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Amateur Radio

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JUNE 1982 $2.00

CQ

A CQ Exclusive:

CQ Interviews: James C. McKinney,

Chief, Private Radio Bureau, FCC ...page 13

SPECIAL QRP ISSUE

0 74820 08241 06

THE RADIO AMATEUR'S JOURNAL

R-600

"Now hear this"...digital display, easy tuning

The R-600 is an affordably priced, high performance general coverage communications receiver covering 150 kHz to 30 MHz in 30 bands. Use of PLL synthesized circuitry provides maximum ease of operation.

R-600 FEATURES:

- 150 kHz to 30 MHz continuous coverage, AM, SSB, or CW.
- 30 bands, each 1 MHz wide, for easier tuning.
- Five digit frequency display, with 1 kHz resolution.
- 6 kHz IF filter for AM (wide), and 2.7 kHz filter for SSB, CW and AM (narrow).
- Up-conversion PLL circuit, for improved sensitivity, selectivity, and stability.
- Communications type noise blanker eliminates "pulse-type" noise.
- RF Attenuator allows 20 dB attenuation of strong signals.
- Tone control. • Front mounted speaker.
- "S" meter, with 1 to 5 SINPO "S" scale, plus standard scale.
- Coaxial and wire antenna terminals.
- 100, 120, 220, and 240 VAC, 50/60 Hz. Selector switch on rear panel.
- Optional 13.8 VDC operation, using DCK-1 cable kit.
- Other features include carrying handle, headphone jack, and record jack.

Optional accessories for R-600 and R-1000:

- DCK-1 DC Cable kit. • SP-100 External Speaker.
- HS-6, HS-5, HS-4 Headphones.
- HC-10 Digital World Clock.

R-1000

High performance, easy tuning, digital display

The R-1000 high performance communications receiver covers 200 kHz to 30 MHz in 30 bands. An up-conversion PLL synthesized circuit provides improved sensitivity, selectivity, and stability.

R-1000 FEATURES:

- Covers 200 kHz to 30 MHz.
- 30 bands, each 1 MHz wide.
- Five-digit frequency display with 1-kHz resolution and analog dial with precise gear dial mechanism.
- Built-in 12-hour quartz digital clock/timer.
- RF step attenuator.
- Three IF filters for optimum AM, SSB, CW.
- Effective noise blanker. • Tone control.
- Built-in 4-inch speaker. • Dimmer switch.
- Wire and coax antenna terminals.
- Voltage selector for 100, 120, 220, and 240 VAC. Operates on 13.8 VDC with optional DCK-1 kit.

TS-530S

"Cents-ational"...IF shift, digital display, narrow-wide filter switch

The TS-530S SSB/CW transceiver covers 160-10 meters using the latest, most advanced circuit technology, yet at an affordable price.

TS-530S FEATURES:

- 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.
- IF shift tunes out interfering signals.
- Narrow/wide filter selector switch for CW and/or SSB.
- Built-in speech processor, for increased talk power.
- Wide receiver dynamic range, with greater immunity to overload.
- Two 6146B's in final, allows 220W 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.

TS-660

The TS-660 "QUAD BANDER" covers 6, 10, 12, 15 meters.

- FM, SSB (USB), CW, and AM
- Dual digital VFO's
- Digital display
- IF shift built-in
- 5 memories with memory scan
- UP/DOWN microphone
- All-mode squelch
- Noise blanker
- CW semi break-in/sidetone
- 10 W on SSB, CW, FM; 4 W on AM.

Optional accessories:

- PS-20 power supply
- VOX-4 speech processor/VOX
- SP-120 External speaker
- MB-100 Mobile mount
- YK-88C, YK-88CN CW filters
- YK-88A AM filter.

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Customer Signature: _____

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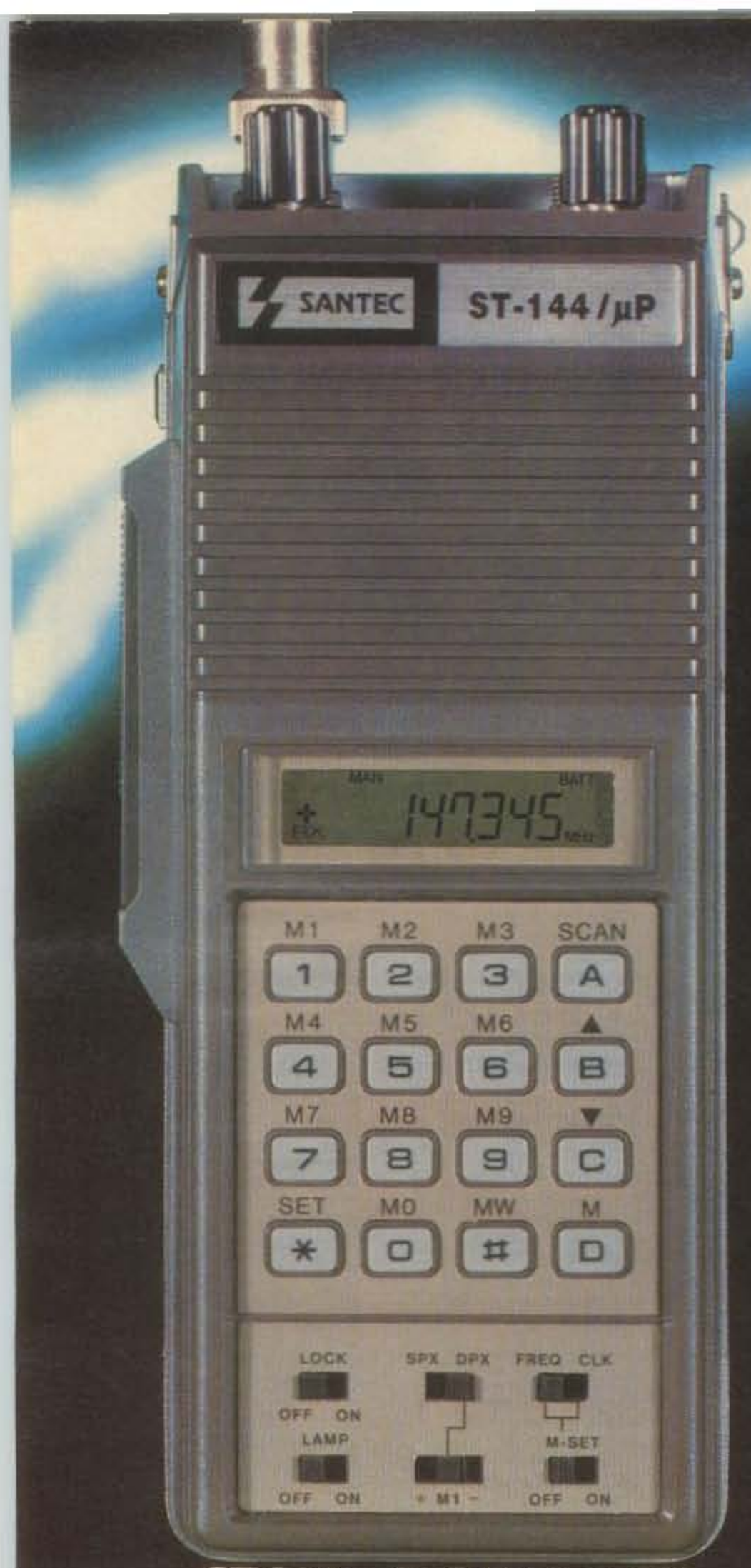
CQ-BB/82

Good Mar. 1 through Jun. 15, 1982.

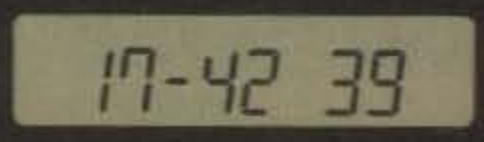


ST-144/μP, 2 Meter FM

It's Time!

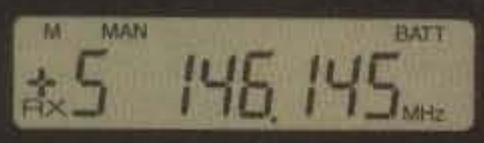
■ It's time you got your share of the excitement of full-feature synthesized handheld operations. ■ SANTEC(nology zaps to the lead of the state-of-the-art in 2 meter handhelds with the new ST-144/μP. ■ Only SANTEC hands you all the up-to-the-minute features of this "clockwise" precision jewel.

■ The 24 hour format digital clock on the LCD display is uniquely SANTEC, and it typifies the thoughtful operator-oriented design incorporated throughout the ST-144/μP. ■ Not only does it give you accurate time checks whenever you want, but also it can display the time instead of the frequency, while this handful of radio continues to operate on your "favorite" frequency.



24 Hr Clock provides time of day even while the radio is turned off, or it can be selected by the front panel switch while in QSO.

Full Frequency Display showing offset selected, battery condition and current scan mode. At turnon, the contents of M-1 are loaded into the operating register, and the display looks like this.



The Memory Mode is indicated by the small "M" above "+", the "5" indicates that the data were stored in Memory 5 before recall. The "+" indicates that the + offset was stored with the frequency.

Memory Scan with "Priority Scan/Auto-Resume" has stopped on Memory 9 to listen for a few seconds.

Transmit is indicated on a minus 600 kHz offset from 146.820 MHz which was stored in M-6. Activity on Memory 6 was found by using the "Search" mode of Scan.

■ The 10 frequencies that you put into the memories are stored with your repeater offsets, and you can have them scanned, searched or instantly recalled at the touch of a button. ■ Memory 1 even gets priority treatment in the memory scan mode. ■ That's timely complexity made amazingly simple: and the high power option of 3.5W (nominal) is simply the greatest reach you've ever held in your hand.

■ "Battery saver" function by the computer to hoard battery power when the frequency is quiet ■ Programmed limits for both ends of bandscan ■ Simplified frequency entry only by keyboard ■ Full capacity, low impedance audio output to drive an external speaker ■ Wide band span for MARS, CAP, AF MARS: 142.00-149.995 MHz ■ Quick-change 500mAh battery ■ Separate level controls for MIC, TT, PL and DEV ■ & so much more that we don't have space to mention ■ SANTEC hands it all over, while others can't even give you the time of day.

All stated specifications are subject to change without notice or obligation.

Accessories for SANTEC Handheld Radios
clockwise from upper left:
- **Leather Case (ST-LC)**
- **Base Charger & Power Supply (ST-5BC)**
- **Remote Speaker (MS-50S)**
- **Mobile Charger (ST-MC)**
- **Speaker Microphone (SM-1)**

Sale of the ST-144/μP is subject to FCC certification: approval and availability expected January, 1982.

SANTEC

2000 Avenue G, Suite 800, Plano, Texas 75074
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CQ The Radio Amateur's Journal

ON THE COVER: Milt Mann, W9PRM, displays his home-brew 20 meter battery powered QRP rig including the specially made antenna which unscrews into four parts for quick and simple travel.

JUNE 1982 **VOL. 38, NO. 6**

FEATURES

DEPARTMENTS

Zero Bias

AN EDITORIAL

The best laid plans of mice and men often have a way of tripping over their own feet. I know that the best weather for putting up an antenna is the warmer summer months. However, most hams seem to opt for colder, more rigorous weather to actually do the work.

I live on a narrow, winding street in a neighborhood that has alternate side of the street parking during the winter, or "snow," months. This is to provide access for snow plows, fire engines, or ambulances in time of emergency. The last official day of the "snow season" in my area is March 31st, after which, according to local government edict, it doesn't snow. Being dubious, I usually give it one more week just to be on the safe side. On April 6th, Woody, K2UU, and I were supposed to hoist my tower up on the roof to do some preliminary guy measurements. Since I'll be using Phillystran guy line, the lengths have to be roughed out ahead of time in order to allow for curing time of the epoxy which holds the end fittings. Well, you guessed it. I awoke that morning to what is being called "The Blizzard of 82," and I hope that whoever is in charge of our local weather gets cited by our mayor. No, no matter what I said, Woody couldn't be coaxed to climb up on the roof.

The target dates for the great event are still on, and if everything goes right (or more right than they have been going), there will be progress to report shortly. As this is being written before the Dayton Hamvention, I'm still sort of on schedule.

Congratulations

Congratulations are in order for Vic Clark, W4KFC, and Dave Sumner, K1ZZ. As most of you know by now, Vic was elected the new President of the ARRL, and Dave was selected as the League's new General Manager. Both men were heavily involved in WARC-79, and through their efforts, amateur radio not only held on to existing frequencies, but in fact will add three new band segments. We wish them good luck in their new positions.

Travels With CQ

On March 12th, Jack, W2LZX, and I flew down to Orlando, Florida, for the hamfest there. Dick, K2MGA, and his family had arrived earlier in the week to spend some time with his folks, who live there. The hamfest was moved this year from the Twin-Towers to the local fairgrounds, which implies the obvious: it was hot. It is hard to aircondition a tent (although they promise to do it next year). By 10 a.m. on Saturday morning the temperature in the commercial exhibitors tent was about 95°, according to Fred Huft of Optoelectronics who was displaying a digital thermometer. It was even hotter in the fleamarket tent. People walked around dazed and grumbling about the heat, but all in all, a lot of people came, stayed, and bought from the dealers. We exhibitors did our share of grumbling, too, which prompted the promise of airconditioning next year. A big *CQ* salute to the heroine of the weekend—Mrs. Ross, Dick's mom. She provided a big electric fan and a large cooler filled with iced cokes.

The next weekend Dick, Jack, and I flew to Charlotte, North Carolina, for that hamfest. The Charlotte show this year was bigger than ever with far more people and exhibitors in attendance. It is shaping up to be the biggest show in the south. We sold out of practically everything we brought to the show. The pickings at the fleamarket were quite good, too, and as usual I had some goodies to bring home. It was a good crowd, and most of the dealers I spoke with were quite pleased with both the turnout and the amount of business they did.

On March 26th I flew to Washington, D.C., to attend a NIAC meeting of the FCC. As I boarded the 7 a.m. Eastern shuttle to Washington, I saw John Lindholm, W1XX, of the League, and so we flew down together. These meetings concern themselves with amateur participation in the emergency broadcast system and what we can and should be doing for both our communities and country.

The following Friday it was back to Washington for other meetings. I did have the chance to have lunch with our man in Washington, Ted Cohen, N4XX. Joining us for lunch was Ken Miller, K6IR, who we interviewed in our January issue. Ken is a very interesting man, and so it was a lively three-way discussion and a very pleasant lunch.

Lew McCoy, W1ICP, and his wife, Martha, did the honors and represented us at the SAROC show in Las Vegas early on in April. From all accounts it was a busy show and a buying public. Lew and Martha signed up a lot of new subscribers for *CQ*. They'll be doing a local show in New Mexico the week after Dayton, so I hope that a lot of you will have turned out to that one and said hello.

By next month I'll be able to report on Dayton for those of you who didn't make it this year and for those of you who keep promising to go but don't. It really is an experience in amateur radio. This year there are predictions of 30,000 people attending.

At all of the shows, from the biggest to the smallest, and despite dire predictions from New England, it is evident (I'm glad to report) that hams are buying new equipment. People are carrying those cartons home from hamfests and conventions. I'm not trying to say that it is a boom time for all, but I can see the trend in updating equipment and improving stations. I can see from the letters we receive from our newsstand readers—some just getting their feet wet in amateur radio, others looking for a helping hand to get started—that there is and will be a growing market for amateur gear in the near future. It will follow that a strong and viable industry will make a strong and viable amateur radio.

Next Month

Next month the accent will be on v.h.f. We'll present some interesting "hands on" pieces of a practical nature. We've got another in our series of special interviews and features of general interest. It's shaping up to be a very exciting issue.

I hope to present further progress on the great antenna party, if the weather cooperates. The forecast for this coming weekend is for more snow, so all I may be able to manage is to show some partially assembled antennas stacked in my garage. Upward and onward!

73, Alan, K2EEK

New Drake TR5 Transceiver

far above average!

COMING SOON:
RV75 Synthesized VFO featuring the Drake "VRTO"

• **Frequency Synthesized** for crystal-controlled stability • **VRTO (Variable Rate Tuning Oscillator*)** adjusts tuning rate as function of tuning speed. • **Resolution to 10 Hz** • **Three programmable fixed frequencies** for MARS, etc. • **Split or Transceive operation** with main transceiver PTO or RV75

* Patent pending

With the new TR5 versatility and value are spelled D-R-A-K-E . . .

DYNAMIC RANGE

The dynamic range of the TR5 is unexcelled by any transceiver in its class. The TR5's greater than 0 dBm third order intercept point (85 dB two-tone dynamic range) at 20 kHz spacing can be achieved only by the use of a passive diode-ring double balanced mixer. Drake was the first to bring this technology to the Amateur market with a high-level mixer in the TR7.

RELIABLE SERVICE

When you purchase a TR5, or any Drake product, you acquire a product of the latest production techniques, which provide reliable performance.

Yet with a product as sophisticated as one of today's transceivers, after-sales service is a must. Ask any Drake owner. Our Customer Service Department has a reputation second to none.

ACCESSORIES

Drake is the only Amateur Radio manufacturer who offers a full complement of accessories to satisfy almost every desire the HF Amateur may have. This wide selection allows any operator to assemble a station which meets his needs, and assures compatible interfacing and styling instead of a desk full of equipment with a variety of styling and poor operation as a system.

KILOWATT AMPLIFIER

Everyone wants to be heard! The accessory L75 and its 3-500Z (1200 watts PEP input) and a decent antenna will do the trick. This rugged self-contained amplifier / power supply will put the TR5 on an even footing with the best of them.

ENGINEERING

The TR5 and all Drake Transceivers, are backed by the best in engineering. The TR5 is the result of an extensive engineering effort, combining proven past techniques and ideas with new state of the art concepts.

As a result, the TR5 will not be superceded by a new model every six months. It represents a true radio communications value that will provide many years of operating enjoyment.

Features, availability and prices subject to change without notice or obligation.

See your Drake dealer or write for additional information.

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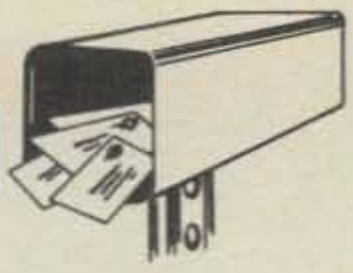
CIRCLE 18 ON READER SERVICE CARD

Our Readers Say



Attention Charger Builders

Editor, *CQ:*

It has been brought to our attention that an article by David Swaim on page 64 of September 1981 *CQ* regarding a simple, inexpensive charger for the FT-207R contains some misleading and incorrect information. If the information is applied per the author's recommendations, the unit described would be anything but inexpensive.

In column 3 of the article, it is stated that the NC-9B wall charger "is really just a transformer with a 117 volt primary and a 13 volt secondary." The rectification of the 13 v.a.c., the author claims, is done in the FT-207R. The statement in fig. 1 ("The wall charger delivers 13 v.a.c. at the charging jack.") is dangerously incorrect!

The diodes rectifying the A.C. are in the NC-9B. The diode shown in fig. 1 is used for reverse polarity protection; the application of 13 v.a.c. to the charge jack could send you, your FT-207R, and/or your battery pack into the promised land.

Use of the NC-9B (output: *13 v.d.c.*) with Swaim's simple adapter will not cause the dangerous condition described previously. Yaesu provides a simple adapter (FBA-1) for use with the NC-1A and NC-3A drop-in chargers to charge the battery as it is outside the unit.

We hope none of your readers have damaged their equipment because of the article. Although we understand the good intentions of the author, we know of several methods of laying waste to a transceiver; this one is, by far, one of the fastest.

Edward A. Kerr
Service Manager
Yaesu Electronics Corp.

Project SCORE

Editor, *CQ:*

I enjoyed your Satellite TV issue, February 1982, of CQ magazine, but I must call to your attention an error of fact appearing therein. On page 31 under a heading labelled "A Chronology of Events" ("An Introduction to Satellite Television," Part II), it shows 1958—SCORE, first American satellite, built and launched by the U.S. Air Force."

This statement is incorrect in two particulars. Project SCORE was *not* the first American satellite and it was *not* built and launched by the U.S. Air Force.

Project SCORE was the first *communications satellite* anywhere. It was a project of the U.S. Army Signal Research and Development Laboratory at Fort Monmouth, New Jersey. Your statement that it was launched on a U.S. Air Force rocket is correct.

Despite the fact that Project SCORE is often reported and discussed incorrectly by various publications, the facts I have stated are correct. I was at Fort Monmouth at the time and had a small part in SCORE.

