Accessories Also When Purchased With Antenna

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KT34A 4-el Broad Band Triband Beam	$339
KT34XA 6-el Broad Band Triband Beam	$489
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2m-16LBX NEW-16-el 2-mtr Beam	$99
2m 22C NEW-22-el 2-mtr Satellite Antenna	$119
432-30LBX NEW-30-el-432 MHz Antenna	$99
435-18C 435 MHz Satellite Antenna W/CS-2	$119
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ROTORS

Alliance HD73 (10.7 sq ft rating)	$119.95
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Telex CD 45II (8.5 sq ft rating)	$Call
Telex HAM 4 (15 sq ft rating)	$Call
Telex Tailtwister (20 sq ft rating)	$Call
Telex HDR3000 Heavy Duty (25 sq ft rating)	$Call
Kenpro KR500 Heavy Duty Elevator Rotator	$189
Kenpro KR5400 AZ/EL Rotor Package	$319

ROTOR CABLE

Standard 8 cord cables (vinyl jacket 2-#18 & 6-#22 ga)	$.19/ft
Heavy Duty 8 Cond cable (vinyl jacket 2-#16 & 6-#18 ga)	$.36/ft

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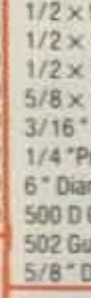
10 ft Stack Sections

20G $39.50 45G $112.50
25G $49.50 55G $149.50



All 20G, 25G, 45G and 55G Accessories in Stock at Discount Prices - CALL!

Foldover Towers	Model	Height	Ant Load*	Price
	FK2548	48 ft	15.4 sq ft	$899
	FK2558	58 ft	13.3 sq ft	$949
	FK2568	68 ft	11.7 sq ft	$999
	FK4544	44 ft	34.8 sq ft	$1199
	FK4554	54 ft	29.1 sq ft	$1299
	FK4564	64 ft	28.4 sq ft	$1399

25G Foldover Double Guy Kit $249
45G Foldover Double Guy Kit $269

*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex
All Foldover Towers Shipped Freight Prepaid Continental USA! Foldover Prices 10% Higher West of Rockies

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3/16 EHS Guywire (3990 lb rating)	$.15/ft
1/4 EHS Guywire (6650 lb rating)	$.18/ft
5/16 EHS Guywire (11,200 lb rating)	$.29/ft
5/32 7 × 7 Aircraft Cable (2700 lb rating)	$.15/ft
3/16 CCM Cable Clamp (3/16" or 5/32")	$.45
1/4 CCM Cable Clamp (1/4" Cable)	$.55
1/4 TH Thimble (fits all sizes)	$.45
3/8EE (3/8" Eye & Eye Turnbuckle)	$6.95
3/8 EJ (3/8" Eye & Jaw Turnbuckle)	$7.95
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1/2 × 12EJ (1/2" × 12" Eye & Jaw Turnbuckle)	$13.95
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HPTG2100 Guy Cable (2100 lb rating)	$.29/ft
HPTG4000 Guy Cable (4000 lb rating)	$.49/ft
HPTG6700 Guy Cable (6700 lb rating)	$.69/ft
9901LD Cable End (for 2100/4000 cable)	$8.95
9902LD Cable End (for 6700 cable)	$9.95
Socketfast Potting Compound (does 6-8 ends)	$14.95

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Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
.12 in Wall	$29	$49	$69	$89
.18 in Wall	$39	$69	$99	$129
.25 in Wall	$69	$129	$189	$249

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High Tech
HT XCVRS

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IC3AT 220 MHz
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Heavy Duty - High Quality - Rugged - Reliable

- Input Voltage: 105-125 VAC Output: 13.8 VDC ± .05V
- Fully Electronically Regulated— 5mV Maximum Ripple
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- M-Series With Meter— A-Series Without Meter

Model	*Cont. Amps	ICS Amps	Price
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RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199
RS50M	37	50	229

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B3016
ONLY $229!

Model	Band	Pre-amp	Input	Output	Sale Price
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B23S	2M	No	2W	30W	$ 99
B23A	2M	Yes	2W	30W	$129
B215	2M	Yes	2W	150W	$259
B108	2M	Yes	10W	80W	$159
B1016	2M	Yes	10W	160W	$259
B3016	2M	Yes	30W	160W	$229
D24	440	No	2W	40W	$219
D1010N	440	No	10W	100W	$319

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AL80A NEW 1000W 3-500Z Amplifier $699
Al-84 600W PEP Output
(4-6MJ6 Tubes).....$399
RCS-4 4 Pos Remote Antenna Switch....$119.95
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World of Ideas

a monthly feature by
DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

Amateur Radio Is Not An Expensive Hobby

One of the most common statements many of us hear from prospective newcomers or curious investigators involves the misconception that amateur radio is a relatively expensive hobby. While most veteran amateurs realize that such isn't necessarily the case, the importance of clarifying that illusion reflects on each of us, especially if our amateur world is to continue surviving in good health. In many ways this situation can be visualized as an ongoing campaign supported by our own society—you, me, every true amateur, not a club's single public-relations officer or Novice class instructor. This month's column is thus oriented towards unique means of enjoying amateur radio's many rewards within the confines of a low budget. We'll also include some ideas on antennas and even Phase III OSCAR satellite gear along the way. Next month we'll expand the views to include a revisit of classic-style amateur gear. Fair enough?

In many ways it's fairly easy to understand why curious onlookers might be intimidated by the financial aspects they see in amateur radio. Our own typical demonstrations or mobile rig exposures to others, for example, usually involve proud displays of new gear with every imaginable feature and option included for sheer pleasure. And why not? Statistics show that the average U.S. amateur is approximately 50 years of age, pursues or has pursued a financially rewarding career, and has been a radio amateur for several years (or decades). As such, we've "worked our way up the ladder of success" and now enjoy the best equipment available—gear that naturally makes anyone drool with envy. Monthly magazines with their many glamorous ads may seem to support that "high finance philosophy," but again I say that amateur radio isn't necessarily an expensive pursuit, and that doesn't mean one must start with a one-tube transmitter and a regenerative receiver. Think about that.

Were you ever bitten by the sports car bug? Remember how you plunked down big bucks for a sleek new roadster and later learned of better sports-car deals after joining a local club? That same relation holds true in amateur radio. "Inside information" is the keynote. Time-proven and knowledgeable amateurs can truly serve as a guiding light to newcomers and/or curious investigators in this respect. We can suggest various types of older gear which we've used in the past and found to be impressive performers. We can also offer advice regarding those attractive deals occasionally found at hamfest fleamarkets or random garage sales, plus we can offer useful pointers on refurbishing those items to like-new condition. The opportunity of "bringing up" a newcomer to an enthusiastic and knowledgeable amateur whom anyone would be proud to endorse can prove to be a highly rewarding experience. Don't merely take my world for that statement, however. Try it yourself and watch the results!

Eastwood Village, No. 1201 So., Rt. 11, Box 499, Birmingham, AL 35210

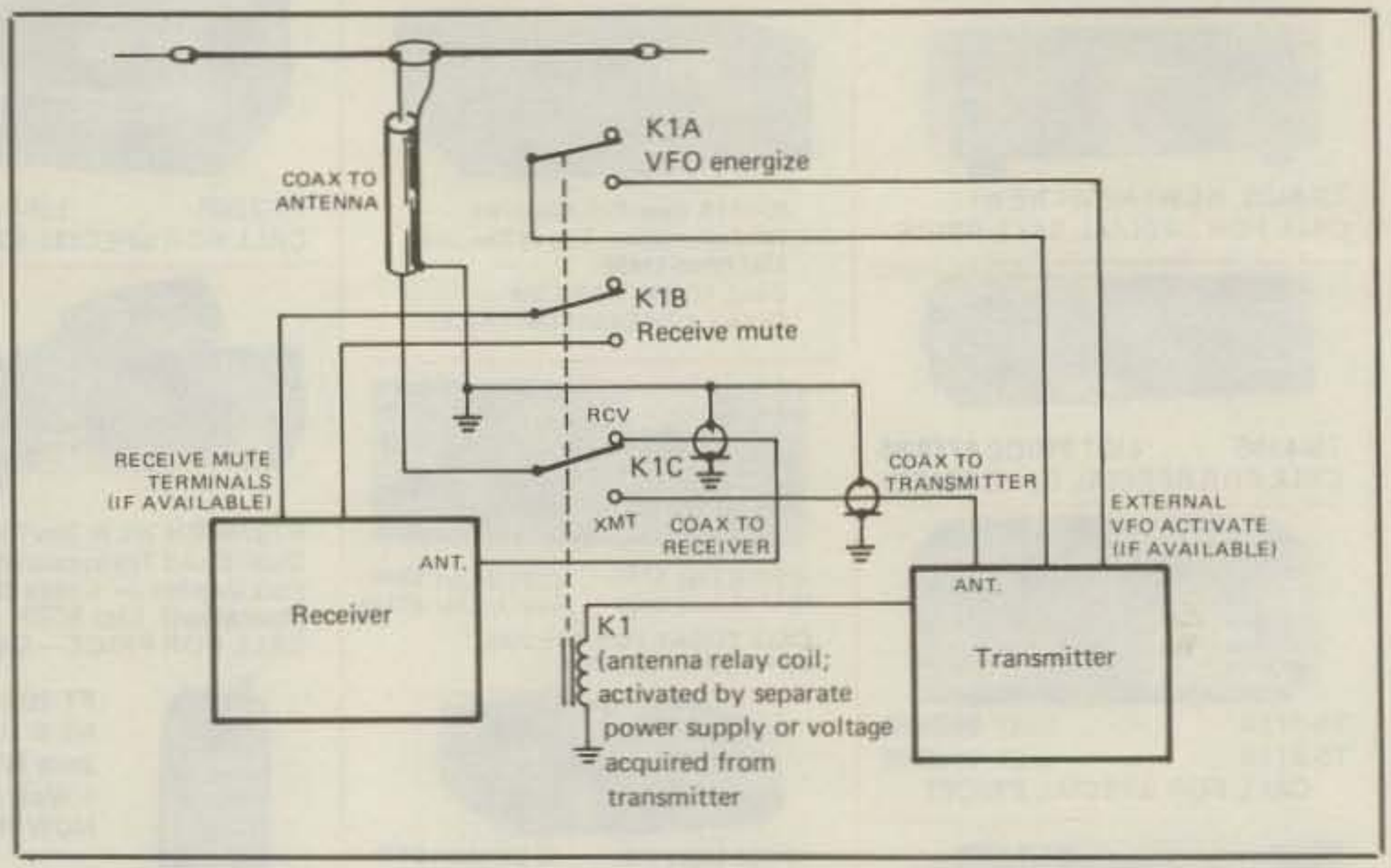
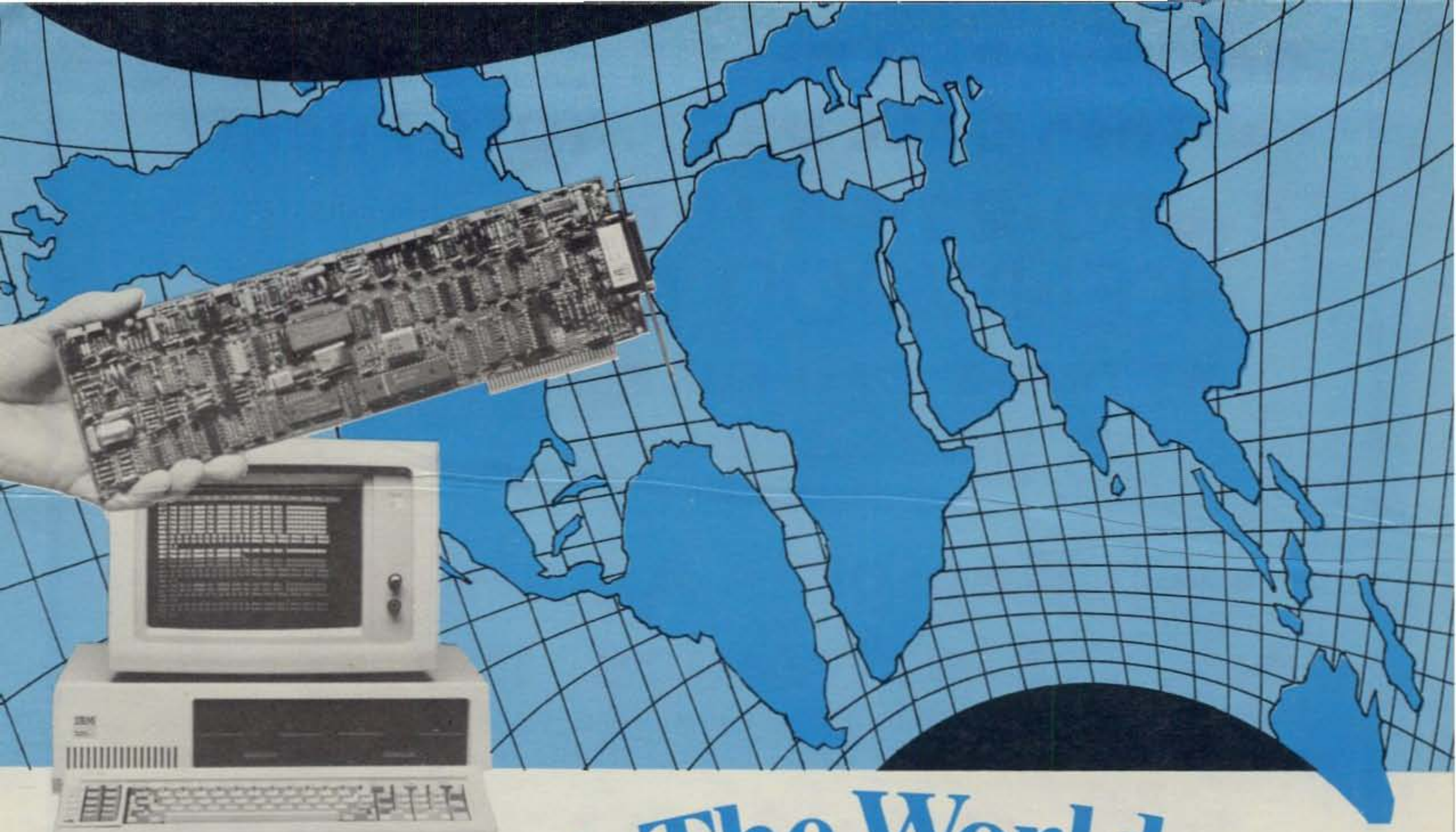


Fig. 1–Basic method of interconnecting older model transmitters and receivers into a smooth working amateur setup with single switch T/R operation. Relay (K1, with triple contacts) can be a Dow Key coaxial unit or an "open air" type with all coax cable (antenna) shields connected together. Second and third relay contact sets can be used for muting receiver, applying voltage to VFO, etc., as required (always refer to a unit's instruction manual for specifics). Relay coil can be voltage-activated from transmitter, thus using its front-panel switch for T/R control.

Modern Trends and Attractive Alternatives

As everyone will surely agree, today's society is more luxury/first-class oriented than that of previous years. The approach of pursuing any area of interest has shifted from "bare bones beginnings" to "all out investments" right at their onset. Such reasoning has its merits, true, but amateur radio is an encouragingly flexible pursuit for today's flexible society. Our on-the-air signals and our ability to copy others are our primary public image. If one's signal is clean and clear, the particular model of equipment generating that signal isn't a crucial factor. In fact, I've heard several inexpensive older rigs that sounded better than some modern transceivers. Assuming one agrees with the idea of emphasizing the communications medium rather than the communications equipment itself, several additional possibilities avail themselves. Let's take a closer look in that direction.

CW has always been the easiest and least expensive way of getting on the air with a respectable signal. Home-constructed gear is a well-known means to that end for aged amateurs, but newcomers need on-the-air "enjoyment exposure" and some home-assembly experience before being diverted from QSO excitement. This is the area where extensive personal effort and an exceptional "helping Elmer" substitute for miniscule finances. Check the science and technical departments and archives of your local library for amateur magazines of previous decades. Study their advertisements and new-product reviews of past-era transmitters and receivers until you're able to recog-



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RTTY:
- 45-9600 baud
- US or CCITT #2 Baudot
- ASCII with selectable parity
- 170-425-850 shift
- 103/202 modem
- Programmable end-of-line sequence
- Transmit line length of 20 to 76 characters
- Synthesized AFSK tones match receive mode
- FSK output with 6 selectable levels
- Audio input sensitivity — less than 1 mv R.M.S.

CW:
- 5-125 WPM Send and Receive
- Autotrack receive with speed readout
- Advanced CW receive algorithm

Display:
- Split screen for 12/12 or 20/4 RX/TX text
- Receive text in bright video (TX in dim)
- Full status line on top of screen
- Full-feature editor in transmit buffer

Buffers:
- 250 line receive buffer with viewing scroll
- 2 - 250 line transmit buffers with scroll
- 10 - full-line HERE IS messages
- Store all buffers and HERE IS messages on disk
- Load and send any text file from disk
- Set-up parameters stored on disk

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CIRCLE 124 ON READER SERVICE CARD

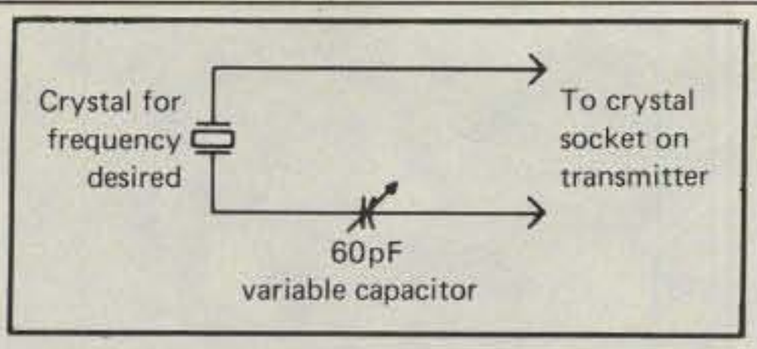


Fig. 2– Quick and easy way of slightly varying a crystal's frequency when using older style transmitters. The variable capacitor can be mounted in a small adaptor-type box for plug-in convenience.

nize those units at hamfest fleamarkets. Study also how such units interconnect either via a coaxial relay or automatic T/R switch so you'll know how to assemble older units into a smooth operating setup. (see fig. 1). That acquired knowledge can provide a true "leading edge" for choosing inexpensive gear. I urge newcomers to strive for the latest era gear they can afford to avoid any unnecessary confusion.

Assuming one locates a good-condition transmitter such as Heath's DX-35 or Johnson's "Navigator" (which, incidentally, sports smooth sounding time sequence keying) and a National NC-300 or Hallicrafter SX-101 receiver, an impressive setup can be created. If the gear is refurbished to like new, its special flair is comparable only to enjoying a classic auto rather than a trendy compact in today's age. A vast number of additional "classic oldies" can, naturally, be substituted in the previous examples. Merely remember to stick with names and models you've read about or known rather than opting for "off the wall" items unfamiliar to anyone except the seller. If you hold a General or higher class license and would like to experience amateur radio supreme, I heartily recommend modifying some classic older gear for operation on our low-power and CW-only 30 meter band. A crystal-controlled transmitter can be "frequency warped" a few kHz for covering the prime 10.102 to 10.105 MHz range (see fig. 2), its tank coils can be tapped between 40 and 20 meter points, and a general-coverage receiver will tune 10.1 MHz without any modifications.

Setting up an SSB station can also be accomplished in high style while remaining within a limited budget. Once again, the keynote here involves studying and seeking out slightly older and/or overlooked "classic" type gear—preferably transceivers. There's a special warmth and personality in those vacuum-tube rigs that simply can't be equaled by modern solid-state gear. I'll bet many old timers could rediscover the sheer joys of amateur radio itself by using such setups! I recently spotted a Swan 500 CX and a Galaxy V transceiver, both with matching AC supplies and both like new, for example, and priced at $200 each. Where? A small southern hamfest fleamarket. Those are 300 and

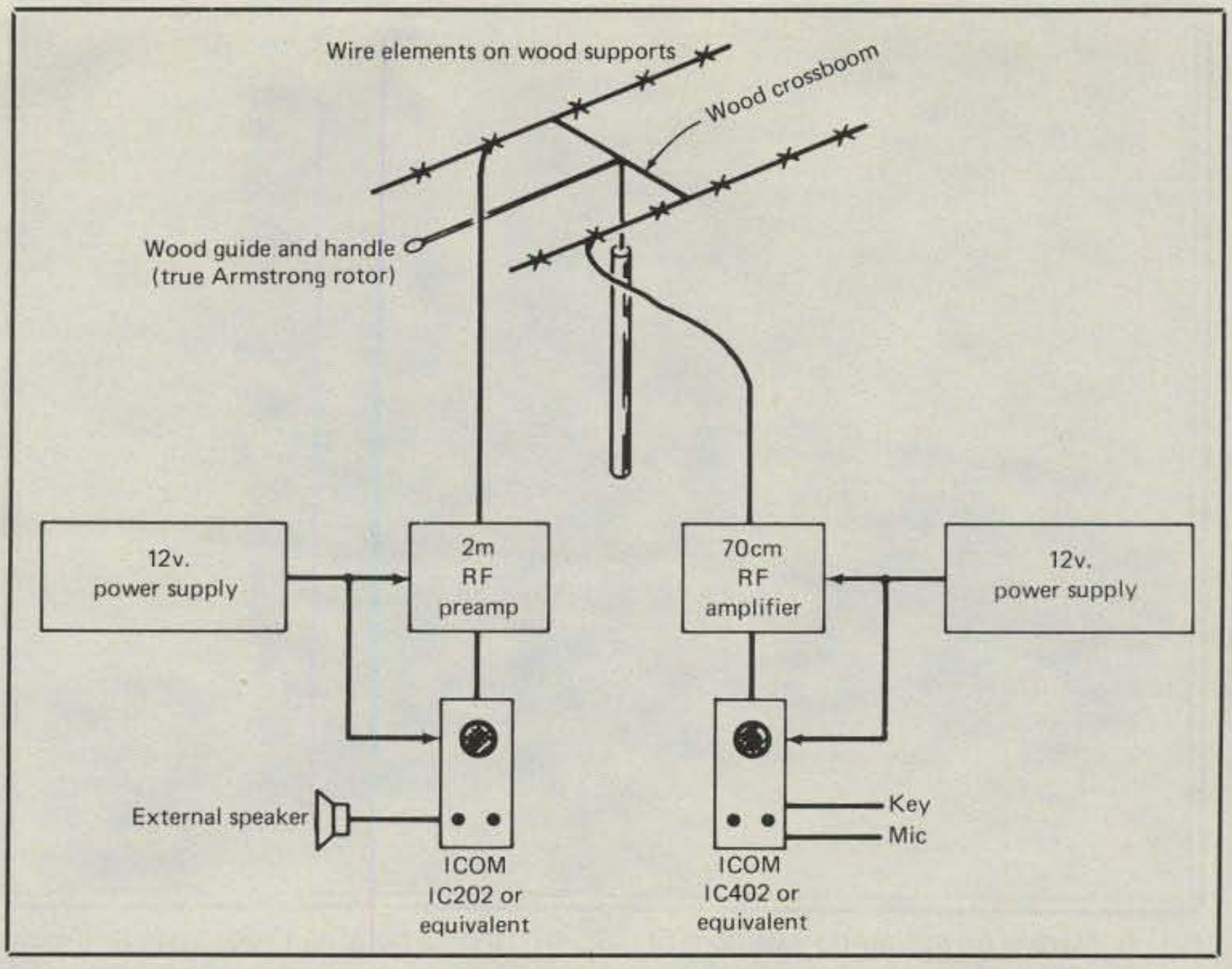


Fig. 3– One example of a modern OSCAR 10 setup assembled around "overlooked" transceivers, homebrewed accessories, and wire-type antennas. See text.

350 watt SSB/CW transceivers, gang, and they're a ball to operate. Collin's ever-popular KWM-2 and collector's item KWM-1 are also showing in used gear sales arenas with surprisingly low prices. Another unit that could only be described as "going first class" is Signal One's older model CX-7 HF Transceiver. I've spotted three of these dream rigs during the last year, and their price tags ranged from $600 to $700. Operating one of those gems is comparable to driving a classic Rolls Royce—a real treat.

Inexpensive yet effective antennas are another area that's wide open to personal ingenuity and creativity. Almost any skywire that can be constructed with tubing can also be duplicated with wire (beam, vertical, etc.), and bulk rolls of large gauge wire are quite plentiful at hamfest fleamarkets. A couple of years ago I purchased a nice fat roll of good antenna wire for $1.00 at a hamfest fleamarket. I assembled several test antennas described in my latest book, *Wire Antenna Handbook,* and there's still wire left for future use. Longwires, Vees, and Slopers are additional antenna ideas anyone can assemble and erect, and they perform beautifully. Old-time nostalgia buffs can likewise construct classic radiators such as open-wire all-band doublets, 8JKs, or extended double Zepps to add a "finishing touch" to a special vintage-style setup.

Our new era Phase III OSCAR satellites are another area of fascinating pursuit that can be enjoyed within a limited budget. While these satellites utilize SSB and CW modes on our increasingly popular 2 meter and 70 cm bands, slightly older model and/or overlooked multimode equipment is fairly abundant. A few years ago KLM produced some small Echo 70 and Echo 2 SSB/CW transceivers. ICOM also produced two small SSB/CW portables: the IC-202 (2m and the IC-402 70cm). These units continue appearing with quite low prices at both hamfest and dealer clearance sales. Simple RF amplifiers and even GaAsFET preamps can be homebrewed and mated with such setups with surprisingly good results. Assuming the inclusion of multi-element 70 cm and 2 meter quads or Yagis home assembled on wooden frames and crossbooms, one can experience today's hottest frontier on a very modest budget (see figs. 3 and 4). Think, plot, and use your ingenuity to sidestep large expenditures. It's fun!

The Beauty of Basics

Although rather undesirable as one's first rig or main setup for amateur radio activities, there are occasions when strictly basic gear can prove highly enjoyable and useful. Old timers might desire a second station or "weekend special" with a nostalgic flair, for example, or budget-limited newcomers might desire a small direct conversion trans-receiver for portable use. Assuming one appreciates the simple times of yesteryear, recreating and operating 1930-style CW gear can be truly fascinating. That gear might take the form of an 01A or 210 tube-type Hartley transmitter and super-regenerative receiver, or it might be "updated" to consist of a 6L6/807 transmitter and S-40 Hallicrafter

Fig. 4– Here's an authentic example of OSCAR 10 on a budget. Older style and inexpensive SSB/CW transceivers for 2 meters and 70 cm form a basis upon which an RF amplifier and preamplifier is added. Matching 2 meter and 70 cm antennas complete the setup.

receiver. Specific gear selections depend on basically what comprised one's "first rig" or what early amateur magazines and/or handbooks are uncovered in the dusty archives of one's local library. Assembling a low-power rig from scratch and operating it on today's bands is much more than trivial pursuit. It's an inexpensive way to rediscover amateur radio's original excitement!

Assuming younger amateurs have an operational and "air-worthy" first rig which can be enjoyed at home, an inexpensive QRP/portable rig can prove to be an exciting second setup. The units I'm now suggesting are not powerful setups capable of getting answers to *every call*, but small rigs that are homebrewed and used almost anywhere—even mobile on an auto's seat. They can be powered from handheld 2 meter rechargeable-type batteries, and they can be connected to super-thin wire (invisible) antennas. Such pocket-size and home-built HF rigs essentially consist of two or three transistor transmitters and two or three IC receivers. Chris, G4BUE, had his self-assembled rig at Dayton '86 (the Foxx transceiver) that used only five transistors total, had 1 watt output, and could be lost in a coat pocket.