Brig. Gen. H. McD. Brown U.S.A. (Ret.)
Edinburg, TX

The Ham Radio Family Plan

Editor, *CQ:*

Enclosed is a photo I thought you might find interesting. It is of the Booth family: (left to right back row in photo) mother, Marie, KA1AWO; son Ron, WA1WRI; father, Bob, KA1BAX; (front row) son Rick, N1BYH [ex-KA1HBH]). What I feel makes the Booths unique is that we are all active in ham radio from three different New England states. KA1BAX and KA1AWO are active Novices who have helped many other Novices with "rare" Rhode Island and are still active on the Novice frequencies. W6DDB has contacted KA1BAX and mentioned him in the Novice column.

The other two of us are both grads of the University of Rhode Island (hence N1BYH's "Rhode Island" shirt, despite the fact he lives in Connecticut!). Rick is a reporter/photographer for the Westerly, RI *Sun*, and I am a self-employed Marine Resources Specialist here in Maine.

Best wishes and keep up the excellent work in *CQ*. The four of us enjoy it very much.

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- **Jefferson Davis QSO Party -** This Pennyroyal ARS sponsored event will take place Saturday, June 5, from 1500 to 2400 UTC. Suggested frequencies are 3.940, 7.260, 14.310, 21.410, and 28.610 MHz phone and 3.730 MHz c.w. A certificate for contacts will be available. (No call given.)
- **Fort Delaware Mini-Expedition -** The Wilmington, DE, area amateurs will hold this event on June 5 and 6 in the General segments of the h.f. bands, daylight hours only, with each operator using his own call and the Fort Delaware identifier. Members of the Independent Amateur Radio group of Delaware are N3ACU, N3ARU, N3ARV, KB3PD, and KB3HZ. Commemorative QSLs will be issued to those contacts supplying s.a.s.e.'s.
- **Harborfest Tri-Centennial Special Event** -As part of Norfolk, Virginia's Tri-Centennial celebration, June 11–14, the Tidewater area amateur clubs will operate 24 hours each day in the 80 through 2 meter bands c.w. and s.s.b. For more information, contact KC4YX, 3101 Petre Road, Chesapeake, VA 23325.
- **Tri-City ARC Special Event -** The Tri-City ARC will operate a special event station Saturday, June 12, from the replica of Stonehenge near Maryhill, WA. W7VPA will operate from 1600 to 0100 UTC on or near 3.900, 14.290, 21.390, 28.690, and 146.52. For a special certificate send QSL info and $1.00 to W7VPA, Special Event, P.O. Box 73, Richland, WA 99352.
- **Nebraskalands Days Special Event -** The North Platte ARC will operate W0CXH from 1700 to 2300Z June 12 and 13 on 21.400, 14.290, and 7.250 MHz s.s.b., and 21.150 and 7.150 MHz c.w. ± QRM. A certificate will be available for confirmed contacts by sending an s.a.s.e. to the North Platte ARC, P.O. Box 994, North Platte, NE 69101.
- **Special Event Station W0MG -** The N.E. Iowa Radio Amateur Assoc. will operate W0MG on June 12–13. Activity will take place from Waterloo, Iowa, and will be on 7.240, 12.290, and 21.370. Special Commemorative QSL for s.a.s.e. to NEIRAA, P.O. Box 92, Waterloo, IA 50704.
- **WB3KUH Special Event Station -** WB3KUH will operate from Fort McHenry, Baltimore, MD, the birthplace of The Star

(continued on p. 85.)

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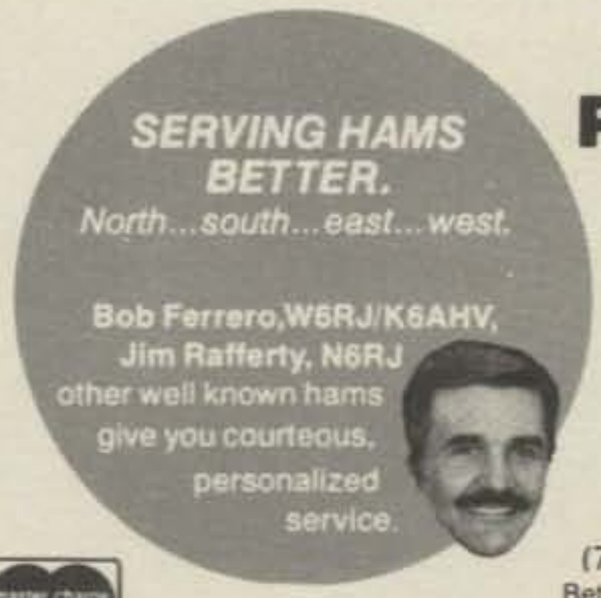

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A CQ EXCLUSIVE

CQ Interviews:

Mr. James C. McKinney

Chief, Private Radio Bureau
Federal Communications Commission

BY DR. THEODORE J. COHEN*, N4XX

James C. McKinney is a graduate in Electrical Engineering from West Virginia. A career employee of the Commission for the past eighteen years, he has extensive service both in the field and at headquarters in the areas of licensing, public service, and enforcement. McKinney is a Charter Member of the government's Senior Executive Service, and he recently served as the Chief of the largest bureau in the Agency, the Field Operations Bureau. He was appointed Chief of the Private Radio Bureau on 1 Sept. 1981.

McKinney has received a continuing series of management awards and honors throughout his career, including Outstanding Senior Executive (1980); Sustained Superior Performance (1979); FCC nominee—Arthur S. Fleming Award (1979); Outstanding Performance (1977); and FCC nominee—William A. Jump Award (1976). He is a Senior Broadcast Engineer of the Society of Broadcast Engineers, a Fellow of the Radio Club of America, and serves on the Board of Directors for the Radio Intelligence Division Association.

In the international area, McKinney has served as a representative to the technical arm of the International Telecommunications Union (the CCIR) and was a delegate to both the World Administrative Radio Conference of 1979, and the CCIR Preparatory Meeting for the WARC (1978). He was also Vice Chairman of the FCC Steering Committee for the preparation of the United States position for WARC-79.

In his regular duties at the Commission, McKinney serves on the Automatic Data Processing (ADP) Steering Committee, and he was Chairman of the FCC Incentive Award Committee from 1976–1980, inclusive.

McKinney, 41, is an instrument-rated pilot who flies his own plane. He is also an accomplished photographer, working in both film and video-tape. A native of Montgomery and Oak Hill, WV, McKinney now makes his home in Burke, VA.

With the above as background, we are now pleased to present our exclusive interview with Mr. James C. McKinney, Chief, Private Radio Bureau, FCC.

CQ: Jim, when we last spoke with you *(as recorded in the interview published in November 1980, CQ—ed.)*, you were Chief of the largest organizational unit within the FCC, the Field Operations Bureau. Do you find your new job as Chief of the Private Radio Bureau to be as demanding of your talents, both as an administrator and a policy-maker, as was your previous position?

McKinney: Ted, it's good to be with you again. I enjoyed doing the interview with you in 1980, and I'm looking forward to discussing lots of new issues today.

The new job is more challenging than was my position as Chief of Field Operations. This is due to a number of factors. First, I knew the field very well. I had spent seventeen years there, and the issues were familiar to me. I had a good historical perspective. I knew why things had been done a certain way, and I knew when to change direction.

To some degree I also knew Private Radio issues, but understanding the issues is a different matter. I have spent six months or so in a very intense learning phase in the new job, and I still have a great deal to learn. But I am beginning to feel comfortable with the issues.

From a management standpoint I don't think the Private Radio Bureau is very different from the Field Bureau. I am dealing with professionals here who want to do good work, and it is my job to aid them in that. I find they are tolerant of my ignorance in certain areas and are anxious to help me.

CQ: Our readers are well aware of the cutbacks imposed on government agencies by the Reagan Administration. Given that budgetary uncertainties still surround the operation of the Commission, can you summarize the impact such cutbacks are already having on the Private Radio Bureau?

McKinney: The budget cutbacks over the past two years have been very severe,

*Washington Correspondent, CQ

and our projected budget for 1983 will certainly be austere. The Private Radio Bureau will have lost between one-third and one-fourth of its staff by the end of next year. But the result will not be all doom and gloom!

First, we have implemented a strict Management-By-Objectives (MBO) program. Goals and timetables have been established for the agency as a whole, for the Bureau, and so on, right down the line to the individual employees. We have taken a hard look at what we have been doing, and we have stopped doing some things that are not essential. For example, my instructions to our rule-writing staff are: "Don't sit around trying to dream up new rules that will change the amateur service. Let the amateurs tell you when a change is needed." You will recall that we recently stopped working on the "plain language" rulemaking. That effort was opposed by the amateur community and promised to cost us a lot of resources in implementation. I chose not to "throw good money after bad."

"My instructions to our rule-writing staff are: 'Don't sit around trying to dream up new rules that will change the amateur service. Let the amateurs tell you when a change is needed."

In the licensing area, our Gettysburg facility is running the best speed-of-service in amateur licensing we have ever had. In most cases, licenses are being received by applicants about three to four weeks after papers are mailed, and, even with reduced employees in 1983, it is my intention to assure that licenses still get out rapidly.

On the down side, we'll see some rulemaking delays, less enforcement of the rules, and less strategic planning in the Bureau. It won't be business as usual, but the things which are critical will still be done, and done well.

CQ: What are the most important areas relating to the amateur service which you are now addressing?

McKinney: Let's see, Ted. Recently we have handled a number of matters of interest to hams: station identification requirements were relaxed, most of the power restrictions in the 160 meter band were lifted, television and facsimile were approved for all h.f. telephony subbands, and some of the clubs which missed the boat in renewing their station licenses were allowed a special "open season." We have a full calendar of amateur items between now and the end of September. There are several dockets bulging with

"Even with reduced employees in 1983, it is my intention to assure that licenses still get out of Gettysburg rapidly."

comments in response to our proposals on a number of subjects we are working on: beacons, repeater ERP, h.f. telephony subbands, spread spectrum, and more digital emissions. Most of these, if not all, will be brought to the Commissioners this year.

However, the bigger story may be in what we did not do. The amateur service has always had a large backlog of petitions on file—sometimes a hundred or more. Most of these petitions asked for more rules, more subbands, more restrictions, more classes of operators, etc. That backlog has now been eliminated, largely by dismissing those petitions which were inconsistent with the Commission's objective of eliminating all unnecessary regulations and burdens. For instance, I recently dismissed a petition which called for the FCC to establish a telegraphy subband on 160 meters. I dismissed this petition because this is clearly a matter the amateur community should resolve, and *was* resolving through a band plan the ARRL was developing. When the FCC must designate subbands, everyone loses, as an inflexible, usually inefficient, burden is placed on amateur operators. An enforcement burden is also placed upon the Commission. I intend to view all future petitions in this same light.

CQ: Jim, in *CQ*'s exclusive interview with your predecessor, Mr. Carlos Roberts *(see CQ, June 1980—ed.)*, Carlos stated, "The most important thing that the amateur community can do to assure itself of the type of amateur service it wants in future years is to learn the regulatory process . . . ." Has the amateur community made any progress in this area?

"Amateurs are the single, loudest voice of all groups interested in the FCC's legislative package for this year."

McKinney: Boy, have they! I was speaking last week with key staff members of one of our Congressional committees. I was told that amateurs are the single, loudest voice of all groups interested in the FCC's legislative package for this year. They hear more from amateurs on the Hill than from all the aviation, marine, CB, and land mobile interests combined. The ARRL is doing a very effective, educational job, both on the Hill and at the Commission.

Individual amateurs, of course, generally take little interest in regulatory and Congressional procedures in Washington, but their clubs, the amateur press, and amateurs who live in and around DC are very active. I would say that the amateur service is very well represented along the banks of the Potomac.

"I would say that the amateur service is very well represented along the banks of the Potomac."

CQ: What more can amateurs do to help the Commission better understand their concerns, desires, and needs?

McKinney: I'm not sure I can think of a single thing! I guess if I were pressed for an answer, though, I would like to see a bit more "meat" in the individual amateur comments on our rulemakings. Frequently, amateurs are so incensed over one of our proposals that we get only a barrage of negative comments with no helpful hints on how we can improve the item. I'm hopeful that we'll be issuing better proposals in the future, and I'm hopeful that amateurs will respond in a way that educates us and enables us to produce good, workable rules.

"Without experimentation, the amateur service will eventually lose the unique identity it now enjoys."

CQ: How important is it for the amateur service to go back to its "roots" and to experiment with emerging communication technologies?

McKinney: Ted, that is a key issue. It goes to the very heart of the amateur service. First, let me observe that without experimentation, the service will eventually lose the unique identity it now enjoys. Experimentation and efforts by hams to "push" the state-of-the-art are foundation stones on which the service was built. These things must, of course, continue.

However, once a mature service is at hand—as it clearly is for amateurs—then it seems to me there is room to do some other things, too. Public service is a good example. Amateurs have always excelled in their efforts to help the communities in which they live (whether the community is a town, a state, the nation, or the world at large). And, I see no reason why we should object to amateurs who choose to use their stations for personal communications as well. Two-meter repeaters represent a very active part of the amateur service, and I have no prob-

Jim McKinney at his office computer terminal, his "most-used work-tool."

lem with that. To summarize, I guess I accept experimentation by amateurs as "a given," and I also accept non-experimental applications as valid uses of the service as well.

CQ: What impact do experiments such as those performed by the Amateur Research and Development Corporation (AMRAD)—experiments in packet radio and in the use of spread-spectrum modulation techniques—have on the Commission?

"I believe the critical linkage of the 80's is the connectivity between computers and communications."

McKinney: AMRAD is operating on the cutting edge of technology. These "high-tech" experimentations are not only good for the service, but they are good for the Commission and the nation. The results help us understand the future of communications and what I believe is the critical linkage of the 80's—the connectivity between computers and communications. The members of AMRAD and others who are working in these areas are dealing in some very exciting areas. We all will benefit from their efforts. You may know that I work with computers every day. Even though I no longer have the need to do complex mathematical and engineering modeling, the computer is still my most-used work-tool. I am active on two electronic mail networks, and I do my own querying of our data bases whenever licensing problems come to my attention.

So, you can understand my very active interests in AMRAD's work. I see digital communications as *the* action area for the remainder of this decade.

CQ: How would you characterize the Commission's current attitude towards the amateur service? Is there a clear understanding of our service's scope and purpose, or is there still some confusion regarding the nature of the amateur service and that of the Citizens Band (CB) service?

McKinney: I think hams would feel very comfortable walking the halls of the FCC today. This has not always been the case. The level of understanding of the value of the amateur service and of individual amateurs is very high indeed. The Commissioners clearly understand the difference between hams and CBers, and between the goals, achievements, and issues which surround those two services.

"The level of understanding within the Commission of the value of the amateur service and of individual amateurs is very high indeed."

CQ: Jim, what are your views regarding the Morse code requirements for an amateur license?

McKinney: You don't have to know Morse code to do some very useful things in amateur radio (I suppose half the readers just tossed this issue in the waste basket!). At v.h.f. and above, Morse code is certainly not required, and we need a license which recognizes that.

"You don't have to know Morse code to do some very useful things in amateur radio."

I went to the WARC in 1979. I fought the battle to eliminate the Morse code requirement from the amateur service at all frequencies—that was the United States' position. We lost that fight, at least at the frequencies below 30 MHz. We were soundly defeated, and I do not foresee the United States raising that issue again at any early date. I also do not believe we would attempt to provide for a code-free service below 30 MHz in abrogation of that treaty. At least one developed nation has done that, though, and they are suffering widespread negative reactions from the rest of the world.

However, we are free to develop a code-free amateur service above the h.f. bands, and I do favor doing that. We have petitions "in-house" now which seek a code-free service. The Commission is on record favoring the establishment of some kind of non-Morse service, and the Private Radio Bureau will float such a proposal within the coming months. I expect very active participation by amateurs in this rule-making effort. Whether it will succeed in the end is not clear.

"At v.h.f. and above, Morse code is certainly not required, and we need a license which recognizes that."

CQ: If and when the Commission takes up the matter of a code-free license, do you think it will favor the issuance of such licenses for hobby or for experimental purposes? That is, to what segment of the potential amateur community will the code-free license be addressed?

McKinney: Well, you've hit the two possibilities. The demand we have seen is for a hobby-type service. The need is clearly for a digital service, perhaps along the lines of the Canadian Digital Amateur Radio Operator Certificate. We also need to consider the impact on our examination process as well. I frankly don't know, just now, what the proposal will look like.

"We are free to develop a code-free amateur service above the h.f. bands, and I do favor doing that."

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CIRCLE 66 ON READER SERVICE CARD

CQ: Access to the new amateur bands created at the 1979 World Administrative Radio Conference (WARC)—specifically, bands at 10, 18, and 24 MHz—would appear to be delayed until the Senate approves the WARC-79 treaty. Do you have any idea when this could happen, and, subsequent to that, how long do you think it will be before the Commission will seek the public's comments on the opening of these bands?

McKinney: I don't know, Ted. That matter will have to come from the FCC's Office of Science and Technology. They are responsible for reallocation proceedings. I frankly thought we could move expeditiously on the 10 MHz-band issue in January. But, I guess there are regulatory problems that must be addressed. The amateurs of some other nations are already active on the new bands, and I would like to see U.S. hams legally be able to begin using them as soon as possible. I would think that maybe the September–December time frame is the most likely period when we might begin to access those bands, assuming, of course, that the WARC treaty is ratified by the Senate in time.

CQ: Does the fact that most amateur activity in the high-frequency bands (3–30 MHz) appears to be of a "hobby" or "communicator" nature disturb the Commission?

McKinney: As I've noted above, Ted, it doesn't bother me, and I don't think it bothers the Commissioners. The h.f. spectrum is international in scope, and

Amateur radio policy makers (left to right) Jim McKinney, Chief, Private Radio Bureau; Johnny Johnston, Chief, Personal Radio Branch; and Joe Johnson, Deputy Chief, Rules Division.

"The September–December time frame is the most likely period in which we might begin to access the new 10, 18, and 24 MHz bands, assuming, of course, that the WARC treaty is ratified by the Senate in time."

hams are usually good ambassadors. After all, the US society is a technological society, and I see no problem in the hobby use of technology.

CQ: For some years, the amateur population has remained relatively constant in number. Given that an involvement in amateur radio often serves to introduce individuals to communications and electronics—and, in many cases, induces some to pursue careers in these areas—is the lack of growth in the amateur service of concern to you and the Commission?

McKinney: Yes, it is. But I don't think the slow growth of amateur radio is indicative of the technology interests of our young people. I see absolutely amazing acceptance of technology by our youth. They are perfectly "at home" with computers, video equipment, arcade games, and various other digital equipment. The question is whether the amateur service is ready for our young people!

CQ: What do you think can and should be done to stimulate growth in the amateur service?

McKinney: Several things:

- Make it easier to get training;
- Make it easier to take an exam;
- Increase the use of new technologies;
- Share the "joys" of amateur radio with young people.

The FCC can do some of the above, but amateurs themselves must shoulder most of the burden.

CQ: What is your view on the sharing of spectrum allocations by the amateur service and other services? For example, Del Norte now shares our 450 MHz allocation on a Secondary basis. They obtained this allocation by convincing the Commission that their spread-spectrum radiolocation system would not interfere with other users in the band. Can we expect that proposals for such spectrum sharing will increase in the future?

McKinney: Almost certainly. Sharing of the same segment of the spectrum by users whose operations are harmonious, such as in the radiolocation situation, is a practical approach to spectrum manage-

ment. As the never-ending demand for spectrum grows, I fully expect to see more use of this approach. While it may not always be as ideal as an exclusive frequency allocation, it is far preferable to denying spectrum use to a service with a legitimate demand.

CQ: Assuming that amateurs can develop viable spread-spectrum communication systems, do you think it will be possible for us to gain access on a Secondary basis to bands now allocated to other services?

McKinney: From the international standpoint, that possibility is probably a long way off. Within the FCC regulatory areas, it may be possible for the amateur community to make an acceptable case for some limited Secondary allocations in non-amateur bands for spread-spectrum operation only. I don't have any particular frequency range in mind, but the only possible scenario I can envision would involve extensive proof testing and a convincing argument for the need.

CQ: Jim, what are two or three of the major problems facing the amateur service today?

McKinney: All in all, I think the service is fairly healthy and that it will continue to be so. The controversial issues we've touched on—code-free license, slow growth, new technology—are challenges. Shifting the burden of examination and monitoring from the Commission to the amateur community will be a challenge. However, I am fully confident that workable answers will be found.

One issue that I might mention—and I would characterize it more as an "embarrassment" than as a problem—is the matter of measuring transmitter power at an amateur station. The present rules are so far out of date in this regard that they are practically meaningless. The Commission has, on a number of occasions, called upon the amateur community to develop and disseminate information on power measurement that could form the basis for meaningful rules. I know that such work has been carried out because articles have appeared in the ham magazines on the construction and use of suitable devices. For any radio service—and in particular the amateur service—to be so far out of date in the way transmitter power is measured should be, as I said, an embarrassment. I hope we soon see something from the amateur community on this.

CQ: Is intentional interference by some amateurs to the operations of other amateurs considered a problem today, or has that activity abated?

McKinney: I know malicious interference has abated in some areas, because

"We will take firm action against amateurs who intentionally interfere with others. I think our recent actions prove this point."

where it became intolerable, we targeted those areas for intense enforcement while I was with the Field Operations Bureau. Malicious interference appears to occur most often where the type of operation being conducted requires a group of stations to transmit on the same frequency with a degree of regularity, such as is the case with repeaters, nets, and bulletin stations. The vast majority of hams probably either approve of, or at least respect, these "channelized" operations. But it does provide those persons who seem to exhibit poor behavior an opportunity to harrass a large number of their fellow hams, and to do so all at the same time. While the number of such misfits is quite small, they can cause considerable annoyance. We *will* take firm action against amateurs who intentionally interfere with others. I think our recent actions prove this point.

CQ: Going back to budgetary constraints, and addressing what amateurs can be doing to help themselves, two areas in which some operators have suggested we take on new or expanded responsibilities are license examinations and enforcement. Would you comment on how you see amateurs assisting the Commission in these areas?

"I fully expect that we will see a considerable increase in voluntary assistance by amateurs to their government in the conduct of examinations and in enforcement of our rules."

McKinney: The Goldwater Bill (S.929) and our own legislative proposals are on parallel tracks. I fully expect that we will see a considerable increase in voluntary assistance by amateurs to their government in the conduct of examinations and in enforcement of our rules, and I welcome that assistance. I know the amateur community is anxious to utilize any new statutory authority we may get, and I would expect to see various rule-making proposals filed with the Comission as soon as the legislation is approved.

CQ: One of the amateur service's continuing problems is related to radio-frequency interference (r.f.i.), of which so-called television interference (t.v.i.) is an exam-

ple. Legislation in the Congress *(Sen. Goldwater's bill, S. 929—ed.)* would enable the Commission to impose susceptibility standards on electronic home-entertainment equipment if r.f.i. problems are not addressed by the electronics industry itself. Do you favor such enabling legislation?

McKinney: I favor it completely and without reservation. The Commission also went "on record" this year as favoring such enabling legislation. The television manufacturing industry clearly has it within its power to vastly improve susceptibility standards of TV receivers at minimal (or no) cost to consumers if it chooses to do so. I would hope we will never have to write new receiver standards. I would hope the industry will do it on its own. But, I have been around long enough to know they will not do it until they clearly feel they have to. We need the legislation to convince them the time to act is now. The compatibility problems between and among electronic devices in this "digital decade" must be addressed. The issue is, of course, much larger than one simply involving amateurs. Interference today involves a host of new consumer technology items—for example, computer terminals, electronic games, and video equipment—all because of a lack of well-designed television receivers.

"Television interference today involves a host of new consumer technology items—for example, computer terminals, electronic games, and video equipment—all because of a lack of well-designed television receivers."

CQ: In your opinion, has the amateur service done enough to educate our legislators on the reasons why electronic home-entertainment equipment experiences r.f.i.?

McKinney: I think hams have done an excellent job. I wish some other groups (TV station owners, public safety licensees, common carriers) would do their share. Unfortunately, r.f.i. is assumed to be an amateur problem—not a national one.

CQ: In a recent "think paper," members of the Commission's staff proposed (as but one option) that the burden of correcting r.f.i. problems be placed on operators in the service allegedly responsible for the interference. This action would not be without precedent (for example, the Commission has a requirement that Watercom, a provider of telecommunications services for users of our inland waterways, resolve r.f.i. problems they are alleged to cause to the reception of Ch. 13 television signals). Is such a "solution" to r.f.i. problems realistic when it comes to the amateur service?

McKinney: In general, I like the "last man in" rule. That is, the new spectrum user has to fix compatibility problems for the old-time user. But, application of such a rule where there are two existing services would not work. You would be faced with a situation in which a ham with "clean" equipment who moved near a 10-year-old, plastic, low-cost TV set would have to (probably) buy a new set for the new neighbor. On the other hand, I might move my new seven-foot projection TV with excellent t.v.i. rejection near a "dirty," but existing amateur station, and would have to suffer his interference. Making judgments of who is at fault would be very difficult indeed. However, if a new service is introduced on or adjacent to an existing service's frequencies, the new user ought to make a value judgment as to whether he wants to pay for the damage he may do. It should be the new user's burden to preserve the integrity of the existing user's communications.

CQ: Are there any other areas you wish to discuss regarding the Commission and the amateur service?

McKinney: Well, Ted, I think you have done a thorough job with the questions you have asked. There is one final point I would like to make before we conclude this discussion. I feel that we do have a good dialogue going between the amateur community and the FCC. For that, we have you and your fellow amateur radio news reporters and columnists to thank for playing the leading role.

We seldom get a chance to talk to a licensee except through legal channels. For the past several years these interviews in *CQ* have significantly aided in amateur/FCC understanding. For the first time, amateurs have been exposed to the FCC and the people involved with the regulatory process. Such open discussions are extremely helpful both to the Commission and to our licensees.

It is only through the amateur radio press that the Commission's staff learns much of what is happening in amateur radio. Moreover, I gather from the letters we receive that it is through the same press corps that the amateur community learns what is happening at the FCC. I salute you and your associates for a job well done.

Finally, I want to thank you for the opportunity to express my views in response to your excellent questions. I look forward to working with the amateur radio community. CQ

There is a limit to the number of euphemisms for the word "cheap." Sometimes cheap is exactly the right word to describe something, and this is one of those times. We are, of course, speaking of cost, not quality.

THE CHEAP MATCH
A TRANSMATCH FOR $10

A QRP ANTENNA TUNER WITH A TUNABLE INDUCTOR

BY T.K. DAVIES*, VE7DHD

The growth of the QRP movement has presented the amateur fraternity with some new perspectives and design demands. The QRP enthusiast's preoccupation with efficiency and the conservation of power colors his attitude towards design and his selection of equipment. Or to put it another way, QRP types are as cheap with money as they are with watts. There is some kind of elegance in doing things cheaply and simply. Bearing all this in mind, this QRPer set out to build an antenna matcher for a Heathkit HW-8, and what resulted was the "Cheap Match."

In looking over the articles for matchers, I found most to be for high power at even higher prices. If you have a kilowatt, you have to pay for it in all ways, not just the rig. When you use less than 10 watts, you can save cash and try some things not possible in QRO designs.

There are many low-power designs around, but they all suffer from the same drawback—the inductor, or how the inductance is changed. In some designs the inductor is tapped, and a switch is used to vary the inductance. This type is okay, but it is a compromise in that not all combinations of L and C are possible. In other designs a coil with a ferrite rod is used which in one fashion or another is made moveable. The adjustable-core type has some shortcomings; however, the worst is that the minimum inductance of an all-band coil is far too high to be useful on the 15 and 10 meter bands, and some gimmick must be found to get the inductance down. In most cases a parallel inductor is switched in for the high bands; however, this makes the tuning a little touchy. The best of this type is the "Baby Ultimate" (described in *QST*), which uses a variable inductor made from one half of a 1-inch diameter toroidal core. Although very attractive as an idea, this adjustable core has to be made in a machine shop and is not the type that you can build on your kitchen table. So, while I was sitting at my desk in the shack, I started doodling on the back of my log book to see how I could simplify the inductor construction. Well, the following is the result.

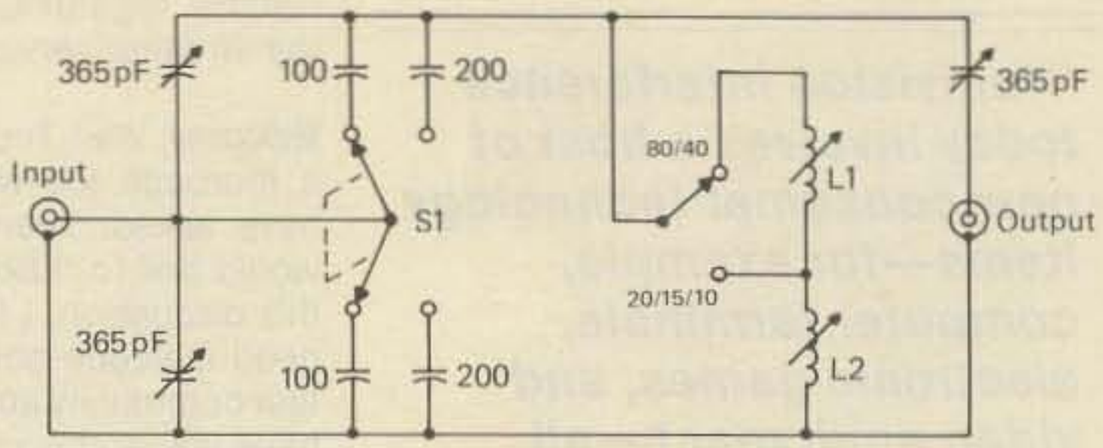
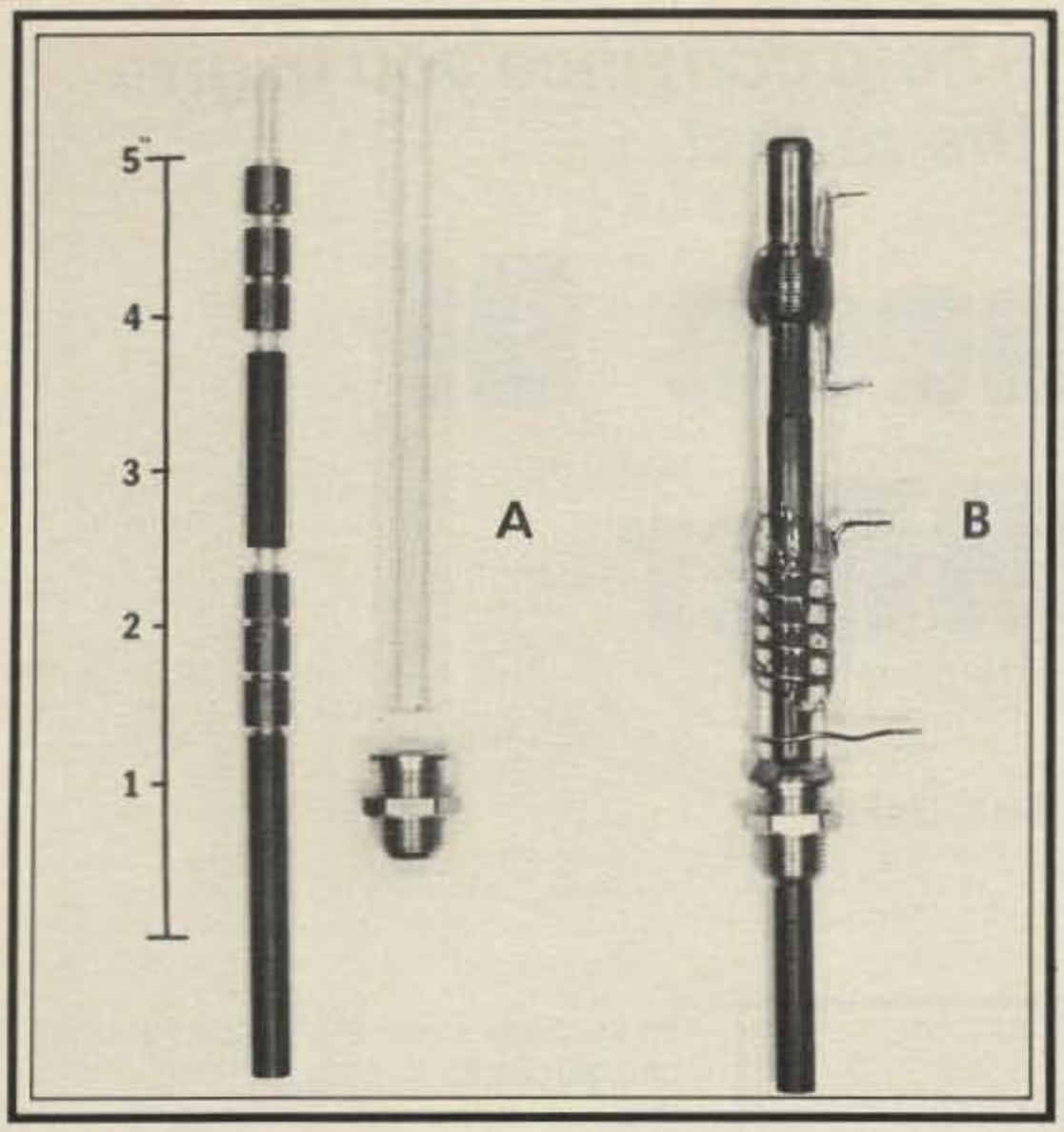


Fig. 1– The Cheap Match. L1: 0.5 uH to 1.0 uH (5T #18 Spaced over ¾"). L2: 1.5 uH to 6.0 uH (12T #24 Closewound). S1: D.P.D.T. center off switch.

In that the inductor is the unique part of the Cheap Match, I will start with it. As is shown in (A) of the exploded view of the inductor, the inductor is constructed of a panel bearing to which is attached a coil former made out of Plexiglass. The tuning slug is a double ferrite core made from two sets of three jumbo beads each. At first look, you may think that a couple of pieces of ferrite rod would do better, but not so. The ferrite beads are easier to mount and provide a much higher inductance change. The trick is to mount all these bits and still have a slug and tuning extension (a tuning handle) that will go inside the coil form and slide smoothly through the bearing—easy. The beads have a hole (0.090") which is just the size of the wooden sticks used for cotton swab applicators.

The tuning handle is a ¼" insulating rod cut into two pieces

*Dept. of Chemistry, University of Victoria, Victoria, B.C., Canada V8W 2Y2



Parts List for Inductor:

6	*Jumbo Ferrite Beads (Amidon FB-43-801)*	*$1.50*
1	*¼" Panel Bearing (Smith 119)*	*.37*
6"	*Plain ¼" Acetate Rod (Smith 1406)*	*.24*
4"	*⅜" O.D. × 1/16" wall Plexiglass Tubing*	*.10*

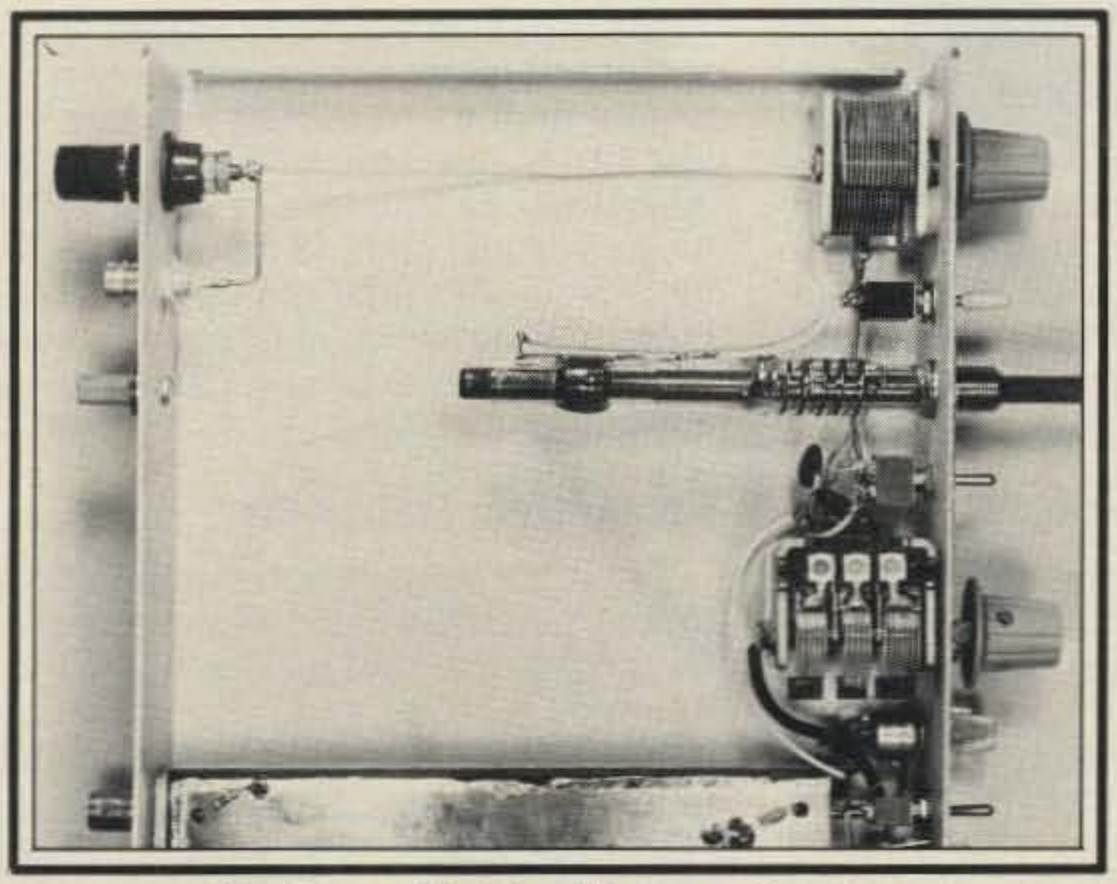
An exploded view of the tunable inductor is shown at (A). (B) is the assembled inductor ready for installation.

The coils are wound on the former as follows: L1 starting ¼" from the bearing and ending at 1" (these turns are spread out to fill the space); L2 is close wound starting at 2¼" from the bearing. The two windings are held in place by their ends with masking tape, and after checking their position using the tuning slug in the former, the coils are glued in place. The photo at (B) shows the tunable inductor assembled and ready to be mounted in the "Cheap Match."

The matcher is not original, but it has a few wrinkles which add to its versatility. Fig. 1 is the schematic of the unit. The tuning capacitors were removed from old equipment, a dual and a single 365 pf. My "dual" is, in fact, a triple from an a.m./f.m. radio. Transistor-radio types will work equally well, but watch the power you use. The insulation in the tuning capacitors is the limiting factor in the upper power limit. Air types have better insulation and normally can handle more power. I added a +100 and +200 pf switch to add range to the input capacitor. This is particularly useful on 80 meters when you are trying to load short random wires. My unit has an s.w.r. meter of the traditional type, but a better type, which is simpler to build, is a 50 ohm matching unit.[1]

I have priced the supplies for the inductor in the parts list. The inductor can be built for less than $3. Add two tuning capacitors for $1.50 each, and you still have enough for a case and some connectors. I have used this little unit on a variety of antennas and to date have not had an antenna that I could tune with a commercial tuner that would not tune with the Cheap Match. In fact, one version which had a third section of coils similar to L2 would tune 160 meters. The Cheap Match is far from the "Ultimate Transmatch," but it is a long way towards *cheap.*

[1]*Solid State Designs for the Radio Amateur*, ARRL Publications, Newington, CT 06111, p. 166–167.



The Cheap Match, with s.w.r., in case.

2½" and 1¼". The shorter piece is drilled at each end with a drill slightly larger than the hole in the bead to a depth of ¼". The longer piece is drilled in one end in a similar manner. After cutting two 1¼" lengths of the small wooden stick, assemble the whole shaft as seen in the photo at (A) with a drop of model-airplane glue or epoxy between all the sections and beads. One tip: have a 6" piece of metal shaped in a Vee to cradle and align the shaft while all the glued parts are drying. After the glue has set lightly, sand the shaft to remove any excess glue. A 4" piece of Plexiglass tubing is glued to the panel bearing to make the coil former. Take care to make the former coaxial with the hole in the bearing, or the slug will bind in the tube, making smooth adjustment of the inductor very difficult.

Perhaps this G-QRPer's story will help convince you to give low-power operation a try. Join the ranks!

Experiences Of A G-QRPer

BY TONY SMITH*, G4FAI

Since getting my amateur radio license in October 1973, I have only worked QRP (low power). In 1973, I reached the ripe old age of 41, and my 14-year-old son, Paul, got his license at the same time. We had consecutive calls; I was G8IAQ and he was G8IAR.

The G8-plus-three-letter calls are for v.h.f. only, so we started on 2 meters using 5 watts a.m. Paul's first QSO seemed to bode well for our new hobby, as G3ST, who was then in his 80th year, replied to Paul's CQ. Sid had been licensed since 1911, when he transmitted with spark apparatus. He was very encouraging and helpful to us both and forecast much enjoyment ahead.

A.m. at that time was on the way out as a popular mode, and we soon changed our station equipment to a multi-mode transmitter plus a Trio-Kenwood JR500S receiver with a 2-meter converter. The transmitter ran 10 watts f.m. and 25 watts s.s.b., and that, for me, was the high-power peak of my ham career!

Regrettably, Paul decided that his studies and other interests had to take priority. He dropped out of amateur radio, and it was at this time that I began to consider where I was going in the hobby. I had always been attracted to the idea of getting a quart out of a pint pot, and I thought of trying lower power to see what I could do.