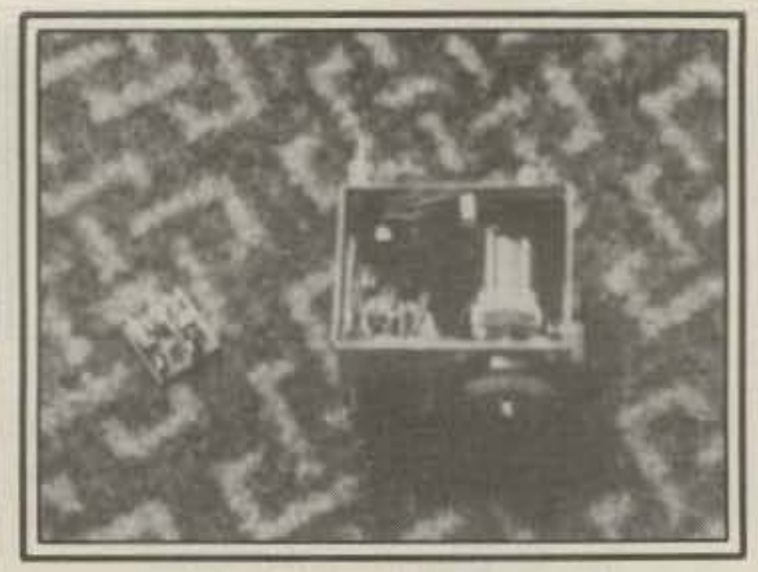


Fig. 5– G4BUE's pocket-size 1 watt transceiver is an inspiring little unit with large appeal. Unit can be assembled quite inexpensively. Item next to transceiver is a 1 inch square 1 watt transmitter. Info and kits of both rigs available. Contact Sprat *for details (see text). Pardon our photography. Photo was quick(!) shot on forum floor at Dayton '86 in almost dark room!*

It was a show stopper (see fig. 5). Dig out all the back issues of *CQ* you can find (especially June issues, which usually highlight QRP), the ARRL's solid-state manual, join the QRP Club International ($5.00 a year—treasurer is William Harding, K4AHK, 10923 Carters Oak Way, Burke, VA 22015), and get cracking on your own homebrew rig. I also heartily recommend subscribing to the English QRP magazine, *Sprat*, which is usually packed with exciting QRP transmitter and receiver circuits along with offers of kits for those units. *Sprat*'s subscriptions ($10 a year) go to Alan Lake, G4DVW, 7 Middleton Close, Nuthall, Nottingham, England, NG16 1BX. Another upcoming "basic gear" newsletter worthy of investigation is "Electronic Advocations," obtained for $6.00 a year sent to Arnold Timm, KAØTPZ, 2308 Garfield Avenue So., #304, Minneapolis, MN 55405. With all the previously listed information readily available, your mailbox should fill to maximum each month with fascinating projects and ideas. Why, who knows . . . QRP or CW mobile might become your favorite alternate activity. It's worth investigating, right?

Conclusion

As we've pointed out, amateur radio's financial investment and enjoyable returns are not always directly related. Operating any band and mode within the confines of a low budget is also quite possible and tremendous fun. Here's hoping we inspired your thoughts in those directions, that you'll find some second area or pursuit of interest, and you'll also help others to discover our "inside world" of unlimited fascination. Next month we'll continue the discussion with some views of true nostalgic gear that can be a blast to operate on today's amateur bands. Watch for it!

73, Dave, K4TWJ

Novice

a monthly feature by
BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Technical Help

My wife (Marie, W6JEP) and I have taught amateur radio licensing courses on a regular basis (three to seven courses per year) since 1948. We are starting to get the hang of it. We have written and printed a wide variety of aids which we distribute to our students. We have converted most of these aids into articles that have been printed in *CQ*'s Novice column.

Material is separated into six categories to make it easier to locate desired items in the following lists. These information categories are introduction, code, theory, miscellaneous, station, and operating. If the aid has been printed in *CQ*, the month and year of the issue containing the article is shown.

Introduction

Advantages of Starting as a Novice 6-78
A Short History of Electrical Communication
CQ Novice Column
Facts for Prospective Novices 8/9-84
FCC Publications 5-84
Getting on the Air 2-85
Getting Started 3-86
Getting Technical Help from Experts 10-77
History of the Novice License 10/11/12-83
How Radio Started
How to Get Started in Amateur Radio 7/8-78
Private Radio Services
Sources of Aid for Prospective Amateurs 12-78
Telegraph Hill
U.S. Government Printing Office Publications 2-84
Volunteer Examinations 4/5-85

Code

Code 1/2/3-79
Code is Not CW 6-81
Code Operating Tips 1-81
Code Practice 1-82
International Morse Code
On-the-Air Code Practice 6-81
Printing System
The Demise of Marine Radiotelegraphy
USAF Code Practice 9-83
USAF MARS Bulletins 3-82
Worldwide Codes 12-80
Worldwide Sources of Code Practice 10/11-80

Theory

Antenna Radiation Resistance Versus Height
Commonly Used Electronic Schematic Symbols
Emission Designations 12-83
Finding the Square Root of a Number
Formula Reference Sheet
Novice Licensing Data 7 thru 12-85,1-86

2814 Empire Ave., Burbank, CA 91504

This is Art Walsh, KB4NKZ, of Annandale, Virginia. He is a retired AT&T long-lines man. Art is also an officer in the 4th Aircraft Wing of the U.S. Marine Corps Reserve. He became a Novice in April of 1985 and he upgraded to General during February of 1986. His station includes a Yaesu 757 and an all-band vertical antenna. Rain gutters are his most effective antennas. Art has worked 43 states and 3 countries on code. He is in the process of joining MARS (Military Affiliate Radio System) and upgrading to Advanced.

Ohm's Law (all variations)
Prefixes and Prefix Conversions 7-84
Tables and Data (color codes)
VSWR and Power Loss
VSWR Versus Forward and Reflected Powers
FCC General/Technician Sample Written Exams

Miscellaneous

Amateur Radio Philately Club 11-82
Cable Television Interference 3/4-84
Fire Safety Checklist 12-81
Guidelines for Conducting Amateur Radio Shows 6/7/8-80
PCB Danger 3-81
Prescriptions for Healthy Ham Clubs
Shortwave Listening 5/6/7/8/9/10-82
Technical Terminology Tripe 5-84
Time Stations 1-81

Station

Amateur Radio Station Grounding 9/10/11-78
Amateur Radio Station Installation Tips 11/12-77, 1/2/3-78
CB Gear Conversion to Amateur Use 1-82
Dipoles 5/6/7-83
Earth Resistivity Map—U.S.A.
Electric Power for Fixed Stations 3-85
Electric Shock 4-83
Headsets and Ham Radio Microphones and Headphones 4-82
Military Equipment Code Letters
Military Radio Frequency Transmission Lines 8-83
Open Wire Feedline 3-83
Station Installation Information 12-82
Ten Electronic Commandments
Yagi Positioning in High Winds 3-81

Operating

Amateur Bands Bar Graph
Amateur Radio Frequency Allocations Table
Amateur Radio Frequency Segments 6-81
Amateur Radio Rules and Regulations 4-85
Amateur Radio Station Callsigns 4/5-79
ARRL Divisions 3-82
ARRL Sections Checkoff Sheet
Assignment of Radio Station Callsigns
Beginning Operating Certificates 9-80
CQ and ITU Worldwide Radio Zones Maps
Disaster Communications/SECURE 3-82
DX List/All Possible Prefixes
General Frequency Allotments
HF Radio Wave Propagation Predictions 3/4-80
International Communications 4-81
International Reply Coupons 2-86
Low Power Operation (QRP) 5-81
Military Affiliate Radio System (MARS) 4/5-86
Novice Bands 7-81
Novice Bands DX Operating 1-81
Operating Etiquette 12-82
Operating Privileges 10-84
Operating Tips 8/9/10/11-81
Phillips Code 11/12-79
Phonetic Alphabets
Q-Signal for Ham Use 2-80
QSL Cards 1/2/3-79 & 9-80
QSO Definition 5-84
Queen Mary Novice Band Operation 4-82
Radio Amateurs' Conversation Guide 4-81
Rag Chewers' Club 3-82
Reciprocal and Third-Party Agreements List 6-86
Selection of Frequency for a Given Range
South Pacific Map 4-85
Temperature Conversion 2-84
Ten American Districts Award 6-86
Terms and Abbreviations 2-83 & 6-84
Time and Frequency Standards
Topographic Maps (U.S.A.) 10-80
Universal Time Conversion to Local Time 2-84
What To Do When You Hear a Radio Call for Help 11-82
Worldwide Amateur Radio Callsigns 1-80
Yasme Foundation and the Colvins 3-86
Zero Beat 11-84
40 Meter Novice Band Operation 12-84
160–10 Meter Operating Privileges 6-85

The preceding lists show that most of these printed aids are available from *CQ*, 76 North Broadway, Hicksville, NY 11801. Each issue costs $2.50.

Where no date is shown beside an item, it is a printed aid I have prepared for distribution to students in the amateur radio licensing courses that I instruct. A list of my licensing program printed aids is

Dan Amoroso, KA3MNF, of Media, Pennsylvania is a baker. Dan is married with three children. His son Daniel appears with him in this picture. Dan has been a shortwave listener (WPE3DNC) since 1959. Our May through October 1982 Novice columns provided an introduction to shortwave listening. That article included an invitation to shortwave listeners, urging them to add amateur radio to their activities. Dan decided to accept the invitation, and he earned a Novice license in April 1984. His station includes a Kenwood TS-930-S transceiver, Butternut vertical antenna, and a delta loop.

sent to anyone who requests one and furnishes a self-addressed, stamped envelop. Class printed aids are constantly being deleted and replaced. I simply send a complete set of the printed items that are available when a request is received. Payment in full is $15 for a complete set of these printed aids, including shipping costs. Such requests should be addressed to Bill Welsh, W6DDB, 2814 Empire Avenue, Burbank, CA 91504. Licensing course instructors are welcome to duplicate my printed aids for use by their students. All amateurs are urged to let new and aspriing amateurs know about these sources of help. Newcomers to amateur radio usually have a difficult time finding the help they need.

A separate set of printed material is available at $5, including shipping costs. This set consists of 10 typical General/Technician written examinations, one exam that picks up the remaining 75 questions that are not included in the 10 typical tests, and the answer master for all 11 exams. Each of the 10 initial tests has the correct proportion of questions from each FCC element 3 sub-element group. Questions and multiple-choice answers are printed exactly as they appear in examinations that will be used until about April 1987. These tests provide accurate checks of how one is progressing towards passing the Technician/General "written" examination. The student should complete a test without referring to notes or textbooks. After correcting the completed test, the student should study related material to ascertain the correct answer of each question that was answered incorrectly. One should progress through all the tests, following the same procedure. Naturally, one's grades should improve with each exam one completes. Again, instructors are welcome to duplicate this material for distribution to their students. Also, readers are urged to make this source of help known to those who are preparing to pass Technician/General exams.

Ground Fault Interrupter

The ground fault interrupter (GFI) is basically a supplementary circuit breaker. The National Electric Code (NEC) requires GFI's to be used in new electrical installations of garages, bathrooms, and outdoor areas. The GFI's internal circuit compares the currents flowing in (black wire) and out (white wire) of a circuit. If there is a leak causing a difference of at least 5 milliamperes (0.005 ampere) between these currents, the GFI trips open, cutting off electrical power. This action occurs within 1/40 (0.025) of a second, possibly preventing a person from suffering a serious electrical shock or fatal injury.

A GFI can be connected in either of two wiring configurations, as is shown on accompanying printed material supplied by manufacturers. One wiring configuration just protects the primary receptacle, whereas the other wiring configuration also protects additional downstream receptacles. This second wiring configuration is more susceptible to nuisance trips when using tools and appliances with minor low-current high-resistance leakage paths.

The March 1985 Novice column covers electric power for fixed stations. Single copies should be available from *CQ* Magazine, 76 North Broadway, Hicksville, NY 11801, at a cost of $2.50 each.

Photographs Wanted

Photographs of Novices in their shacks provide introductions to a few of the newer amateurs. Photograph size is unimportant, but good definition, contrast, and subject matter are important. Color pictures can be used, but black-and-white photographs are preferred. Operating activities and achievements, plus a self-introduction, are needed with each picture. Send an SASE if a picture must be returned. A free one-year *CQ* subscription (or renewal) is awarded to the one amateur whose picture I select as the winner for the month. If you are a subscriber, please enclose the mailing label (or copy) from your latest *CQ* issue. One award is made each month, no matter how many photographs are printed. DX amateurs, who frequently work the American Novice bands, are also urged to submit photographs. I have not received a picture from a Novice in Hawaii or Vermont.

73, Bill, W6DDB

No-65-66

VHF

a monthly feature by
STEVE KATZ, WB2WIK

PRINCIPLES, PRACTICES, AND PROJECTS FOR THE VHFER

People and Places

There's never been any shortage of reader correspondence to relate, and I've been saving up some for this month's column. I can't tell of any great personal experiences (except a brief report on the ARRL 23 cm Sprint) because I've been pretty busy buying and selling houses; by the time you read this, I should be packing for a move—not far, only about 70 miles and within NJ—and as I'm sure many have found for themselves, relocating is cruel and unusual punishment. More so when the move involves towers, 20 antennas, and a couple of thousand pounds of radio gear. Ugh.

John Butrovich III, W5UWB, sent a note commending our reports on EME work and reminding us that all it takes to work moonbounce is persistence. John ran a single 2 meter "Jr. Boomer" (14 element Yagi) at 55 feet for 2 years—August 1982 to August 1984—and completed 28 moonbounce QSO's with 18 stations. The biggest station worked was K1WHS (24 "Jr. Boomers") and the smallest was K6MYC/KH6 (4 × 16 element KLM LBX's). W5UWB now has a 4-bay array of KLM 16 LBX's himself and is enjoying better results on 144 MHz EME, but stresses the importance of the smaller stations' perseverence. If you'd like to try working W5UWB in grid EL17, contact John by writing to him at P.O. Box 5019, Kingsville, TX 78363.

I received a nice letter from John Kitchens, NS6X, of Camarillo, CA. John is an active VHF contester and is the new VHF editor of *Radiosporting* magazine, published by the International Radiosport Association. For those unfamiliar with *Radiosporting*, it is a monthly magazine dedicated to contesters and their operations and published by Yuri Blanarovich, VE3BMV. The magazine has been published in Canada since its inception, but Yuri plans to move Stateside this year, and future issues should be published in the U.S. NS6X is working on a new VHF contest, to be sponsored by IRSA, and is looking for ideas to help make it a success. If you're a VHF/UHF contester and have suggestions to offer, write to John at P.O. Box 939, Camarillo, CA 93010.

Scott McCann, W3MEO, wrote to ask some advice on portable/hilltop QRP operations. He intends to do some hilltop work with an ICOM IC-402 (3 watts PEP) 70 cm transceiver and asked, "Is this likely to produce any QSO's? Is 432 more complex than this? Are there enough amateurs listening for it to work? Is 432.1 the right frequency? Could I hear EME with this rig?"

I replied to Scott with a personal letter, but will print some condensed comments here. First, I'd strongly recommend the use of a 21-element F9FT Yagi for such small-scale portable work. This Tonna antenna offers excellent gain for its diminutive size and light weight, and is a cinch to assemble in the field with one small wrench. Next, I'd recommend using Belden 9913 transmission line. It has considerably less loss than conventional RG8/U type cables without consuming more space or adding more weight. Use only Type N connectors, and no more cable than necessary, to minimize losses. Install your portable beam high enough to clear local obstructions (especially trees), but no higher than necessary. Be sure to have a secure clamping system to eliminate antenna "windmilling"; 70 cm antennas, especially ones with any real gain, are very sharp. A pair of "vicegrips" clamped to the antenna mast with handles pressed firmly against the leg of a supporting tripod makes a good anti-windmill clamp.

Then set up for operation on Wednesday evening or during a VHF/UHF contest weekend. Unless you've publicized your portable operation well in advance and are operating from a rare grid square, operating almost any other time will produce few, if any, QSO's. Wednesday night is "70 cm activity night" all around the U.S. and Canada, and this is when folks who are equipped for the band usually activate their stations, even if they're not on the air at other times. In these parts activity usually peaks at about 9:00 to 10:00 PM local time, but it is too dark to set up then, so arrive on site earlier and set up properly. If you plan to operate from a genuine mountain (definitions vary; mine is "a mountain is a place that is much higher than its surroundings and has its own weather system"), avoid operating in dense fog, which has the unique ability to reduce UHF propagation to nearly zero.

I think 432.1 MHz is the right frequency for general calling, but local convention rules. Most EME work is done lower in the band, but an IC-402 and single beam antenna are very unlikely to receive moonbounce signals under any conditions. Even if the IC-402 were connected to a huge array and preceded by a low-noise preamplifier, it wouldn't make an ideal EME receiver; it lacks the precision dial accuracy, narrow IF bandwidth, and extreme oscillator stability which are almost prerequisite to successful EME work.

Here are N8CGY and N8EPJ during Ken's first portable/hilltop outing on 144 MHz SSB. He's looking forward to more such operations and plans to be on for the CQ WW VHF WPX.

Scott, I wish you luck and success in your portable/hilltop ventures and hope you'll write again to let us know how you're doing. Seventy cm is a great band with a lot of potential. Don't be discouraged if your first couple of operations don't result in hundreds of contacts.

Ken Miller, N8CGY, of West Branch, MI wrote about his first hilltopping adventure on 2 meter SSB. Ken set up on a hilltop he didn't name (don't they all have names?) using an old KLM Echo II transceiver and a portable 5-element Yagi; not your classic contest station, but Ken managed to work seven grids at distances to about 350 miles with this lash-up. He thanks N8EPJ for the last-minute loan of a Mirage 160 watt amplifier, and WD8MHZ and WD8MQX for arriving on the scene to take photographs of the operation. N8CGY says he intends to operate from rare EN67 in August, this time

24 Louis Dr., Budd Lake, NJ 07828

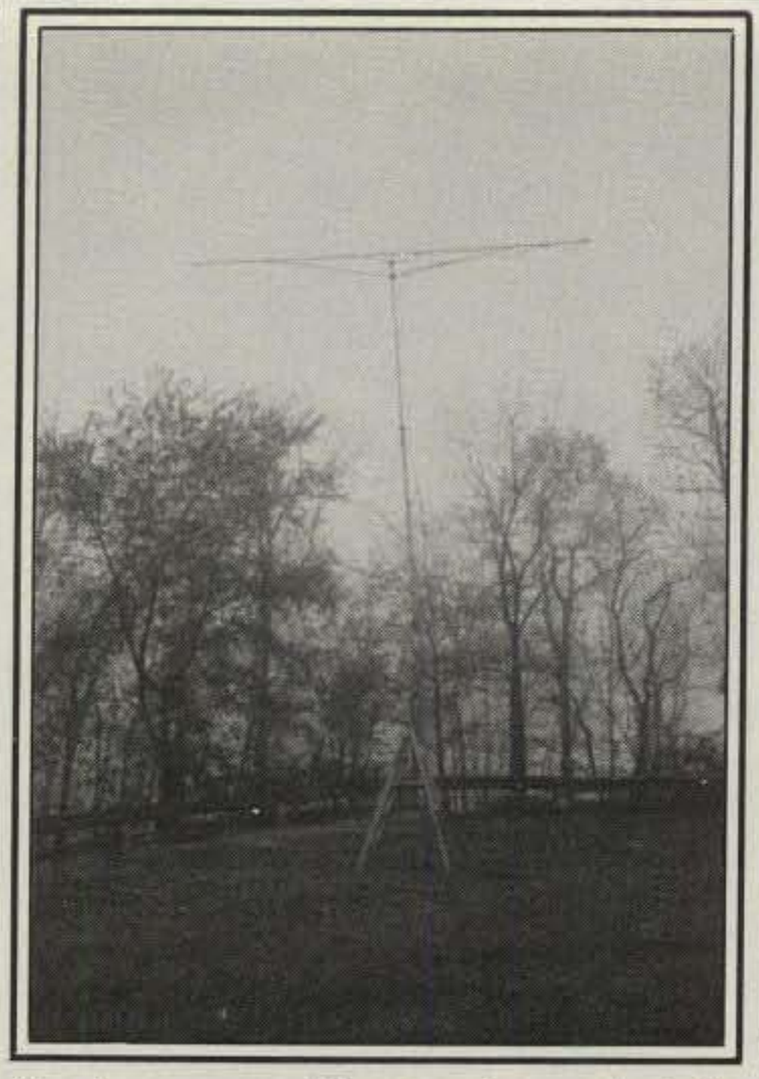
using a TS700A/160 watt amp and an 11-element Yagi. He also hopes to be operational on 432 MHz by then. Thanks for the note and the pictures, Ken! Why not put together a portable/hilltop operation during one of the VHF contests? There might still be time for you to plan for the *CQ* WW VHF WPX.

I received a terrific letter from Chris Burger, ZS6BCR, of Pretoria, South Africa. Chris is active in VHF contest work there and spent a recent weekend backpacking in five different grid squares to operate a 24-hour contest and give out grids on four bands! ZS6BCR and comrade ZS6G drove about 1500 km, including several hundred km on dirt tracks, and backpacked another 5 km carrying an IC-551, IC-260, FT-290R, MMT432/144, TR50 (1 watt 1.3 GHz FM rig), all antennas, 56 AH lead-acid batteries, and all sorts of associated paraphernalia for this escapade. Chris said he knows exactly what it felt like for me to exclaim, "Leave me here to die!" as I did while backpacking up 4200 foot Slide Mountain, NY during the June 1985 VHF contest.

At home Chris uses an IC-551 at 10 watts output to a dipole on 6 meters, and began working stations over a distance of 1400 km immediately upon getting the station together. He says this is about as far as one can work within South Africa, as it represents the distance across the country, and he feels this is too short for "regular sporadic-*E*." I don't feel that's quite true; this is about 870 miles, and I've worked *E*-skip over much shorter paths than that here in the U.S. In my case, I'm sure we'll all be looking for ZS6BCR at the next solar cycle peak. This is a workable F2 path from America's east coast, and I'm looking forward to our first 50 MHz QSO, Chris.

Don Hilliard, W0PW, is once again organizing a UHF/SHF conference to be held this year at The Inn at Estes in Estes Park, CO over Labor Day weekend. This year's conference, "Microwave Update 1986," will address t he 1.3, 2.3, 3.4, and 5.7 GHz bands with knowledgeable speakers such as Chip Angle, N6CA; Rick Campbell, KK7B; Al Ward, WB5LUA; and of course W0PW, who has authored some of the best SHF material ever published in amateur circles. Don was requesting that all attendees preregister by August 10, so it is not too late to let Don know you plan to attend. Write to W0PW at P.O. Box 563, Boulder, CO 80306 for details of "Microwave Update 1986."

Are you on 6 meters? If so, your call should be in the *North American 50 MHz Activity Listing* published by Harry Schools, KA3B, of Philadelphia. Harry's unique work lists the callsigns of 1894 North American stations known to demonstrate recent activity on the 50 MHz band. Sure enough, I did what everyone does when they see such a publication: I looked to see if I am listed. Whew. I'm in



Our temporary 23 cm antenna installation for the Spring Sprint: A 55-element F9FT Yagi on a 30 foot slip-up mast set up on Sunrise Mountain in northwestern NJ. Photo taken during a brief cloud lift, just before dark.

there. How about you? Harry has broken down the list by grid square, which seems as good a way as any, and this list could prove very useful for making contest skeds or amassing VUCC credits. KA3B does not have photocopying facilities, so anyone who desires a copy of the *North American 50 MHz Activity Listing* is welcome to write to me for a copy. I'll make as many as people need.

KA3B also sent a letter to explain that neither he nor AC3T, the other 6 meter station active from Delaware, is "cheap," as related by K9BDI's "Operator's Comments" in the WW VHF WPX Contest writeup (June *CQ*). Harry didn't really know if K9BDI was referring to him or not, but made a point to say that he and Len, AC3T, both have been QSLing 100% and have already gone through about 2000 QSL cards after operating three HF and four VHF contests from DE in 1985. Harry said the 6 meter Sprint on May 17 offered excellent conditions, and he was happy to be state #50 for three of the 116 stations (in 66 grids) he worked during that four-hour period. Good job, Harry!

The ARRL VHF/UHF Spring Sprints have come and gone, and I fooled around a bit in the 70 cm and 23 cm Sprints, making about 75 QSO's on 432 from my home station and far fewer on 1296 from a portable site. Once again, my friend Pete, KT2B, snared me into another struggle to prove our sanity (or lack thereof) by getting me to agree to a portable/hilltop QRP effort, this time for the 23 cm Spring on May 8. Pete had borrowed a new IC-1271A from ICOM and wanted to see how it worked under "contest conditions" (you know: rain, snow, sleet, mud, beer spills). The 23 cm Sprint was nearly upon us, so the timing was right for a portable operation.

We arrived at our carefully-selected site (which was carefully selected to have a paved road to the summit—no use making this an Olympic event) at about 7 o'clock PM local time, just as the contest was starting. Maybe there are extra points for quick setup? The weather, which had been splendid for days, was

Pete, KT2B, is shown operating the brand-new IC-1271A for 23 cm from the rear of his station wagon. If he looks a bit drenched, he is.

lousy. It was raining, foggy, a bit windy, and about 50 degrees Fahrenheit. Great. Out came the 30 foot slip-up mast, in went the guy stakes, and up went the 55-element F9FT antenna. With the 15 foot long antenna up 30 feet above ground, we could barely see it through the fog, which was getting denser all the time. I snapped a quick shot of the antenna installation during a brief cloud-lift which allowed us to see about 200 feet.

We had the little 10 watt (actually, we were getting 7.5 watts out, probably due to low supply voltage) station on the air quickly, and all checked out okay. We used a 14 AH motorcycle battery to supply the IC-1271A, and operated out of the back of Pete's Honda station wagon using the back lid as a bit of a rain cover. We got wet.

After about two hours of operating, we had worked all of ten stations. This is not exactly an exciting QSO rate, so we had time to think about what was wrong. We checked the antenna's VSWR (we did have a Bird meter along) and it was terrific. We turned the beam back and forth across the strong stations we could hear, and the antenna behaved normally, showing a very large peak in the proper direction. So, we concluded that either activity was very poor, or the cloud in which we found ourselves was destroying signals, or both. Considering we were set up at an elevation of 1652 feet above sea level with a clear shot in every direction except southwest where there was a slight rise, I was surprised to hear essentially no activity from New England. Signals from southern NJ and the Philadelphia area, about 90–120 miles distant, were quite good. Another case of mysterious UHF propagation, I guess.

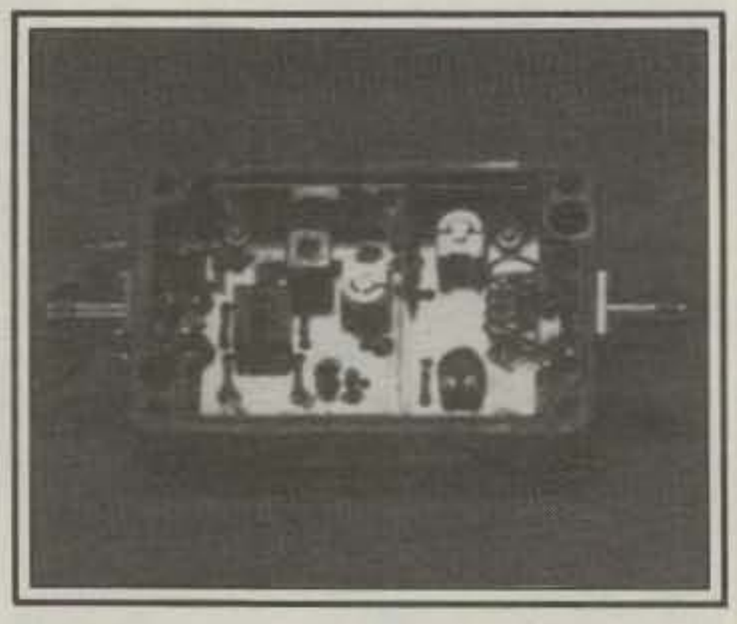
Product Review: The SSB Electronic DX220 Low-Noise Receive Preamp

As regular readers are aware, I am a "220 Booster" of sorts. I like the 135 cm band and am reasonably active on both ends, chasing weak-signal DX at the low end and working FM above 222 MHz. When assembling the gear to build a satellite receiving system for a 2 meter repeater, I even chose 135 cm for the link "talkback" frequency, while almost everybody I know uses 70 cm or the telephone lines for this job. With the single exception being the lack of commercially available equipment, getting on 220 MHz is a cinch. Expertise in microwave apparatus and techniques is not required (as it is on 23 cm or 13 cm), popular transmission lines suffice for most installations, antennas are easily assembled and erected.

Cushcraft and KLM both manufacture high-quality Yagis for 220 MHz work, and these are reasonably priced and readily available. The famous N6NB "quagi" design works very well and can be reproduced in the field for just a few dollars. Transverters Unlimited (Toronto, Ontario) manufactures an excellent 220/28 MHz transverter similar to the popular Microwave Modules Ltd. "black box" design for 2 meters, and this tiny box opens the door to 135 cm weak-signal operations for a pittance, providing you already have an HF rig. Solid-state power amplifiers for 220–225 MHz have been available for some time from Mirage, and are becoming available from Alinco, TE Systems, and others. What other station accessories are needed, then, to help complete your 220 MHz VUCC?