I therefore sold the 25-watt rig and purchased an Icom IC-202 transceiver running 3 watts s.s.b., with c.w. as an available additional mode. Running this rig from portable locations with a lightweight, two-element quad antenna was good fun, and I worked some reasonable DX when conditions were right.

*1 Tash Place, London, N11 1PA, England

The author's small-power small-size station, including threshold limiter, notch filter, speech processor, a.t.u., and 2-meter transverter, with external power supply at top.

Getting The H.F. License

At the back of my mind all this time, however, was the thought that this was not the ham radio I had studied for and dreamed about before I got my license. Where were the far-away places, the foreign accents, the yarns to tell, the prestige at work? My QTH is London. It really didn't amount to much to casually remark in the office, "Oh, by the way, I worked into Manchester last night." *I* might have been thrilled with it, bearing in mind the equipment I was using, but I thought how much more exotic and satisfying it would be if I could say that I had been working into Moscow, Tokyo, Los Angeles, or Tel Aviv.

To do that in Britain you need a Class A license. The v.h.f.-only license is a B license. Once you have passed the examination for that, all you need to do for the A license is pass the post office Morse code test of 12 words per minute. Easier said than done! I had been trying to work on my code speed ever since I got my G8 call, but I was so busy working on 2 meters, or constructing things, or doing something else that I seemed unable to master that magical 12 w.p.m.

In the end I signed up for the test. I found there was a six-week wait, and I literally gave up ham radio for that period to concentrate exclusively on the code. Came the day, I passed the test, and in April of 1976 I went on the air with my new call sign, G4FAI.

The next step was to try my newly acquired code. I was still exclusively on 2 meters, and on the 9th of May I put out my first CQ on the key. G3KEQ, about 20 miles away, came back to me with beautiful slow Morse code to match my hesitant, nervous keying, and I was hooked. Looking back over my log, I see a steadily increasing number of c.w. QSO's as my confidence increased.

Home-brew Transmitter

I had not forgotten, however, about those h.f. bands where I was yet to put in an appearance. I still had the trusty Trio-Kenwood receiver, and I was constructing a little two-transistor c.w. transmitter

The author with his "go-anywhere" rig in use in a domestic situation. At one time there was no permanent location for the rig in the G4FAI QTH, hence the compact/portable assembly.

QSL cards from other QRP stations. As explained in the text, many are received directly and not through the bureau.

A selection of the author's cards from QRO stations. It is not unknown for the power ratio to be 1000 watts one way and 5 watts the other way!

for 80 meters. It was crystal controlled and was to have 2 watts input.

On August 3rd I called CQ on 3.585 MHz, and GW4ETS/A in South Wales came back with a 5-5-9. I was more than excited! My QTH in 2-meter radio terms gave the impression of being at the bottom of the bucket. Except in lift conditions, I rarely worked more than 20 or 30 miles. With my new transmitter running less power than before, and with a temporary longwire antenna strung down the back garden, I did not know what to expect. I knew the signal *ought* to get out all right, but where it was going to land in that big, wide world out there I just did not know.

That first QSO covered just 120 miles, but I knew I was in business. I had a few problems with the stability of the transmitter and had to drop the power to 1-watt input. The temporary longwire became permanent, and I started to work into other European countries.

Then I became frustrated with working fixed frequency, so I rebuilt the rig with a v.f.o. and got it working properly at the 2-watt level. The countries began to come in. It was really the most interesting and exciting period of my amateur radio life. Almost every day I got a new country, and most stations were particularly interested in my QRP level. I remember hearing a Polish station, SP2AOB, calling CQ DX, which of course meant outside Europe. At that time I hadn't worked SP, so I called him on the key. "ONLY DX," he came back at me. "UR DX FOR ME," I sent, "HR QRP 2 WATTS." So he took time out from his DXing to give me a report, exchange greetings, and in due course I got his QSL card from Gdansk.

Other QRP Stations

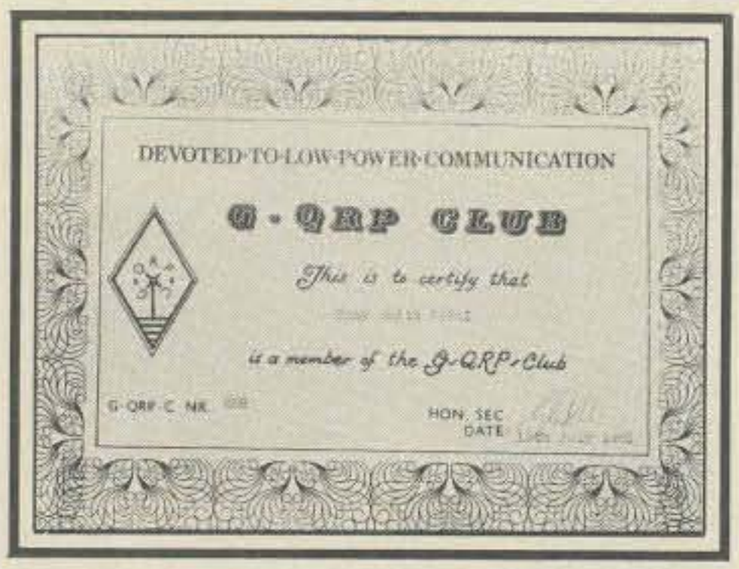
I began to discover that I wasn't the only QRP station on the band and that there was even a QRP calling frequency. I worked stations running about the same power in Holland, Denmark, Sweden, Germany, Italy, Czechoslovakia, and more. I joined the G-QRP-Club and found many new friends throughout the United Kingdom as well as abroad.

As was to be expected, I eventually felt the need to progress. The sunspot cycle was on the way up with promise of exciting things ahead. I decided to sell my IC-202 and get myself a Heathkit HW-8 transceiver covering 80 through 15 meters with an output of about 3 watts. It has always been a source of regret to me that in order to obtain some new piece of radio equipment I have had to sell the old rigs—and there was no exception in this case.

The HW-8 had to be assembled before I could use it, and I found that a useful and interesting experience. I took a lot of care in assembly and have never had cause to regret it. Of course, I then found that I had four bands to work, not just one, and the only thing I found strange was tuning the direct-conversion receiver, having to remember to take the higher frequency of the two signals received. That was a minor point which I rapidly became used to, and I was soon sampling the new bands available to me.

In the period that followed I filled in all the gaps in my European coverage and started to move over to the east a bit more. It was an exciting day when I raised 4X4NSA in Ashkelon, Israel. He gave me 5-2-9 on 15 meters, and two weeks later his card came through the mail.

One particularly pleasing occurrence was not a direct contact at all. I received a listener's report from UA-0-112-2 in Blagoveshchensk, just north of the Manchurian border, which by my reckoning was 5,300 miles away. George had monitored my QSO with UK1APA in Leningrad and gave me a 5-4-9 from Zone 19. My card was on its way back to him by return mail!



One of the certificates issued by the G-QRP-Club, which has over 1,200 members worldwide, including the U.S. Details of membership available from Rev. George Dobbs, G3RJV, 17, Aspen Drive, Chelmsley Wood, Birmingham, B37 7QX, England. (Send IRCs.)

The New World

By this time the effect of the sunspots was beginning to be felt, and I thought it was time I turned my attention to the "New World." On May 12, 1978, I heard WB2VNU in Pennsylvania calling CQ and I replied to his call. He heard me, came back, but I lost him in QSB.

Two days later I called WB2JUH, and this time there was no doubt about it—I had crossed the Atlantic. Hank gave me 5-4-9 and our QSO lasted for 23 minutes.

Four hours later I was working WD8MRC in Detroit, who gave me 5-5-9, and I knew it was no fluke. I really was beginning to achieve something with those 3 watts.

Not long after this I decided to get myself a Ten-Tec Argonaut. This not only would give me 10 meters as an extra band, but it also would give me s.s.b. facilities while running at about the same power level as the HW-8. Some years earlier I had read a lot about the Argonaut and what it had done to popularize low power in the United States, and at that time I had made up my mind that one day I was going to get one.

Alas, the HW-8 had to go the way of all the others. It had given me such pleasure and excitement that I sold it with real regret. However, I now had my new Argonaut, and another era was opening up for me.

New QTH

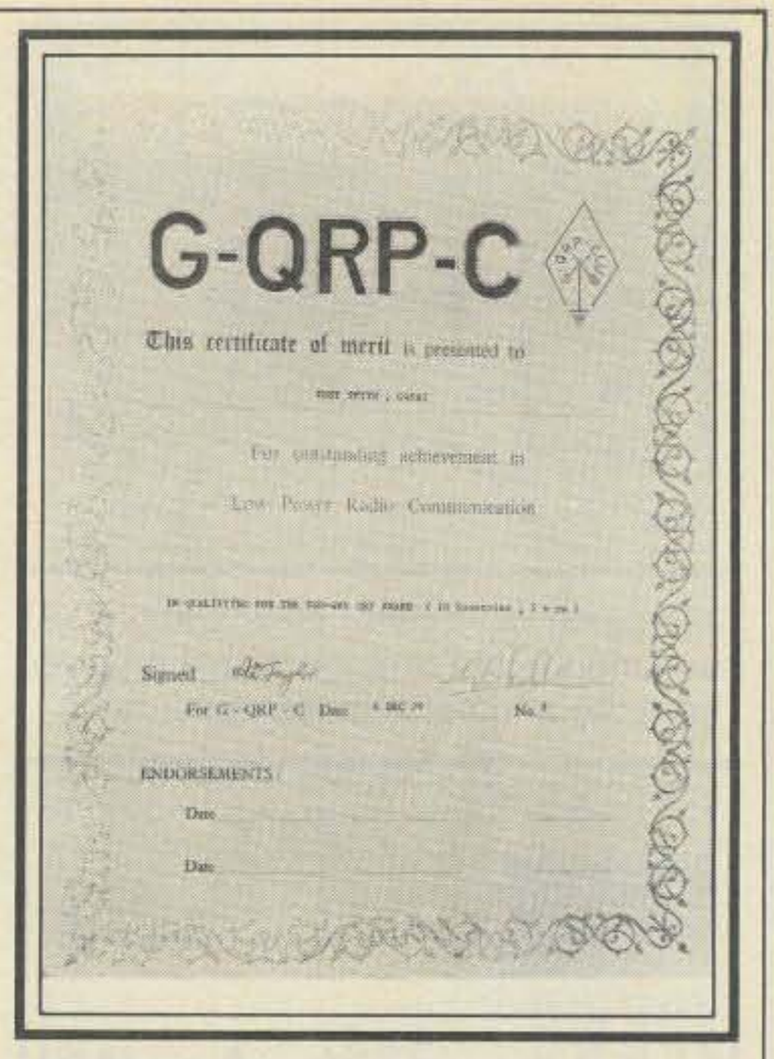
About this time I moved to another QTH and had the problem of deciding what to do about a new antenna. The old longwire had served me well on all bands, but my garden had been about 30 meters long. The new garden was only 9 meters long and 5 meters wide, so I had a slight problem on my hands. The longwire principle was still the best bet in terms of installation, however, so I decided to try it again. The configuration which eventually evolved was the shape of a letter W with the two points at the bottom end of the garden. The total length was 40 meters. It was end fed as before through a 5-network a.t.u. and was loaded against the central heating system. Do I make things hard for myself!

The amazing thing was that it worked. Within days I had worked WD2AIT and WA2HNK in New York, WB3JYD in Baltimore, WB8YXU in Cleveland, Ohio, and WB3LGQ in Proctor, Pennsylvania.

And so I was back in business with a new transceiver, a new antenna, and a new QTH. It was almost like starting fresh, especially as I now started using the microphone for the first time on the h.f. bands. My first QSO stateside on s.s.b. was at 0705 GMT on July 2, 1979, when I head a CQ from W3JBJ on 20 meters. "W3JBJ this is QRP station G4FAI calling, do you copy me?" I inquired hopefully. "I copy you very well," replied Marshall, and to my very pleasant surprise I found myself in QSO with Williamsport, Pennsylvania.

Experimental Beam

Later still, I experimented with a miniature 10-meter beam which measured just over 1.5 × 1.5 meters (5′ × 5′). This is called a Zygi beam and was designed by G3PTN. I put it up temporarily in my bedroom at the top of the house and pointed it towards the United States. The first station I worked was W3HBQ in Elysburg, Pennsylvania, who gave me 5-6. On his



Another of the certificates offered by the G-QRP-Club, this one for the two-way QRP Award.

card, which came about two weeks later, Bill wrote, "It did not seem possible that you had such a nice signal with 5 watts."

Forty minutes later I called W9JLR in Falls Park, Wisconsin, on the key and he came back with 5-6-9. Ten minutes later there was WBØNHD in Minneapolis on the mike giving me 5-2 and 24-minute QSO. It seemed as if I were striding across America in huge steps. It was a remarkable sort of feeling, and if the band hadn't closed down just about then, I feel sure I would have kept going until I hit the West Coast!

And that's just what I did a bit later on, not with the Zygi beam, but with the longwire. QRP is a funny thing; you get a lot of lows as well as highs. You'll go for some time without any great success and begin to feel that something has gone seriously wrong with the rig, and suddenly you are there again. I had such a period in April 1980 when I seemed to have difficulty in working even G-stations. Then on the 23rd I heard JA1HQY in Tokyo calling on 15 meters. I picked up the mike—nothing ventured, nothing gained. I gave him a shout and back he came with 5-3 and no QRM. Three days later, in the same week, I called AD6C, Fred, in Los Angeles, this time on 20, and I had finally made the West Coast. About the same distance in the opposite direction as Blagoveshchensk!

I have found that QRP encourages experimenting, especially with antennas. My latest is a single-element delta loop fed by 300-ohm balanced feeder and a home-brew a.t.u. The bottom is only 4 feet above ground, and yet it works well on all bands 40 through 10 meters. Now that the peak of the sunspot cycle has passed, we are moving into the trough again when 10 and 15 meters will have

nothing to offer. However, at the time of writing (October 1981), 10 meters is still performing well. A week ago I had my first 2-way QRP contact with the United States. W2JHX, in Livingstone, New Jersey, dropped from 100 watts to 1 watt s.s.b. and we had a very good QSO. The next day A9XZ in Bahrain picked out my 2 watts s.s.b. from the middle of a pileup, giving me a new country, a 5-5 report peaking to 5-9, and confirmation that my new antenna is another good runner.

QRP Is Extra Nice

One of the nice things about working QRP is that the other stations often take more of an interest in you. It's not at all unusual to exchange cards directly rather than through the bureau and to send letters and photographs to each other at the same time. This happens more often when the other station is also QRP, but not necessarily so. I have also had plenty of correspondence with QRO stations.

Of course the best and most satisfying QSO's are with other QRP stations, and these are usually on the key. In difficult conditions two such stations will persevere much longer than any QRO station will. There is a sense of comradery—a sense of unity that makes us want to achieve success.

When the QSB sweeps over you, when the QRM hits you, and when the woodpecker engulfs you, when all that's gone, the other QRPer is still there waiting patiently to continue the QSO. DX doesn't come into it in the accepted sense. Fifty, five hundred, or five thousand miles—the fact is that every QSO is a challenge to be overcome, and what you do about it is what really matters.

I am more than aware that I have been handicapped by a limited antenna system and that I really haven't done anything remarkable compared with the accomplishments of others. Some QRPers have become well known through quite fantastic achievements. Some have worked around the world with as little as 10 milliwatts. Some have achieved DXCC with less than one watt.

The things that are common to all those stations, however, are high levels of operating skill coupled with lots of patience, and I like to think that a bit of each rubs off on every QRPer. And, most important, they all take a great deal of care in setting up their antenna systems.

I am unable to have a better system for various reasons, but at least I see to it that my antenna is carefully tuned to resonance every time I operate to ensure an s.w.r. of unity, and I think I have demonstrated that it is possible to operate fairly successfully with low power under quite unfavorable circumstances.

One G-station summed it up for me when we were having a difficult QSO on 80 meters over about 100 miles. Conditions were absolutely poor. We were using c.w. and lost and found each other several times, but we completed the QSO. "This," he keyed to me, "is real ham radio." And he was right.

I was tempted to finish this article by writing about the techniques of QRP operating, but these have been well covered by others, including Ade Weiss, K8EEG, who already writes for *CQ* magazine (it was Ade's writing in the *Milliwatt* some years ago that first drew my attention to the Argonaut).

I do hope, however, that what has already appeared, plus, perhaps, something in these ruminations, will persuade others to try QRP, including those who, like me, find themselves working in far from ideal conditions. It's not necessary to come down to 5 watts immediately. Just try reducing power if your rig will let you. How about 20 watts for a start? See what you can do at that level. There would be a lot less QRM on the bands if more did that. There would be a much greater sense of achievement, and you might even decide it's fun!

Whatever power you run, if you hear me on the mike or on the key, give me a call!

HPE CU VY SOON. 73 DE G4FAI. $\overline{VA}$.

This simple-to-build Mini-Tuner should appeal to QRP operators, as well as to those using up to 100 watt output transceivers for portable work.

A Full-Feature, Quality Mini Antenna Tuner

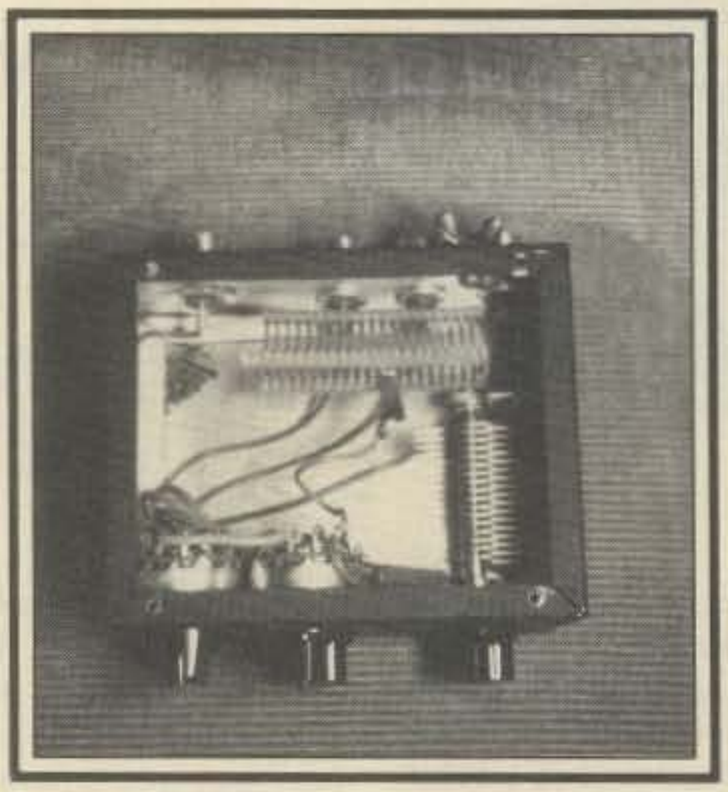
BY JOHN J. SCHULTZ*, W4FA

Many of the new solid-state 100 watt class h.f. transceivers that come on the market seem to be shrinking more and more in size. This does open up more possibilities to use these transceivers for all sorts of mobile and portable applications. However, one factor does seem to remain constant: Such transceivers will continue to use broadband transmitter circuitry, and the load impedance connected to them cannot vary much from 50 ohms if they are to produce maximum power output. So, it seems that for some time to come we will still need a device that can interface these transceivers to the real world of varying antenna load impedances. In other words, the old antenna tuner, coupler, or whatever one prefers to call it, will be around for some time to come.

There are a lot of good antenna tuners on the market, but few are optimized for small size for portable operation. This article describes a project developed to build a small-size tuner for a 100 watt class transceiver for portable applications. The goal was to build a compact tuner which was of a quality to match a reasonably expensive transceiver, but which used readily available components. With customized components one could probably build a tuner somewhat smaller than the one to be described here, but the price would soar.

As with any project, it first becomes necessary to define the features desired within the overall constraints just mentioned. First of all, it was not envisioned that the tuner would be used to match a transceiver to extremely unusual loads, such as a 16 foot wire on 80 meters. Such a tuner can be built, but because of the extremely low load impedance involved, extreme emphasis would have to be given to reducing ohmic losses within the tuner, which would mean large-size wire coils, etc. Rather, it was envisioned that the tuner might be used on 80–10 meters to match a ¼λ or longer wire worked against the ground, dipole or similar antenna where the s.w.r. without the tuner might run up to somewhat beyond 1:5 or so. In such cases, an L-type network will usually suffice, and its size can be kept reasonably small. The L network would have to be reversible for maximum versatility in impedance matching. Also, it was considered desirable to have provisions for direct-through operation of the tuner in order to check its effectiveness and to have the ability to switch between at least two antennas (or an antenna and a dummy load). As an option, metering was to be provided for either monitoring relative power output or s.w.r. The latter is not necessary with many of the newer transceivers since they have built-in s.w.r. metering.

Seen next to a D-104 microphone, one can appreciate the tuner's small size.

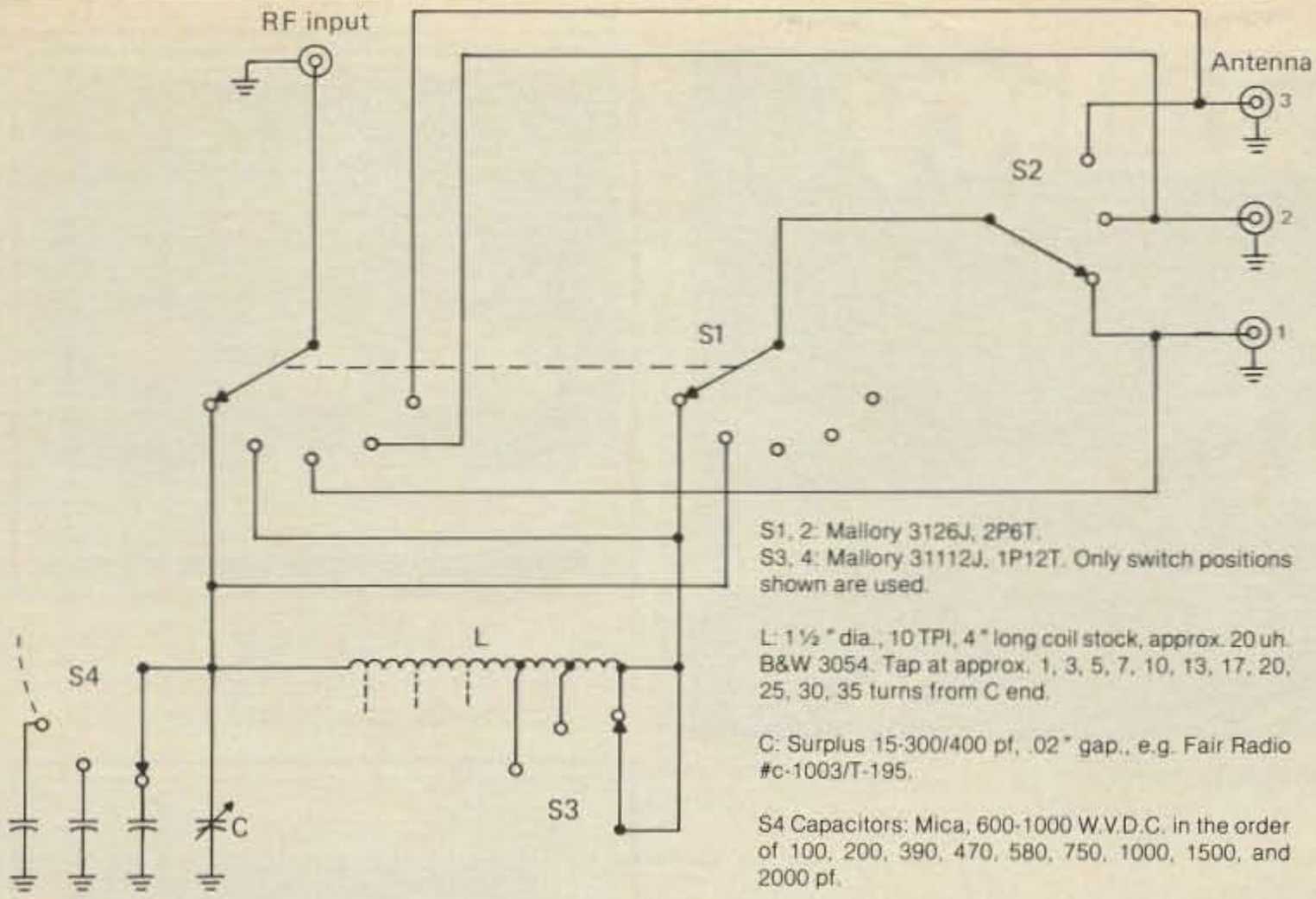


Top view showing placement of the switches and other components.

The design of such a tuner was accomplished in a standard 3" × 4" × 5" aluminum utility enclosure, and the tuner weighs about 1½ lbs. The diagram of the tuner is shown in fig. 1. The switching may appear to involve a lot of wiring, but in reality it can be accomplished easily. One might like to compare the switch functions shown in fig. 1 with the switch placement shown in the front view. Switch S1 (upper left in photo) in its first two positions provides for switching the L network as either a CL or LC configuration. The CL configuration is generally best to match impedances below 50 ohms, while the LC configuration usually works best with higher impedances. In its last three positions, switch S1 provides for a direct-through connection to any one of the three selectable output loads. Although S2 (lower left in photo) normally selects the output, when S1 is set for a direct-through connection it doesn't matter how S2 is set. This provides for a minimum of switch manipulation when one wants to quickly check the various antennas connected without going through any tuning motions. S3 (upper center in photo) selects various coil taps, while S4 (lower center in photo) selects various additional fixed capacitors which can be padded across the variable tuning capacitors in the L network.

The switches used are all readily avail-

*c/o CQ Magazine



S1, 2: Mallory 3126J, 2P6T.
S3, 4: Mallory 31112J, 1P12T. Only switch positions shown are used.

L: 1½" dia., 10 TPI, 4" long coil stock, approx. 20 uh. B&W 3054. Tap at approx. 1, 3, 5, 7, 10, 13, 17, 20, 25, 30, 35 turns from C end.

C: Surplus 15-300/400 pf, .02" gap., e.g. Fair Radio #c-1003/T-195.

S4 Capacitors: Mica, 600-1000 W.V.D.C. in the order of 100, 200, 390, 470, 580, 750, 1000, 1500, and 2000 pf.

Fig. 1– Diagram of the tuner with parts specifications.

able and inexpensive. Although Mallory part numbers are given in fig. 1, very similar switches are available from Radio Shack (270–1385, 275–9452 series). The open, simple construction of the switches makes them very suitable for low-level r.f. switching, since they have a very low contact-to-contact and contact-to-ground capacitance. The placement of the switches in the enclosure is better seen in the top view. Fig. 2 shows the wiring of the switches as seen from the back side of the switches. Since both the top and bottom of the utility box are removable, it is relatively easy to wire the switches using short leads.

The top view also shows several other features of construction of the tuner. Seen from the top, the variable capacitor is in the lower left-hand corner of the enclosure. It is mounted both by its shaft to the front panel and by 6-32 screw hardware to the side panel. Many other types of variable capacitors can be used, although the unit specified in fig. 1 is available from Fair Radio at $5 is a good buy. The usual air-insulated, single- or double-section 365 pf BC-type tuning can also probably be used successfully, although the "cheapie" sheet dielectric insulated BC-type capacitors should definitely be avoided.

At the bottom of the top view one can see the coaxial connectors mounted on the back panel of the tuner. The rear view shows these connectors in more detail. The connectors are not labeled, as shown, but the one on the right is the input connector and the three to the left are the #1, 2, and 3 antenna connectors. Shown above the first antenna connector is the ground connection, which uses #8 hardware and a wing nut.

Looking at the top view one can see a coil in place, but also note that there seems to be a lot of empty space in the enclosure. In fact, the coil has only been mounted temporarily and placed towards the rear of the enclosure to emphasize the room available to properly mount an air-wound inductor. Air-wound inductors are generally conceded to be more efficient than ferrite core inductors, but they do require a clear space of one-half to one times their coil diameter around them if their efficiency is to be realized. By mounting the switches, variable capacitors, and connectors as shown, a surprising amount of space is available even in the 3" × 4" × 5" enclosure. Fixed coil taps are specified in fig. 1. These taps simply represent a more or less tapered distribution of the coil taps. In conjunction with the reversing capability of the L network and the wide range of padding capacitors available across the variable capacitors, a great range of load impedances can be accommodated. Nonetheless, one might like to provide two or three positions on the coil-tap switch with leads having coil-tap clips. Since the top of the enclosure is easily removed, the flexibility of having available some moveable coil-tap leads greatly facilitates initial tune-up when using a new antenna. Miniature alligator clips are usable, although the special flat clips made especially for tapping coils are preferable when available (Mueller #34 or similar). Since the top cover of the tuner is readily removable, it is an easy matter to get at the coil clips when a new antenna matching situation is encountered and one wants to quickly establish how much tuner inductance is required. To facilitate the process if it has to be done often, the top cover of the tuner can be outfitted with snap connectors so a screwdriver is not required to remove it.

It is not difficult to provide some metering in the tuner enclosure—either of the simple relative-output type or full s.w.r. metering. Normally the tuner is adjusted so the s.w.r. between the transceiver and the tuner is 1:1 under matched conditions. As was mentioned before, many of the newer transceivers have built-in s.w.r. metering so additional metering in the tuner is not absolutely required. However, even in such cases the use of a relative-output meter in the tuner can facilitate tune-up. The circuitry required is shown in fig. 3(A), and the last photo shows a tuner variation which includes

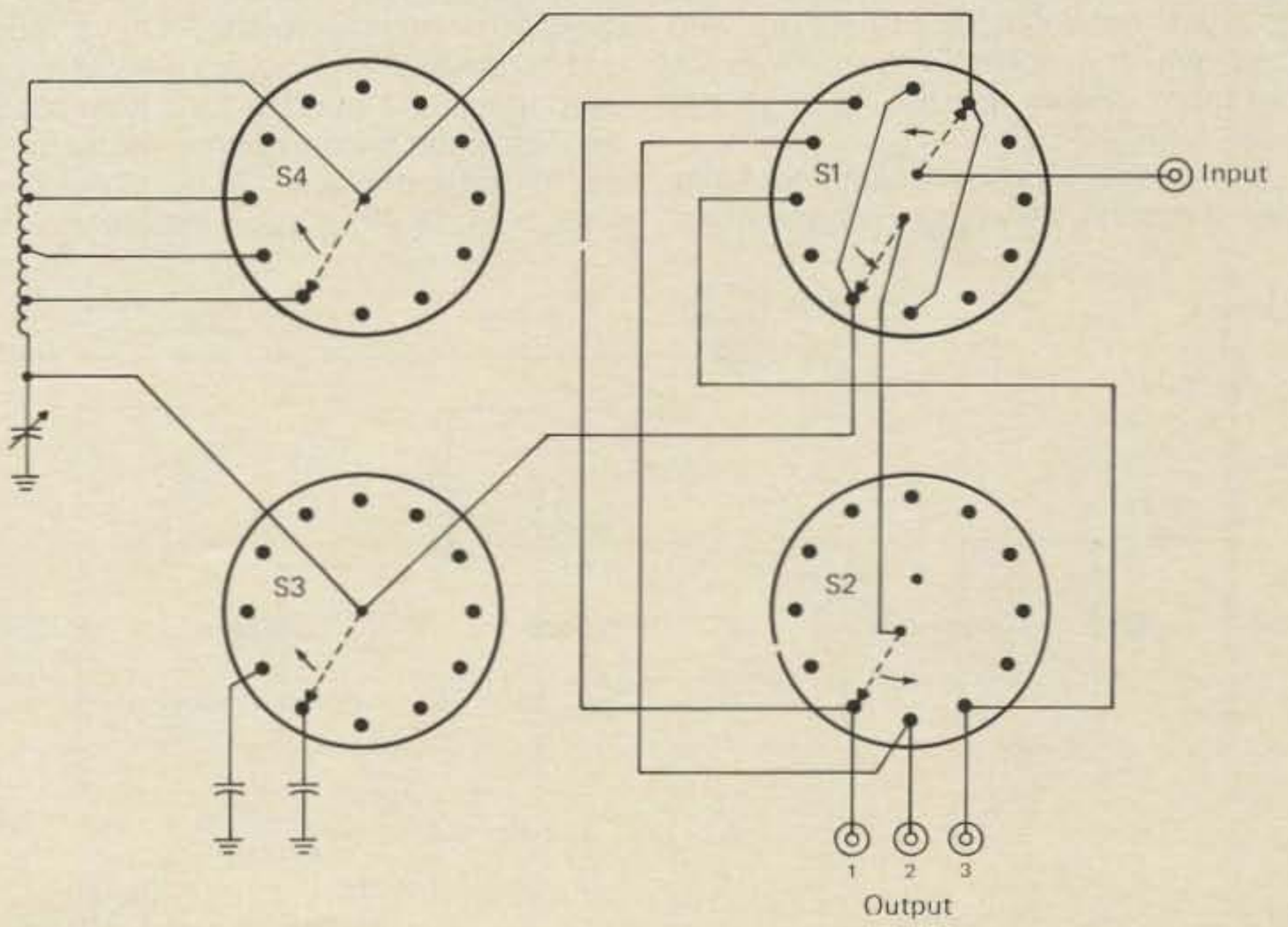
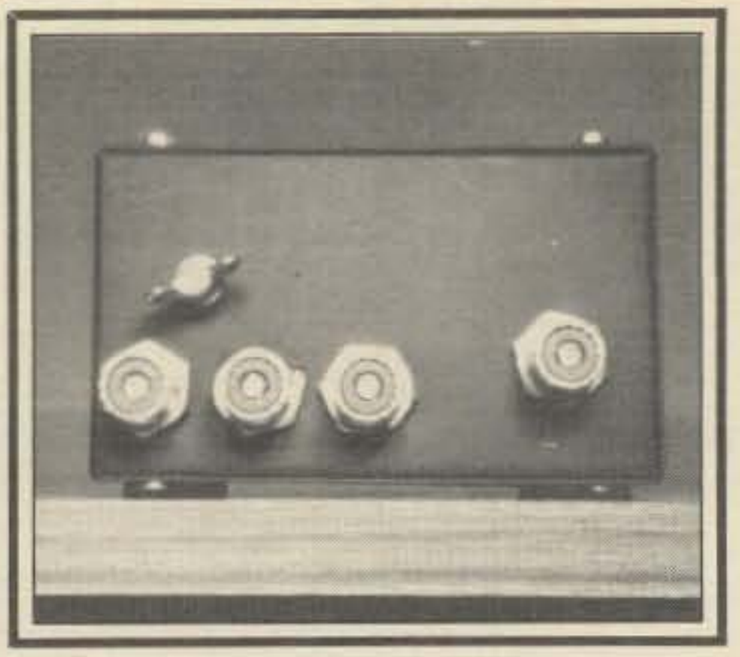
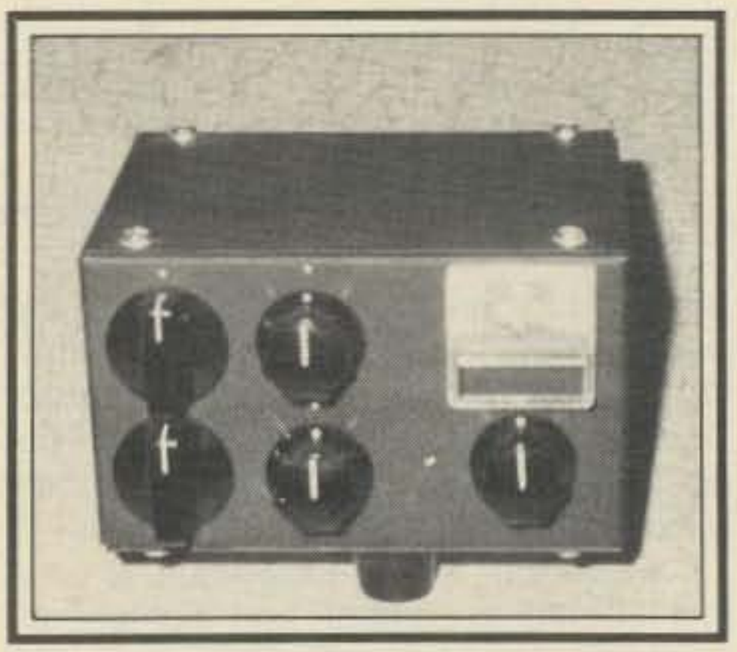


Fig. 2– This part pictorial, part schematic diagram shows the switch wiring as seen from the rear of the switches inside the tuner enclosure. If good high-frequency performance is to be achieved, short lead dress should be maintained. Ordinary 500 volt rated hook-up wire can be used.



Coaxial connectors and ground connection on the rear panel. Single hole mounting coaxial connectors are used.



This version of the tuner shows one way a front-panel meter can be added for use with a relative power output or s.w.r. sensing circuit.

a front-panel-mounted meter directly above the variable capacitor tuning. The meter itself is one of the ubiquitous 200μ amp Japanese types which sell for $1–2. The circuitry of fig. 3(A) is easily assembled on any sort of terminal strip and mounted internally near S2. The 25 K sensitivity control need not be front panel mounted since it can be pre-set using typical antenna loads. The variations in the readings obtained will usually not be that wide ranging when operating at the 100 watt level. Such metering is mainly useful to quickly obtain the setting of the L/C controls on the tuner. They are, of course, adjusted for maximum relative output reading. But, this adjustment should not be depended upon for final tuning. A peak in the relative output reading does not necessarily correspond to a 1:1 s.w.r. between the transceiver and tuner, which is normally the criteria for maximum power transfer through the tuner.

If the transceiver used does not have s.w.r. metering, very neat s.w.r. metering can be added to the tuner. There are many forms of r.f. pickup devices that can be used for s.w.r. monitoring. In the case of this tuner, the toroidial transformer circuit shown in fig. 3(B) is highly recommended. It is very compact, economical (the toroid costs less than a dollar) and basically self-shielding. It can be assembled on a small 1½" × 1½" piece of perforated board stock mounted on the side wall of the tuner near the input coaxial connector. The same metering is used as for the circuit of fig. 3(A). The only thing one does have to do with this circuit is check it for balance using a 50 ohm carbon resistor dummy load on any one of the tuner outputs selected. If the circuit was constructed carefully, the meter should read essentially zero with the switch in the REF position. If not, add a small 10 pf trimmer as shown in fig. 3(B), and on the highest frequency band to be used adjust the trimmer for a zero reading. The meter can, of course, be calibrated for different s.w.r.'s by simulating s.w.r.'s with various value load resistors.

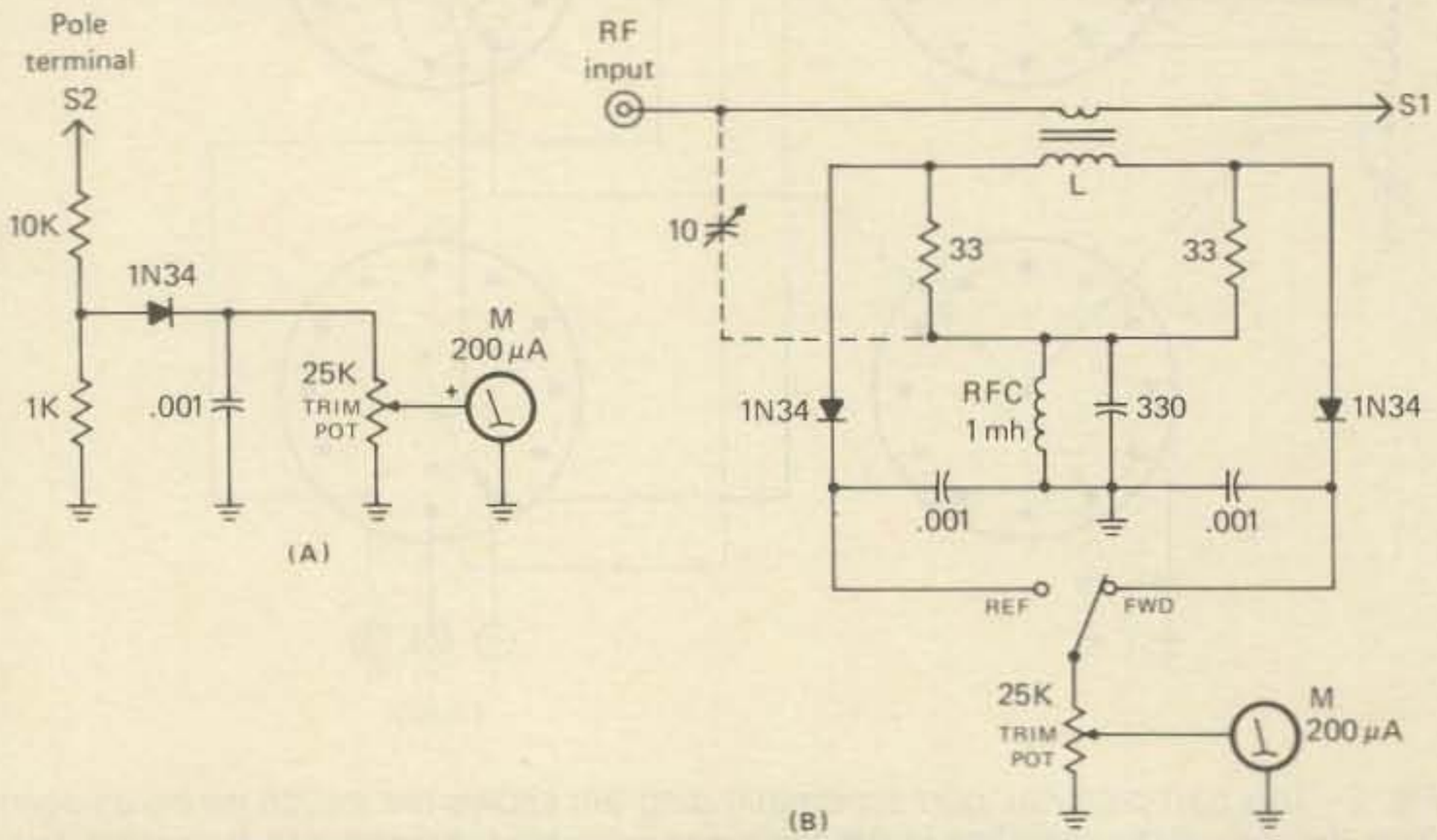


Fig. 3– Metering circuits which can be added to the tuner for either relative output or s.w.r. measurement. All resistors are ½ watt. L—Amidon T-68-2 core. Wind full with about 60 turns #28 enam. Primary is 2–3 turns hook-up wire.