The DX220 preamp is obviously an iteration of the company's popular DX144 for 2 meters. This unit was a prototype and had a remarked label.

A good, low-noise 220 MHz preamplifier! Unfortunately, the receive preamps built into most of the solid-state power amplifiers leave much to be desired in the way of dynamic performance; they usually have too much gain for the receiver which follows and offer poor large-signal handling characteristics. Further, the solid-state power amplifiers usually contain an antenna changeover relay which has its own losses that become part of the total receiver noise figure. Those who are *real* weak-signal operators are already running high-powered vacuum tube amplifiers which create the need for outstanding receiver sensitivity. A high-quality receive preamp is called for, and its dynamic characteristics must suit a wide range of operating conditions.



The interior of the SSB Electronic DX220 GaAsFET preamplifier for 135 cm reveals excellent craftsmanship.

As stated many times before in this column, noise figure and gain are not the only two important criteria by which a receive preamplifier must be judged. At a frequency as low as 220 MHz, a receive noise figure below 1 dB is a waste of effort for terrestrial (and the majority of EME) work, and unless the following receiver sensitivity is nil, or line losses between the preamp and receiver are very high, preamp gain in excess of 10 dB will probably do more harm than good for overall dynamic performance. A 220 MHz receive preamp must either reject signals from TV Channel 13 or be able to cope with them without overload or the creation of intermodulation products. This is a requirement somewhat unique to the 135 cm amateur band; we have a TV channel only 4 MHz below us, which is less than 2% of our operating frequency. Channel 2's proximity to 50 MHz is about 12% of our operating frequency, and *above* our band, making popular low-pass networks rather effective in rejecting this "reverse TVI."

I had been using a home-modified Advanced Receiver Research P144VDG GaAsFET preamplifier, tuned to 220 MHz and adjusted for minimum NF using laboratory equipment, at my station for a couple of years with reasonable success. The preamp was very sensitive (NF less than 1 dB) and certainly improved my ability to hear the weak ones, but brought in all sorts of terrible noises from TV Channel 13 along with the desired amateurs signals, especially when I used a beam heading which peaked New York City's World Trade Center towers. I blame the preamp for some degradation in Channel 13 performance, because this out-of-band interference is so noticeably worse with than without the preamp. (The Channel 13 intermodulation is just barely perceptible with the "barefoot" receiving converter, but downright disconcerting with the preamp.)

When the opportunity to use a new SSB Electronic model DX220 GaAsFET preamplifier arose, I didn't hesitate to grab it. This rather new product is a made for North America iteration of this West German manufacturer's DX144 preamplifier, reviewed previously. It is nice that SSB Electronic thinks enough of the U.S./Canadian market to produce an accessory that has no domestic (European) market at all.

The DX220 uses a single-gate Mitsubishi GaAsFET (MGF1400 series) in a grounded-source circuit to provide about 22 dB gain with a rated noise figure less

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than 0.5 dB. The preamp is built in a robust die-cast aluminum housing whose cover plate is held by four screws, affording a well-shielded assembly suitable for full-duplex repeater operation. RF input and output connectors are type N female receptacles, and the DC connection is made by solder attachment to a feedthrough terminal (+) and ground lug (–). DC input requirements are 12–14 Vdc at 20 mA.

An interesting and useful feature of the DX220 circuitry is a built-in (on-board) 10 dB, 50 ohm attenuator following the preamp's active stage and switchable in and out of the preamp output line. Since 22 dB is much more gain than most installations require, this pad can be put to good use to maintain desired receiver gain distribution. The resistive pad also provides an excellent termination for the active stage and enhances overall circuit stability.

A laboratory measurement of the DX220's gain across the 135 cm band indicated it to be fairly broad in response, offering –6 dB points at 190 and 255 MHz and –20 dB points at 155 and 330 MHz. The passband ripple was less than 1.0 dB from 220 to 225 MHz, the amateur band limits. I would have preferred to see a narrower response, to aid in rejecting TV Channel 13, but was not surprised to see the 20 dB points separated about one octave. This seems the rule in low-noise preamplifier designs. Since a simple coaxial stub "trap" will offer little or no rejection to signals less than 2% in frequency from that which is desired, those of us in areas served by a local (and powerful) TV Channel 13 will need to use more sophisticated tuned rejection circuits (e.g., coaxial cavity notch filters) or rely on superb receiver performance to enable our reception of very weak signals at 220 MHz.

With this in mind, I measured the SSB Electronic product's 1 dB compression point, a valid indicator or top-end dynamic performance. This measured +12 dBm output, corresponding to –9 dBm input, with the internal attenuator switched "out." This is one healthy signal—nearly 1 volt output, surely more than the average 220 MHz receiver could possibly tolerate without complete saturation. I made a mental note to be sure to use the preamp's internal 10 dB pad in my station to avoid overload of my receive converter, a Transverters Unlimited MMT220/28 which uses a MOSFET first RF stage.

I also evaluated the DX220's low-end dynamic performance with a measurement of MDS (minimum discernible signal) in a 1 kHz bandwidth, using an HP spectrum analyzer as the receiver and 8640B signal generator as the source. This measurement revealed the MDS to be –132 dBm (1 kHz), or about .05 uV. If you subtract the MDS from the 1 dB compression point, the result is approximately the dynamic range of the stage, in this case about 122 dB.

A subsequent measurement of noise figure using a trusty old model 340 automatic NF meter yielded readings of .44 dB and .52 dB with the internal 10 dB post-amp attenuator switched "in" and "out," respectively. I'm not certain why this would make any difference. In any case, the DX220 is surely a top-notch product based on laboratory evaluation.

Trying out the DX220 in my station has been a delightful experience. I had occasion to use this preamp during the January 1986 VHF Sweepstakes (and for several months thereafter), with the preamp isolated by two sets of coaxial relay contacts from my 700 watts plus output transmitter power amplifier, and have run this system through hundreds of T/R cycles with no ill effect. The preamp is as sensitive today as it was prior to all the "abuse" of in-station operation, and has even survived a few nearby lightning strikes while on line with the antenna connected. The DX220, with its onboard 10 dB pad switched in line, seems more immune to intermodulation by TV Channel 13 than other preamps I've tried at my home station, which I should mention is line-of-sight to (though about 50 miles away from) the Channel 13 antenna in New York City.

In all, I'm quite satisfied with the SSB Electronic DX220. It is well conceived and well built, and has certainly served to improve my ability to hear the weak ones on 220.1 MHz. Now if only there were more stations to hear . . . .

The SSB Electronic DX220 is available from Transverters Unlimited, Box 6286 Station A, Toronto, Ontario M5W 1P3. The MMT220/28 transverter mentioned in this review is also available from them.

Next month we'll have a review of the new (and darned good) Alinco ALR-206T 146 MHz FM transceiver, a tip on improving performance of the popular Cushcraft A50-6 six meter Yagi, and station highlights of a famous (?) VHFer from New England. Don't miss it!

73, Steve, WB2WIK

Awards

a monthly feature by
DOROTHY JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for August is:

Anatomy of a USA-CA All Counties Award
by
Clifford A. Taylor, WB4FBS
All Counties #87, 11-16-72

"It is said that 'curiosity killed the cat,' and I have to agree. I was just wondering how many different stations I had worked for counties, etc., to finish the All Counties award, so I broke out the paper and went to work. After days of compilation, this is the abridged result.

"First of all, the total number of different operator callsigns in my 'coloring book' is 677. Fifty-four of these callsigns appeared in more than one kind of operation (fixed, portable, or mobile). Of the 3077 counties worked, 301 were from fixed stations, 40 from portable, and 2736 from mobile stations.

"Three hundred and ninety mobile stations were contacted and included in these were two air mobile, K3HKS and W4GGU; two maritime mobiles, K8ODY and K9UIM; and bicycle mobile WB6NKJ.

"Although I could not have achieved All Counties without the contacts from all the mobile stations, I have listed below only those stations which gave me 25 or more. (Read: station worked, number of counties, number of states.)

WB2ZSO–32–8	K7ZJP–40–5
WA3IXL–25–5	K8DCR–30–5
W4ARH–32–5	WA8ETX–25–3
W4BPC–127–10	WA8TEL–30–7
W4GGU–53–5	K9DCJ–54–4
K4LRX–39–2	W9SOM–28–4
WA4OIV–29–3	W9ZHD–26–3
WA4RMX–29–3	W0AYL–31–8
WB5DVT–28–2	WA0DCQ–37–2
K5KDG–30–2	WA0JRZ–43–5
WA5OCG–54–2	WA0SBR–36–3
W6JHV–50–7	W0SJE–71–4
K7WQJ–40–6	WA0WOB–49–12
	W0YLN–45–6

"The vast majority of counties were worked on the 20 meter band—2886 of them. The remainder were worked as follows: 132 on 75 meters; 37 on 40 meters; 12 on 15 meters; and 10 on 10 meters. The CW mode of operation did not fare well on my award. I only counted eight counties on CW. (I obtained my license while in Germany, and the preponderance of my CW work, hundreds of QSO's, went into obtaining the DLD-400 Award, the German equivalent of our USA-CA Award.)

"Broken down by call areas, the number of stations from each one is: 1st – 30; 2nd – 50; 3rd – 40; 4th – 110; 5th – 84; 6th – 37; 7th – 49; 8th – 58; 9th – 67; and 10th – 139. Also worked were 5 KH6's, 4 KL7's, 3 VE's, and F2YS, portable in W2 land.

"I did not begin county hunting in earnest until August of 1969, although I had worked quite a few counties before this while chasing awards as an avid member of the Certificate Hunters Club. The first contact for which I counted a county was DL4BO, me, with K4CG (Fairfax County, Virginia) on July 7, 1967. My first mobile contact was with K1QZV on July 12, 1968, on the now defunct CHC Service Net on 14.340. I first checked into the 20 Meter Independent County Hunters' Net on Febuary 26, 1969, and ran Leslie County, Kentucky as a fixed station and had 17 contacts. I took my first mobile trip in September 1969. I rode side-saddle with WA5OCG and we ran 39 counties in Southwest Texas.

"I spent many hours net-controlling, running mobile, and listening during the period August 1969 to September 1970, and in the latter month had to change QTH's to Vietnam. I lacked 112 counties. I got back on the air in October 1971, and on November 4 of the following year K5JBC gave me St. Helena Parish, Louisiana to give me all 3077 counties (the required number at that time). With that I qualified for USA-CA All Counties #87.

73, Cliff, WB4FBS"

(Note: This article first appeared in the "Road Runner" in February. For another story of Cliff's experiences see CQ, August 1973.)

333 South Lincoln Ave., Mundelein, IL 60060

Clifford A. Taylor, WB4FBS, All Counties #87, 11-16-72.

Cliff Saccalis, SV1JG, who recently qualified for USA-CA 500 #2094. Cliff is heard during the WPX contest operating J41JG, and some of us have heard him from Mount Athos and Cos Island, as well as from his home QTH in Athens.

USA-CA Special Honor Roll

Charles H. Oliver, KA1CKX
All Counties –508, 4-11-86
All 20 M/SSB, Mobile

Larry M. Gray, K5OUK
All Counties #509, 4-12-86

Honor Roll

3000		2500		2000		KA9JOL	666	KY9Y	667	1500		G5PQ	744	KA1CKX	745	K5OUK	746	KA9JOL	747	W3IJT	748	KY9Y	749	1000		KA1CKX	921	K5OUK	922	KA9JOL	923	KE6KT	924	KY9Y	925	500		W5MW	2099	KA1CKX	2100	K5OUK	2101	KA9JOL	2102	KY9Y	2103	WA5ZKL	2104
KA1CKX	540	KA1CKX	606	KA1CKX	664																																										
K5OUK	541	K5OUK	607	K5OUK	665																																										
KA9JOL	542	KA9JOL	608																																											

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73, Cliff, WB4FBS"

(Note: This article first appeared in the "Road Runner" in February. For another story of Cliff's experiences see CQ, August 1973.)

Awards Issued

Charles H. Oliver, KA1CKX, confirmed contacts with all 3076 counties and qualified for USA-CA 500 #2100, USA-CA 1000 #921, USA-CA 1500 #745, USA-CA 2000 #664, USA-CA 2500 #606, USA-CA 3000 #540, and All Counties #508. All awards were dated 4-11-86 and endorsed All 20 M/SSB, All Mobile.

Larry M. Gray, K5OUK, sent for USA-CA 500 #2101, USA-CA 1000 #922, USA-CA 1500 #746, USA-CA 2000 #665, USA-CA 2500 #607, USA-CA 3000 #541, and All Counties #509, Mixed, all dated 4-12-86.

John (Jack) Bigelow, KA9JOL, claimed USA-CA 500 #2102, USA-CA 1000 #923, USA-CA 1500 #747, USA-CA 2000 #666, USA-CA 2500 #608, and USA-CA 3000 #542, Mixed, dated 4-14-86.

Owen T. Chelf, III, KY9Y, took time from his mobile operating to qualify for USA-CA 500 #2103, USA-CA 1000 #925, USA-CA

The 1983 ON4CLM Award in honor of the Stormont Dindas and Glengarry Highlanders. The award is still available.

The 1985 ON4CLM Award in honor of the Canadian Scottish Regiment (award is still available).

The 1984 ON4CLM Award in honor of the Regina Rifle Regiment (also still available).

award is available for all contacts with ON4CLM. This year's award features the cap badge of The Royal Winnepeg Rifles. Each successive year will honor one of the Canadian regiments that participated in the liberation of Knokke.

Cost of the award is $5.00 or 10 IRC's or the equivalent, with all proceeds going towards a welfare fund. The money is used to maintain memorials, displays, etc.

Listen for ON4CLM from October 27th until November 2nd, 1986 on the following frequencies: 3.685, 7.045, 14.145, 21.245, 28.545, and 144.250 on SSB; and 3.515, 7.012, 14.020, 21.020, 28.020, and 144.020 on CW. The station will also be on 145.475 FM.

To enable amateurs to collect the entire series, there are still limited quantities of '83, '84, and '85 awards available, honoring the "Stormont Dundas and Glengarry Highlanders," the "Regina Rifle Regiment," and the "Canadian Scottish Regiment."

For QSL's, SWL's, or additional information, please write to Radio ON4CLM, P.O. Box 140, 8300 Knokke, Belgium.

The Caribbean Award. The "Diploma Caribe" (Caribbean Award) is offered by the Federacion de Radioficionados de Cuba. Work 20 or more of the 32 counties and islands in the Caribbean, including XE, VP1, TG, HR, HT, TI, HP, HK, and YV. Cuba must be one of the countries worked. Contacts with K64 (Guantanamo Bay) are not valid for this award.

No QSL's need be sent. Send only the log data with contacts certified by associated radio club or two active hams. Contacts may be any mode or band. Send ap-

The Diploma Caribe sponsored by the Federacion de Radioaficionados de Cuba.

1500 #749, and USA-CA 2000 #667, Mixed, dated 4-18-86.

D.H. (Doug) Allerston, G5PQ, continues to improve his score with USA-CA 1500 #744, Mixed, 4-3-86.

George A. Dessert, W3IJT, sent for USA-CA 1500 #748, All SSB, 4-14-86.

Earl Mathison, KE6KT, won the gold seal for USA-CA 1000 #924, All SSB, 4-16-86.

USA-CA 500 certificates went to:

Charles W. (Bill) Peale, W5MW, #2099, Mixed, 4-3-86.

Charles H. Oliver, KA1CKX, #2100, All 20 M/SSB, Mobile, 4-11-86.

Larry M. Gray, K5OUK, #2101, Mixed, 4-12-86.

John (Jack) Bigelow, KA9JOL, #2102, Mixed, 4-14-86.

Owen T. Chelf, III, KY9Y, #2103, Mixed, 4-18-86.

Mack Avery, WA5ZKL, #2104, All 20 M/SSB. Mobile, 4-18-86.

Awards Available

The Canadian Liberation March Award. In the autumn of 1944, Canadian troops fought a long and exhausting battle in the Belgian coast area. On November 1, 1944 the town of Knokke was finally liberated, a great cost in Canadian lives. Each year the Canadians are remembered with ceremonies, festivities, and a "Canadian Liberation March." Many Belgian and Canadian veterans, radio amateurs, and VIP's are participants in the event.

Special event station ON4CLM (Canadian Liberation Movement) will once again be on the air from the "Scharpoord Hall" in Knokke. A magnificent six-color printed

plication with fee of 10 IRC's or $2.00 US to: F.R.C., P.O. Box 1, Habana 1, Cuba. If any country changes prefix, both old and new will be valid. The award is free of charge to "Cuba DX Group" members, Radio Clubs, or other amateur organizations.

Awards Program of Hungarian Radioamateur Society. Given here are the general rules for the Hungarian Radioamateur Society Awards. We will publish specific requirements for the various awards in this column as space permits.

Hungarian Awards can be obtained by licensed radio amateurs and SWL's all over the world. All amateur bands and modes may be used, except QSO's via repeaters. Contacts/receptions may be made from any locations within the same DXCC country. Each station may be contacted only once on any band or mode.

The log should show the callsign(s), name, and QTH of the applicant as well as the following information: station worked/heard, date, time (UTC), band, mode, received report. SWL's should indicate the station being worked by the heard stations.

Each list must be accompanied by a statement from the applicant's national society or from any two amateurs other than the applicant that the QSL cards of the contacts/receptions listed are in the possession of the applicant and that the items of the cards are correctly listed. (Exception: Szeged Festival and DUNAFERR awards need only log extract; HCS award —enclose confirming slices cut from the QSL's. Foreign participants in HA-DX and HG-VHF contests may apply for the following Hungarian Awards upon the contest QSO's using separate application forms: Budapest, Balaton, Dunakanyar, Pannonia, Savaria, WHD.

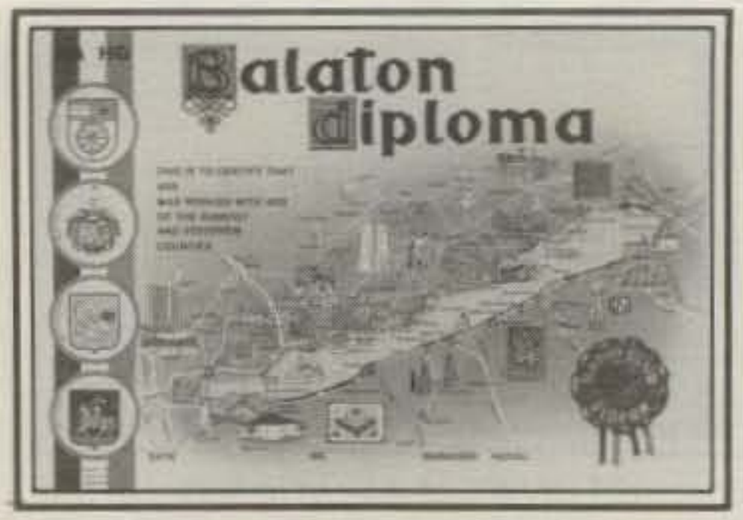
Fee for the Hungarian Awards is stated with the rules for each award. The decisions of the MRASZ Award Committee are final. All correspondence may be sent to the Award Manager or to: Hungarian Radioamateur Society Award Committee, P.O. Box 22, Tiszakecske, Hungary, H-6061.

Balaton Diploma (BD) — Hungarian Radioamateur Society. The Radioclub Siofok issues the BD. The applicant must submit proof of contacts made on or after January 1, 1967.

Conditions: Two-way communications with amateurs indicated under a, b, c. DX stations must obtain 15 points; at least 1 contact should be with a member of the Radioclub Siofok. European stations must obtain 30 points; at least 2 contacts should be with members of the Radioclub Siofok.

Points: (a) Radioclub Siofok and its members: 5 points (HA, HG3KGJ, KHL, GI, GJ, GQ, HE, HL, HQ, HZ, IG, IK, IQ, IS, NG, 4XW, 6NP, 8UA); (b) Stations with constant QTH around Lake Balaton: 3 points (HA, HG1KXX, XA, XX, ZY, 2KRQ, KSC, RQ, RC, SH, Y, YRC, 3KHB, KHO, GG, GO, HK, HO, HU); (c) Any other station in Veszprem, Somogy, and Zala county: 1 point (Each callsign between with: HA, HG2KPA-KTZ, PA-TZ, ENA-EZZ, 3KGA-KIZ, GA-IZ, FLA-FSZ, 1KRA-KRZ, KXA-KXZ, KZA-KZZ, RA-RZ, XA-XZ, ZA-ZZ, DRA-DZZ).

Fee is 10 IRC's. Send appreciation to the award manager: Jozsef Turjanyi, HA3GJ, P.O. Box 78, Siofok, Hungary, H-8601.



The Balaton Diploma offered by the Hungarian Radioamateur Society.

The Master Scanner Award offered by Amateur Television Magazine.

Master Scanner ATV (A5) Award (SSTV). This award is a beautiful 8× 10 "gold" framable certificate recognizing the accomplishments of completing a number of successful two-way Slow-Scan TV contacts on the HF/VHF/UHF bands in increments of 100, 200, 300, etc., logged visual QSO's with special endorsements for over 1,000 contacts, and HI/RES or C-O-L-O-R SSTV enhancements.

Send applications and request for further information to: Spec-Com, Membership Services Department, P.O. Box H, Lowden, Iowa 52255.

Notes

Summer holidays are at their height here in Midwest America. Soon it will be time to return to work and school. I hope everything is going well where you are.

73, Dorothy, WB9RCY

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Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Cycle Stalled

The decline of the present sunspot cycle seems to have stalled. The Royal Observatory of Belgium reports a monthly mean sunspot number of 20.4 centered on April 1986. This results in a smoothed sunspot number of 17 centered on October 1985. The present cycle has remained almost steady at a smoothed sunspot number of 18, plus or minus one, for the seven month period between April and October 1985. Such plateaus are not uncommon during the late declining years of a cycle. The plateau will probably continue for another month or two, and then the cycle will likely resume its decline towards a minimum value. This does mean, however, that solar activity will be somewhat higher this summer than originally thought, and that the minimum of the present cycle may not occur until sometime next year. A smoothed sunspot number of approximately 10 is now forecast for August 1986.

The median value of 10.7 cm (2,800 MHz) solar noise flux for April was 75.1, as observed at the Ottawa (Canada) solar observatory.

Cycle Statistics Available

Thanks to a recent computer program produced by the U.S. Department of Commerce's National Geophysical Data Center at Boulder, Colorado, Table I lists "vital" statistics for all sunspot cycles for which data is available, from 1610 to the present. Note, in particular, the amount of years that it has taken previous cycles to fall from maximum to minimum. Based upon the 6.2 year average for all cycles, the minimum of the present cycle should have occurred by 1986.1, or during January 1986. This wasn't the case, since detailed examination of the position of the spots on the sun's surface and their magnetic fields shows that most of the present spots are still from the "old" cycle, and that a new cycle has not yet started.

Note from Table I that it took 10.2 years for cycle 4 to drop from maximum to minimum, and for the past two cycles the span was 7.0 years for cycle 19 and 7.6 years for cycle 20. While we are dealing with nature and anything may happen, it does appear now that the end of cycle 21 and the beginning of cycle 22 probably won't occur until early 1987.

The data in Table I was compiled from a set of two diskettes prepared recently by the National Geophysical Data Center at Boulder. Data collected during the past 285 years has been stored on two 5.25 inch, double density, double-sided diskettes. The diskettes are formatted for IBM-compatible personal computers. Five tables summarize the following:

- Yearly mean numbers beginning in 1700.
- Monthly means starting in January 1749.
- 12-month running averages since July 1749.
- Daily counts from January 8, 1818 to the present.
- Dates since 1610 of sunspot cycle minimum and maximum.

The data can be updated using a text editor, and can be plotted graphically by merging with graphical programs available commercially.

The set of two diskettes costs $60 and is available from the Information Service Division, National Geophysical Data Center, Mail Code E/GC4/EOS, Boulder, CO 80303. It is requested that payment be enclosed with an order. The purchase of the diskettes can also be charged to VISA, MasterCard, or American Express by calling (303) 497-6135.

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for August 1986

	Expected Signal Quality			
Propagation Index	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 1, 14, 28	**A**	**A**	**B**	**C**
High Normal: 2, 4, 7-8, 17, 25-27, 31	**A**	**B**	**C**	**C-D**
Low Normal: 3, 5-6, 10, 12-13, 15-16, 18-19, 23-24, 29-30	**A-B**	**B-C**	**C-D**	**D-E**
Below Normal: 9, 11, 20, 22	**B-C**	**C-D**	**D-E**	**E**
Disturbed: 21	**C-E**	**D-E**	**E**	**E**

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be excellent (A) on Aug. 1st, good (B) on the 2nd, fair-to-good (B-C) on the 3rd, good (B) on the 4th, etc.

August Propagation

During August *20* meters should continue to be the best band for DX propagation. Openings are forecast to most areas of the world between sunrise and midnight when conditions are at least Low Normal. Peak conditions should occur for a few hours after local sunrise, and again during the late afternoon and early evening. Excellent short-skip openings are also expected on *20* from shortly after sunrise to almost midnight. These should range from a few hundred miles out to the one-hop limit of 2300 miles.

Not much DX expected on *10* meters, but an occasional opening towards South America should be possible during the afternoon, when conditions are High Normal or better. Look for frequent short-skip openings on *10* between distances of about 500 and 1300 miles.

There's a good chance for *15* meter DX openings towards South America and other southern areas during the afternoon hours, especially when conditions are High Normal or better. Frequent short-skip openings are also expected throughout the daylight hours between distances of about 400 and 1300 miles.

Some fairly good *40* meter DX openings are forecast to many areas of the world from sunset through the sunrise period. Look for excellent short-skip openings between approximately 250 and 750 miles during most of the daylight hours, and between about 750 and 2300 miles at night.

Despite seasonally high static levels, some fairly good DX openings should be possible on *80* meters during the hours of darkness. Expect conditions to peak just as the sun begins to rise on the "light" side of the transmission path. Try *80* meters for short-skip openings up to about 250 miles during the daylight hours, and between 250 and 2300 miles during the hours of darkness.

It's still too early for *160* meter DX openings on a regular basis, but look for the occasional one during the hours of darkness and the sunrise period. Short-skip on *160* meters looks good for the hours of darkness, up to distances of approximately 1300 miles and possibly beyond.

Since the summer propagation season

Minima and Maxima of Sunspot Number Cycles

Sunspot Cycle Number	Year† of Min	Smallest Smoothed* Monthly Mean	Year† of Max	Largest Smoothed* Monthly Mean	Rise to Max (Yrs)	Fall to Min (Yrs)	Cycle Length (Yrs)
—	1610.8	—	1615.5	—	4.7	3.5	8.2
—	1619.0	—	1626.0	—	7.0	8.0	15.0
—	1634.0	—	1639.5	—	5.5	5.5	11.0
—	1645.0	—	1649.0	—	4.0	6.0	10.0
—	1655.0	—	1660.0	—	5.0	6.0	11.0
—	1666.0	—	1675.0	—	9.0	4.5	13.5
—	1679.5	—	1685.0	—	5.5	4.5	10.0
—	1689.5	—	1693.0	—	3.5	5.0	8.5
—	1698.0	—	1705.5	—	7.5	6.5	14.0
—	1712.0	—	1718.2	—	6.2	5.3	11.5
—	1723.5	—	1727.5	—	4.0	6.5	10.5
—	1734.0	—	1738.7	—	4.7	6.3	11.0
—	1745.0	—	1750.3	92.6	5.3	4.9	10.2
1	1755.2	8.4	1761.5	86.5	6.3	5.0	11.3
2	1766.5	11.2	1769.7	115.8	3.2	5.8	9.0
3	1775.5	7.2	1778.4	158.5	2.9	6.3	9.2
4	1784.7	9.5	1788.1	141.2	3.4	10.2	13.6
5	1798.3	3.2	1805.2	49.2	6.9	5.4	12.3
6	1810.6	0.0	1816.4	48.7	5.8	6.9	12.7
7	1823.3	0.1	1829.9	71.7	6.6	4.0	10.6
8	1833.9	7.3	1837.2	146.9	3.3	6.3	9.6
9	1843.5	10.5	1848.1	131.6	4.6	7.9	12.5
10	1856.0	3.2	1860.1	97.9	4.1	7.1	11.2
11	1867.2	5.2	1870.6	140.5	3.4	8.3	11.7
12	1878.9	2.2	1883.9	74.6	5.0	5.7	10.7
13	1889.6	5.0	1894.1	87.9	4.5	7.6	12.1
14	1901.7	2.6	1907.0	64.2	5.3	6.6	11.9
15	1913.6	1.5	1917.6	105.4	4.0	6.0	10.0
16	1923.6	5.6	1928.4	78.1	4.8	5.4	10.2
17	1933.8	3.4	1937.4	119.2	3.6	6.8	10.4
18	1944.2	7.7	1947.5	151.8	3.3	6.8	10.1
19	1954.3	3.4	1957.9	201.3	3.6	7.0	10.6
20	1964.9	9.6	1968.9	110.6	4.0	7.6	11.6
21	1976.5	12.2	1979.9	164.5	3.4		
Mean Cycle Values:		**5.7**		**116.1**	**4.8**	**6.2**	**11.1**

**12-month running means of monthly mean sunspot numbers.*
†Other measures of solar activity have been used with the spot count to select times when the cycle reached either a minimum or a maximum.