In reality, this doesn't prove too much, since adjustment of the tuner is always made to achieve the lowest reading on the meter when switched to the REF position. Tune-up should always be done with low power, of course. Normally the null reading on the s.w.r. meter will remain fixed when power output is increased. If it doesn't, one should accept the tuning control positions found when using low power, provided the transceiver shows fully loaded collector current. The nonlinear action of the diodes in the s.w.r. circuitry and possibly saturation of the toroid core might account for a drift of the meter reading at different power levels. This is, by the way, a general rule and does not apply only to the circuit shown.

One can dress up the tuner in various ways, although a 3" × 4" × 5" utility box will never look like a Ten-Tec enclosure. The Radio Shack knobs shown in the front view go well with the tuner, and rub-on lettering can be placed on their skirts to indicate control positions. Two-tone painting of the covers and enclosure body can also be used to complement a given transceiver. Depending on how inexpensively one can buy the components necessary, the cost of the tuner can be held to $20–30. That is not a bad price for a very compact and versatile low-power tuner.

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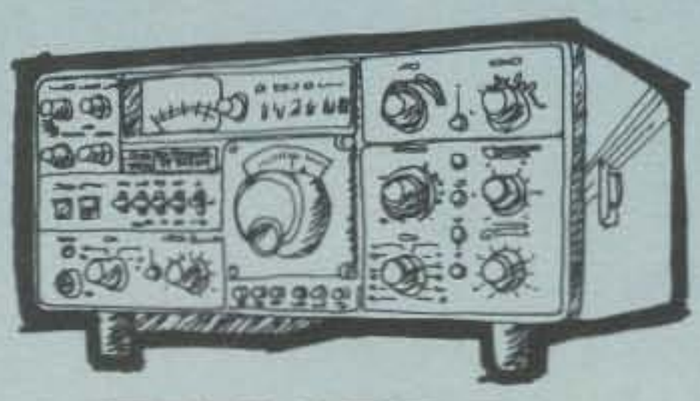

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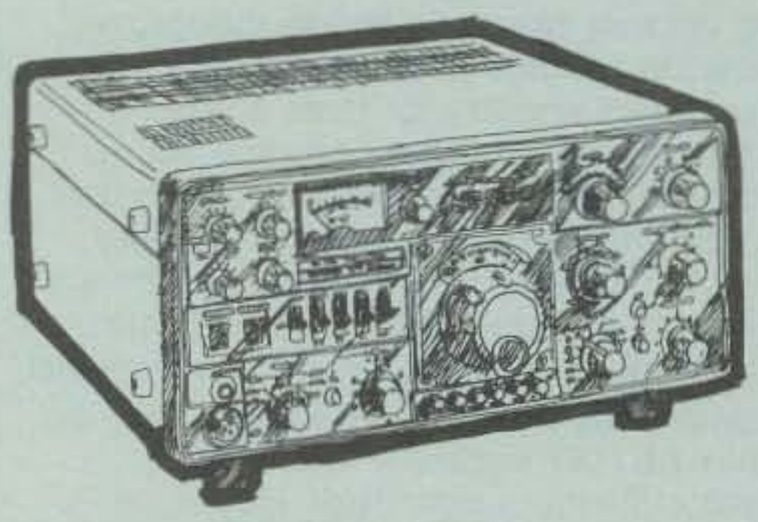

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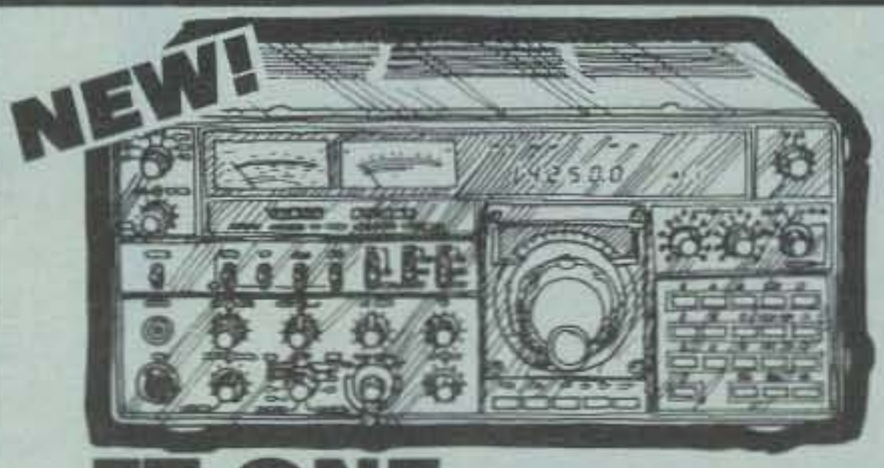

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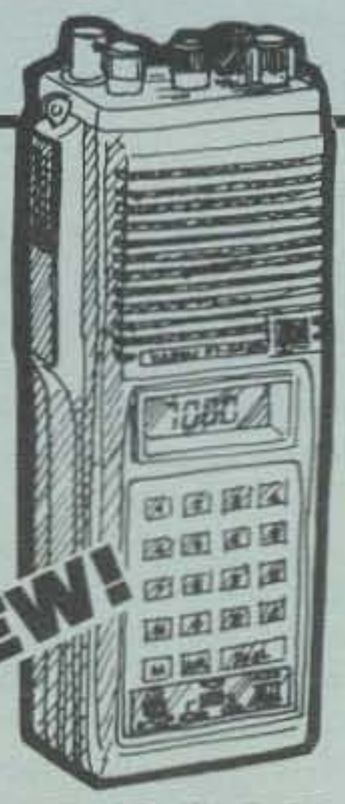

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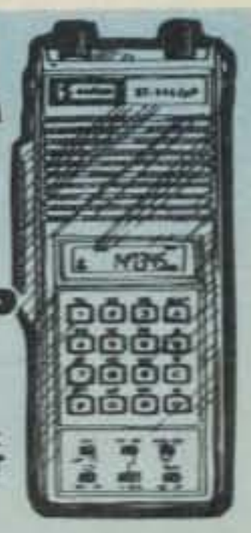

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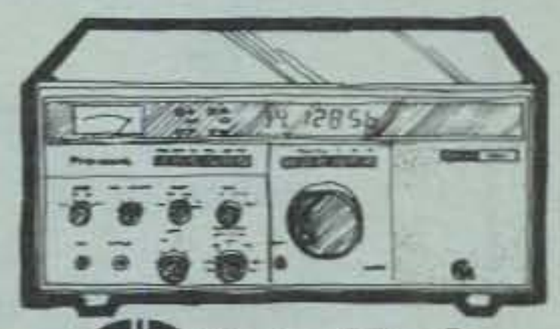

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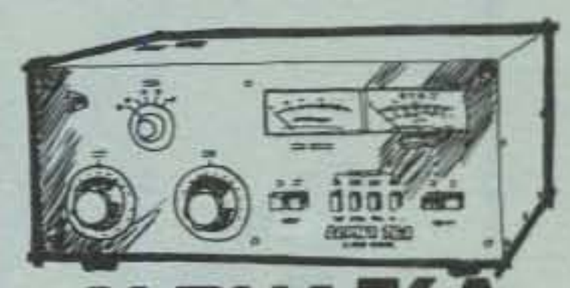

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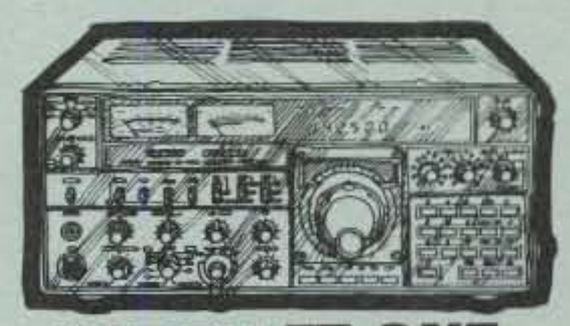

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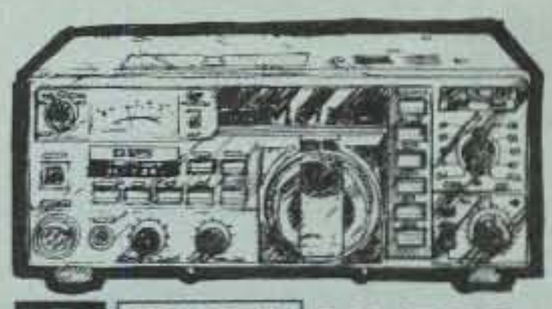

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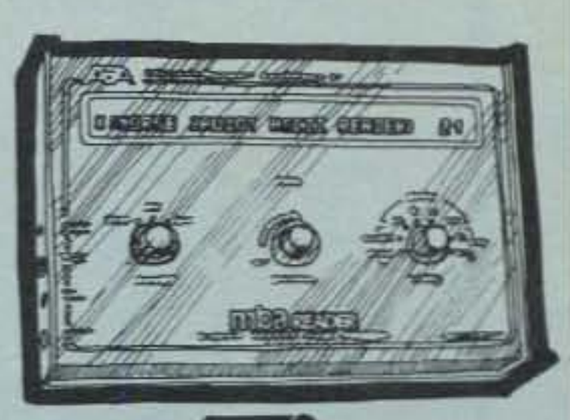

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QRP operation can be as exact a science as you wish to make it. G4BUE has achieved some remarkable data using his modified Argonaut.

QRPing With Milliwatts

Some Experiences Using Milliwatts With An Argonaut

BY CHRISTOPHER J. PAGE*, G4BUE

There are many amateurs throughout the world using QRP to achieve worldwide contacts. In fact, many of them have never used anything other than QRP since being licensed. With power levels ranging between 1 and 10 watts, schedules have been maintained, DXCC achieved, and contests entered and won. The definition of QRP, which is now accepted world wide and approved by The World QRP Federation, is 5 watts d.c. output or 10 watts d.c. input for c.w. Negotiations are continuing to find an agreed-upon level for s.s.b. Recently, several amateurs have been experimenting with input power levels much lower than this, being measured in milliwatts as opposed to watts.

The purpose of this article is to attempt to illustrate to those amateurs who never use less than their legal maximum power that it is possible to make contacts with much lower power. To those amateurs already convinced of this, it is an attempt to illustrate that they can continue to make contacts with even less power.

Let's initially examine the theoretical implications of decreasing power. Imagine a QSO is in progress and signal reports of 599 are being exchanged, which is very common between European stations on the h.f. bands. Suppose one of the stations is located in England and is running the maximum permitted power of 150 watts d.c. input, and the operator reduces power to 5 watts. This is equivalent to a ratio of 30:1, which corresponds to 15 dB, and assuming 6 dB is equal to one "S" unit, it represents a decrease in signal strength from S9 to S6/7. If the same operator further decreases power to 150 mW, which is an additional decrease of

The author's QRP station as described in the text. Precise measurements of power can readily be made.

15 dB, the signal strength should, in theory, drop to S4. A further reduction of 15 dB, and therefore to a signal strength of S1/2, brings the input power down to only 5 mW. Assuming a clear frequency and no QSB, all these signal strengths should be sufficient to enable the QSO to be continued. The total signal strength reduction from 150 watts to 5 mW is 45 dB, and this represents a reduction in signal strength to S7 of a 25 dB over S9 signal.

The point I am trying to make is that with a good antenna and reasonable band conditions, a genuine 25 dB over S9 signal is not too difficult to achieve on the h.f. bands (with 150 watts input). By reducing power to an input of only 5 mW, an S7 signal is obtained, which is quite adequate to achieve even DX QSOs.

Having shown that in theory it is possible to reduce power to quite low levels and maintain a QSO, let's examine how we can achieve these low power levels. My interest in using milliwatts was initiated after reading an article by Brice Anderson, W9PNE, which appeared in the Autumn 1978 edition of *Sprat* (the journal of the G-QRP-Club). Brice had been using milliwatt power levels for some time and had obtained WAC, WAS, and 36 countries with an input of only 500 mW. He used an outboard PA, which was constructed solely for QRP work at these low levels, and this is probably the most common method in use by other amateurs. I do not intend to describe circuits suitable for QRP outboard PAs, as there are many available in the various amateur handbooks (i.e., *Solid State Design for the Radio Amateur*, published by the ARRL).

The alternative to building an outboard PA is to modify an existing QRP transmitter, and I chose this method simply because I had just purchased a Ten-Tec 509 Argonaut for general QRP work. Although the description that follows is that used with the Argonaut, it can form the basis of similar modifications to other QRP transmitters, i.e., HW8, FT301, FT7, 120V, etc.

In its standard form the Argonaut has no provision for measuring input power. The dual-purpose meter built into the Argonaut is used as an "S" meter and an s.w.r. bridge with forward ("FWD") and reflected ("REV") positions. Reference to the operator's manual under the tune-up procedure (pages 1–2) directs the operator to set the meter to the "FWD" position and advance the drive control to indicate full-scale deflection with key down. This represents an input of 5 watts, and as there is a voltage of 12 volts on the PA, we can therefore assume that the current is approximately 417 ma.

In order to accurately measure input power, the installation of a 1 A ammeter was essential. Examination of the circuit diagram of the Argonaut shows that the r.f. amplifier board (80185) receives its 12 volts via L1 (fig. 1). It therefore seemed that the ideal position in which to install

*Alamosa, The Paddocks, Upper Beeding, Steyning, West Sussex, BN4 3JW England

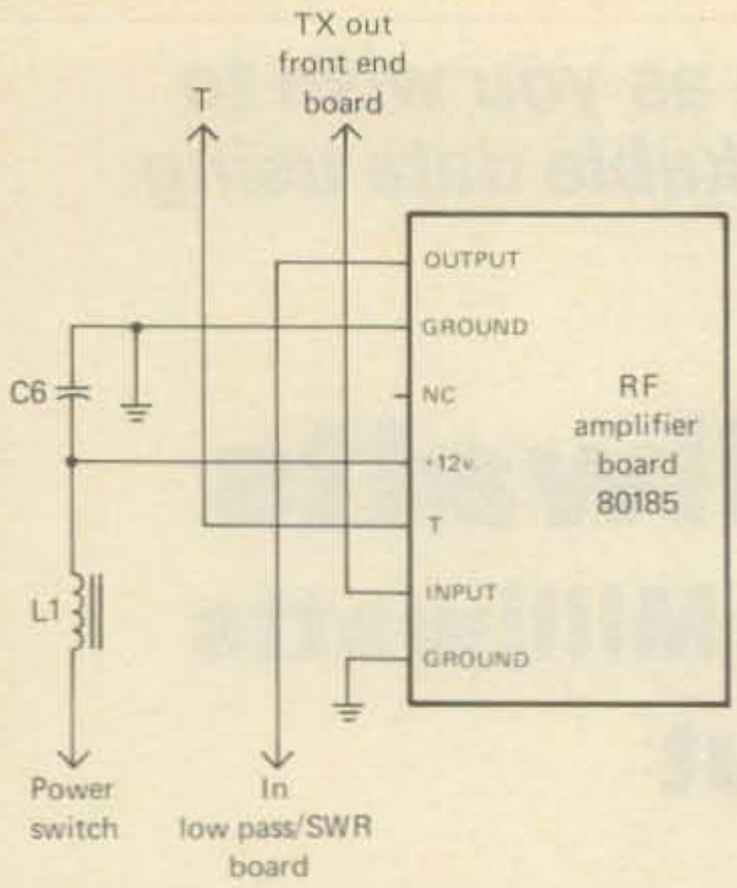

Fig. 1– Block diagram of the Argonaut r.f. amplifier board.

Input Power	Current
5 watts	417 ma
1 watt	83 ma
750 mW	62 ma
500 mW	41 ma
350 mW	29 ma
250 mW	20 ma
150 mW	12.5 ma

Table I– PA current of the Argonaut for different input power levels. (Note: These figures are based on 12 volts to the PA.)

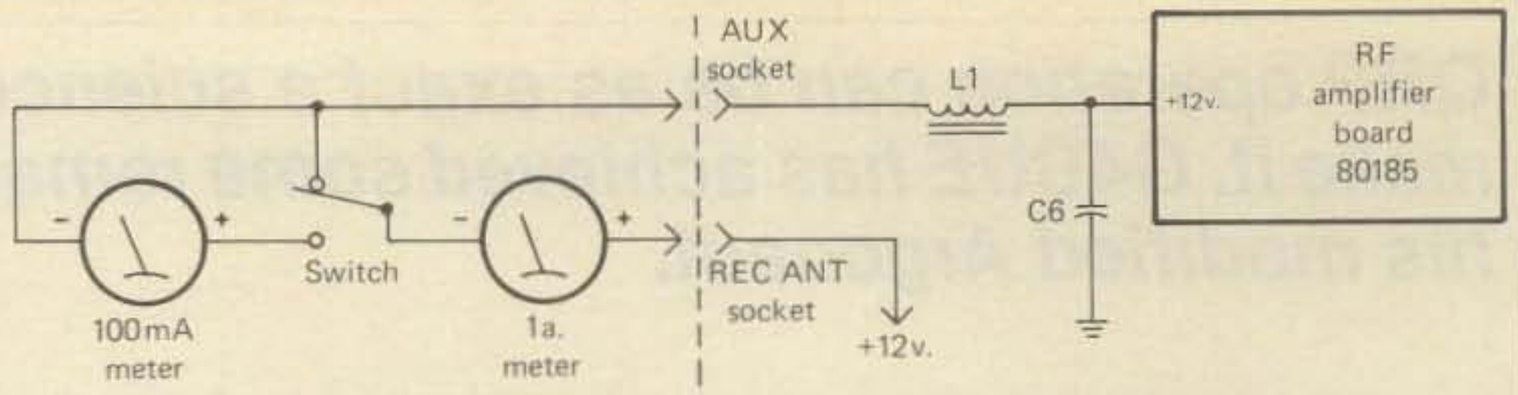

Fig. 2– The two meters are connected to the r.f. amplifier board via L1 and the two external jacks on the back panel of the Argonaut.

the meter was between L1 and the r.f. board. In addition to the 1 A meter, it was decided to install a 100 ma meter so that lower current readings could be made accurately, and to install both meters in a separate cabinet, with the capability of being able to switch the 100 ma meter in or out of circuit. A small pilot lamp was also installed in the cabinet to indicate when the 100 ma meter was in use, and this was to act as a reminder in a situation in which it was desired to quickly revert to the full input power of 5 watts.

After the meters had been installed in the cabinet, a means had to be found of getting the 12 volt line out of the Argonaut to the meter cabinet and back again, preferably without drilling any holes in the Argonaut cabinet. The "REC ANT" and "AUX" sockets on the rear panel of the Argonaut were not being used, so the internal wires from these sockets were disconnected and insulated. The wire attached to the 12 volt pin on the r.f. board was disconnected and reconnected in such a manner that one end of L1 was attached to the board and the other to the "AUX" socket. This was to act as the return for the 12 volt line. The 12 volt line inside the Argonaut was connected to the "REC ANT" socket, and the condenser, C6, connected between the – 12 v pin on the r.f. board and ground (fig. 2). Two sockets were mounted on the rear of the meter cabinet and two suitable leads were made up. A short jumper lead was also made up to fit between the "REC ANT" and "AUX" sockets to bypass the meter cabinet should the Argonaut be required for mobile or portable use.

The voltage to the r.f. board was checked and found to be exactly 12 volts on load, and the values shown in Table I were calculated. A check was then made to see if full-scale deflection of the Argonaut's meter in the "FWD" position did in fact correspond to 5 watts input. On each band full-scale deflection corresponded to approximately 417 ma on the ammeter, so all seemed to be going well.