Table I– Minima and maxima of sunspot number cycles.

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart approprate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8 KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. A ** indicates the best time to listen for 10 meter openings; * best times for 160 meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:
(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days
Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *daylight* time is used, *not GMT*. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce, Boulder, Colorado, 80302.

August 15-September 15, 1986
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Central Europe & North Africa	10-12 (1) 14-17 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	18-19 (1) 19-20 (2) 20-00 (3) 00-02 (2) 02-04 (1)	20-21 (1) 21-22 (2) 22-00 (3) 00-02 (2) 02-03 (1) 21-22 (1)* 22-00 (2)* 00-02 (1)*
Northern Europe & European USSR	10-12 (1) 14-16 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	19-21 (1) 21-23 (2) 23-01 (3) 01-02 (2) 02-03 (1)	21-23 (1) 23-01 (2) 01-02 (1) 23-01 (1)*
Eastern Mediterranean & Middle East	13-16 (1)	07-08 (1) 08-09 (2) 09-14 (1) 14-16 (2) 16-17 (1) 22-00 (1)	19-21 (1) 21-23 (2) 23-00 (1)	22-00 (1)
Western Africa	10-14 (1) 14-16 (2) 16-17 (1)	13-15 (1) 15-16 (2) 16-17 (3) 17-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	20-23 (1) 23-02 (2) 02-04 (1)	22-23 (1) 23-01 (2) 01-02 (1) 22-01 (1)*
Eastern & Central Africa	14-16 (1)	15-17 (1) 17-19 (2) 19-20 (1)	20-22 (1) 22-00 (2) 00-01 (1)	22-00 (1)
Southern Africa	10-12 (1) 12-14 (2) 14-15 (1)	07-15 (1) 15-17 (2) 17-19 (1) 23-01 (1)	21-22 (1) 22-01 (2) 01-02 (1)	22-01 (1) 22-00 (1)*
Central & South Asia	*Nil*	08-11 (1) 20-23 (1)	06-08 (1) 18-21 (1)	07-08 (1) 18-21 (1)
South-east Asia	*Nil*	08-11 (1) 19-22 (1)	06-08 (1)	06-08 (1)
Far East	*Nil*	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-21 (2) 21-22 (1)	06-08 (1) 18-19 (1)	06-08 (1)
South Pacific & New Zealand	13-16 (1) 16-18 (2) 18-20 (1)	07-08 (1) 08-11 (2) 11-13 (1) 18-21 (1) 21-00 (2) 00-07 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1)	03-04 (1) 04-07 (2) 07-08 (1) 04-07 (1)*
Australasia	16-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-16 (1) 16-18 (2) 18-21 (1) 21-23 (2) 23-01 (1)	03-04 (1) 04-07 (2) 07-08 (1)	04-05 (1) 05-06 (2) 06-07 (1) 05-06 (1)*
Caribbean, Central America & Northern Counties of South America	12-14 (1)** 14-16 (2)** 16-17 (1)** 09-11 (1) 11-15 (2) 15-17 (3) 17-19 (2) 19-20 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-00 (1)	19-20 (1) 20-21 (2) 21-04 (3) 04-06 (2) 06-08 (1)	22-02 (1) 02-04 (2) 04-07 (1) 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	14-17 (1)** 09-10 (1) 10-12 (2) 12-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-11 (2) 11-16 (1) 16-17 (2) 17-19 (4) 19-21 (2) 21-23 (1) 23-00 (2) 00-02 (1)	21-22 (1) 22-23 (2) 23-01 (3) 01-03 (2) 03-05 (3) 05-06 (2) 06-07 (1)	22-02 (1) 02-04 (2) 04-06 (1) 02-05 (1)*
McMurdo Sound Antarctica	*Nil*	07-09 (1) 21-22 (1) 22-00 (2) 00-01 (1)	01-03 (1) 03-06 (2) 06-07 (1)	03-06 (1)

Time Zones: CDT & MDT
(24-Hour Time)
CENTRAL USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Central Europe & North Africa	13-15 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	20-22 (1) 22-01 (2) 01-04 (1)	22-02 (1)
Northern Europe & European USSR	13-15 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-15 (2) 15-17 (1) 21-23 (1)	20-22 (1) 22-00 (2) 00-02 (1)	22-01 (1)
Eastern Mediterranean & Middle East	12-14 (1)	07-12 (1) 12-15 (2) 15-18 (1) 21-23 (1)	20-23 (1)	21-22 (1)
Western Africa	10-12 (1) 12-14 (2) 14-15 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-21 (1)	20-22 (1) 22-01 (2) 01-02 (1)	22-23 (1) 23-00 (2) 00-01 (1)
Eastern & Central Africa	13-15 (1)	07-09 (1) 15-17 (1) 17-18 (2) 18-20 (1)	21-00 (1)	*Nil*

Southern Africa	10-11 (1) 11-13 (2) 13-14 (1)	07-09 (1) 12-15 (1) 15-17 (2) 17-18 (1) 22-01 (1)	20-21 (1) 21-23 (2) 23-01 (1)	22-00 (1)
Central & South Asia	*Nil*	07-08 (1) 08-10 (2) 10-11 (1) 18-21 (1)	06-08 (1) 19-21 (1)	07-08 (1) 20-21 (1)
South-east Asia	17-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 20-23 (1)	06-08 (1)	06-08 (1)
Far East	16-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-22 (2) 22-00 (1)	03-06 (1) 06-07 (2) 07-08 (1)	05-07 (1)
South Pacific & New Zealand	16-18 (1)** 12-14 (1) 14-19 (2) 19-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-18 (1) 18-21 (2) 21-23 (3) 23-01 (2) 01-04 (1)	00-01 (1) 01-03 (2) 03-06 (3) 06-08 (2) 08-09 (1)	02-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
Austral-asia	16-19 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-10 (2) 10-11 (1) 18-20 (1) 20-00 (2) 00-02 (1)	02-04 (1) 04-07 (2) 07-09 (1)	04-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Carib-bean, Central America & North-ern Countries of South America	11-14 (1)** 14-16 (2)** 16-17 (1)** 08-10 (1) 10-14 (2) 14-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-00 (1)	19-21 (1) 21-23 (2) 23-03 (3) 03-06 (2) 06-07 (1)	21-00 (1) 00-03 (2) 03-06 (1) 00-05 (1)*
Peru, Bolivia, Para-guay, Brazil, Chile, Argen-tina & Uruguay	14-17 (1)** 08-09 (1) 09-11 (2) 11-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-11 (2) 11-15 (1) 15-17 (2) 17-19 (4) 19-21 (2) 21-23 (1) 23-00 (2) 00-02 (1)	21-22 (1) 22-23 (2) 23-01 (3) 01-03 (2) 03-05 (3) 05-06 (2) 06-07 (1)	22-01 (1) 01-04 (2) 04-06 (1) 02-05 (1)*
McMurdo Sound, Antarc-tica	15-18 (1)	08-10 (1) 20-21 (1) 21-23 (2) 23-00 (1)	01-03 (1) 03-06 (2) 06-07 (1)	03-06 (1)

Time Zones: PDT (24-Hour Time) WESTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & South-ern Europe & North Africa	*Nil*	06-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-16 (1) 22-00 (1)	20-21 (1) 21-23 (2) 23-00 (1)	22-23 (1)
Central & North-ern Europe & Northern USSR	*Nil*	06-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-15 (1) 21-23 (1)	19-20 (1) 20-22 (2) 22-23 (1)	21-23 (1)
Eastern Mediter-ranean & Middle East	*Nil*	07-08 (1) 08-10 (2) 10-12 (1) 12-13 (2) 13-14 (1) 20-22 (1)	20-23 (1) 06-08 (1)	21-22 (1)
Western Africa	12-14 (1)	07-08 (1) 08-09 (2) 09-14 (1) 14-15 (2) 15-16 (3) 16-17 (2) 17-19 (1)	21-01 (1)	21-23 (1)
Eastern & Central Africa	*Nil*	12-15 (1) 15-17 (2) 17-18 (1)	20-22 (1) 06-08 (1)	*Nil*
South-ern Africa	10-12 (1)	07-09 (1) 12-14 (1) 14-16 (2) 16-18 (1) 22-00 (1)	20-21 (1) 21-22 (2) 22-23 (1)	20-22 (1)
Central & South Asia	17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-20 (2) 20-21 (1)	06-08 (1) 18-20 (1)	06-07 (1)
South-east Asia	16-20 (1)	08-09 (1) 09-11 (2) 11-13 (1) 18-21 (1) 21-23 (2) 23-00 (1)	02-05 (1) 05-07 (2) 07-08 (1)	06-07 (1)
Far East	17-19 (1)	07-08 (1)* 08-10 (2) 10-12 (1) 12-14 (2) 14-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	01-02 (1) 02-06 (2) 06-07 (3) 07-08 (1)	03-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
South Pacific & New Zealand	16-18 (1)** 12-15 (1) 15-16 (2) 16-18 (3) 18-20 (2) 20-21 (1)	07-08 (1) 08-10 (2) 10-17 (1) 17-19 (2) 19-20 (3) 20-22 (4) 22-23 (3) 23-00 (2) 00-02 (1)	22-23 (1) 23-00 (2) 00-06 (3) 06-07 (2) 07-08 (1)	23-02 (1) 02-06 (2) 06-07 (1) 02-06 (1)*
Austral-asia	14-17 (1) 17-20 (2) 20-21 (1)	17-19 (1) 19-20 (2) 20-23 (3) 23-01 (2) 01-07 (1) 07-10 (2) 10-13 (1)	00-02 (1) 02-03 (2) 03-05 (3) 05-07 (2) 07-08 (1)	02-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
Carib-bean, Central America & North-ern Countries of South America	11-13 (1)** 13-16 (2)** 16-17 (1)** 08-09 (1) 09-14 (2) 14-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-10 (3) 10-15 (2) 15-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-02 (1)	18-21 (1) 21-22 (2) 22-01 (3) 01-04 (2) 04-07 (1)	20-22 (1) 22-02 (2) 02-05 (1) 23-03 (1)*
Peru, Bolivia, Para-guay, Brazil, Chile, Argen-tina & Uruguay	12-13 (1)** 13-15 (2)** 15-16 (1)** 08-09 (1) 09-10 (2) 10-12 (1) 12-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-10 (2) 10-15 (1) 15-17 (2) 17-19 (4) 19-20 (3) 20-22 (2) 22-00 (1)	20-22 (1) 22-23 (2) 23-01 (3) 01-03 (2) 03-05 (3) 05-06 (2) 06-07 (1)	22-02 (1) 02-04 (2) 04-05 (1) 02-04 (1)*
McMurdo Sound, Antarc-tica	16-18 (1)	08-10 (1) 17-19 (1) 19-21 (2) 21-23 (3) 23-00 (2) 00-02 (1)	00-03 (1) 03-06 (2) 06-07 (1)	03-06 (1)

**Indicates best times for 160 meter openings.*
***Indicates best times for 10 meter openings.*

should end by mid-September, this month's DX Propagation Charts cover only a one month period rather than the usual two month span. Short-Skip Charts for August appeared in last month's column.

VHF Ionospheric Openings

Frequent sporadic-*E* propagation is expected to continue during August, with a good possibility for *6* meter openings between distances of approximately 750 and 1300 miles. During periods of intense and wide-spread sporadic-*E* ionization, *6* meter two-hop openings may be possible up to about 2500 miles. During periods of intense ionization also check for possible short-skip openings on *2* meters, over a range of about 1100 to 1300 miles.

One of the year's most prolonged and intensive meteor showers, the *Perseids*, should take place between August 10 and 14. Maximum intensity is expected during the late evening hours of the 12th, with an average count of 50 meteors an hour. Ionization produced as these meteors enter the earth's atomosphere should make possible numerous meteor-scatter type openings on the *6* and *2* meter bands. The range of these openings could be up to several hundred miles and beyond.

There is a possibility for some auroral-scatter propagation on the VHF bands during August, when the ionosphere is disturbed. Check the Last Minute Forecast appearing at the beginning of this column for those days that are expected to be Below Normal or Disturbed on the HF bands. These are the days when VHF auroral-type openings are most likely to occur.

Auroral-scatter-type propagation openings can range from a few hundred up to about a thousand miles, and are usually characterized by very rapid flutter fading, and Doppler shift on SSB signals.

73, George, W3ASK

Antennas & Accessories

a monthly feature by
KARL T. THURBER, JR., W8FX

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

Hamshack Computers: Part I

This month columnist W8FX begins a multi-part series on the personal computer in the hamshack. We're certain that you'll especially appreciate author Thurber's comments and advice if you've yet to delve into the world of bits and bytes.
—K2EEK

Last month we did some catching up on reader mail with some antenna notes from Bill Fanckboner, W9INN, and H.P. Forbes, KC5KJ. We also highlighted the impressive Quad installation of Jack Riggs, N7AM, and we took note of several antenna and computer-related books for the hamshack. We also focused on a couple of new antenna products and some new amateur radio software. To wrap up last month's column we noted an interesting, ham-radio-oriented users group, the Atari Microcomputer Network and its publication, *Ad Astra*.

This time we'll begin a multiple-part series on the personal computer (PC). In this series we'll specially emphasize, but won't limit ourselves to, computer employment in the hamshack. Over the next few months we'll cover hopefully useful topics such as computer selection, installation, operation and maintenance, and software selection. We will kick off the series this month with a look at computer selection. Following this introductory look at the PC, we'll also examine some new reading matter and products in the space remaining.

Computer Selection

No one knows just how many hams own computers, but it's likely that a significant number of U.S. hams, certainly numbering in the tens of thousands, are also "into" computers to a greater or lesser extent. Ham radio and computers tend to fit hand-and-glove as hobbies. The ARRL tried to get a handle on hamshack computer usage last year when it conducted a reader survey in the September 1985 issue of *QST*. The results didn't give a clue as to the total number of hamshack computers that are in use. Nevertheless, these results, reported in *QST* in the January 1986 "On Line" column, disclosed some interesting facts, some of which I'll highlight here.

•The ham owning a computer uses it for ham radio applications about 41% of the time that it is in use.

317 Poplar Drive, Millbrook, AL 36054

An early Radio Shack computer. Radio Shack, Commodore, and Apple constitute the troika of firms that pioneered the personal computer in the home. All of these firms, and the products they sell today, have come a long way in the past few years. (Photo courtesy Radio Shack).

•Some 43% of hamshack computers are used for RTTY; other areas of significant usage, in order of decreasing popularity, are CW, packet radio, logging, antenna bearing, propagation forecasting.

•Over 20% of hamshack computers are Commodore 64s; the Vic-20, Radio Shack CoCo, IBM-PC, Xeros 820, and Apple II+ are represented in significant numbers of hamshacks, as well.

•Nearly 80% of ham computerists use a printer; a majority or greater use disk drives, ham interfaces, and modems.

To be sure, you can enjoy ham radio fully without a personal computer residing in a prominent position in the hamshack. But as the above figures show, many hams have found that the computer enhances and improves their "productivity," as well as the enjoyment they derive from their hobby.

As we have pointed out many times in the past, the PC can be used for a variety of tasks. In addition to the major uses cited in the ARRL survey, almost every endeavor in ham radio finds its own niche, with valid applications in contest logging and duping, antenna and circuit design, awards tracking, AMTOR, fast scan and slow scan TV, troubleshooting, amateur radio bulletin boards, SWL activities, and many other fruitful areas.

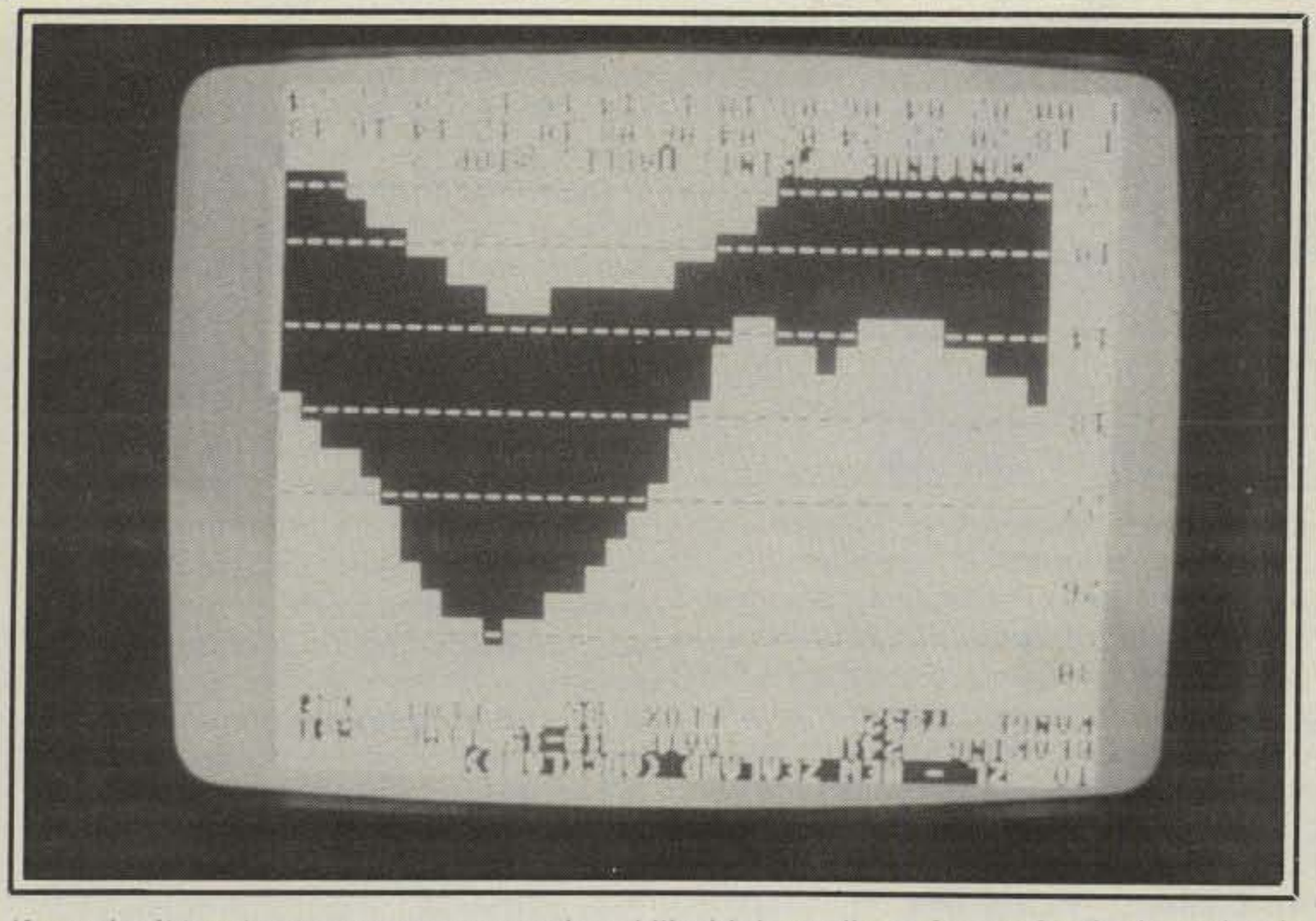
Okay, so you're mildly interested in adding a computer to the operating table. Where do you start? As with the purchase of any new hamshack equipment, it pays to do a good deal of preliminary research before plunking down hard cash. Computers are not yet at the "appliance stage." They're complicated and have capabilities and limitations that are not necessarily apparent on first look. Computers are expensive, and so it's important to make that first purchase decision wisely. This is especially important in that once one has committed to a particular computer, it's difficult and expensive to change systems as peripheral devices (printer, disk drives, modems, and the like) are added to the system. Changing from, say, a fully equipped Commodore 128 setup with all of the bells and whistles, to, say, an IBM-PC or compatible computer could involve $3000 to $4000 in out-of-pocket expenses.

Assuming that you, your temperment, and your family would be comfortable owning a computer—hamshack-specific or not—it's important to select a computer system that adequately fills your needs. We've identified some eight areas of consideration that we believe are important.

1. Identify Major Computer Uses. A computer for the hamshack probably represents a hybrid situation, one in which the same computer may double as a family productivity tool, a game-playing machine, and a work-at-home device. Thus, the first step is the most important one: that of deciding precisely what you will do with the computer, in addition to straight hamshack computing. At the outset, you may have trouble identifying all of the possible uses, for as you examine the choices, many previously unthought of uses may become evident.

Bear in mind that if you use the computer primarily as a hamshack accessory and operating tool it may become less convenient for you to use it for the more customary household purposes—wordprocessing, financial evaluation, addressbook keeping, checkbook balancing, game-playing, and the like. The ham computer is usually placed in close proximity to the operating console, and as such it may be impractical to use it for other purposes without lugging records and files into the hamshack. In some cases the computer (especially if it's used for RTTY, CW, or packet) may be hardwired to the ham rig, making using the device for other purposes an annoying exercise in wire-pulling and reconfiguration.

Don't forget to assess just *who* will be using the equipment. You've probably got it made if yours is an all-ham family and understands your operating habits and needs, but the spouse or harmonic may



If you don't trust your own programming skills, high-quality software for the hamshack is slowly becoming available. Shown here is a typical screen display from the MUFPLOT V2 propagation prediction program offered by Base 2 Systems, previously described in the Antennas & Accessories column. (W8FX photo)

Bear in mind that a computer won't do anything significant until it is programmed with a set of instructions to follow. If you're planning to write your own programs, it's important to survey the various computer languages which are available for the computer you're considering for purchase. Most personal computers (though not all) are equipped with BASIC, the most popular computer language around today. But for other applications in which you may have an interest, PILOT, Pascal, FORTH, Logo, "C," and other languages may be more suitable.
not understand why they can't do a report or play a game on the computer just now, as you're not yet done dupe checking that last big contest log. These considerations have driven many to purchase a second computer, often one with different features and characteristics, for other family members or purposes other than strictly hamshack computing. Interestingly, the ARRL survey found that many hams owned two or three computers. Indeed, one ham responding to the survey even owned eight of the critters!

2. Consider the Software. Many texts on computer selection indicate that the first consideration should center on the software available to do a particular job, with the choice of the computer on which to run the software driven by the software that's chosen. This is fine for a business application where specific tasks are intended in advance, but in the rapidly evolving hamshack and personal productivity markets, it's important to give equal consideration to the computer's present capabilities and expansion potential, and the available software for it.

We have found that there is a great deal of hamshack software out there, if you know where to look for it. Almost every month we've identified new software as it becomes known to us. We've also published software resource listings from time to time, most recently in the December '85 issue. At present we find that the Commodore 64/128 is the best supported PC around as far as hamshack software goes, but we've also found a good deal of software for the various Apple machines, IBM-PCs and compatibles, Radio Shack CoCo, and the family of Timex-Sinclair machines. There is also a good deal of Vic-20 software, though the machine is not as popular as it once was, the Commodore 64 having largely taken its place.

If you also want to use your computer for purposes other than hamshack computing, this fact complicates the problem of getting a good "software match." The excellent RTTY and CW computer used with a green screen monitor may not be a good player of dazzling color graphic games. Too, a 40-column machine such as the Commodore 64 is not the best choice for working with big spreadsheets and wordprocessing programs where 80-column performance is the name of the game. Bear in mind, too, that software tends to be priced to the machine it supports. Thus, you'll find that almost all software for, say, the IMB-PC will be more expensive than comparable software for an Atari or a Commodore.

If software compatibility between computers is important to you, then you should know that, for better or worse, software written for the IBM-PC has become more or less standard in the business world. Thus, IBM-compatible software (and a machine on which to run such software) may be a purchase consideration, if you want to be able to run the maximum amount of software possible on your computer. In similar fashion, computers that are "CP/M compatible" may also be important, since there are also thousands of business programs available that will run on CP/M compatible hardware. However, for hamshack software, no "standard" has emerged, so software compatibility may not be an important factor for you.

3. Decide on Primary Features and Requirements. Assuming that you have a good idea of the uses to which you will put your computer, the next task is to decide what minimum features and capabilities the computer must have to accomplish those tasks. A very basic requirement is that the keyboard be comfortable to the touch. There are several types of keyboards that are available, from touch-sensitive membranes, to chiclet-style calculator-like pushbuttons, to standard typewriter keys. Having an appropriate type of keyboard is fundamental: it's very difficult, for example, to enjoy wordprocessing on a membrane-type keyboard.

Color, graphics, and sound capabilities are normally associated with home computers and game playing applications. Such computers should have provisions for plugging in game controllers such as joysticks, trackballs, or touch-sensitive graphics tablets. The trend is toward color, graphics, and sound even in business-type applications, with the prices of computers which support such capabilities declining rapidly in price. Keep in mind that a computer's bottom-line performance in these areas is as much a function of the computer's programming language as it is of the hardware itself.

Another primary consideration is the computer's available random access memory (RAM) space: is there enough space for present and future needs? It was just a few years ago that home computers that had but 5 to 8K of RAM were considered perfectly adequate for almost any home application one might envision. This figure has crept upward past 64K at present, is pausing at 128K, and may not stop even for a breather at 256 or 512K. Many sophisticated ham programs, such as logging databases, can require considerable memory space for competent performance, so if the computer you're considering comes factory-equipped with a relatively small memory, check to see how difficult and expensive it is to add additional memory.

Equally important is the screen display that the computer offers. Typically, the display will be 24 lines high and either 40 or 80 columns wide. The 40-column display has large letters and is easy to read, though for certain business applications it is very awkward to work with. Some computers allow you to switch between either

a 40- or 80-column screen. Generally, a 40-column screen can be displayed on a TV set, but an 80-column screen requires the resolution that only a high-quality monitor can provide.

The ease and expense with which peripherals may be connected to the computer are important, too; few computers come 100% equipped out of the box. Undoubtedly, you'll want to add mass storage (either a cassette unit, disk drive, or hard disk), a printer, modem, and likely some ham equipment interfacing. Some computers require the purchase of special boards or "cards" in order to hook up any peripherals to the basic computer. Especially, check to see if the computer has, or is easily adapted to, the use of a standard RS-232C bus, as many ham/computer interface devices require access to this data communications link.

4. Decide on Secondary Features and Requirements. One should first have in mind one's primary objectives in purchasing a computer, with a clear understanding of the uses to which it will be put. The selection should be based largely on these objectives, without the "mental clutter and confusion" of consideration of secondary, or nice-to-have, features. Having these considerations clearly in mind should prevent one from being swayed by an ad claim or salesman's pitch about a particular machine's capabilities and features that may have nothing to do with the uses you are likely to have for the computer.

Nevertheless, one cannot make a computer selection in a vacuum, and it is important to consider nice-to-have or secondary features, as well as the alternate uses to which the computer may be put. Taking these into account is important in the purchase of a computer for the home, since it is unlikely that the machine would be limited to a single application (even if it is ham radio). Thus, the factors that may not have been "primary players" in (3), above, should be considered, keeping the primary factors clearly in mind. Keep in mind that a computer's secondary uses may eventually take up more of a computer's time than the primary purposes for which it was purchased.

While there is no such thing as *the* best computer, several of the lower-end computers are surprisingly versatile in the home environment. Some of these include the IBM-PC Jr., now discontinued but still available at bargain prices; the Atari 520ST, a fantastic graphics oriented game-playing computer with as-yet untapped business and ham applications; and the Commodore 128, actually three computers in one, with access to the large C-64 and CP/M software libraries.

5. Check the Price Tag. Obviously, a computer's price plays a major part in selection. Today, it's possible to spend well under $50 to buy a fairly complete computer, such as a Vic-20 or a Timex-Sinclair, or to spend many thousands of dollars for

Handicapped individuals find increasing use for the hamshack PC. Shown here is Dr. Tom Linde, KZØT, an active member of the Handi-Ham Program. This is an international service organization dedicated to bringing the excitement of amateur radio to those with severe physical, sight, hearing, or speech handicaps. For information on membership, contact the Courage Handi-Ham System, 3915 Golden Valley Road, Golden Valley, MN 55422. Tom Linde, in the photo, is also the proprietor of Twin Oaks Associates, which markets several excellent computerized Morse code training programs for the Apple computer. Contact Tom at Route 5, Box 37, Knoxville, IA 50138, for more information. (Photo courtesy Bruce Humphrys, KØHR)

an IBM PC-AT or other business-oriented machine. The best choice for you probably lies somewhere in between these extremes. You want a machine with the features that you need for the application(s) intended, but without any gold-plating.

Computer pricing can be extraordinarily frustrating; indeed, there hardly seem to be any consistent pricing rules. The marketplace tends to be chaotic, with a jumble of rebates, discounting, and promotions muddying the water. Consider, too, that the price of the computer itself may represent but a small portion of your total computer system expenditure. This is true for computers in all price ranges. The multiplier effect, when peripherals are added, is especially noticeable in the low-end computers, where the price of a disk drive, printer, or monitor may easily exceed the base cost of the computer itself. On the high-end machines the basic computer may not actually do anything out of the box, without the expenditure of several hundred dollars for "required accessories"—much as would be the case if brakes and a steering wheel were optional accessories for an automobile. Be sure you know what the necessary extras are before buying!

Closely related is the "now versus later" stackup. You may be able to do with a satisfactory, inexpensive system consisting of a basic computer, cassette drive, and TV set to begin with, but may find that expansion of that particular computer is very expensive and may result in a "kludge" installation. It is generally not cost-effective to greatly expand very inexpensive computers with additional memory, special-purpose boards, a music or speech synthesizer, and the like, as the ultimate result is often a very large investment in something that doesn't perform nearly as well as a more expensive basic model—not to mention the low resale value of computer accessories and add-ons. You may find that the *real* "best buy" is a computer system that includes most of the accessories, such as dual drives, a monitor, and hard disk in one tidy package.

Computers are not yet in a class with home appliances such as toasters and washing machines. Thus, obtaining proper service for them is a real problem and should be considered along with the machine's basic price. Generally, warranties run 90 days for parts and labor. Repair is usually accomplished at an authorized service center, though some stores do their own servicing and offer service contracts for extended periods. Some manufacturers offer little or no service, often the case when an "orphan" computer (one that is no longer manufactured) is purchased. In such cases, even minor repairs can be extremely difficult to obtain and may cost the proverbial arm-and-a-leg. Be sure to ask how warranty service is handled, and how subsequent service is obtained (and how much it costs), particularly if you buy your computer from a mail-order dealer.

A final point on pricing applies to the software. Like it or not, software tends to be priced along "what the traffic will bear" lines—that is, to how "hot" a product is, and for the specific computer it's to run on. You'll find that comparable programs, offered by the same manufacturer, tend to be priced lower for, say, the Commodore version than for the IBM-PC version. Apparently many software manufacturers try to gauge the consumer's spending power by the computer he or she uses!

6. Assess Sources of Information and Supply. In connection with your checking out the specs on a variety of computers as to their suitability, survey the potential sources of supply. Few computers are purchased directly from manufacturers; most are purchased from either a local retailer or via mail order. There are some exceptions, notably Heath/Zenith, where Zenith computers may be ordered from Heathkit; also, Zenith has made special arrangements whereby government employees and university students and faculty members may purchase their equipment.

For most people buying a computer from a local retailer is probably the most hassle-free way of making a computer purchase, though it is not necessarily the least expensive one. Few local retail computer specialty firms can compete price-wise with low-overhead mail-order firms. However, most retailers do more than merely sell you a computer. They may offer advice

on machine and software selection, as well as at least some measure of post-sales support and service. Mass-market retailers, discounters, and catalog showrooms such as Sears, K-Mart, JAFCO, Service Merchandise, and other volume dealers generally sell computers, though they typically limit their selection to low-end lines, and the degree of support offered may be spotty.

Mail-order buying is something of a "mixed bag" and tends to become more trouble-plagued than buying ham gear through the mail. Practically all computer hardware and software can be bought via mail-order, usually at heavily discounted prices. Even Radio Shack equipment, usually sold through franchised outlets, is available by mail. Any computer magazine is filled with ads from mail-order companies, but the trick is to distinguish the ethical, responsible, and competent mail-order outfit from the lesser breed. Buying by mail is probably a good choice for an experienced computer buff, one who knows exactly what he or she wants, and who knows precisely what support to expect from the mail-order firm. But this type of buying is probably unwise for the beginner who needs the store personnel for some "hand-holding" in setting up the system. Return policies, warranty coverage, and service are critical considerations when ordering computer equipment by mail, so if you do so, make sure that you are aware of the firm's policies in these areas before whipping out your credit card.

Naturally, before making a final selection you will want to have researched all available information on the computers that interest you. Computer magazines and user groups, local computer store salespeople, friends and acquaintances, and computer trade fairs and shows all represent possible sources of information. Bear in mind that the computer manufacturers' advertising naturally stresses their products' favorable points and capabilities, but is silent on limitations and problem areas. The manufacturers get away with this because the buying public is not nearly as knowledgeable as to the ins-and-outs of computers as they are with other consumer appliances. It's squarely up to you to ferret out a machine's *real* capabilities and limitations. Be especially critical of manufacturers' claims if the computer has been on the market for under nine months to a year. By that time the computer should have gone through a technical and/or market shakeout, if there's going to be one (you want a survivor!).

Consider, too, the degree of user support the manufacturer offers. A customer service number (especially one that is toll free) is a real plus, as is the existence of a company published or supported users magazine. The existence of a local or national users group can be important, as well.

7. Get Your Hands on the Merchandise. Regardless of where you may actually purchase your computer, do some "test driving" of your own, if possible. Preferably, this should be done in person at a local computer retail outlet with a salesman available to point out the machine's features and to walk you through them. Just getting your hands on the computer of interest may result in your discovering a "fatal flaw" that would make its purchase unwise, such as a keyboard "feel" that you just can't stand or a monitor that hurts your eyes. Many mass-market stores have demonstrator displays where you can play with the machines, though you're often left to your own devices in checking them out. Try to find a friend who owns a computer of the type you're considering for purchase and get your hands on it. Needless to say, if you plan to use the computer with your ham gear, find out what computers the "locals" are using, how they like them, and what software is available for them.

If you live in an area where there isn't an opportunity to experience a hands-on demonstration, you may have to rely on published product reviews. While computer magazines seem to be dropping from the scene like flies, there are still many that publish reviews of computer hardware and software. Many of these magazines, especially those for computers that are not in widespread use, are difficult to find. They are often available only on big-city newsstands that carry a wide selection of magazines. Often, however, computer stores carry magazines, though these are frequently limited to magazines that support the brand(s) carried by the store. Another problem is that magazine reviews are often not very rigorous, to avoid offending the magazine's advertisers. Naturally, these reviews may not offer anything specific as far as ham radio applications, but they can be useful in assessing the computer's overall performance and suitability.

Occasionally, consumer testing firms

publish their evaluation results of popular computers and software. This information can be very valuable if they happen to survey the products in which you are interested. *Consumer Reports*, for example, surveyed the very confusing IBM-compatible computer field and published the results of their evaluation of seven best-selling compatibles in the October 1985 issue. Their conclusion was that although the computers surveyed were less costly than the IBM-PC, some were better in certain design particulars. The magazine, in fact, rated the Leading Edge Model D as a "best buy" among them.

8. "Byte" the Bullet! Once you've made the decision to purchase a computer, decided on the primary and secondary uses to which it will be put, and considered the other factors we've discussed, there's little to do except to open your wallet and go for it. With the right kind of research, and a little patience in learning how to master your new machine, you're unlikely ever to regret taking that step. I bought my first computer, a Commodore Pet, in 1978, and although that computer long ago went to computer heaven, I haven't regretted that initial plunge into the world of bits and bytes for a minute.

This time we've devoted most of the column to a discussion of how to make an intelligent computer selection decision. In future columns we'll continue with a discussion of computer installation, operation and maintenance, and software selection and use.

For the Bookshelf

Space permits us to highlight only two library candidates this month. The first one we'd like to mention is a booklet, *The World Below 500 Kilohertz*, by L. Peter Carron, Jr., W3DKV. Of special interest to LWLs (longwave listeners), the book constitutes a good introduction to the longwave portion of the RF spectrum. Spanning the region from 0 to 500 kHz, the book covers LORAN, OMEGA, GWEN, standard time and frequency broadcasts, beacons, foreign broadcasting stations, "lowfer" (amateur-like) communications, and the many unusual and unidentified signals that populate that portion of the spectrum. The author covers receiving equipment and techniques, propagation conditions, publications, and many other interesting low-band aspects, all written in an easy-to-follow style.

The 64-page booklet is available for $4.75 plus 75 cents postage from L.P. Carron Publishers, 205 Ridgewood Rd., Easton, PA 18042.

Fellow antenna columnist Ed Noll, W3FQJ, who authors the monthly "Better Signals" column in *CQ*'s sister publication, *Popular Communications*, has come up with a hefty (2 pound), 575-page, *Landmobile and Marine Radio Technical Handbook*. Though Ed is probably better known to most readers for his antenna articles and books, his latest effort constitutes a complete atlas of the commercial two-way radio field. In the book he covers radio fundamentals, circuit details, equipment installation and maintenance, test equipment, cellular systems, antennas, microprocessors, and much more.

This practical and useful reference book and guide is available directly from the author for $24.95 plus $2 postage and handling. Contact Ed Noll, W3FQJ, Box 75, Chalfont, PA 18914.

New Products

Sensatrol. Since we've essentially limited the column this month to computer topics, we'd like to mention one new computer product that looks quite interesting. Not really a ham product at all, it nevertheless appears to have useful household, small business, and school control applications —some of the more promising areas for those "secondary uses" we alluded to in our computer purchase discussion above.

There are many environmental sensing and energy control interface devices on the market today which allow the homeowner to measure and monitor many types of environmental conditions, and to control various devices based on information generated as a result of their monitoring functions. Sensatrol is one of the more sophisticated of these interfaces. It is a digital sensor/controller which interfaces directly with your computer. As such, it is compatible with any computer which has an RS232C port, such as the Apple, IBM-PC, Radio Shack, and many others. The device, when interfaced with your computer, appropriate sensing devices, and controllers, can allow you to monitor a variety of environmental elements such as wind speed, temperature, hot water, smoke, furnaces, alarms, and others. The system allows you to translate what the sensors detect into control of heating, cooling, ventilation, fire extinguishers, security devices, and other systems. A large distributed network of sensors and controls is possible, covering hundreds of feet.

The Sensatrol interface provides a good example of the kind of linking that's possible between your personal computer and the environment. The device is a digital sensor/controller which directly interfaces with any PC that has an RS232C port. A variety of measurement and control applications are possible. (Photo courtesy Data World Products)

All this isn't cheap (Sensatrol is priced at $385), but for the right applications it looks like a worthwhile investment. If you're interested in using your personal computer in such an advanced application, a large packet of technical information is available from the manufacturer. Contact Data World Products, Box 33, Francestown, NH 03043.

Wrapping It Up

This time we've devoted most of the column to a discussion of computer selection, not just in terms of hamshack applications, but in terms of personal computing in general. We've covered eight areas which we feel to be relevant in selecting the "right" computer; hopefully, these will be useful to our readers. Following that, we touched on two new publications of interest, and we also took note of a sophisticated computer interface for environmental monitoring and energy control.

Next month we'll continue with our series on PCs in the hamshack. We think that you'll find our discussion interesting and a logical follow-on to this month's initial considerations. See you then.

73, Karl, W8FX

WELZ CORP.

POWER METERS

SP-825
1.8-1300 MHz

SP-425
140-525 MHz

SP-225
1.8-200 MHz

SP-122
1.6-60 MHz 2kW

Model	SP-825 AUTOMATIC SWR 1.8 - 1300 MHZ	SP-425 DUAL METER VHF/UHF	SP-225 DUAL METER HF/VHF	SP-122 HIGH POWER HF	SP-450 HIGH POWER VHF
Freq Range	1.8-200, 430-450, 800-930, 1240-1300	140-525 MHz	1.8-200 MHz	1.6-60 MHz	140-470 MHz
Power Range (FWD)	2-15-150 W	5-15-150 W	5-15-150 W	20W-200W-2KW	50-300-1500W
(REF)	1-3-30	1-3-30 W	1-3-30 W		
Accuracy (FWD)	± 10% F.S.	± 7% F.S.	± 7% F.S. (160-200 10%)	± 10% F.S.	± 10% of Full Scale
(REF)	± 10% F.S.	± 10% F.S.	± 10% F.S.	± 10% F.S.	
SWR Sensitivity	SENSOR S-1: 2W; S-2:2W	2.5 WATTS	1 WATT	3 WATTS	30W
Insertion Loss	SENSOR S1:0.2 dB; S2:0.3 dB OR LESS	140-250: 0.1 dB 250-400: 0.2 dB 400-525: 0.3 dB	0.2 DB OR LESS	0.1 DB OR LESS	Less than 0.1 db
Available Measurements	AVG. PWR., TRUE PEP, SWR	AVG. PWR., TRUE PEP, SWR	AVG. PWR., TRUE PEP, SWR	AVG. PWR, SWR, PEP	AVG PWR, REF PWR, VSWR
Connector Type	S1: 'M' TYPE S2: 'N' TYPE	'N'	'M'	'M'	'N'
Indicators	LED, PEP-AVG. LED-SWR	LED, PEP-AVG. LED-SWR	LED, PEP-AVG. LED-SWR	LED, PEP-AVG. LED-SWR	
Power Required	DC 13.8V 400 mA	DC 13.8V 300 mA	DC 13.8V 300 mA	DC 13.8V 200 mA	NONE
Size	192W × 72H × 65D m/m	192W × 72H × 65D m/m	192W × 72H × 65D m/m	120W × 72H × 85D m/m	160W × 65H × 133D m/m (body)
Weight	1240g	850g	850g	680g	1.15 kg
Sensor Type	EXTERNAL TWO SENSORS	INTERNAL	INTERNAL	INTERNAL	EXTERNAL REMOTE

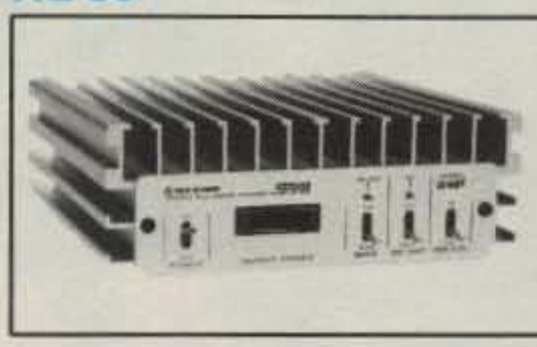
TOKYO HY-POWER LABS, INC.

VHF LINEAR AMPLIFIERS

HL-160/V25

HL-110

HL-85



HL-35V-L

MODEL	HL-160V and HL-160V25 VHF 160W OUTPUT METER PREAMP	HL-110V VHF AMP 100 WATTS OUTPUT METER PREAMP	HL-85V VHF 80 WATT GaAsFET PREAMP METERING	HL-62V VHF SSB/FM AMP, GaAsFET PREAMP	HL-35V/L VHF FM/SSB AMP 25 WATT GaAsFET PREAMP
Description	144 MHz all mode amp with low noise FET type preamplifier. 160 Watts out from 3, 10, Watts with 160V (25 W 160V25)	144 MHz all mode with MOS-FET preamp	144 MHz all mode amp with low noise GaAsFET type preamplifier. 80 Watts Output with 10 W drive.	144 MHz all mode amp with GaAsFET type pre-amplifier.	VHF multi-purpose amplifier for SSB or FM. ECONOMICAL Best Buy in $/Watt with SSB capability and GaAsFET PRE-AMPLIFIER.
Frequency Range	144-148 (Export Available 150-160 MHz)	144-148 MHz	144-148 (Export Available 150-160 MHz)	144-148 MHz	144-148 MHz
Modes	SSB, CW, FM	SSB,CW,FM	SSB, CW, FM	SSB, CW, FM	FM(35V) FM/SSB/CW (35V/L)
Supply Volts @ Amps	DC + 13.8V @ 23A (V25: 22A)	DC + 13.8V @ 15 AMPS	DC + 13.8V @ 12 amps	DC + 13.8V @ 7.5'A	DC + 13.8V @ 4 Amps
R.F. Power-Out (AVG)	160W	100 Watts	80 Watts	60 W	25 Watts
R.F. Power-In (NOM)	3 or 10 (V25: 25W)	10 Watts	10 Watts	10 Watts	2.5 Watts
Connector In/Out	TYPE 'M'	TYPE 'M'	TYPE 'M'	TYPE 'M'	TYPE 'M'
Pre-amp Type	F.E.T.	MOS-FET	GaAsFET	GaAsFET	GaAsFET
Output Meter Type	LIGHTED METER	LIGHTED METER	LIGHTED METER		L.E.D.
Dimensions	218W × 82H × 299D m/m	172W × 60H × 263D m/m	172W × 60H × 184D m/m	150W × 45H × 164D m/m	100W × 35H × 150D m/m
Weight	3.5 Kg	2.2 Kg	2.0 Kg	1.2 Kg	520g

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A4 is designed with you in mind because it has fewer parts to assemble, less weight and minimum wind load on your tower. With the 18 ft. boom, A4 gives excellent gain and front-to-back ratio. If your interest is rag chewing, DX-ing or contesting, A4 is the perfect 4 band beam for you.

MODEL A4 10, 15, 20 METERS

MODEL A744 40 METER ADD ON KIT

SPECIFICATIONS **F/B ratio 25 dB, SWR 1.2-1 bandwidth 500 +KHz, boom 18 ft., longest element 32 ft., wind area 5.5 ft.², turn radius 18.4 ft., weight 37 lbs. Excellent gain.**

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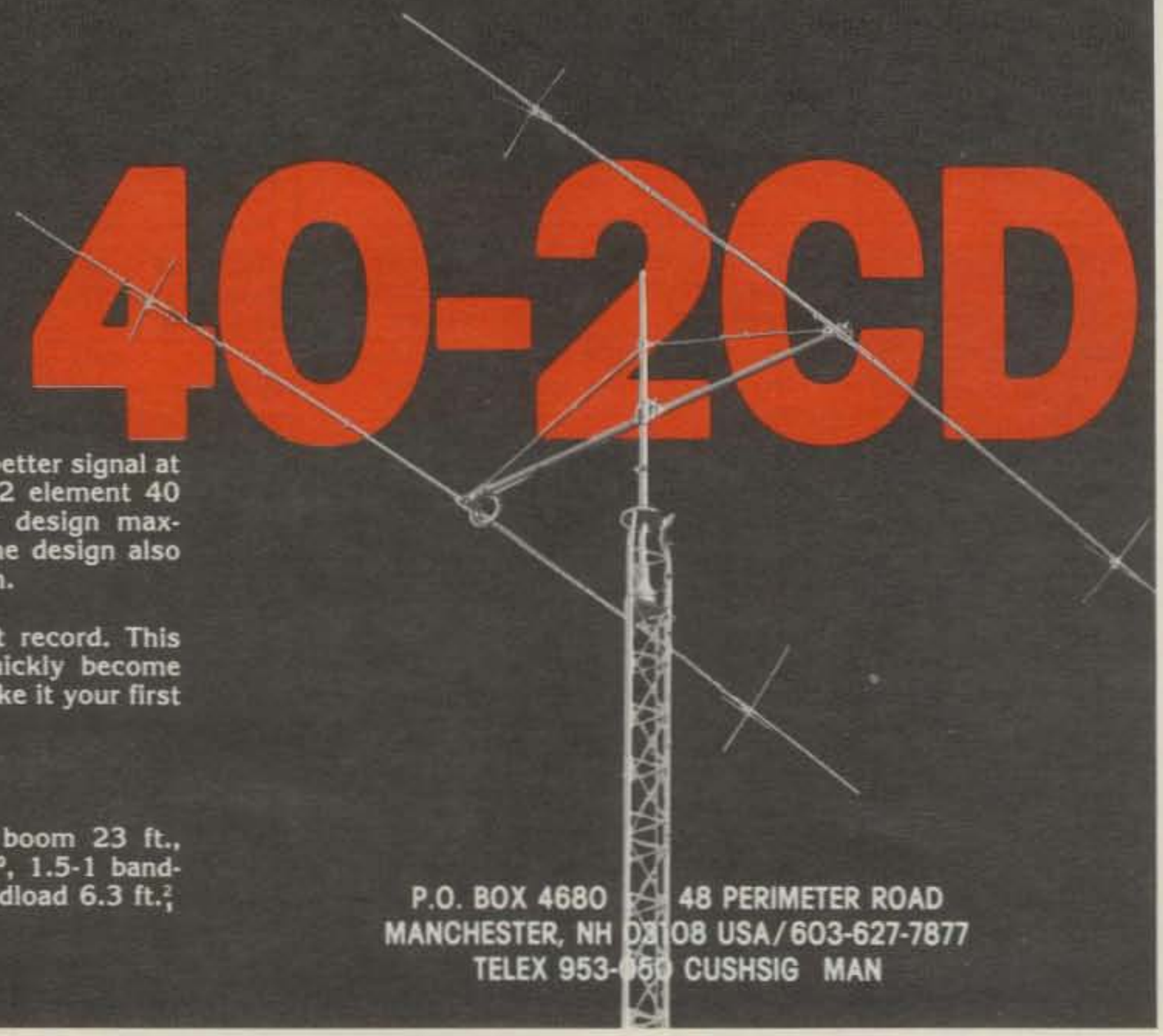
40-2CD



More contacts, less interference and a better signal at the receiving end are yours with this 2 element 40 meter Skywalker Yagi. The computer design maximizes gain and reduces side lobes. The design also gives low SWR with excellent bandwidth.

Holder of the North American contact record. This compact two element antenna has quickly become "the most wanted" 40 meter beam. Make it your first choice.

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SPECIFICATIONS **F/B ratio 20 dB, boom 23 ft., longest element 42 ft., beamwidth 70°, 1.5-1 bandwidth 180 KHz, turn radius 24 ft., windload 6.3 ft.², weight 40.7 lbs. Excellent gain.**

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CIRCLE 5 ON READER SERVICE CARD

DX

a monthly feature by
HUGH CASSIDY, WA6AUD

NEWS OF COMMUNICATION AROUND THE WORLD

If there's a hope for every woe,
And a balm for every pain,
Then tell me when 10 meters
Will come alive again . . .

Someone once said that the dawn and the early mornings are the best times of the day. But it was also said that this knowledge is only known to young children and old DXers. Last week we got to thinking that this might also apply to some of the younger ones, when guess what came hippitty-hopping around the curve of the hill, the sun scarcely above the San Pedro Ridge to the east. This young one came with a problem.

"Do you remember a couple of years back," he said, immediately getting to the problem, "when I was thrown out of that traffic group meeting?"

We thought that we did. It was a hard thing to forget. "You mean that time when you got up," we remembered aloud, "and declared that there were but two kinds of amateurs, those who were DXers and those who were not? Was that it?" We were sure it was.

"You do remember some things," the Local said, racing on before we could even ask what he meant by that remark. "Well, a couple of days back I ran into the same situation again. Only this time I did not get rooted out of the meeting. Perhaps if I tell you about it you might tell me if I'm doing something wrong. I'm wondering myself."

What could we do? Certainly there will be other dawns and other bright mornings, but one learns eventually to value every single one. As there was no escaping, we suggested that the Local tell us his latest problem. He was more than willing.

"You know how the old DXers here in the county get together every week or so," he said quickly, obviously wanting to get his troubles out in the open. "It's what they call the 'Old Timers Luncheons.' Well, I thought that being on vacation I might enjoy meeting with these old codgers, so I went and . . ." The Local paused, obviously trying to find words to express himself. He finally blurted out, "I had a lot of difficulty understanding what they were talking about." He was obviously confused. "These fellows all seemed to be talking about people that I never even heard of at all. They'd talk about the time they worked Danny and Gus and George. One fellow was even very proud about working someone whose name I thought was 'Reamed' until one took the time to tell me that it was

77 Coleman Dr., San Rafael, CA 94901

The 54th Annual General Meeting of the Irish Radio Transmitters Society was held at The Cill Dara Hotel in Kill County, Kildare, Ireland in April. Shown here is Mike Staunton, EI3DY, president of the IRTS, as he reads the society's news bulletin on 80 meters.

the callsign they were referring to, this being RAEM. They talked of Ted and Don and more people who were strangers to me, but the whole idea seemed to be that those were the great days of DXing and we will never ever see days like that again—those days when those other fellows were active. I still can't figure out what they were talking about. Can you?"

We were starting to try to explain that in other years these had been ones who brought much needed DX to the Deserving, and how one never forgets the good times. But about then the Old Timer came down from higher on the hill hanging onto an airdale terrier that he had recently acquired. We thought it was a good time for him to sit and rest a bit with us before the terrier tugged him further onwards, the dog leaning forward on the leash, the Old Timer leaning backwards.

We told the Old Timer about the problem of the Local, advising that as yet we hadn't gotten to the crux of the problem. We then got back on track.

"Well," the Local continued, "after listening to how great things used to be—and they never seemed to tire of reminiscing about those days—I thought that maybe I'd toss in something that I have been thinking about. Maybe something that they'd have some ideas about." The Local paused to sadly shake his head. "They didn't seem to think it was much of a good idea. In fact they immediately forgot Danny and jumped all over me!"

When the Local paused for breath, we looked at the Old Timer. The Old Timer looked at us. We both waited. Finally the Old Timer asked, "Just what did you say anyhow? Most times those fellows are careful of their energy banks. How did you get them worked up?"

"All I said," the Local continued, "was that with so may countries not available and the problem of ever attaining the Honor Roll for a new DXer such as myself, I brought up the idea that maybe it was time to start DXCC all over again. This time, however, we would write the rules so there wouldn't be all those questions about whether places like the UN or the ITU or things like that were countries. Also, this time we would make sure that the DXCC counters were real countries and not some aberrations—you know, places like Corsica and Sardinia and Wales and the Isle of Man. I thought I was holding their attention, and I even suggested that countries such as Albania or Burma or Afghanistan—all those countries where there has been no activity for a number of years, maybe decades or more—would be deleted from the DXCC country list until there was activity again." The Local paused, and for a moment we could not figure out whether he was troubled or just confused. Then he spoke again, almost a plea in his voice. "You fellows have been around for a long time," he stuttered onward. "You understand what I was thinking about, don't you? Why did those fellows get so upset?"

We thought we could, but before we could speak the Old Timer was asking, "I think I am understanding some, but what exactly did those fellows say? That might help us understand a bit better."

The Local was ready, though the hurt in him was noticeable in his words. "These fellows told me that maybe the DXCC country list and criteria have some areas that some have questioned, and that I'd better keep in mind that they had worked

Here's more proof that CQ WW DX Tests are always an endless cycle of song. This operation at another test in Barbados had Elsa, 8P6MH/9Y4LL/J73LL, on the left. In the middle is Bonnie, WB2WSV/8P6, and on the right John 8P6KX/9Y4JW and J73JW. All of the crew are smiling for the camera of Ed Mason, K2QIE.

The WPX Program

Mixed

1212	W1MGP	1215	W4WKO
1213	HL2SF	1216	VE3NBE
1214	KD2JC	1217	I1CCA

S.S.B.

1804	JF2MVI	1811	W4WKO
1805	WP4K	1812	KC2FC
1806	LX1RQ	1813	XE2NNZ
1807	I6KYL	1814	IK0APR
1808	YB5QZ	1815	WB6UAN
1809	N5GAP	1816	5B4MF
1810	F6BVB		

CW

2376	KG2LGM	2380	HA1YG
2377	WA6PES	2381	W4WKQ
2378	YB4FN	2382	EA2AMU
2379	K4MF		

WPNX

229 ..... KY3V

WPX

246 ..... I2-51723

Endorsements

Mixed: 450 W1MGP, W4WKQ, VE3NBE. 500 W1MGP, W4WKQ, VE3NBE. 550 VE3KZE, W4WKQ, VE3NBE. 600 AA4LB, W4WKQ, VE3NBE. 650 W4WKQ, VE3NBE. 700 W4WKQ. 900 NE6I.