The 100 ma meter was then switched into circuit, and the drive of the Argonaut was adjusted to show a current reading of 83 ma, i.e., an input of one watt. This caused the Argonaut's meter to just flicker when in the "FWD" position, as opposed to the full-scale deflection at the 5 watt level. (The meter used in the Argonaut is a 500 ua meter.)

During the weeks that followed many QSOs were made on the h.f. bands with power levels down as low as 150 mW, but soon the quest to obtain even lower power levels caused a further examination of the system being used. Up until that time, power levels below the standard 5 watts had been obtained solely by reducing the drive control of the Argonaut and therefore the current to the PA, while maintaining the voltage at 12 volts. When using 12 volts on the PA the standing current is approximately 10 ma, so it is not possible to accurately reduce the current much below the 12½ ma figure (an input of 150 mW). The only alternative was to reduce the voltage while keeping the current at 12½ ma. A voltmeter, showing a full-scale deflection of 25 volts, was then added to the two existing meters, and some dry batteries were obtained to enable PA voltages between 12 and 1½ volts to be selected in place of the standard 12 volts. By using a voltage divider on the 1½ volt cell, a voltage of 1 volt was obtained, which, with the current of 12½ ma, resulted in an input power of only 12½ mW. In this manner three U.S.A. stations were worked on 21 MHz during the 1979 ARRL C.W. Contest.

During a conversation with a local amateur, the question of efficiency of the PA at these low power levels was discussed. I was ashamed to admit that I had absolutely no idea what it was, but I assumed (quite wrongly as it later turned out) that it was in the region of 50%. The amateur worked in a test laboratory and had the use of a very expensive oscilloscope which he allowed me to use to accurately measure the output of the Argonaut and to calculate the efficiency of the PA when used at these very low power levels.

On 21 MHz, with an input of 5 watts, the Argonaut gave just over 2 watts output, which was about right. Output readings were then taken as the input power was gradually reduced, initially by reducing the current to 12½ ma and then by reducing the voltage, as described above. The result was that the efficiency of the PA reduced at about the same ratio as the input power. At the 12½ mW input level, the output was measured as 576 uW, giving an efficiency of only 4.6%. What was obviously happening was that changes in current and voltage were altering the impedance of the PA, thus making it less efficient. It then dawned on me that the three contacts I had made with U.S.A. stations in the ARRL Contest had been accomplished with an output power of just 576 uW, equivalent to over five million miles per watt! It seemed absolutely incredible that r.f. power of 576 uW had been sufficient to travel across the Atlantic.

The results of the tests with the oscilloscope made me do some deep thinking about what I was trying to achieve. It had shown that given the right conditions, contacts could be made with very small amounts of r.f. The next thing was to improve that 4.6% efficiency figure.

The Argonaut is designed, biased, and filtered for efficient operation at 5 watts input, and obviously any lower power operation without circuit or voltage changes will result in poorer efficiency. The output impedance of a transistor r.f. amplifier stage is given by the expression

$$RL = \frac{Vcc^2}{2\ PO}$$

RL = Collector load
Vcc = Collector voltage
PO = output power

The optimum load resistance therefore changes with the output power level, unless the voltage to the collector is also changed.

The next step was to find the correct

voltage and current combinations which would result in the most efficient operating of the PA. A simple r.f. output power meter was built to monitor r.f. output, based on the K8EEG and GM3OXX design (see *Sprat*, Spring 1980 edition), and the dry batteries were replaced with a variable power supply to the r.f. board only. A third ammeter was added to the voltmeter, and both meters were housed in a second cabinet. The additional ammeter had a full-scale deflection of 25 ma, and the four meters thus enabled voltage and current measurements to be accurately made to quite low levels. The photograph illustrates the two meter cabinets situated above the Datong r.f. clipper on the shelf above the Argonaut. Immediately above the Argonaut is a Datong FL1 audio filter and the Argonaut c.w. filter. The variable power supply for the PA is above the s.w.r bridge.

There then followed a very long series of tests using different voltage and current combinations to find the combination that gave the most r.f. out at different input levels. The results of the tests are shown in the graph of fig. 3, and note that the best efficiency line is constant throughout the power levels used. The voltages and currents used to achieve the best efficiency are shown in Table II, and it is interesting to note that when running the Argonaut at its standard input power of 5 watts, the PA was more efficient with 10 volts on the collectors of the transistors than the Ten-Tec designed 12 volts.

Having ascertained the most efficient method of running the PA at different input levels, the next step was to measure the r.f. output on the different bands and calculate the efficiency. The r.f. output meter was used and the results are shown in Table III. In order to accurately measure r.f. output, the services of my friendly amateur and his oscilloscope were again used, this time to calibrate the r.f. output meter. By fitting three switches and some resistors I was able to extend the range of the meter to indicate r.f. output from 200 uW to over 8 watts output in three separate ranges.

It will be noted from Table III that for the higher input levels (above 2 watts) there is not very much difference between the five bands, but at the lower input levels efficiency is better on the l.f. bands. The r.f. output meter was also used to measure the output from the driver stage of the Argonaut, and this was done by simply switching off the variable power supply to the r.f. board. The output of the driver stage, with the drive control fully advanced for the five bands, is shown at the bottom of Table III and varies greatly from one band to another. In a letter to me, Ten-Tec stated that the MRF 402 driver stage should easily deliver 100 mW (plus 20 dB). My measurements confirm this, with the exception of 28 and 14 MHz which are slightly under.

I have described in some detail the efforts I have made to use the PA of the Argonaut for milliwatt power levels in an efficient manner, but as stated previously, the same approach can be used for any other QRP transmitter. I hope that some of the steps I have described may save other amateurs some of the preliminary work, and give them some figures on which to commence their own experimenting. There is obviously room for further experimenting in that I have not yet tried reducing the bias to the base of the PA transistors to improve the efficiency of the PA.

Having shown that in theory it is possible to maintain QSOs with milliwatt power levels and having illustrated a method of achieving these power levels with the Argonaut, what else do we require to use our milliwatts of r.f. on the amateur bands to achieve QSOs? Those amateurs reading this who are already using QRP will know the answer—patience, skill, and cunning, and probably in that order! The mere fact that QRPers are using 5 watts instead of, say, 150 watts (and voluntarily giving away 2½ "S" units) means they have to find other qualities to compete with their QRO colleagues.

When you go one step further and give away 2½ "S" units to QRPers, those qualities of patience, skill, and cunning have to be used to an even greater degree if success is to be achieved. In addition, it is absolutely imperative that all the r.f. from the PA (or driver stage!) is radiated from the antenna, and that none of it is lost enroute. It is a good idea to remove anything between the transmitter and the feedline to the antenna—i.e., s.w.r. bridge, antenna switches, etc.—once initial set up has been done. It goes without saying, of course, that the antenna must be perfectly matched to the feedline, achieving an s.w.r. of as near 1:1 as possible. Attention to these matters will not only enable milliwatt QSOs to be made, but it will give the amateur the self-satisfaction that his station is being operated in the most efficient manner possible.

As to the practical approach of using milliwatts on the amateur bands, it is mostly a matter of common sense and experience coupled with the qualities previously mentioned. It is obviously a waste of time to call "CQ DX" when you are using 100 mW, as the chances of a reply are slim. A search of the bands will usually locate an amateur with a loud signal calling "CQ." If he does not answer your call when you are using 100 mW, try giving him another call after increasing the power to, say, 500 mW. I find that by keeping a

Input Power	Volts	Current	Input Power	Volts	Current
5 watts	10	500 ma	250 mW	2.25	111 ma
4 watts	9	444 ma	150 mW	2	75 ma
3½ watts	8	437 ma	100 mW	1.6	62.5 ma
3 watts	7.5	400 ma	75 mW	1.4	53.5 ma
2 watts	6	333 ma	50 mW	1.15	43.4 ma
1 watt	4.25	235 ma	30 mW	0.75	40 ma
750 mW	3.5	214 ma	15 mW	0.65	23 ma
500 mW	3	166 ma	10 mW	0.5	20 ma
350 mW	2.75	127 ma	5 mW	0.4	12.5 ma

Table II– Voltage and current combinations for the PA of the Argonaut at various input power levels.

Input Power (watts)	28 MHz		21 MHz		14 MHz		7 MHz		3.5 MHz	
	R.F. Out	Eff.	R.F. Out	Eff.	R.F. Out	Eff.	R.F. Out	Eff.	R.F. Out	Eff.
5	3.3	66	3.47	69.4	3.23	64.6	3.3	66	3.3	66
4	2.6	65	2.6	65	2.6	65	2.6	65	2.6	65
3	1.92	64	2.008	66.9	1.925	64.1	1.95	65	1.95	65
2	1.102	55.1	1.45	72.5	1.3	65	1.3	65	1.3	65
1	.618	61.8	.624	62.4	.624	62.4	.643	64.3	.643	64.3
0.75	.43	57.3	.446	59.4	.446	59.4	.466	62.1	.473	63
0.5	.31	62	.31	62	.322	64.4	.334	66.8	.334	66.8
0.35	.187	53.4	.196	56	.196	56	.223	63.9	.223	63.9
0.25	.152	60.8	.157	62.8	.157	62.8	.169	67.6	.169	67.6
0.15	.1	66	.108	72	.104	69.3	.112	74.6	.110	73.3
0.1	.062	62	.0672	67.2	.0685	68.5	.0698	69.8	.0688	68.8
0.075	.044	58.6	.0484	64.5	.0484	64.5	.0492	65.6	.0477	63.6
0.050	.021	42	.0242	48.4	.0242	48.4	.0258	51.6	.0252	50.4
0.030	.0147	49	.0150	50	.0152	50	.0154	51.3	.0155	51.6
0.015	.005	33.3	.00585	39	.00642	42.8	.0068	45.3	.0068	45.3
0.010	.003	30	.00397	39.7	.00397	39.7	.00424	42.4	.00443	44.3
0.005	.001	20	.00144	28.8	.00144	28.8	.00144	28.8	.00144	28.8
Driver Only (Max. drive)	.0992		.165		.0992		.221		.141	
5 watts Input as per Ten-Tec Handbook (12V on PA)	2.6	52	2.42	48.4	2.6	52	2.6	52	2.775	55.5

Table III– Measurements of the output of the driver stage taken with the output of the driver stage going through the r.f. board.

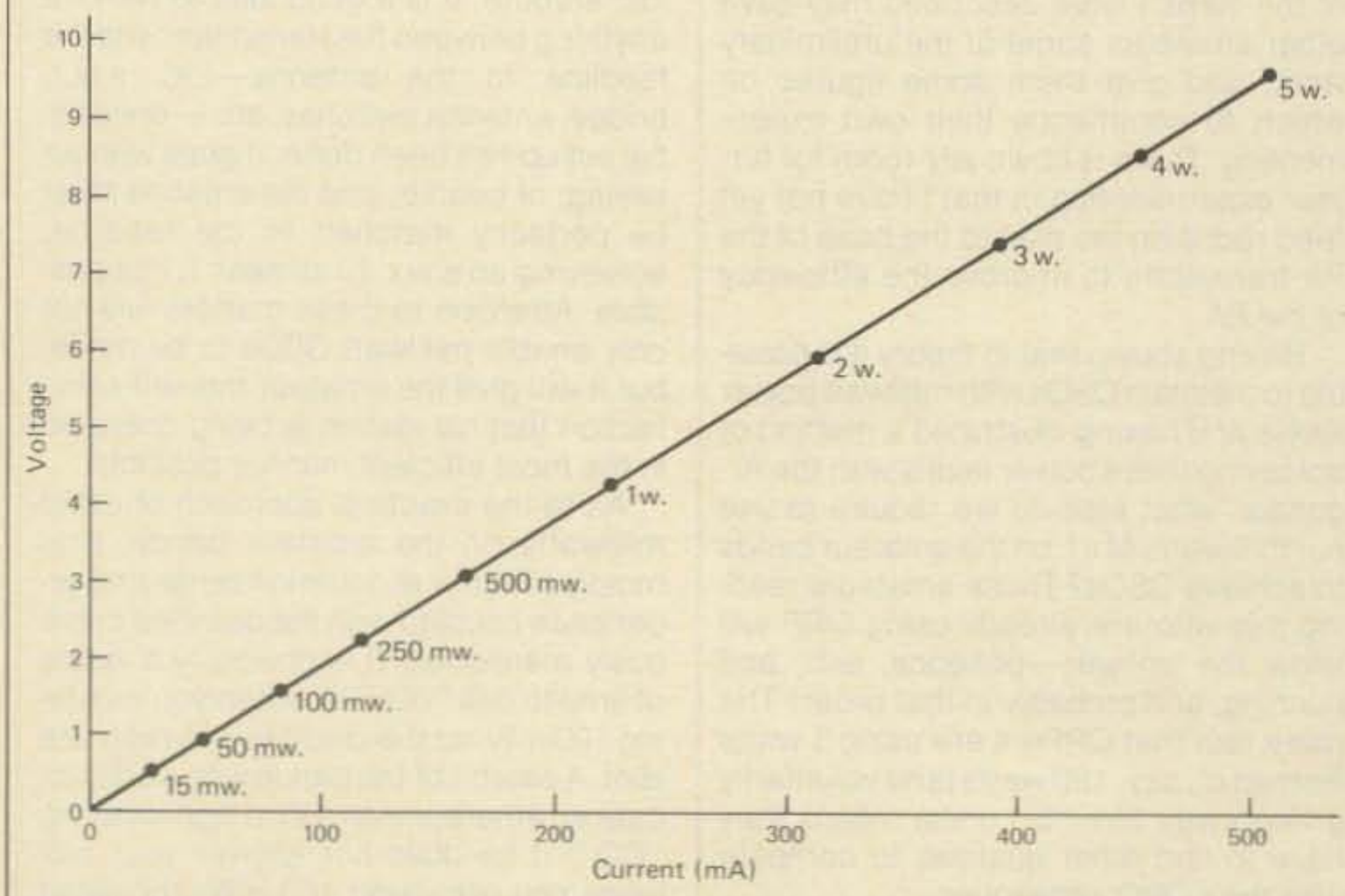

Fig. 3– Efficiency of the system can be tabulated using several voltage and current combinations.

card with the figures in Table II close to my rig, I am able to change very quickly from one power level to another.

The world-wide contests are an excellent method of assessing the performance of milliwatts. The large multi-multi transmitter stations usually stay on one frequency for long periods working contest-type QSOs, and the input power can gradually be increased each time you call until contact is eventually made. In this manner I find that an added bonus is that you very quickly discover which of the loud signals from the multi-multi transmitter stations are due to antennas and which are due to high power! Those who hear you calling when you are only running a few milliwatts can hear you due to good antennas and receiving capabilities. I usually find that although the majority of these stations are received at the same signal strength, it is always the same ones who hear my milliwatt calls on each band. That must prove something!

Experience with milliwatts will quickly teach you to assess signals you hear on the bands and the minimum power that you require to make contact with them. After the initial thrill of working DX while only using a few milliwatts, you tend to become a little blase about it and take for granted that it can be done. It is interesting to call a DX station without mentioning the fact that you are QRP, and after exchanging the usual information, casually mention that your input power is 100 mW, or whatever the case may be. It is also interesting to start a QSO while running 5 watts and gradually reduce power while obtaining a signal report each time, i.e., to see whether the reduction in signal strength is consistent with the theoretical reductions in power outlined at the beginning of this article.

Some examples of reducing power tend to give conflicting reports, as the following "on the air" examples will show. YV1NX was worked on 28 MHz and the following reports were received: 5 watts 589, 1 watt 549, 500 mW 439, and 100 mW 329. GM3AWF was worked on 7 MHz with these reports: 5 watts 579, 1 watt 559, 500 mW 549, 150 mW 549, 50 mW 339, and 15 mW no copy. K4JD was worked on 28 MHz and gave me 599 at 5 watts, 579 at 500 mW, and 539 at 5 mW. YU1OXA was worked on 21 MHz and gave me: 1 watt 599, 350 mW 569, 150 mW 559, and 50 mW 339.

Obviously, when conducting the above experiments you are in the hands of of the amateur at the receiving end, but a pattern gradually emerges showing that reasonable signal reports are received with very low power inputs. My own yardstick for award claims, etc., when working with milliwatts (and I think also the yardstick of the majority of other amateurs) is not to claim contacts made by reducing power as described above, but only to count those where contact was made by initially calling and exchanging the relevant in-

formation at the power level in question. For instance, Brice Anderson, W9PNE, has just completed WAS at 250 mW, and all his contacts were made at that power level and not by initially calling at a higher level. Brice is now attempting to do it again, but this time using only 100 mW. I am currently attempting WAS with an input of 750 mW, and to date 43 states have been worked, all on 28 MHz c.w.

Another amateur who has been experimenting with milliwatts is Petr Doudera, OK1DKW, and his favorite power is 300 mW output. I have given him a 559 report on 3.5 MHz at this level. Petr, however, went one step further than working with milliwatts by using microwatts! Using an input of only 600 uW, Petr had a QSO with a G4 station on 21 MHz using a tube transmitter with only 3.72 volts on the PA.

Petr's experiments with microwatts prompted me to give it a try. The first problem I encountered was that of accurately measuring the input power levels below the 5 mW figure previously used. To achieve the 5 mW figure I had already reduced the voltage to 0.4 and the current to 12.5 ma. As the standing current of the Argonaut was 10 ma, the only method was to reduce the voltage even further. I reduced the voltage to 0.05 volts and noticed that the standing current dropped to 4 ma. I was then able to operate with an input of 500 uW with the voltage at 0.05 and the current at 10 ma. With this method a 559 report was received from OH2BQS during the 1979 ARRL 28 MHz Contest. I did not take too much notice of the 559 report, as contest reports do not tend to be very accurate. However, the OH station had not only heard me call him, but had copied my call sign correctly. In the same contest I then worked UL7LAW and N8II, but had to increase the power to 750 uW (by increasing the current to 15 ma) to do it. I finally worked UK2GDZ with the current at only 5 ma—i.e., an input power of 250 uW. It then dawned on me that I had worked three continents with a maximum input power of just 750 uW!

After the contest I attempted to measure the output of the PA while running at microwatt input power levels, but found that it was becoming impossible due to the very small readings registering on the output meter. I also discovered that although the drive control of the Argonaut was at a low setting at these levels, the output of the driver stage was greater than that of the PA! The r.f. registering on my output meter was not output from the PA, but leakage from the driver stage through the PA, because due to the very low voltage applied to the collectors of the PA transistors (0.05 volts), they were not being switched on.

Ten-Tec had previously advised me that it would be in order to bypass the r.f. board completely and have the output of the driver stage (situated on front end board 80262) going into the input of the low pass filter/s.w.r. bridge board 80260 (presumably, the output impedance of the driver stage is approximately 50 ohms). The necessary wiring was done, and a small switch was fitted to enable me to select the input to the low pass filter/s.w.r. bridge board from either the output of the driver or the PA. I then made a further set of measurements of the output of the driver stage, but this time bypassing the r.f. board as follows: 28 MHz—.117, 21 MHz—.197, 14 MHz—.104, 7 MHz—.24, and 3.5 MHz—.143. It is interesting to compare these figures with those in Table III taken with the output of the driver stage going through the r.f. board. The 100 mW, or so, of r.f. from the driver stage can then be reduced further by reduction of the drive control.

I then took this one step further and routed the output of the transmitter mixer stage (on board 80261) direct to the low pass filter/s.w.r. bridge and measured the output with the meter. The results are as follows: 28 MHz—.001, 21 MHz—.0007, 14 MHz—.000225, 7 MHz—.0015, and 3.5 MHz—.00035. On the strength of the QSOs I made with the U.S.A. during the ARRL Contest in 1979 (12.5 mW input and 576 uW output), the transmitter mixer stage of the Argonaut should be capable of achieving QSOs!

I then decided not to bother with input power levels below 5 mW, but instead to use output power as my standard. By only using the driver stage and reducing the drive control accordingly, I was able to obtain various output levels on the different bands. A scale was drawn onto a small piece of paper which was then stuck onto the front panel of the Argonaut beneath the drive control knob. This enabled me to select different output powers quickly and without using the output power meter each time.

The *CQ* C.W. WPX Contest in May 1981 seemed a good opportunity to do some experimenting with these very low output levels, as for once, ideal band conditions had coincided with a major contest. The results of the experiments staggered me! During Saturday evening between 2000 and 2130 GMT when 21 MHz was "wide open" to North America, I made a number of QSOs, gradually reducing output levels as the log extract shows:

2017 W9OA 15 mW
2023 W0WP 4 mW
2033 W1RX 1.5 mW
2039 K8HV 625 uW
2046 VE3PCA 450 uW
2123 KB8SX 200 uW
2139 AB2E 200 uW

Apart from the 559 report received from W9OA, all reports received were the usual contest 599! Although I accept that my true signal strength was obviously much lower than 599, in each case the other station correctly copied my call sign and signal report to him.