S.S.B.: 350 WP4K, I2YKV, N5GAP, F6BVB, KC2FC, 5B4MF. 400 YB3CDL, I2YKV, F6BVB, KC2FC, 5B4MF. 450 YB3CDL, WA4PMF, I2YKV, YB3CEB, F6BVB, K8KUH, KC2FC, 5B4MF. 500 YB3CDL, YB3CEV, F6BVB, KC2FC, 5B4MF. 550 YB3CDL, W5LLU, NM5Y, YB3CEV, F6BVB, WA3IJT, KC2FC, 5B4MF. 600 W5LLU, YB3CEV, KC2FC, NB5C, F6BVB, KS3F, 5B4MF, NE6I. 650 AG2K, F6BVB, KC2FC, 5B4MF. 700 AG2K, F6BVB, I2TZK, 5B4MF. 750 AG2K, EA8AKN, F6BVB, I2TZK, 5B4MF. 800 EA8AKN, F6BVB, I2TZK, 5B4MF. 850 EA8AKN, W4UW, F6BVB, EA3AQC. 900 EA8AKN, W4UW, F6BVB, EA3AQC. 950 F6BVB, EA3AQC. 1000 F6BVB, XE1XF. 1050 F6BVB. 1100 F6BVB. 1150 F6BVB. 1200 F6BVB.

C.W.: 350 W9IAL, K4MF, HA1YG, NK2W. 400 JA1OJZ, K4MF, HA1YG. 450 K4MF, HA1YG. 500 G3VQO, K4MF, HA1YG. 550 HA1YG. 600 KT2C, HA1YG. 650 NE6I. 700 OK3CFF, IK2BFX. 750 I8YRK. 900 AK2H. 1100 SM6AYM. 1200 VE1MF. 1250 IS0FPH. 1300 IS0FPH. 1750 N2AC.

10 meters: I2YKV, 5B4MF.
15 meters: 5B4MF.
20 meters: I2YKV, 5B4MF.
40 meters: WA2CNF.
80 meters: NE6I.
160 meters: W9IAL, G3VQO.

Asia: JF2MVI, I2YKV, NJ0C, 5B4MF.
Africa: NJ0C, W0ULU, I2TZK.
No. America: I2YKV, KD9OT, 5B4MF.
So. America: VE1MF.
Europe: I2YKV, I6KYL, 5B4MF.
Oceania: I2YKV.

Award of Excellence: WA8YTM

Award of Excellence Holders: DL3RK, WB4SIJ, DL7AA, ON4QX, YU2DX, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, I0JX, WA1JMP, K0JN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM0DJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, K6JG, N4MM, I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX.

Award of Excellence Holders with 160 Meter Endorsement: W8ILC, W1BWS, G4BUE, LU3YL/W4, VE7WJ, W9NUF, N4NX, SM0DJZ, DK5AD, W3ARK, LA7JO, W4VQ, K6JG, W4CRW, N4MM, SM0AJU, KF2O, K5UR, OK1MP, N5TV, W8CNL, W1JR, W6OUL, W4BQY, W5UR, W8RSW.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

Two DXers met in Cambridge, England earlier this year to talk about their exotic collections—telegraph keys. On the left is Peter Lamb, G3IRM, and on the right Dick Randall, K6ARE. Dick has also signed G0K6ARE.

their countries under those rules and *no one* was going to take anything away from them! When I tried to bring up things like Burma and Albania, which are not on the air, they just told me that any newer DXer could work them the same way they did, when they are on the air. Heck! I even tried to argue that they could hardly be worked when they were not on the air, and all I was told was 'so what!'. Let them work the new countries for counters. It was a wasted effort trying to bring reason to this so-called discussion. They would not even agree that this last suggestion gained nothing. All the old timers would work the new ones as well."

At this point the Old Timer held up his hand. "I think I understand things a bit better now," he said, "and actually some of these suggestions have been made by others. However, I sometimes think that things are based somewhat on word of mouth or possibly just hearsay." The Old Timer leaned closer to face the Local. "Just what do you know about the country list anyhow? Tell us."

We immediately thought that the Old Timer had asked a good question—maybe even better that he had asked the Local and not us. We were realizing that our knowledge of the country list might not be solid, and we wanted to hear what the Local had to say. It turned out that he had little to say. However, the Old Timer did have some words on the subject, and when he started to talk, we listened.

"The DXCC came into existence back in 1937," the Old Timer started in. "Actually, you will find it announced in the September issue of *QST* if my memory is still good. The first listing for the DXCC was in the November issue, there being four calls listed, the top being 105 countries. Maybe you know this already?"

We didn't, but the Local saved us from having to admit it. "1937! I wasn't even born yet," he expostulated. Again we were silent and the Old Timer continued.

"Actually, things were developing some years prior to this. DXing in contests was becoming a big thing, and Clint DeSoto, whom you may remember as writing '80 meters and Down,' set out to define just what a DX country was, this to be used in contests. Clint asked the advice of many of the current DXers back then, did a lot of research on his own, and along about 1935 took his pen in hand to give a definitive definition of a DX country. Are you ready?"

It was obvious that the Local was. He was sitting there holding his breath. We were feeling the same. The Old Timer smiled. "The word from Clint was: 'Each discrete geographical or political entity is considered to be a country.' And that was it. The feeling was that this was the general rule to be followed by a DXer in deciding what was a country and that each amateur would have enough information concerning standard practice so that he would be able to prepare his own list of DX countries, and such a list would, naturally, be uniform with other lists. What do you think of that?"

There was a glaze in the eyes of the Local. "Write your own list," he was saying slowly. "Write your own DXCC list? But did it work?"

The Old Timer shrugged. "That was a long time ago," he continued, "and while a lot of study had gone into that definition, it was not universally hailed with delight.

The WAZ Program

10 Meter Phone

305 ..... JA2MNB 306 ..... I2YSB

15 Meter Phone

234 ..... JR7XBN

20 Meter Phone

559 ..... N2CIC 560 ..... WD4CRG

20 Meter CW

241 ..... NE6I

80 Meter CW

8 ..... YU2TW

All Band WAZ

SSB

3018	JF1PHJ	3022	I2BCU
3019	I4JJS	3023	NC6V
3020	I0FLY	3024	I4UYL
3021	PA2FHZ		

Phone and CW

5961	KS0X	5966	G4OBK
5962	IK4CIE	5967	K1ZVU
5963	G3DNR	5968	JE2JML
5964	N2CIC	5969	SP5DRH
5965	DL4NI		

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (39 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

5 Band WAZ

Standings as of May 1, 1986

All 200 zones worked:

1. ON4UN	41. I4RYC	81. DJ9RQ
2. K4MQG	42. ZL1BIL	82. EA5SP
3. SM4CAN	43. I4EAT	83. EA2IA
4. AA6AA	44. ZL1BQD	84. SP3BQD
5. W8AH	45. TG9NX	85. LZ1NG
6. W6KUT	46. XE1J	86. N4JF
7. EA8AK	47. F5VU	87. CT2AK
8. LA7JO	48. W3AP	88. HB9CIP
9. EA3SF	49. YO3AC	89. OK1MG
10. OH1XX	50. K3TW	90. CT4BD
11. EA8OZ	51. XE1OX	91. VK6HD
12. W0SD	52. VE7IG	92. EA6ET
13. K0ZZ	53. OK1ADM	93. VK3QI
14. ON6OS	54. CT1FL	94. LZ2DF
15. OK3TCA	55. WA1AER	95. ON4QX
16. K6SSS	56. N4RR	96. SM0DJC
17. ZL3GQ	57. UW0MF	97. CT3BM
18. OK3CGP	58. W4DR	98. K2TQC
19. SM0AJU	59. OK1MP	99. EA8XS
20. OZ3PZ	60. W1NW	100. HA9RE
21. I3MAU	61. OE1ZJ	101. SM4CTT
22. I2ZGC	62. HB9AHL	102. A71AD
23. 4Z4DX	63. HB9AMO	103. LZ2CC
24. N4KE	64. LA6OT	104. SM4CLE
25. K5UR	65. UR2QD	105. LZ1HA
26. K9AJ	66. UK2RDX	106. SM5AKT
27. SM3EVR	67. ZS5LB	107. CT4NH
28. LA5YJ	68. F6DZU	108. ZL4BO
29. DL3RK	69. DL4YAH	109. I1BSN
30. N4WJ	70. LA7ZO	110. DF6CY
31. G3MCS	71. W9ZR	111. DK5AD
32. SM5AQD	72. W1NG	112. DL6EN
33. W0MLY	73. VK9NS	113. SM6CVX
34. I0RIZ	74. N4KG	114. LU8DPM
35. ON5NT	75. YU7DX	115. SM6DYK
36. OH6JW	76. DL8MAG	116. DL7XS
37. OK1AWZ	77. OK3DG	117. DF7NM
38. IV3PRK	78. ZL1BOQ	118. UA3TT
39. DJ6RX	79. EA9IE	119. OK1DDS
40. OH3YI	80. DL7HZ	120. YU2TW

The top 16 contenders for 5 Band WAZ are:

1. JA1BWA, 199	9. LU6GV, 198
2. JA3EWU, 199	10. K4CEB, 198
3. N4WW, 199	11. W2YY, 198
4. K6YRA, 199	12. G3GIQ, 198
5. W8UVZ, 199	13. K7UR, 198
6. F6BEE, 199	14. W3GG, 198
7. JA0CWZ, 199	15. SP7KTE, 198
8. W6GO, 199	16. ZP5JCY, 198

371 Stations have attained the 150 zone level.

Some DXers were quick to note that a broad application of the idea would bring several hundred DXCC counters and some dissent. So about 1937 they made another attempt. Some word was about that the country list evolved after an attempt was made by the League to make a radio map of the world, and naturally having to index the map, the decision was that the index would be the 'standard' country list. So they printed a list, it running to about 250 countries, more or less, and ran that list up a flagpole to see who might salute it. While some at times have declared that some

How does one recognize DXers? Sometimes one recognizes them very easily by their DXing attire—always with the seat of their pants cut knee length. Here is the crew at ZY1RR in a CQ WW effort at couple of tests ago. From the left are PY1JF modeling the DXer's attire, then PY1BSD, PY1VOY, and PY1DFF getting a bit glassy-eyed from logging QSOs. Know the signs of a DXer and always select your suits with the pants cut knee length.

countries are on the DXCC list because of political or other considerations, it might be noteworthy to know that Corsica and Sardina were both on the 'standard' country list back then. What do you think of that?"

Apparently the Local was doing more listening than thinking at this point because he didn't even speak. He just nodded his head in acknowledgement. But he had a question. "How about those other countries, the Russians and the . . ." The Old Timer held up his hand.

"I'm getting to that," he continued, "and remember to keep in mind that though this list was published, there yet had to be a proposal for the DXCC certificate. But anyhow, that list went for another year when a second list was published. This time the country list grew a bit.

"In 1938 a list was published which separated the Cayman Islands from Jamaica and added Chagos, the Channel Islands, Curacao, French India, Franz Josef Land, the Isle of Man, Jan Mayen, Jarvis, Kuwait, Scotland, S.W. Africa, Trinidad and Tobago, Turks and Caicos, Wales, and the Russian republics of U2-White Russia, U5-Ukraine, U6-Trans-Caucasus, U8-Uzbeck, and U8-Turkestan. There was a single deletion and the Bismarck Archipelago in the south Pacific was dropped as a country. By this time DXers were generally in agreement, having found the list acceptable for DXing purposes. Then later in that year the DXCC Award was announced, and while the half-century in between had had its effect and toll on that original country list, it is surprising to find how much of it has survived. Actually, the list was revised again in 1939, the changes being minor this time, mostly to note some changes in the Pacific. Austria was delted, it being taken over by a neighbor." The Old Timer paused a bit before continuing, obviously trying to get things sorted out. "By this time things were getting a bit sticky," he continued, "and DX was sliding downhill. Actually, it got so bad with all the various disputes erupting around the world, that even the DX Column in *QST* was put on hold early in 1941. Then in December amateur radio was closed down. It was back on a number of years later, and in February 1947 we got the post-war DXCC list. While amateur radio had been back on the air for a year or so then, they did a lot of studying in composing the post-war list, and it has held together pretty well since then." After a slight pause the Old Timer asked, "Any questions?" The Local had a couple.

"First," the Local asked, "how do you remember all of this and those dates? And second, what you do think of starting things all over again? Do you think it will happen?"

Even though the airdale terrier had started to get restless, the Old Timer found time to laugh at the questions. "How do I remember?" he repeated. "Very easily—if we are talking about back then. That was the time I could almost repeat the country list in alphabetical order. I needed them all mostly, and I wasn't taking any chances on missing any. You should know how that is. As for starting all over again, sometimes I wonder if there is more possibility of that than any changes in the country list—the basic country list, I mean. It does seem that after 50 years any country list would be rather well shaken down, and it does seem that the DXCC list is just that. As for the restart of the DXCC itself, I doubt if it will come without a lot of tumult. But when one looks at the number of pages needed these days just to list the DXCC members, as well as the pages needed to list the Honor Roll, it might be possible that something might come. After WW II they started all over again with some minor provisions for those who had DXCC prior to 1942. Maybe they'll do that again. But there will be shouting and turmoil. You can bet on that. Just like the time they allowed phone to be used on 40 meters. Remember? But my feeling is that economics may eventually dictate a change if nothing else does."

Left to right are Russ Mason, KG6IP, and Wayne Sakamoto, WD6M, while operating from VP2M on the Island of Monserrat. QSL via KG6IP. (Photo by Gail Mason)

The Local was still quiet when the Old Timer had been finished for some moments. He was thinking, finally speaking, "You mean phone hasn't been on 40 all along?"

Not for the W/Ks, he was advised, and with this in mind to consider he headed back down the hill. We actually could not decide whether he received answers to any of the questions he had raised, but we did feel he had something to think over. Truthfully, we ourselves had a few things to consider.

The airdale continued to pull at his leash and the Old Timer finally prepared to leave. "It sure brings back some good memories to talk about those days back then," he said, "but I find that some today try to judge things that happened years back in the context of the present. Things were different back then. They are even better now. It would help to remember that."

We assured him that we did, but we had a question. We had to know the name of the airdale terrier. The Old Timer smiled.

"I just call him Sam," he said. "He reminds me of a DXer I know who always has to be out in front of the pack. And this one certainly does." And away they went, the airdale leaning forward, the Old Timer leaning back to hold him in check. We continued to sit in the morning sunlight. The Old Timer had left us with one item that we could understand completely.

Youngest Honor Roll Member

Some years back and in another DX effort it was mentioned that someone had worked WAC in a matter of hours. We soon heard from Lloyd Colvin, W6KG, who noted he had done it in a fraction of an hour. Then, to prove that when he put his mind to it he could really work them in all directions, while out on one of his Pacific trips Lloyd worked WAC in just a couple of minutes. No one has come down the pike since to claim a faster score, but a couple of months back we mentioned "... the youngest member of the Hall of Fame." Since then we have heard of some even younger.

Bob Johnson, WB9YXY, in downtown Endeavor, Wisconsin got his first license back in 1976 when he was 14 years old. He got a General class license in March 1977 and started DXing. CE0AA was the last country worked to put Bob on the Honor Roll, the QSL not being received until January of this year. Bob is looking for his call to be in the next listing of the Honor Roll. He turned 23 last May. This puts him right there with Rich Hilding, K6VVA. Incidently, Bob, was recently in A6 The United Emirates, but due to hostilities in the Gulf area there he was unable to get operating permission, though he tried. He mentions that some of the JYs are trying to arrange for some operations from A6. Bob did operate from JY8XY in Amman, making about 1K QSOs in 12 hours of operating. He has finished working the needed countries for 5BDXCC, and after working 50 countries on 160 meters in the last season, he is out to work DXCC on this band.

But as young as Bob Johnson, WB9YXY, is, we heard from another of the young but deserving—Bill Tippett, W0ZV, of Berthoud, Colorado, whom we knew some years back as W0RKO in Loveland, Colorado. Bill notes that he was licensed rather young, picking up DXCC while on his Novice license at the age of 13. In the September 1964 Honor Roll listing Bob showed for the first time with 302 countries, and he was but 19 years old. At that time the call was K4RID. Bob is another who is working 160 at the bottom of the cycle, he having worked 162/153 since October 1984.

Both of these DXers have exceptional records, one making the Honor Roll in six years, the other in eight. The next time you run into someone on the Honor Roll ask how many years it took. Some say it takes years, some say forever, and there are some who say it takes even longer than that—especially when you are looking and waiting for the last one or two.

HK3MAE

F.J. Monroy, HK3MAE, notes that he has been in the *CQ* WW DX and WPX Tests but that his callsign is not in the callbooks—yet. This is ex-HK3IJM, and you can direct your QSL to F.J. Monroy, HK3MAE, via HK7IMB, POB 864, Bucaramanga, Colombia. You can also look for HK3MAE in the upcoming CQ World-Wide tests starting in October and November, these hopefully marking the start of the new cycle—of DX activity, of course.

Novice Proposals

This proposal came out a couple of months back, but you have until August 20th to make reply comments, the initial time for comments being July 20th. This is Proposed Rulemaking PR Docket 86.161 and is in line with the ARRL Novice enhancement proposal. The proposal calls for Novices on CW and digital modes from 28.1 to 28.3 MHz; CW and SSB from 28.3 to 28.5 MHz

The WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or to confirm present total. If no up-date, file will be placed into "inactive" until next up-date. Lifetime Honor Roll fee $2.00 (U.S.) for each mode, with no fees required for up-dates.

MIXED

2903	YU2DX	1792	YU7BPQ	1448	N5TV	1131	YU2CQ	917	W6YMH
2865	F9RM	1782	SM7TV	1437	N6AW	1108	SM0AJU	901	W0JIE
2616	W2NC	1675	I2PHN	1415	K8LJG	1090	N4IB	889	I0AOF
2614	K2VV	1674	W0SFU	1392	I2MQP	1079	N8BJQ	883	WI4K
2532	K6JG	1668	I6SF	1370	PY1APS	1074	K2POF	853	K7CU
2416	VE3XN	1663	W9NUF	1322	N6JM	1063	KC8CC	821	KX1A
2346	K6XP	1654	4X4FU	1312	LA7JO	1052	3A2LF	820	W2XQ
2210	W4BQY	1644	YU7AW	1283	KL7AF	1038	YU2CBK	800	I2TZK
2209	W9DWQ	1637	I2PJA	1263	IS0LYN	1028	PY1DFF	799	KO2Q
2174	N4MM	1620	K9BG	1253	DK5AD	1028	W5PWG	764	I2EAY
2103	YU7BCD	1599	WA8YTM	1247	YU7AJD	1025	WD9IIC	747	OE1KJW
2077	YU2TW	1597	KF2O	1231	W6OUL	1016	N2AIF	745	VE6VW
1971	N6JV	1586	I3ZKD	1227	WB8ZRL	1007	AI6Z	661	KL7VZ
1931	N9AF	1572	YU7KV	1194	W7CB	997	SV1PL	650	JO1BMV
1869	K5UR	1564	IN3ANE	1189	JH1VRQ	995	KC2RX	640	N3KR
1855	N4UU	1518	K7NN	1181	K2QF	973	VE5FX	640	G4SDJ
1840	N2AC	1516	PY4OD	1156	CT1LN	934	WD4RAF	632	K6UXO
1836	I8YRK	1516	WA1JMP	1151	G4FAM	922	VE2PD	600	AC2J
1792	YU1DZ	1473	K6ZDL	1149	K2OLG	917	NE6I		

SSB

2789	F9RM	1479	WF4V	1074	XE1OX	909	I0SGF	707	K9BQL
2408	I0ZV	1398	CT4NH	1073	N6FX	902	VE2PD	704	K8ZZU
2260	K2VV	1377	I2MQP	1060	TG9GI	896	WA2FKF	699	I2KKL
2223	K6JG	1370	WA4QMQ	1037	KC4OV	896	PY4VX	692	XF4MDX
2098	ZL3NS	1339	KF2O	1035	WB8ZRL	895	N4IB	687	W6YMH
2089	K6XP	1303	CT1FL	1032	KC8CC	888	I5AFC	666	JA1XDA
2070	I0AMU	1271	W9NUF	1029	N2AC	884	W3GXK	662	TI2KD
2058	K2POA	1234	LA7JO	1017	I4LCK	878	WI4K	662	VO1AW
1956	N4MM	1204	W3ARK	1012	KC8YM	850	CT1BY	659	I4UFH
1909	CT1UA	1204	G4CHP	992	HI8GB	848	IK5ACO	654	EA8AKN
1840	I4ZSQ	1199	N5TV	967	LA2TO	817	ON6IT	654	KX1A
1825	W0YDB	1193	AC2J	950	PY4OD	805	EA8AKN	652	CP8HD
1724	YU7BCD	1173	W2NC	948	KK0L	792	AG2K	649	AI6Z
1699	WD8MGQ	1171	W2CC	947	EA3AQC	769	KK5P	646	OE5BGL
1688	OZ5EV	1132	I8KCI	945	CT4UW	763	K3IXD	643	KE6KT
1667	I8YRK	1130	NJ0C	938	W4UW	758	WB6SRK	618	CT1BWY
1633	I2PJA	1095	KL7AF	935	XE1XF	744	EA5BCX	616	NE6I
1605	W9DWQ	1083	ZP5JCY	934	W0ULU	715	I8WYD	615	N2AIF
1593	K5UR	1078	ZP5RS	933	K8LJG	714	SM0AJU	606	WA8YTM
1583	W4BQY	1075	I1POR	921	K5RPC				

CW

2391	W2NC	1501	N4MM	1147	N5TV	767	G4FAM	647	WB8ZRL
2116	K2VV	1482	K5UR	1141	KA7T	751	VE1ACK	646	JA2GCW
1958	N6JV	1446	VO1AW	1130	JE1JKL	748	SM5DAC	646	TI4BGA
1950	WA2HZR	1436	I6SF	1059	IT9VDQ	725	SM0AJU	645	PA3CKO
1901	K6JG	1422	LZ1XL	990	K8LJG	717	F6HKD	643	N4IB
1836	W3ARK	1329	W4WJ	922	OH3TO	698	W9PWM	642	I2EAY
1834	W9DWQ	1290	K9QVB	919	K2POF	692	KN7K	641	NE6I
1739	K6XP	1287	PY4OD	909	DJ1YH	689	OE1KJW	628	W6YMH
1734	W4BQY	1252	W9NUF	901	AK2H	669	ZS6BCR	616	WA8YTM
1730	G2GM	1194	I1YRL	852	I7PXV	667	W2XQ	614	KQ8J
1699	VE7CNE	1177	K6ZDL	818	AI6Z	664	LA7JO	610	K6UXO
1672	YU7BCD	1162	I2DMK	800	JH1VRQ	659	VE4AEX	603	I8YRK
1651	N2AC	1159	N6FX	788	YU2CQ	654	W0JIE		
1569	YU7SF								

CQ DX Awards Program

SSB

1477	I4EAT	1479	N2CIC
1478	VE7FJE		

CW

664	NN5G	665	WD9DUC

SSB Endorsements

310	I8YRK/315	300	K3UA/305
310	I8KDB/315	300	W8IMZ/304
310	K8PYD/312	300	I4EAT/304
310	W@SR/311	300	K@GT/303
310	N6OC/311	275	W9OKL/296
310	I8ACB/312	275	WB3CQN/294
300	WB1DQC/307		

CW Endorsements

300	K8PYD/305	150	I8YRK/182
300	W@SR/300		

Total number of active countries is 315. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

with Novices and Techs limited to 200 watts PEP. If you missed the whole thing, you will find it in the June *QST*. There are also proposals for Novice authorizations 220–225 MHz and 1246–1260 MHz.

OTH-B Radar

Those who have been around for a couple of seasons have knowledge of the Russian Woodpecker sometimes found in the phone bands. Years back the antidote for this over-the-horizon surveillance was offered, this being to call friends at the club station at HH5HH and keep your speed at 25 wpm. You seemed to get through better when you zero-beat the radar signal. However, along the way it was noted by some higher echelons that one should avoid any appearance of deliberate interference. Those calling their cousins at HH5HH were also quick to note that they were just keeping a schedule.

Anyhow, times change, radar changes, and the JAs are wondering if their latest innovation is doing the job. They think it is.

QTH-B uses a back-scatter mode to detect possible doppler shift in the weak back-scattered signal, this to sort vessels and the like from the return from islands, oceans, and various other reflectors. The signal strength for this purpose is 40–50 dB below the clatter on the frequency, and the doppler shifts can be from a few to 10 cycles. The return is fed into a computer which analyzes the signal, showing what might be involved and the speed and direction. If you wonder why such signals show in the phone portions, you can understand how the CW subbands might be a problem.

The JAs speculate that a transmitting power of 100 megawatts mirrors the returns. Thus, they work up a fast formula that looks something like:

100 megawatts ERP + (−40 to −50 dB) + (reflection constant) + (propagation attenuation) dB × 2

This may give some form to the JA thinking. They figure that a strong woodpecker signal would get a return of S3 with this lash-up, and a little frequency drift in your rig might even be better. For some reason they suggest recording the incoming signal on cassette tape and playing it back for 15 seconds or so. All of this sounds interesting, though it may be a bit difficult to follow the JAs' suggestion. However, from a technical standpoint it does seem to have some interesting concepts. Or, as has been said elsewhere, "enlightened overview."

International DX Convention

This annual spring gathering of DXers had 533 DX types registering, this including 14 DXers from overseas points. Katashi Nose, KH6IJ, was given a Special Achievement Award in a joint presentation by the Northern and the Southern DX Clubs, also being made an Honorary Member of both clubs for his long top-dog efforts in both DXing and contest operations. Fred Laun, K3ZO, a familiar name to DXers, won the Henry 2K Classic grand prize.

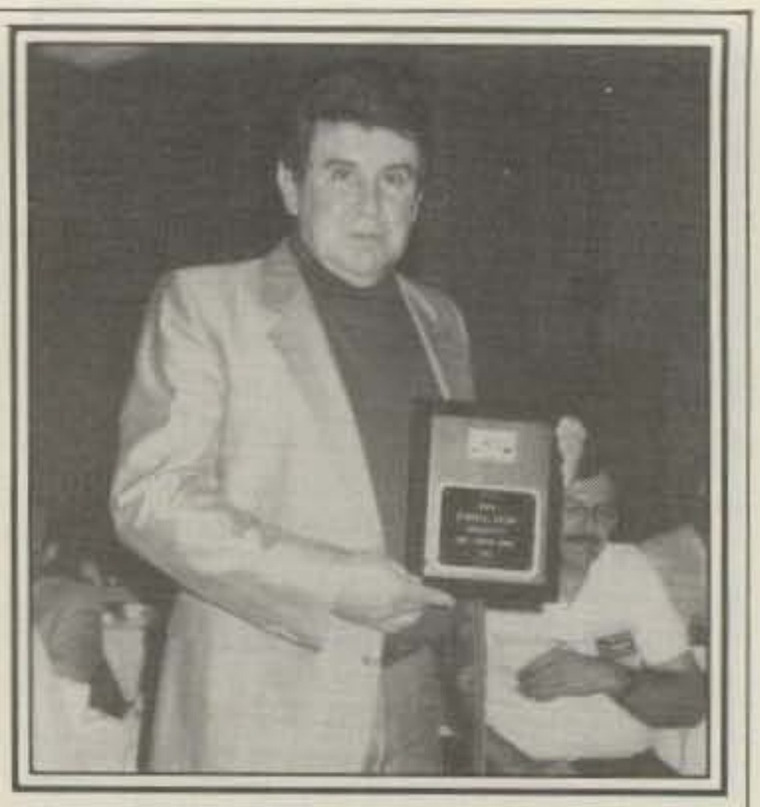
At the International DX Convention in Visalia this past April Katashi Nose, KH6IJ, was honored for over one-half century of dedicated amateur radio activity and DX achievements.

CE3ESS was present to deliver QSLs for CE0AA. D44BC was the banquet speaker and covered the joys of DXing from the Cape Verde Islands. The DX Forum saw a number of opinions, most 180° from the preceding speaker, on gripping topics such as Aruba, the Pribilofs, and a number of other exotic and hard to pronounce DX locales. The Sunday breakfast had Lloyd and Iris Colvin, W6KG and W6QL, giving the story of their recent six-month trip through Africa.

If you are making long-range plans, the annual International DX Convention will, by all reports, again be at the Holiday Inn in Visalia the latter part of April. When a date is firmed, it will be noted. This gathering is all DX. Even the contest forums have DX as their base. And if you think you have heard everything about DX and DXing, there's nothing to compare with meeting those DXers face to face.

Some Long-Range DX Notes

The DX Family Newsletter out of JA-land notes that the IARU Region III office at JARL Headquarters in Tokyo recently received a letter from the Burmese authorities in Rangoon stating that amateur radio in Burma has been suspended since January 10, 1964. Elsewhere there have been reports that a station signing 1Z9A showed on a Russian DX Net. A list of needy W/Ks to work the alleged Burma station was being taken. Guess how far this one will fly.



Also at Visalia Ray, N6DKP, was awarded the W6AM Memorial plaque.

Also some absolutely solid rumors have been heard that JA1UT has been in contact with the authorities in Laos, and would be making a visit there in early summer to get some amateur stations going in Laos. A time period was even mentioned. If nothing showed the last week in April, then watch for early to mid August. JA1UT was one of those who brought XU1SS on the air back in 1983. When it comes to a needed country, one must consider all rumors as solid.

The ARRL has been talking with the FCC on the matter of weather nets, there being some feeling that such regular-meeting nets funneling routine weather data to the weather service are in violation of Part 97.110 of the rules. Emergency work, such as tornado watch or hurricane reporting, are not considered to be in violation, and this has been stated by the Public Radio Section of the FCC. Anyhow, until the matter is clarified, amateurs are advised to keep a low profile, whatever that might mean.

Recently we had a note from a DXer who has an impressive total of awards and achievements, and the note was concluded with the advice that with everything from the Honor Roll to 5BDXCC out of the way, he would be working on the "hard one"—5BWAZ.

Anyhow, from time to time we get queries as to just who the calls are atop the various WAZ awards. There are many, and we will run them past you from time to time. For starters, some of the single-band CW WAZ top calls:

10 meters CW WAZ	15 Meters CW WAZ
1. EA8BK (1978)	1. SV0WIT (1972)
2. 9H1CH (1979)	2. EA8BK (1977)
3. YU2ETW (1979)	3. DL7AA
4. JR1JV (1979)	4. JE1JKL
5. JA1MRM (1979)	5. 9H1CH
6. DL1PM (1979)	6. JA4DLP
7. N4PN	7. JE1HJJ
8. JA2TK	8. JG1ESQ
9. DL7AA	9. JA1TRC
10. JH1IFS	10. JF1COE

We are still searching and waiting, but W4KA advises that as yet the first 10 on 20 meters are not available, nor are the first 5 on 40. On 20 the recent number on the single-band 20 meter CW

Here is Mel Cugnini, LU7MAL, with the local landmark in downtown Mendoza. Mel is standing in front of his 10-element 15 meter monobander. Mel also has a log periodic for 20 with 9 elements. Mario Grinberg, who forwarded the photo, says that all the antennas do produce results and DX. When Mel hears a needed one and fires up it's The Aurora Mendoza!

certificate issued was #214, so that will give some idea. On 20 phone the first 10 are also unavailable. The latest certificate at this writing was #560.

Jim Smith, P29JS, in the Heard Island DX Association bulletin tells of what the action on the 14220 kHz/0600Z net might bring. Jim got a call at the Port Moresby QTH, someone asking about amateur radio. Since the questions seemed rather rounded and definitely circumlocutory, Jim asked the fellow to again identify himself. This was done, the caller saying he was with the ANCA. Everyone knows what ACNA is, naturally. As they were asking if he knew the code P29JS and just what it stood for, Jim got the impression that they either knew little about amateur radio or were working deviously toward something else. Then the caller asked if he might drop by and visit. Could he bring a friend?

After a couple of hours trying to explain things about amateur radio and a growing wonder what it really was that they were after, they asked Jim if "14220" meant anything to him. He then had to describe the activity on amateur radio and all the exciting things that go thereon. After an hour or so of fencing questions, the situation was out on the table.

ANCA is the acronym for Australian National Crime Authority. The two visitors were in town on the possibility that it might be a trans-shipment spot for illegal drug traffic from SEAsia to Australia. Why? Well, an abandoned yacht had been found and on the chart table was written on a notepad: "Jim Smith . . . 14220 daily . . . 0000 UTC."

Heck! Any DXer could have told them that this is where the P29JS Net meets every day. Jim and XYL Kristi were in Dayton a couple of months back, but should be home now. Check the frequency at that time for western and south Pacific information and action, and often something from other stops.

The IARU Administrative Council met in New Zealand some months back. Among the things considered were future WARCs, these expected within the next five to ten years. The group adopted a resolution which, among other things, called for: Retain Morse Code for operation below 30 MHz; gain recognition for a common (worldwide) amateur license; enhance amateur radio as a disaster communication resource; support amateur and amateur-satellite services; protect the amateur service from interference; retain all present allocations below 30 MHz; gain a narrow band for experimentation around 190 kHz; exclusive worldwide allocation of 100 kHz in the vicinity of 1.8 MHz and additional shared allocation of 100 kHz retained in Regions 2 and 3; exclusive worldwide allocation of 300 kHz at 3.5 MHz with shared allocations retained in Regions 2 and 3; exclusive worldwide allocation of 300 kHz at 7 MHz with elimination of footnotes permitting fixed services operation and retention of prohibition against broadcasting in the worldwide amateur band; exclusive 250 kHz at 10.1 MHz; exclusive 350 kHz at 14 MHz with elimination of fixed service operation; exclusive worldwide 250 kHz at 19.068 MHz; retention of 450 kHz at 21 MHz; exclusive worldwide 250 kHz at 24.74 MHz and retention of worldwide allocation of 1.7 MHz at 28 MHz.

There is more for above 30 MHz, this including retention of the frequencies and a cleaning up of some possible problem areas. All of this is to be reviewed by member societies and plans and funding are to be developed for expected WARCs not too far downstream.

The Great Days of DXing will be returning shortly, and we mean the *CQ* World-Wide DX Tests the last weekends in October and November. Frank Anzalone, W1WY, will be giving the rules before long. If you are planning special services, such as DXpeditions, to mark the great days, write to me immediately. Right now! If you are short of time but still want to pass the word, rush the information to *The DX Bulletin, QRZ DX, DX Inc., Inside DX, or to Long Skip* in Canada. All addresses furnished on request. Such information is quickly copied around the world.

To note a few recent actions, EP/AA1V was active from St. Pierre and Miquelon over the Memorial Day weekend; QSLs go to AA1V. K2MFY was on Montserrat with some members of the Long Island DX Club in mid-July for the IARU Radiosport effort. Those operating were W2JGB, K2MFY, and K2OVS. QSLs for this VP2M operation gp to the home QTH of the individual operator. There were special calls to mark the anniversary, actually the bicentennial, of Marc Seguin in France. The special calls—TV3BZ, TV3CO, TV5MO, TV6ADV, and TV6BFI—also had special QSLs. An inventor born in 1786, Seguin is credited with inventing the suspension bridge with cable suspensions, as well as the tubular boiler, a significant advance when steam was first being used as a power source. If you worked these stations but wonder how to QSL, you might try going via F6CRT, BP 12, 83860, Nans les Pins, France. SASE naturally.

With a final windup, if you are planning something downstream, drop a note. And photos of DXers are always needed, but faces are regarded a bit higher than anything else.

DX Ten Years Back

In August 1976 PY0AW was on Trinidade for a month of operating. The DXAC was pondering a change in Rule 9, this one at that time limiting the distance one could move and retain DXCC credits. John Martin, VK3JW, who brought Melish Reef on the air for DXCC credit, was a Silent Key. XT2AG was on from Upper Volta and some all-band QRM was coming out of the Baltic area—the Russian Woodpecker had landed! VK2FT was planning for Lord Howe Island, and the planning was on to start the Outgoing QSL Bureau in downtown Newington. Bill Rindone opened with YM0AA from Geyser Reef, but poor band conditions kept the QSO total low. With this following his ST2SA/0 operation from Southern Sudan, Bill decided that his long travels were at an end and planned to head back home to Lake Oswego. That ST2SA/0 did bring a new DXCC counter for the Deserving. The band conditions were such at that time that the propagation conditions were not opening to many areas. JW7FD was on from Bear Island, and this one was being touted as a possible new country. The Seychelles were going independent and were assigned a block of prefixes, S7A to S7Z, by the ITU. Pete Witcosky, KZ5PW and other stops, was killed when a helicopter on which he was a passenger exploded in the air over Saudi Arabia. Pete had just arrived after being at the International DX Convention a month or so earlier. The DXAC was grappling with a number of momentous questions: Would the Dry Tortugas qualify for country status? Does the Sinai, West Bank, or Golan Heights qualify for country status? Do the Finnish or Swedish sovereignty islets located in the Torne, Muonio, or Konkama Rivers meet the country criteria? And what about Okino-Torishima? Does that meet the criteria? And you thought that life and DXing were simpler in those golden days back then!

73, Cass, WA6AUD

QSL Information

All this with a lot of help from Bob Truhlar, W9LNQ, a Watcher of the lonely night.

AZ1ARU to LU6FAZ
BV2FA to DJ9ZB
C56/EA5AL to EA5EBX
CE0FQU to WB3CQN
CU1CB to N2DUR
D68WS to DJ6QT
DP0GVN to DL2NF/DJ4SO
EN3D to UA3DAU
FO0XX to YASME
FO0WR to N6VO
FK8FI to F6FNU
FM4DR to F6FNU
HB9TL/PJ4 to HB9TL
HI8HALLEY to HI8CLD
HI0JR to HI3JR
HK5ISX to NJ5X
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Ticket Talk

a monthly feature by
FREDERICK O. MAIA, W5YI

INFO ON AMATEUR RADIO LICENSING

FCC Proposes Voice Privileges For Novices

"One of the fundamental purposes of amateur radio is to maintain a pool of operators, technicians, and electronics experts. In light of the apparent downward trends in Novice operators, we are concerned that a valuable national resource is being diminished. Accordingly, we will propose rulemaking in the hope that an enhanced Novice license will benefit the service and reverse the trends."

from FCC Rule Making, April 18, 1986.

	Fiscal Year 1983	Fiscal Year 1984	Fiscal Year 1985	3-Year Totals	
New Novices	18,744	17,392	15,913	52,049	
Dropped Out	9,129	14,883	9,615	33,627	(64.6%)
Novices/Year End	86,781	80,461	76,337	–10,444	

Table I–Statistics show the high attrition rate at the Novice level. (Source: Federal Communications Commission, Personal Radio Branch, Washington, D.C.)

Most newcomers to the hobby are disappointed at being restricted to Morse code operation when they enter the amateur ranks at the Novice level. The greater majority of new amateur radio operators feel the code requirement is antiquated and unnecessary in view of today's technology and their main interest—voice or computer operation. The five word per minute code requirement remains the necessary prerequisite evil to grading up to telephony privileges. The attrition rate at the Novice level is high! (See Table I.) Sad to say, *a staggering two thirds* of all Novices eventually drop out of ham radio without ever obtaining the voice privileges they dearly desire.

Even more of a problem to the future of amateur radio is the declining numbers of new Novices entering amateur radio. It is becoming an old man's pursuit. The average amateur's age is well up in years, when in reality it should be in the teens and twenties!

The FCC statistics published in Table I tell the story! There are more than 10,000 *less* Novice operators than just two years ago! New blood is needed if amateur radio is to continue as we know it. Many commercial groups say they need more spectrum and point to the declining numbers of new Novices and the stagnated Amateur Radio Service in general. They want the frequencies we have. Once lost, you can bet that they will never be regained. They will be gone forever.

The FCC views a growing Amateur Radio Service as a healthy service. While some blame the decline in new amateurs on the bottom of sunspot cycle and its accompanying poorer band conditions, the fact is that the Amateur Radio Service is *anything* but healthy! Just ask amateur radio equipment manufacturers. Reliable VHF and higher frequency communications for the most part aren't affected by propagation.

Current Novice activity is pretty much limited to a small sliver of the 40 and 80 meter bands, which suffer from Canadian amateur phone operation and international broadcast activity. Stated simply, Novices are disillusioned with amateur radio —but the situation is about to change for the better!

The code-bound Novice is about to gain voice privileges—and soon! The long expected **Novice Enhancement** proceeding was released by the FCC on April 30th. Voice privileges for Novices won't be precedent setting, however. They had 2 meter (145–147 MHz) telephony privileges back in the sixties when VHF was considered "experimental" and repeaters were unheard of. The technology just wasn't there. A lot has changed since then! What was once a Morse code and AM phone hobby now basically is FM/SSB telephony and digital operation. Clearly the Novice should be allowed to participate. To deny them is to deny amateur radio and everyone loses. A new generation must be attracted to the Amateur Radio Service.

History of Novice Enhancement

While most important, the American Radio Relay League was far from the first to petition the FCC for expanded Novice privileges. The FCC-supported "no-code" class of amateur ticket was defeated by intense League lobbying a couple of years ago. Enhancing Novice privileges is thought by many to be a second-best alternative to "no code." Technician class amateurs will also reap the benefits of any additional Novice privileges, since they automatically receive all privileges available to the Novice operator.

Larry W. Garens, KC5OQ, of the small west Texas community of Brady, deserves the credit as being the initial author of Novice Enhancement. He filed four petitions for it with the FCC before the ARRL filed their petition. Garens proposed to expand the operating privileges for Novice operators by allowing telegraphy, RTTY, and voice privileges in the 10 meter band and code and voice between 220–225 MHz. Garens filed a fifth petition after the League jumped on the bandwagon suggesting the addition of the 902–928 MHz band to the Novice class. While not given much publicity, the League's petition for Novice enhancement is basically the same as that envisioned many months earlier in the Garens' proposal.

What Did The ARRL Propose?

On June 6, 1985 the ARRL proposed to provide greater motivation for amateurs-to-be to obtain their first license, without reducing the incentive to upgrade by attaching too many privileges to what is, and should continue to be, an elementary license. The League suggested Novice voice and data privileges sufficient to permit communication with other local amateurs and to provide an occasional opportunity for long-distance communications. The essential elements of the ARRL petition were:

1. Authorize Novice control operators digital communication privileges in the 10 meter band on frequencies 28.1 to 28.3 MHz, 200 watt output PEP;

2. Authorize Novice control operators emission J3E (sideband telephony) privileges in the 10 meter band on frequencies 28.3–28.5 MHz;

3. Authorize Novice control operators frequency privileges in the entire 1.25 meter band (220–225 MHz) with all emission privileges authorized for that band and with a transmitter power limit of 25 watts.

4. Stations in 220–225 MHz repeater operation could retransmit the signals of Novice stations, but no Novice licensee

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CIRCLE 10 ON READER SERVICE CARD

could be the control operator of a station in repeater operation;

5. Authorize Novice control operators frequency privileges in the 0.23 meter band on frequencies 1246–1260 MHz with a transmitter power of 5 watts similar to the conditions proposed for the 1.25 meter band.

To eliminate a loss of privileges, the League suggested that the power level be authorized at full amateur level (i.e., 1500 watts output PEP) when a General through Extra class amateur operated in the 28.1–28.2 MHz Novice segment. (The FCC is reviewing comments from the public—particularly Novices—on the feasibility of this.)

New Novice Test Outline Suggested

The League suggested that the Novice written examination (Element 2) be expanded to include topics about digital communications and telephony techniques. The ARRL said this was necessary so that the examination would be commensurate with the Novice privileges granted. The League also asked that the written test be expanded to 30 questions and the question pool (P.R. Bulletin 1035A) from which these questions are selected be increased to 300 questions.

To preserve the integrity of the Novice examination the ARRL said that each examination for the Novice class operator license should be administered by two volunteer examiners holding General class licenses or above, rather than the presently required one examiner.

FCC Issues NPRM

The Commission issued the *Notice of Proposed Rulemaking* just in time for FCC announcement at the 1986 Dayton Hamvention. It was very well received by those in attendance. The FCC's NPRM provides for basically the same features as proposed by the League.

The FCC did caution the amateur community, however, regarding the 220–225 MHz band. They said that it must be recognized that there are three petitions seeking spectrum from this amateur band—two seeking narrowband land mobile operation and another from a "reading for the blind" organization. In view of this, the FCC said that they will not be *finalizing* the matter of permitting Novice operators in the 220–225 MHz band until these petitions are resolved. Any Novice operation authorized must necessarily be on an interim basis pending resolvement of the 220 MHz issue.

License Class	Morse Code Examinations	Written Examinations	Passing Mark
Novice	Element 1A—5 wpm	Element 2—20 questions	15 correct
Technician		Element 3—50 questions	37 correct
General	Element 1B—13 wpm		
Advanced		Element 4A—50 questions	37 correct
Extra Class	Element 1C—20 wpm	Element 4B—40 questions	30 correct

Table II– Requirements of amateur radio license classes.

The FCC did publish new tentative rules, however, authorizing Novice and Technician access to:

28100—28500 kHz, Morse Code, Digital Information, 200 watts PEP output

28300–28500 kHz, Single Sideband Voice (J3E), 200 watts PEP output

220–225 MHz, All current amateur modes, 25 watts PEP output

1246–1260 MHz, All current amateur modes, 5 watts PEP output

Novice class operators may not be the control operator of an amateur radio station in repeater, auxiliary, or beacon operations.

It must be emphasized that these rules are FCC *proposed*. They will become permanent if the FCC adopts their proposal. The general feeling is, however, that we will indeed see some firm enactment of enhanced Novice privileges by year end. The effect on the Amateur Radio Service could be dramatic! And not everyone is in favor of a large expansion of the ham ranks.

The FCC did *not* go along with the ARRL's suggestion that two examiners administer Novice examinations and invited comments on this issue. "Integrity of the license is important, but we are not convinced that two examiners is the right safeguard to employ." The FCC did feel that "Including Novices in the Volunteer Examination System has merit, but we are reluctant to disturb the present procedure under which aspirants to amateur radio receive licenses quickly and free of charge." The FCC also said that they were unsure of the capacity of the VE system to handle a large volume of applicants.

Public comment period on the Notice of Proposed Rulemaking closed on July 16th. A novel approach was also suggested by the FCC in the NPRM, that being to split the present Technician class examination into two sections—separate MF/HF and VHF/UHF questions. "It would be a simple matter," the FCC said, "to rearrange the topics into two syllabi: Element 3(A) for VHF and UHF; Element 3(B) for MF and HF. Element 3(A) would be a written test requirement for a Technician-and-above license. Element 3(B) would be a written test requirement for a General-and-above license." The present Element 3 covers both VHF/UHF and high-frequency operation. Basically, what the FCC's alternative proposal suggests is a simpler examination for Technician class than is now the case.

From The Mailbag

Must the amateur radio examinations be taken in order? Can't I just take the General class and skip the Novice and Technician classes? There are seven different amateur radio operator examinations—three for the Morse code and four written tests. The requirements are shown in Table II.

You can't be a General class amateur without first passing the Novice and Technician class requirements. The written examinations must be taken in order of ascending difficulty starting with Element 2. The cost tests may be taken in any order. Thus, if you can pass the Extra class requirement of 20 words per minute, you need not take Element 1A or 1B. Passing mark is 74% on a written test.

The passing mark on the code test depends on how it is administered, which is up to the VE team. Seven out of ten fill-in-the-blank, true/false, or multiple-choice questions answered correctly or one minute solid copy passes the code test. It is up to the VE team whether or not a sending test is required. Most VE teams don't ad-

minister one, since Morse receiving ability is considered evidence that you can send at that speed.

There is no longer an FCC requirement for a waiting period before retaking failed examinations. Some VEC's do, however, have their own requirements dependent upon their testing capabilities. Even though a VEC may require a specified period before you retake an examination, you can always be immediately retested at another VEC's program. In our own VEC case, we allow candidates to retake failed examinations the following day, but never on the same day administered by the same VE team.

I'm thinking of becoming a volunteer examiner. Just what am I getting into? Being a volunteer examiner for other applicants is the highest calling in amateur radio. It is the key to the future of the hobby. It is very easy to do. Some VEC's have programs that are more difficult to administer than others. We go to great lengths to cut through all of the red tape, unnecessary forms, procedures, and "paper." One of our guiding policies is that is should be no harder to administer a Technician through Extra class license than one at the Novice level. There are differences, however.

It takes three Extra class level VE's to hold a test session at the Technician or higher level, and an advance public notice must be made of the upcoming test session. You can immediately be accredited as a VE if you are an Extra class amateur by simply signing a statement regarding your status and submitting a copy of your amateur radio operator license. (Send for a free application if you are interested.)

Once you have lined up the necessary three accredited VE's, you can hold an examination session by advising us of the date and test site city. You will be mailed a package containing all of the necessary instructions, tests, and forms.

Once you have held a test session or two, you can qualify for our ADP (Automatic Distribution Plan) program where we automatically forward you many test versions for administration by your team as needed. You don't even have to request a test session once you are on the ADP program. Just use the testing materials that we have sent you. The Part 97 rules require that you keep all tests secure against disclosure. You automatically get many new test versions and answer sheets whenever the FCC revises a question pool.

The idea is to make amateur radio operator testing as simple as possible while still maintaining the credibility of the VE system. We feel that it is one of the VEC's responsibilities to make it easy for VE's to quickly hold a hassle-free exam session if there are applicants to be tested and accredited volunteer examiners willing to administer those examinations. Our program is unique in that we also share test fees with our VE teams, since they too have expenses which must be paid.

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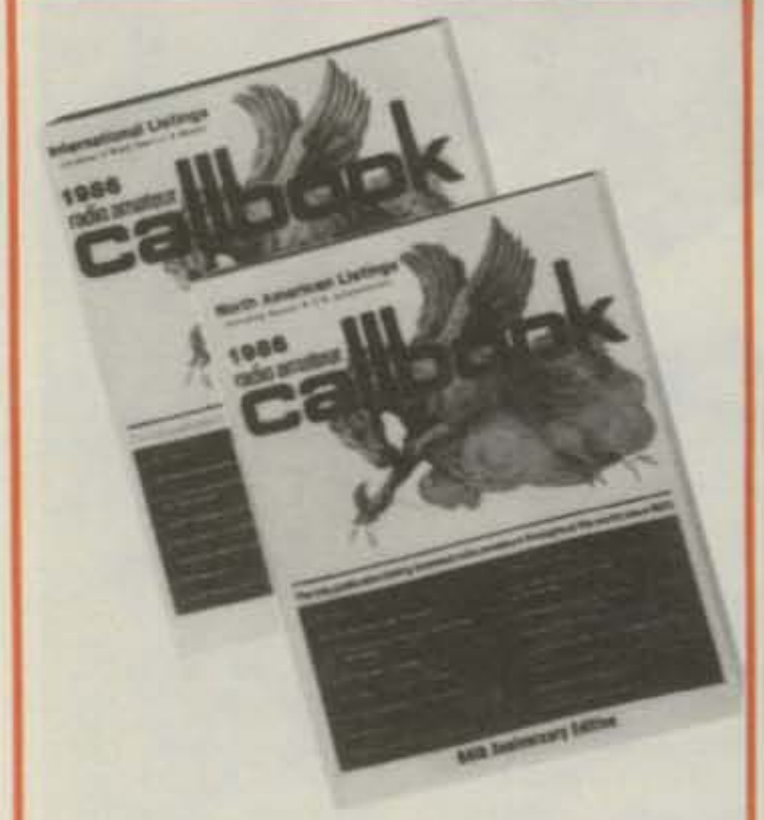

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WANTED: KENWOOD VFO900 (External VFO for TS900). Need in good condition. W8JRK, 1962 Pawnee, Okemos, MI 48864.

DISCOUNT CATV CONVERTERS/DECODERS and video accessories. Send for free information and prices. It could save you big money on your next purchase of these and other CATV items. Easy view (CQ), P.O. Box 221, Arlington Heights, Illinois 60006. Call (312) 952-8504, ask for Rudy Valentine.

W6AMN ESTATE SALE: 75S3C (R–2 filters) + 32S3A (R), perfect, $1000. Telrex rotator, 1,000 ft-lbs rot. torque, with 200 ft. control cable, $1200. Nye MBV 5 ant. tuner, $350. Assorted meters, coils, etc. Jan D. Perkins, N6AW, 11942 Bos St., Cerritos, CA 90701.

HAMMARLUND HX-50A transmitter and HQ-180A receiver. Good condition. Manuals included. $200. Mike Ryder, KA9N, 503 S. 5th St., Oregon, IL 61061.

WANTED: HALLICRAFTERS S-85 Receiver. Heathkit Q-Multiplier. W6DQY, 6477 Boyer Way, Salinas, CA 93907 (408-663-4491).

SCHEMATICS: Radio receivers 1920's/60's. Send Brandname, Model Number, SASE. Scaramella, P.O. Box 1, Woonsocket, RI 02895-0001.

CONNECTICUT'S HAM STORE: Rogus Electronics, 250 Meriden-Waterbury Turnpike (Rt. 66), Southington (203-621-2252).

WANTED: Drake RV-75 VFO Reply to: 215-271-8898. Tony Musero, K3UKW.

PAY TV AND SATELLITE DESCRAMBLING, 5th Edition, 73 pages. Schematics and theory for most systems including Teleast MAAST, Fantasy, Anik, etc. $12.95. The most thorough section on satellite descrambling available. Product catalog $1. Shojiki Electronics Corp., 1327Q Niagara St., Niagara Falls, NY, 14303. COD's 716-284-2163.

CB-TO-10M CONVERSIONS: FM kits, frequency modification hardware, books, plans, high-performance CB accessories. Catalog $2. CBCI, Box 31500CQ, Phoenix, AZ 85046.

CODE TEST BLUES? Let E-Z-R code cassettes solve your problem. Audio tape set for Novice, General, or Extra—just $10.50. New, proven method. Details/SASE. JERLS, POB 1193D, Bedford, VA 24523.

GENERATORS: Honda, Kohler, Winco, Yanmar, Kubota. Factory authorized dealer. Shop, then call us 617-755-8666.

IBM/APPLE COMPUTER program "Hamlog," 18 modules logs, auto-sorts 7-band WAS/DXCC. Full feature. Much more. Also CP/M. SASE KA1AWH, PB2015, Peabody, MA 01960.

CASA MARCONI, INC. Pre-owned communication equipment. We buy and sell. 7189 S.W. 8th St., Miami, FL 33144, phone 305-264-8443.

POWER LINE OR ELECTRICAL NOISE PROBLEMS? Learn causes and cures from former power company technician, $3.50. John W. Spence, AC5K, Dept. CQ, 465 Creekwood Drive, Silsbee, Texas 77656.

QSL CARDS, Free Samples. Shell Printing, KD9KW, P.O. Box 50, Rockton, IL 61072.

QSLs & RUBBER STAMPS—Top Quality! Card Samples and Stamp Information 50¢. Ebbert Graphics D-2, Box 70, Westerville, OH 43081.

IMRA-International Mission Radio Assn. helps missioners—equipment loaned; weekday net, 14.280 MHz, 2:00–3:00 PM Eastern. 1 Pryer Manor Rd., Larchmont, NY 10538.

KNOW FIRST! Ham radio fanatics—you need THE W5YI REPORT, a twice-monthly award-winning Hot Insider Newsletter. Acclaimed best! Confidential facts, ideas, insights, nationwide news, technology, predictions, alerts. Quoted coast-to-coast! We print what you don't get elsewhere! $21.00 annually w/money-back guarantee! FREE SAMPLE for S.A.S.E. (two stamps). W5YI, Box 10101-C, Dallas, Texas 75207.

FOR SALE. CQ/Ham Radio/QST/73 magazines @ 35¢ (thru 1975) and 50¢ (1976-up) each, including shipping. W6LS, 2814 Empire, Burbank, CA 91504.

CERTIFICATE for proven contacts with all ten American districts. SASE to W6LS, 2814 Empire, Burbank, CA 91504 brings data sheet.

CLANDESTINE CONFIDENTIAL NEWSLETTER: Latest info on secret broadcasters. Six issues $10 US, $13 foreign, US funds. RR4 Box 110, Lake Geneva, WI 53147.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. C, Berwyn, IL 60402.

WANTED: Older model bugs, unusual bugs, and miniature hand keys. State price, condition. Dave Ingram, K4TWJ, Rt. 11, Box 499 #1201 South, Birmingham, AL 35210.

QUADS • QUADS • 2, 3 & 4 Element Kits. Also components, Fiberglass Spreaders, Spiders, Wires, etc. (3) $.22 stamps for complete brochure. db+ENTERPRISES, Box 24, Pine Valley, NY 14872, phone 607-739-8480.

HAVE AM CAPABILITY? Join SPAM (Society for Promotion AM). Membership is free. For free info send SASE to: SPAM, c/o F. Dunlap, WA5TWF, 14113 Stoneshire, Houston, TX 77060.

HAM RADIO REPAIR! Tube through solid state. Robert Hall Electronics, Box 8363, San Francisco, CA 94128 (408-729-8200).

BEAMING HEADING CHART, 10 page report in binder with 9 data fields calculated from your exact QTH to over 540 DX locations. $9.95 from John Daley, KB6JGH, P.O. Box 4794, San Jose, CA 95150.

ATTENTION AMATEURS: Send for free discount catalog. Amateur Communications, 2317 Vance Jackson, San Antonio, Texas 78213 (513-734-7793).

BLEEP BLOOP. Very distinctive NASA-style two-tone beeper announces beginning and end of your transmission. Auto mode finds you on the satellite. Kit $12, Assembled $16. John Day, 1440#4 Ruby Ct., Capitola, CA 95010.

FCC COMMERCIAL General Radiotelephone License Correspondence Course. 60 individual lessons for $89.50. Payment plan. Results guaranteed! Details free. AMERICAN TECHNICAL INSTITUTE, Box 201, Cedar Mountain, NC 28718.

ANTENNA AND **TOWER ACCESSORIES**: Standoffs, Beam Mounts, Mast Adapters, Ginpole Kits, Mobile Mounts. Write for catalog. IIX Equipment, P.O. Box 9, Oaklawn, IL 60454. Call (312) 423-0605.

FOR SALE: Old German airforce key as used during WWII Type T.2. In fine condition. Built-in safety plug and red flash sign. Plastic case with hinged cover. Excellently balanced and good feel. $45.00 incl. airmail. Old German army key Type T.1. New. Excellent shape. Old emblem. Brass screws for adjustments, silver contacts, cord line. Black plastic case with hinged cover. $45.00 incl. airmail. Hand-made bug "Made in W. Germany." Type: "Classic-One." High precision and finest quality. New. Fine feeling, two paddles. Support in steel, other parts in brass. Weight: 650 gr. $95.00 incl. airmail. Ask for pictures. Payment with bank draft. Klaus Gramowski, DL7NS, Kaiserin-Augusta-Allee 91, D-1000 Berlin 10, West Germany.

"ELECTRONIC BONANZA" TS-940/S $1625, TS-430/S $724.99, R-2000 $489.99, Sony 2010 $299.99, R-7000 $859.99, MX-7000 $429.99, FRG-9600 $499.99, HX-1200 $244.99. MFJ, Panasonic, Antennas, Coax. USED EQUIPMENT, MORE!! FREE UPS Shipping And Insurance To 48 States. ALL NEW 31 Page, 1986 Catalog Only $1.00 (refundable). GALAXY ELECTRONICS, Box 1202, 67 Eber Ave., Akron, Ohio 44309 (216-376-2402) 9–5pm EST.

HEATHKITS professionally assembled. Send for quote. K4TL, 306 W. Amherst Ave., Melbourne, FL 32901.

WANTED: Working HD-10 keyer & manual. Dave Phillips, KAØWDM, 1310 W. Crestview, Maryville, MO 64468 (816-582-8391).

FOR SALE: ANTIQUE and modern radio, TV, and electronics parts, tubes, and used books. SASE for revised list. H. Lash, 19 E. 157th Street, South Holland, IL 60473-1312.

WANTED: Mini Products B-24 beam for modification of my HQ-1 quad per August 1982 *CQ* article. WB5MTV, Geoffrey K. Kolb, 1840 Hillcrest Ave., St. Paul, MN 55116.

DRAKE TR-4, RV-4, mike, phone patch, manuals; $300 takes all. FOB K2EWA, 17 Crommelin Ct., East Brunswick, NJ 08816 (201-297-5057).

RME-FIFTY RECEIVER, 500 kHz, to 32 MHz, ham bands spread, AM & FM detectors, XTAL filters, S-Meter, $100. Call (203) 426-8041.

ZIMMBEAM: Phased "V" beam antenna (K4JZB), need technical help, send tel. no., arrange SKED. Gary Van Overloop, VE6BIJ, 4444-33 St., Red Deer, Alberta, Canada T4N 0N4.

TRADE?? SSTV Robot 70 & 80 for clean working R-390A/URR radio rcvr. Gary, WB8HLI, 419-447-8229.

HAM PROGRAMS for Commodore, TI, and others. Send SASE for free catalog: E.P.O. SOFTWARE, 7805 N.E. 147th Ave., Vancouver, WA 98662.

1986 "BLOSSOMLAND BLAST" Sunday, October 5, 1986. Write "BLAST," P.O. Box 175, St. Joseph, MI 49085.

"JUST CALL YOUR CALLSIGN" bumper stickers now available. High gloss red vinyl and removeable so it won't hurt your car. Customizing available and dealers welcome. Send $2.50 to Danco Stickers, Dept. AR, P.O. Box 6349, Evansville, IN 47712.

MORSE CODE PROGRAM typed character will show on screen and sound in code. Also programmed practice code on disk $7.00 tape $9.00 program $4.00 for C64, C128, VIC. Box 1734, Eau Claire, Wisc. 54702-1734.

NEW 18 FT. ANTENNA BOOMS: 1⅞" O.D. 6061 tempered alloy. Couplers included. Satisfaction guaranteed. $20.00 includes UPS shipping. George Shira, Rt. #7 Box 258, Anderson, SC 29624.

R-390A RECEIVER: $195 checked; $115 repairable. Parts, tubes, sections. Info SASE. Baytronics, Box 591, Sandusky, OH 44870. Call 419-627-0460 evenings.

Antique Radio Classified: Buy and sell vintage radios. Sample $2.00. 9511-23 Sunrise, Cleveland, Ohio 44133.

ROSS'$ USED August SPECIALS: COLLINS 30L-1, $695.00. KENWOOD TS-520S $359.90, DG-5 $139.90, TV-502 $189.90, ST-1 $39.90, TS-520SE $379.90. YAESU YO-901 $379.90, FT-980 W/filters $1299.90, FV-101Z $89.90. ICOM IC-451A $449.90, IC-451A $469.90. Phone or send SASE for used list. Over 200 used, 7,500 NEW ham items in stock. MENTION AD. Prices cash, FOB Preston. We close at 2:00 Saturdays & Mondays. ROSS DISTRIBUTING COMPANY, 78 South State, Preston, Idaho 83263 (208-852-0830).

DENTRON RADIO CORPORATION: The New Dentron Radio Corporation. Let it be known that Dentron Radio, the New Dentrol Radio Company will not be responsible for any company offering repair, or warranty service, replacement parts, or claim to have Dentron Radio Parts for sale. This will remain in force until otherwise advertised so. Thank you. The New Dentron Radio Company Corporation. Discovering vast new horizons. P.O. Box H, East Rockaway, NY USA 11518. Telephone 516-536-2620.

ZIMMBEAM: Phased "V" beam antenna (K4JZB), need technical help, send tel. no., arrange SKED. Gary Van Overloop, VE6BIJ, 4444 33 St., Red Deer, Alberta, CANADA T4N ON4.

ROHN TOWERS: Wholesale direct to you. 34% discount from the Rohn dealer price. All products available. Also, very low prices on Antenna Specialists antennas and Andrews Heliax. Write or call for catalog and price list. Hill Radio, 2503 GE Road, Bloomington, IL 61701-1405 (309-663-2141).

ROSS'$ NEW SPECIALS (August only): ROBOT 1200C $1299.90, HY-GAIN EXPLORER-14 $329.90. ICOM IC-2AT $198.90, IC-45A $279.90, IC-47A $389.90, IC-751 $997.90. KENWOOD TS-940S $1599.90, R-1000 $399.90, TR-3500A $249.90, TM-2570A $455.90, TS-430S $659.90, TH-21AT $205.90 W/PB-21, VFO-120 $139.90. YAESU FT-720RVH $249.90, FT-757GX $749.90, FRG-7700 $369.90, FRG-8800 $479.90, FV-101DM $269.90, SC-1 $149.90. Over 7500 ham-related items, all major lines. Phone or send SASE for personal price quote. MENTION AD. Prices cash, FOB Preston. We close at 2:00 Saturdays & Mondays. ROSS DISTRIBUTING COMPANY, 78 South State, Preston, Idaho 83263 (208-852-0830).

REPLACE RUSTED ANTENNA BOLTS with stainless steel. Small quantities. Free catalog. Elwick, Dept. 602, 230 Woods Lane, Somerdale, NJ 08083.

C64 & C128 SOFTWARE: Send SASE for list. P.O. Box 387, Chillicothe, OH 45601.

FOR SALE: ANTIQUE and modern electronic parts and tubes. SASE for list. H. Lash, 19 E. 157th Street, South Holland, IL 60473.

FOR SALE: RCA Aircraft RCVR .2–.4/.5–1.3/2.3–6.5 AVR-7HLN $25. AN/GRC-9 Manpack RCVR 2–12 MHz $20. AN/GRR-5 Vehicular RCVR 1.5–18" $25. National NCX5 Transceiver $75. National NC178 .6–31/47–56 MHz $40. Zenith Transoceanic 8G005YT "oldy" $25. RCA Transoceanic style 3BX671 $25. JVC box .55–26 MHz FM & tape $35. Physicians radio network SCA receiver $20. Sony AN-1 active antenna $50. TRS-80 Model I w/software & 2 drives $350. Uniden Bearcat scanner #170 11 band 16 ch $100. MSI Data Corp. handheld computer MSI88S $50. Symbol Technologies laser gun .8 mw HeNe $75. Heath IT-121 transistor tester $20. Codestar Code Reader MBA $100. Bell & Howell design console $15. Panasonic auto dialer 60 entries $40. D. Hunt, 284 Maine St., Brunswick, Me 04011 (207-729-8815).

FOR SALE: Swan 500C with PS and manual $300. Swan 350A with AC/DC built in $200. Midland 13-500 2 meter rig, 144–148, manual and mic $85. Murch antenna tuner with instructions $75. FT-101E 10–160 works only on AC, comes with manual and mic $300. DMP100 R/S printer with manual $100. For more info on above send SASE to: P.O. Box 518, Whitehouse, FL 32220.

WANTED: CB magazines from other countries such as France, Italy, Spain, Australia, England, etc. If there are any CB magazines still being printed in the world, please send names and addresses of publishers and/or sample issues. Service manual for Motorola PT-300 lo band, and manual for PT-300 charger model XNLN 6029A. Rules and regs to become a CBer in other countries. Service manual for Chrysler car AM/FM radio model 4048553 and Motorola AM/FM cassette for cars model TC 890AX. VCRs Photofacts and training manuals from any companies. Sockets for new picture tubes for an EICO CRT Tester Rejuvanator. CB series Photofacts. Radio systems that work underground in mine shaft, gallery, etc. Looking, too, for magazine articles relating to that, and companies that manufacture such equipment. Contact Rejean Mathieu, VE2EUI, 1897 Third Ave., Val d'Or, Quebec, J9P 4N7 Canada.

BUY, SELL, COLLECT, and restore early tube equipment? Early receivers, tubes, and telegraph gear? Join AWA, which sponsors oldtime "meets," flea markets, museum, and journal with free want ads. Annual dues only $8. Write: Bruce Kelley, W2ICE, Rte. 3, Holcomb, NY 14469.

CHASSIS AND CABINET KITS: SASE. K3IWK, 5120 Harmony Grove Road, Dover, PA 17315.

CABLE TV CONVERTERS & EQUIPMENT: Plans and parts. Build or buy. Send SASE for information. C&D ELECTRONICS, 626 Flowerdale, Dept. CQ, Ferndale, MI 48220.

ELECTRON TUBES: Radio & TV types 75% off list price. Huge inventory! Also industrial types. Send for the free catalog today or call toll free (800) 221-5802. Send for 80% off tube listing. Box CC, Transleteronics, Inc., 1365 39th St., Brooklyn, NY 11218. See our display ad this issue.

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YAESU OWNERS: Hundreds of modifications and improvements for your rig. Select the best from fourteen years of genuine top-rated Fox-Tango Newsletters by using our new Comprehensive Index. Only $4 postpaid with Rebate Certificate creditable toward Newsletters purchases. Includes famous Fox-Tango Greensheet and Filter information for your rig (if specified). N4ML, FTC, Box 15944, W. Palm Beach, FL 33416. Telephone (305) 683-9587.

FREE QSL CARD SAMPLES: Quality cards at low prices, wide selection available. 100 FREE miniature cards with each order. Write for free samples. KE7GY, Insta-Copy, Rt. 1, Box 1486, Roosevelt, Utah 84066.

FOR SALE: 170 new radio and TV tubes with caddy, $100. Trimm high imp. headphones, high quality, like new, $8. Used, good UX226, UY227 tubes $5 each. SASE for info. H. Lash, 19 E. 157 St., South Holland, IL 60473.

WANTED: Ham car tags—Idaho, Missouri, Nevada, New Jersey, Oregon, Utah, DC, most Canadian. Buy or trade. Willard Prentice, W3VBM, 2419 Chetwood Circle, Timonium, MD 21093.

7 ELEMENT CUSHCRAFT A144-7 two meter beam, $28 incl. shipping. Service manuals: Kenwood TR9000 $5, Tempo S1/2/5 $3. Charles Bright, 4115 Buckley Ridge Ct., St. Louis, MO 63125.

JUNIOR HIGH SCHOOL needs UR help. Any old 2 meter, SWL gear, and books needed for amateur radio program. Tks. G. Skloot, c/o JHS 180, 320 Beach 104th Street, Rockaway Park, NY 11694.

KENWOOD Antenna Tuner AT200. Like new, $125. Call 201-583-4207.

WANTED: Hallicrafters S-38 receiver. State price and condition. A.J. Smith, 3410 Peninsula Rd. #226, Oxnard, CA 93030.

SELL: Hallicrafters HT-37 very good condition, manual included $100. Mike Popovich, KA3HEL, 294 Langhorne St., Johnstown, PA 15905 (weekdays 10pm to 11pm 814-288-6537).

WANTED: Kenwood TS120S, AT200, and a 1KW 10–80 M amp. Contact KA@VFN, Tony E. Byrum, 520 N.W. 33, OKC, OK 73118.

$1200 CASH PAID for Collins antenna coupler type 490T. $800 for Radar set PPS-15. $200 for radio type PRC-77. Call or write Michael P. Murphy, 11621 Valle Vista Rd., Lakeside, CA 92040 (619-561-2726).

WANTED: I am looking for the following used gear for pick up only, within 100 miles of my QTH. If you have any of the items mentioned below, please contact N3DRB via Callbook. I am looking for : ICOM IC-502A, 202A, 402A, Swan 250C, Swan Mark 6 amp, Yaesu FT-620 6M, most other 6 meter gear, Yaesu FT-221 2M, Swan TV-2 2M xverter, Swan 500CX, 700CX, 160X, Swan ACC. If you have any of the above items, I would like to hear from you and I will answer all inquiries. I will test on air prior to sale. No junk. Call 301-992-7745 and ask for Tim or contact N3DRB via Callbook. Thanks es 73.

HEATH SA-2060A Tuner, $225. MFJ-406 Keyer, $45. Bencher BY-1, $20. All mint. Bud, N7BFN, 206-939-6899.

WANTED: Yaesu FR-101 D or SD receiver, TC-2 2 meter converter, and ICOM IC-SP2 speaker. C.T. Huth, 229 Melmore St., Tiffin, OH 44883.

WANTED: Bencher Key Paddles. State condition and price. C. Hays, 3675 Estates Drive, St. Louis, MO 63033.

YAESU FT-208R, like new, wall charger, manual, rubber duckie, $200. You pay shipping. Joseph Schwartz, 11 Windham Loop, Staten Island, NY 10314 (718-698-8069).

FOR SALE: Swan 500C with PS, manual, $300. Swan 350A AC/DC built-in, manual, $250. FT101E, manual, mike, org. box, $300. R/S Pro-30 programmable scanner, handheld, $150. Midland 13-500 12-channel 2 meter rig, mike, manual $75. More info send SASE to: P.O. Box 518, Whitehouse, FL 32220.

NEED MORE ROOM: Must sell transceivers, receivers, and more. SASE for list. KA@VHY, Mark, Box 116, Mystic, IA 52574.

TRADE?? SSTV Robot 70 & 80 for clean working R-390A/URR radio rcvr. Gary, WB8HLI, 419-447-8229.

SALE: Kenwood TR-7950 2 meter FM transceiver, complete. Mint condition, $195. K4ANN, 116 N. Airport Rd., Perry, FL 32347 (904-584-4344).

WANTED: Hallicrafters S-22R receiver. State price and condition. A.J. Smith, 3410 Peninsula Rd. #226, Oxnard, CA 93030.

WANTED: Alpha 76 or Drake L-7 or Kenwood TL-922, Janel QSA-6, Kenwood MC-46 TT Mike, Mirage MP-1, MP-2, B3016. K@MK, 690 Vermilion Tr., Gilbert, MN 55741.

WANTED: Any HAM software for the TI99-4A computer. Also wanted, low cost working HW-7 or HW-8. Please contact Terry Dolan, 229 Holly Lane, Elk Grove Village, IL 60007 U.S.A. Planet Earth!

WANTED: Manual and schematic for Swan Cygnet Model 260. Any help would be appreciated. Tony Verchio, 820 Bowers Ave., Runnemede, NJ 08078.

RECEIVERS: National NC-188 $75, NC-300 $85, Hallicrafters S38C $35, S38E $65, S40B $45, Knight Star Roamer $45. K6KZT, 2255 Alexander, Los Osos, CA 93402.

WANTED: Mint, ROUND S-Line, 51S1, Collins filters for 75S3B-C, Heights or Universal aluminum tower sections. Tim Colbert, WA8MLV, Burton, OH 44021.

MILLEN High Voltage Connectors #37001. Red or black. New. $3.50 each postpaid. Ralph, KA1FAA, 16 Hansom Rd., Andover, MA 01810.

ATARI 800XL, 1050 drive, 1025 printer, 1030 modem, as new, covers, $325. Epson MX-80 printer, $135. Lanny Aldrich, N. Springfield, VT 05150-0073 (802-886-8121).

KENWOOD YG455CN1 Delux 250 Hz CW filter, new $90, & Kenwood SO1 TCXO, new $100 (both for TS-940/930), Collins MM281 microphone $35 (for KWM-380). A. Emerald, 8956 Swallow Ave., Ftn. Vly, CA 92708.

ZIMMBEAM: Phased "V" beam antenna (K4JZB), need technical help, send tel. no., arrange SKED. Gary Van Overloop, VE6BIJ, 4444 33 St., Red Deer, Alberta, Canada T4N ON4.

WANTED: Operator manuals for Hallicrafters SX-62 and SX-42. R. Miller, 5217 43rd Ave., Ct., NW, Gig Harbor, WA 98335.

NEW ANTENNA MATCHING PREAMPLIFIER: MILLEN R9'R #92109. 30–60 dB gain without rear cabinet, 6AK5 tube. $35.00 postpaid. Ralph Jannini, 16 Hansom Road, Andover, MA 01810.

FOR SALE: TET 2-element beam for 40M and Ham IV rotor, package deal, U pick up. KD9TY, Ken Wolfe, Box 134, Buffalo, IN 47925, or phone 219-278-7808.

HELP! Need any computer programs for the Atari 800XL relating to amateur radio. Will pay. N2GDS, 110 Tanglewylde Ave., Bronxville, NY 10708.

MICROLOG AIR-1 Commodore 64 interface RTTY/CW/ASCII AMTOR modifiable. Like new. $150 UPS included. N. Wald, KD9NT, 3138 N. Seminary, Chicago, IL 60657 (312-935-0588).

YAESU FT-230R compact 25W 2M, new, $225. Cushcraft R-3 motorized 20–10 vertical, $135. Daiwa LA-2035 walky amp, $60. K1LEC (802) 886-8121.

TEKTRONIX Oscilloscope Probes, new, big discount, SASE for list. Sell or trade for: linear amplifier parts, vacuum capacitors/relays. A. Emerald, 8956 Swallow, Fountain Valley, CA 92708.

SWAP for general coverage receiver or sell 16 mm projector with carrying case. Joseph Schwartz, 11 Windham Loop, Staten Island, NY 10314 (718-698-8069).

H*A*R*K Radio Archives low tech newsletter. Enjoying Radio. $1/$6 Bimonthly. Electronic Avocations, 2308 Garfield #304, Minneapolis, MN 55405.

TV SIGNAL GEN. AM/FM 3–260 MHz $45. In circuit capacohmeter $30. HP-100-D Low Freq. Std. 10cy–100kc $85. K6KZT, 2255 Alexander, Los Osos, CA 93402.

WANT: MINT Collins S-Line, 51S1, SM-3, MM-1, 200 Hz, 500 Hz, 800 Hz, 3.1 kHz filters. SELL: Extremely strong 18" square steel 60' self-supporting tower, $400 pick up only. T.N. Colbert, WA8MLV, Burton, OH 44021.

WANTED: Kenwood TS-940S, TR-2600A, Satellite TV antenna positioner. Sell: Drake L-75, WH-7-$575.00. Ten-Tec 252MO 20amp power supply $85.00. CDR TR-44 control box $20. K@MK 218-865-6541.

FOR SALE: Original AN/WRR-2 and AN/FRR-59 Technical Manual, 235 pages of which there are 22 5-page foldouts. $45.00 plus $3.50 shipping. Maximilian J. Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

WANTED: USA Ham Stamp First Day Covers postmarked Anchorage, Alaska, December 15, 1964, to complete topical collection on Amateur radio stamps. KL7HBV, Little John, 4118 Mendenhall Blvd., Juneau, Alaska 99801.

SCOPE 511AD, H/P 200B AUDIO OSC, BC 221AK Freq Mtr, CP-1 plus HAMTEXT C-64 Cart. Pickup only. Any reasonable offers. K2FS 1-718-353-8485.

FOR SALE: TH-4 Hy-Gain 10 thru 20 mtr TR1 beam $95. National NC-183 all band receiver $125. Zenith 3000-I Transoceantic receiver $100. Concord Mod 444 Reel tape recorder $20. SB34 transceiver 10–80 mtr with SB2-LA linear amplifier $275. Two Sears 3 channel CB walkie talkies $15. Q-Tran balancing transformer for dipole antenna "new" $12. Heath RD-1 resistance decade $10. Heath AM-1 antenna impedance meter $10. All in good condition with manuals. U-pay shipping. T.K. Brown, RD1 Box 225, Forksville, PA 18616.

WANTED: IB 1100 counter working or not. Fred, Box 706, Orange City, FL 32763.

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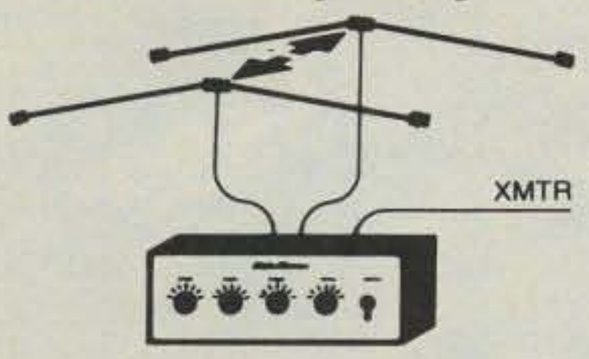

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WANTED: Older model bugs, unusual bugs, and miniature hand keys. State price, condition. Dave Ingram, K4TWJ, Rt. 11, Box 499 #1201 South, Birmingham, AL 35210.

FOR SALE. CQ/Ham Radio/QST/73 magazines @ 35¢ (thru 1975) and 50¢ (1976-up) each, including shipping. W6LS, 2814 Empire, Burbank, CA 91504.

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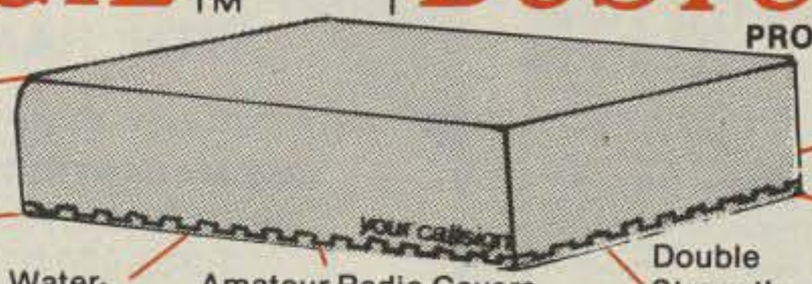

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WANTED: ICOM IC-SP2 speaker, YAESU TC-2 2 meter converter, and YAESU XF10.8HS CW filter unit. C.T. Huth, 229 Melmore St., Tiffin, OH 44883.

WANTED: Schematic or manual for Clegg FM-DX. C. Hays, 3675 Estates Dr., Florissant, MO 63033.

WANTED: Instruction manual, schematic, and mods for the HW-8. Will pay for original or copy and return. David Taillard, KC8GP, 8396 Hillcrest, Westland, MI 48185.

WANTED: Information to connect Western Electric 60A operators' headset to Kenwood HT-2600A. W. Folkerts, W2HDN, 920 Laurel Rd., North Palm Beach, FL 33408-4021.

FOR SALE: Palomar 1:1 beam balun $52.95. Drake 100 watt low-pass filter $9.95. Heathkit programmable heating control GD-1776 (assembled) $29.95. W1TSP, 70 Paulsen Rd., Waban, MA 02168.

WANTED: Used 144 MHz repeater in working condition. Write to NQ0W, Bill Bishop, 312 Minneopa, Ottumwa, IA 52501.

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NEED TUBE CHARTS (or copy of) for 550, and 610 panel, tube tester, B&K Dyna-Quik model. KA7WZM, 312 Filer Ave., Twin Falls, ID 83301.

WANTED: FTV-700 VHF/UHF Monoband Transverter for Yaesu FT-77. Also modifications for Regency HX-1200 Scanner. Marvin Rosen, N3BQA, 20 W. Madison St., Baltimore, MD 21201 (1-301-685-6308).

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H*A*R*K: Radio Archives "Low-Tech" newsletter. Recording amateur anecdotes. $1/$6 bimonthly. Timm, 2308 Garfield #304, Minneapolis, MN 55405.

NCL-2000 PARTS LIST and National Radio Co manuals available SASE. Maximilian J. Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

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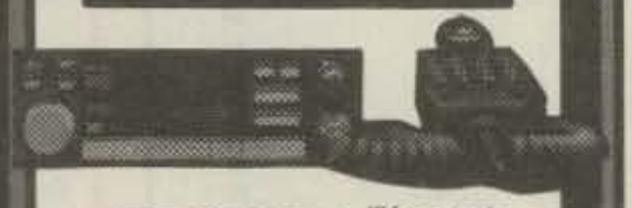

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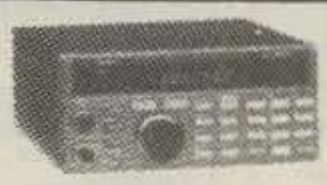

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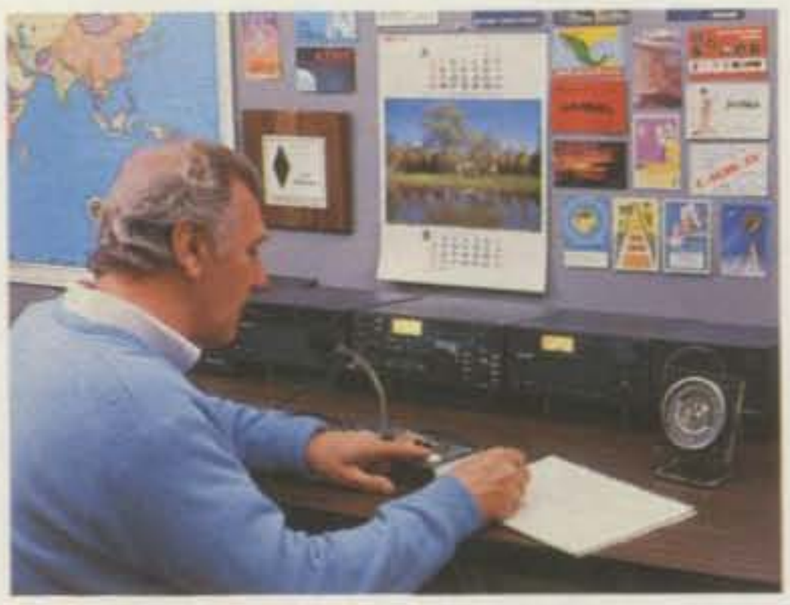

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FL-52A	CW/RTTY	500Hz	0.4550
FL-53A	CW	250Hz	0.4550
FL-70	SSB/W	2.8kHz	9.0115
FL-80	SSB	2.4kHz	9.0115

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