In the same contest, during Saturday, I made QSOs with KH6XX, PY2DLK, OH9UW, JH3LPT, K1XA, and EA8TY with an input of 250 mW for WAC. KG6DX was also logged with an input of 150 mW, and during Sunday QSOs were made with UK8MAA, ZW4OD, EA8TY, K4KZE, and UK2PCR to complete WAC at that power level.

Besides being a very satisfying weekend for QRP DXing, it proved that given the right band conditions, communication can be conducted world-wide with low input levels and on a particular path with very low output levels, even amongst the QRM of a major contest.

Where do we go from here? I think it will be interesting to repeat these experiments in a few years time at a period of sunspot minimum. As mentioned earlier, I am convinced that a good and efficient antenna system is a very important factor in achieving DX QSOs with very low power levels. What I do not know is how important high sunspot activity is. In a rather morbid sort of way I am looking forward to the low sunspot years and to one of those rare days when 21 and 28 MHz open world wide so that I can repeat the above experiments and compare the results.

The approach to QRP operation can be as simple or as complex as you like. On the more relaxed side, W4FA reflects on a QRP operation he initiated while on vacation some time ago.

A Florida QRP Tale

BY JOHN J. SCHULTZ*, W4FA

Going on vacation for a few weeks in isolated parts of southern Florida and the Keys can be a lot of fun. However, after a time one realizes that there is a lot of sense to the saying about "only Englishmen and mad dogs being foolish enough to go out in the heat of the noon-day sun." So, to fill in a few of the leisure hours, I started wishing I had brought some QRP gear along. Naturally, in the haste of getting ready for vacation and with the desire to get away from it all, nothing at all associated with amateur radio had been brought along. It became a bit of a challenge to see what could be done in such a situation, starting absolutely from scratch, to get a small QRP station going in a short period of time.

A little bit of telephoning to Heath's ordering department got a HW-8 QRP transceiver kit on its way. Of course, some of the other QRP equipment on the market, such as Ten-Tec's, could just as well have been ordered by telephone. The HW-8 took four days to come by UPS, which may not sound extremely fast, but the QTH was a bit out of the way on one of the Keys. Undoubtedly, post office delivery would have taken much longer.

Once the kit arrived, it became necessary to get a few tools together in order to assemble it. I am a great believer in using proper tools for electronic assemblies, but, on the other hand, if one exercises patience and a bit of judgment, reasonably priced tools will suffice for the assembly of most relatively simple kits such as the HW-8. There is no need to purchase expensive, "electronic quality" tools unless one does really intricate electronic assembly work. With these thoughts in mind, a visit to one of the local discount houses yielded some quite good buys in their hardware/automotive section. A pair of long-nose pliers cost $2, a somewhat large but still perfectly usable pair of diagonal cutters cost another $2, a set of eight screwdrivers with a "torque multiplier" handle cost only $1, and a 30 watt soldering iron cost $2.50.

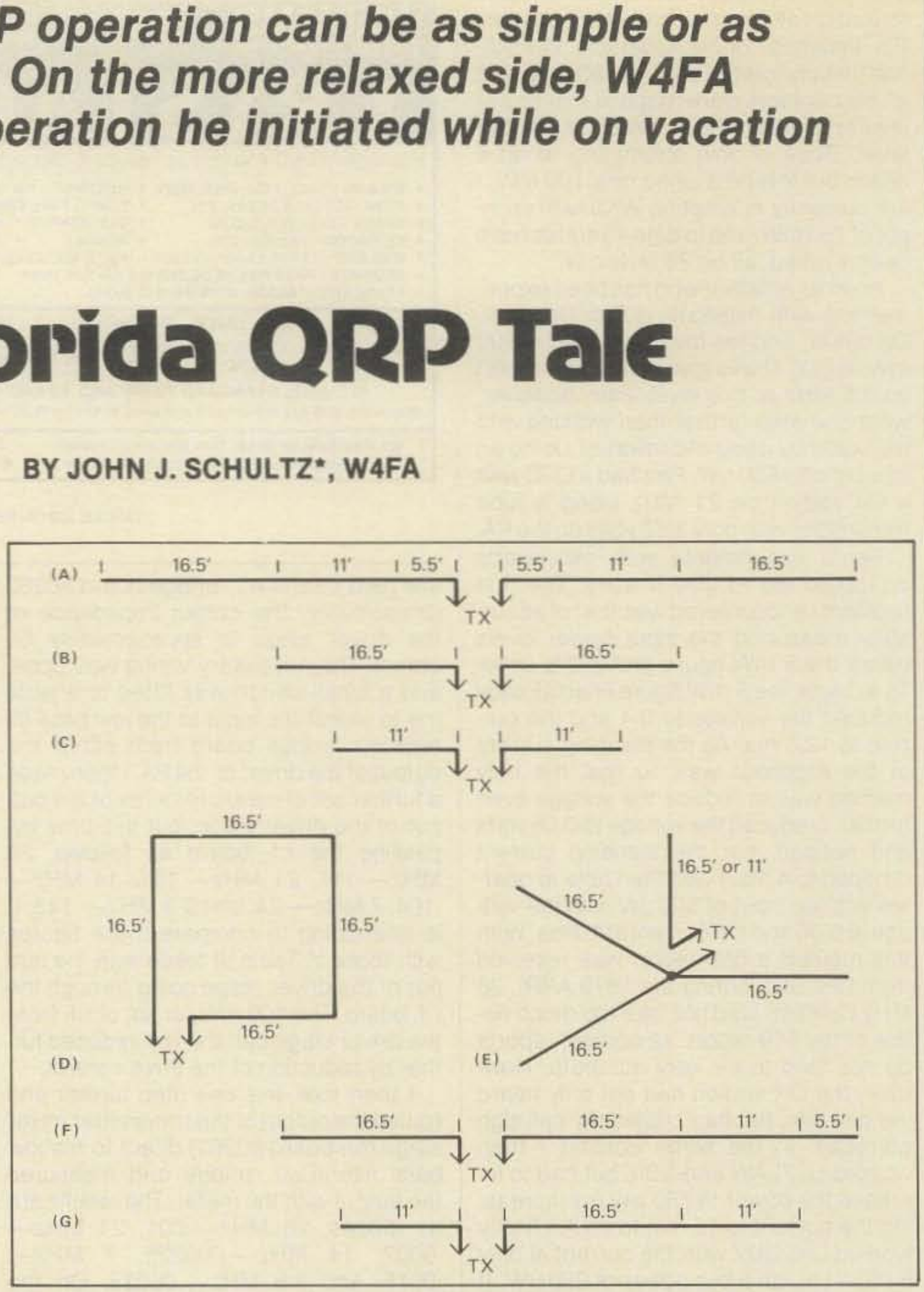

Fig. 1– Various antenna forms that can be assembled for 40, 20, or 15 meter operation using a pre-cut kit of six wire sections.

Admittedly, the quality of these tools was not such that one would want to make them a permanent part of one's shop collection. However, they proved perfectly adequate for this type of kit and cost far less than assembly tools from an electronics supply house. The store also had a good assortment of wire which could be used for stringing up temporary antennas. Picture-frame wire is very flexible and tough and not too expensive at about 40 cents for 15 feet. However, the best buy was some small-diameter galvanized-steel wire which sold at 50 cents for 120 feet. Besides the tools and wire, a standard 12 volt lantern battery was also purchased to eventually power the HW-8.

The only item that posed a bit of a problem was a key. In retrospect, it would have been better to order a simple key with the HW-8 kit. It might have been possible to construct some sort of temporary key out of a lever-type microswitch purchased from an electrical supply house or perhaps even to find a crude CPO with a key in a toy store. However, rather than getting too primitive about the whole affair, a 40 mile trip was made to the nearest Radio Shack store and a proper key was purchased. Besides, the trip provided an excuse to visit another Key on the way which had an interesting bird sanctuary. The Radio Shack item purchased (#20-1084) was a Japanese version of the old Signal Corps J-38 key. It proved to be a very good, smooth operating unit. Considering that it even had ball-bearing piv-

*c/o CQ Magazine

ots, the $5.95 price for it was quite reasonable.

Since building the HW-8 kit was not the prime purpose of being on vacation, its construction was not too rushed. The kit assembled rather easily, although the placement of what seemed like a few hundred components on the one main PC board did tend to get a bit tedious. The HW-8 took parts of four days to assemble. The result, of course, was a compact, 4-band c.w. transceiver with v.f.o. control and a 2–3 watt input to the final. The features of the HW-8 have been covered in detail in various articles, so they won't be gone over here. However, one should note that the HW-8 is a pretty well self-contained station. A sidetone oscillator for c.w. monitoring is built-in, and a "loading" control (a 150 pf variable in series with the antenna output) does not completely take the place of an antenna coupler, but still provides a fair amount of flexibility in working into varying antenna loads. To get on the air, one needs only to connect an antenna, key, earphones, and a 12 volt battery.

The HW-8 manual does call for a v.t.v.m. and a calibrated receiver (or frequency counter) for alignment. In reality, the v.t.v.m. is not absolutely necessary, as the tuned circuits can be peaked using the relative r.f. output meter built into the HW-8. The only thing one has to be careful of is to get the v.f.o. calibrated properly. The actual adjustment to do this is very simple, but an inexperienced amateur should be warned against doing it just by "listening to the bands." The uncalibrated v.f.o. in the HW-8 which was assembled was, for example, a good 100 kHz off the dial markings. I had a portable shortwave receiver with a built-in crystal calibrator, and this was used to align the v.f.o., although a respectful distance from band edges was maintained in actual operation "just in case" until access could be had later to more accurate test equipment. In another situation, one might try to get the use of a frequency counter for a few minutes at a local TV repair shop. If one were going to work QRP with a crystal-controlled transmitter, all alignment problems would, of course, be avoided. In such a case, it is suggested that one procure crystals for 3.554, 7.040, 14.065, and 21.040 MHz, or nearby frequencies, if applicable for one's class of license. QRP operators tend to listen around those frequencies. Novice class operators might best use frequencies near the lower limit of their subband allocations.

Once a QRP rig is operating, the next big step is the antenna. I have done quite a bit of QRP operating, and a lesson learned many times over is that results are mainly dependent on a good antenna and operating practices. Operating QRP with an indoor or partially indoor location for an antenna, such as from a motel room, becomes a doubly challenging situation. Indoor antennas can take any number of forms, and one must simply experiment a bit to obtain the best results.

The basic indoor antenna kit that I used consists of six lengths of wire with simple alligator clips at both ends. There are two lengths each of 5.5, 11, and 16.5 feet. These particular lengths can be clipped together to form various antennas for 40, 20, and 15 meters as shown in fig. 1. Fig. 1(A), (B), and (C) illustrates simple dipoles for 40, 20, and 15 meters. Fig. 1(D) shows a loop-type antenna for 40 and 20 meters. The loop is ½λ on 40 meters and 1λ on 20 meters. The feedpoint impedance on 20 meters is a bit high for a rig such as the HW-8 to match, but, nonetheless, good results have been obtained at times with this antenna form. Fig. 1(E) shows a ground-plane-type antenna which can be used on 20 or 15 meters. The vertical portion is made 16.5 feet for 20 meters or 11 feet for 15 meters, while the radials are left at 16.5 feet for either band.

Various other antenna forms can also be made using the six basic lengths of wire. Fig. 1(F) and (G), for example, shows ⅝λ antennas which can be formed for 20 or 15 meters. If one connects all the lengths of wire together and works the antenna against ground, one will have a ¼λ antenna for 80 meters.

Although one can start with some of the antenna forms illustrated, there really are no hard and fast rules where indoor antennas are concerned. One can try loading up almost anything metallic that is safe to touch, although metallic screens, railings, etc., that face the outside of a room are an obvious first approach. In lieu of having an antenna coupler and/or s.w.r. bridge handy, one can use a dummy-load resistor first and note transmitter loading or relative r.f. output and then compare the indication obtained to that using an antenna or whatever one is trying to use to load the transmitter. The HW-8, for instance, has a relative r.f. output meter and comes with a 50 ohm dummy-load resistor. So, one can alternately plug in the dummy-load resistor and the actual antenna load on the output to compare meter readings.

Often, by folding some section of a given antenna form back on itself or by moving a section around a bit inside a room, the same loading effect as with a dummy load can be obtained. This sort of maneuvering doesn't indicate anything specific, but it at least provides some indication in the absence of an s.w.r. meter that the transmitter output is really being successfully coupled into the antenna to achieve a transfer of power. Most QRP rigs are extremely tolerant of mismatches and high s.w.r.'s. It is certainly the case with the HW-8, as it was loaded and operated with what must have been very high s.w.r.'s for extended periods of time.

The first location from which I attempt-

ed to operate in the Keys most certainly must have been one of the worst possible. I was in one unit of a complex of one-story villa/motel units which were set back a few hundred yards from the ocean and shaded by coconut palms and various other dense vegetation. Initial operation was attempted using the HW-8 one evening on 40 meters using an indoor dipole antenna hung more or less Z-shaped inside a villa and placed as close as possible to the roof. Many stations were heard, but after two hours of operation absolutely none could be raised. This was in spite of the fact that care was taken to use what are regarded as pretty well proven QRP operating techniques. These techniques, or rules of thumb, can generally be stated as follows:

1. Never call CQ except very sparingly on some of the frequencies previously mentioned for QRP operation. Certainly don't bother to do so on any other frequencies.

2. Listen for stations calling CQ and then don't reply unless you cannot hear any other station replying after the end of the CQ transmission. Emphasize the CQ calling station's callsign in your reply rather than your own. Even if the station doesn't get your callsign immediately, the fact that the other station becomes aware that he is being called will make him remain on the frequency.

3. Listen for stations with particularly strong signals who are already in QSO. Tune in on the frequency being used, and when the QSO is finished, immediately call the stronger of the two stations briefly. If there is no response, call the other station briefly. Very often either one or both stations will continue to listen on the frequency just out of curiosity, although they are finished with a QSO and might even intend to shut down.

QRP operators will tend to differ in their viewpoints on operating techniques, and certainly I do not claim to have found the best techniques. But in general, and based on a 100% scale, the success rate of the three approaches mentioned has tended to be 10%, 30%, and 60%, respectively.

The second night of operation from the villa proved to be a completely different experience. The antenna was changed around with the Z-shaped dipole being replaced by the form of fig. 1(D) strung horizontally as high as possible inside the villa. CO2QR was heard calling CQ and easily raised. The signal report received was 599! Of course, Havana was only about 90 miles away from the QTH in the Keys, but nonetheless, it was a good start. K4SV in Orlando was called after he had finished a QSO and was also worked. Raising a dozen more stations on 40 and 20 up and down the east coast proved to be no problem, although none of the signal reports matched that first 599.

During subsequent weeks the QRP rig saw service from various indoor and outdoor locations in Florida. Some of the motel locations were ideal, as several had a balcony or veranda overlooking the Atlantic or the Gulf of Mexico. It didn't take much experimenting at all in such cases to find an antenna form that would work. Usually a dipole proved best with as much of the dipole as possible being strung outdoors even though it required folding some of the dipole back on itself. Since the rig was battery powered, all sorts of outdoor locations were tried, ranging from locations under a coconut palm with a $\frac{5}{8}\lambda$ vertical wire up to a palm leaf to locations at the various oceanside, wayside picnic areas. One of the more interesting of the latter was in Jensen Beach, Florida. There one of the "things to do" is to keep a late-night vigil (in season) to see giant sea turtles come up on the beach to lay their eggs. It must have been quite a sight for some passersby to see me at a picnic table using a telegraph key and occasionally shining a flashlight on a radio (the HW-8 has no dial lamp). No one asked, so maybe the activity passed as being part of a turtle alert network!

All in all, no great DX was ever worked, but all call areas and a few South American and European stations were worked. In addition, a lot of fun was had, and that can't be measured by QSO statistics alone.

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QRP-QRPp What's It All About?

BY LEW McCOY*, W1ICP

It has been many years since I was a QRP aficionado, or to put it bluntly, a low-power nut. But believe it or not, at one time I thought I had the world by the tail if I could work from the south side of Chicago to the north side with 15 watts—big deal! However, our noble leader, Al, K2EEK, said, "McCoy, this month our specialty is going to be QRP, so why not write something on the subject." One does not deny K2EEK, so here goes.

In the first place, QRP means "Shall I decrease power? Decrease power." At least that is what it meant in 1974 as stated in *The Radio Amateur's Handbook*. Somewhere along the line, at least in 1982, I couldn't find the "Q" code in the *Handbook*, so one can assume that is what it still means. So when an amateur says he is going QRP, it means he is going to lower power. How low is low? Well, according to the 1982 *Handbook* (in the Mobile, Portable, and Emergency Equipment chapter) the ARRL definition of running QRP is 10 watts input for a measured 5 watts output (bad efficiency?). QRPp, to quote the *Handbook*, is defined as follows: "The expression "QRPp" has been adopted by some low-power enthusiasts to mean 'very low power.' It is not recognized by the ARRL." In any case, FCC rules state that minimum power should be used to maintain communications. Few, if any, amateurs follow this rule. But, for the sake of discussion, let's ignore that point and discuss what is called QRP operation. One thing for sure, QRP no longer means "shall I reduce power?" It means "I am going to run a few watts input and see what I can work."

Let's get some ground rules out of the way—and in this case I am speaking from many years of experience, with no prejudice, mind you. QRP operation is definitely not for the average Novice. Absolutely not! The newcomer needs all the power he can muster or is allowed until he obtains enough experience to handle QRP operation without becoming completely frustrated. No matter what anyone tells you, amateur radio is a competitive hobby, and there is lots of competition; therefore, you need signal strength as a beginner to get the job done. Under some circumstances QRP operation will provide such strength, and I'll cover those conditions—normally, for 80- and 40-meter operation. Novices need power. Why? To overcome poor antennas, installation mistakes, and QRM. As long as you don't have the Q code, QRM means man-made interference, and in amateur radio that means competition!

All this may sound like I am putting down QRP or QRPp operation. Not so! What I am saying is that extremely low-power operation is for the experienced and can be more fun and rewarding than almost anything. Hmmmm? Not too many years ago one amateur became relatively famous (or infamous) for getting on the DXCC honor role by never running more than 35 watts—at least I recall that it was some low figure like that. And the reason I say infamous is because this amateur would occasionally raise a rare DX station on high power—and I do mean high—and then ask the rare DX to listen for his QRP. Naturally, this all took time and tended to irritate immensely anyone waiting to call and work the rare DX. I know, because many times I waited—and cursed!

In this instance, QRP was 35-watts input, and regardless of what most of us thought, it was a heckuva feat. So what is QRP? I guess ARRL 10-watts input is as good an interpretation as anyone's, but I do prefer better efficiency. And while they don't recognize it, let's say that 10 dB less, or 1 watt less, is QRPp. Now that is low power! I am sure that someone will take me to task, but let's call this a *CQ* first and establish that 1 watt input or less is QRPp operation. Someone can correct me, but I don't believe that *QST*, *Ham Radio*, or *73* ever established such a standard. (Where I live here in the Southwest, everything either stings, bites, or eats you, so I am not afraid to set a standard, hah!)

The Bands—Or Don't Be Ridiculous With 1 Watt!

Just about every CBer who became a Technician quickly discovered 2-meter f.m. He knows if he lives out here in the west, using only 1-watt input he can work at least 100 miles in any direction (back east it's usually 30 to 50 miles). That's lots of miles for low power with QRM-free signals. But when our CBer suddenly upgrades to General and gets on the 20- or 80-meter phone band, forget about 1-watt input. Note that I said "phone" band. You'll need far more than a watt to get a signal out on those bands. The low bands—160, 80, and 40—can be contact bands for QRP or QRPp, but you need patience, acquired operating skill, and a doggone good antenna.

Should you operate phone on these bands? Usually the answer is a flat no. But smart operators can pick their spots and get in a short QSO (oh yes, QSO means contact). The answer for operating these bands is to use c.w. Don't spend too much time calling CQ. You are better off answering a call; the odds increase enormously. What do you hope to achieve running QRP? It is just that—a sense of achievement. Set a simple goal, such as WAS or something else. Every contact you make will make you feel real good. Your fellow club members will probably think you are loco, but you know what you are doing, so challenge them.

In any event, 160, 80, and 40 are high signal absorption bands, and they are the toughies. For 20, 15, and 10 the going is much easier. I recall recently converting a 5-watt CB rig to 10 f.m., and on my first test with 5 watts I got a 5-9 plus from Japan. Now you know that gave me a thrill! Again, pick your spots and your goals and you will find these higher bands a challenge. We already know that very low power, even QRPp, will do an amazing job above 10 meters, so there is no need to discuss operation on v.h.f. with QRP.

Our own Ade Weiss, W0RSP, has been hard at work preparing probably the most complete book on QRP and QRPp. His legendary achievements with his own de-

*200 Idaho St., Silver City, NM 88061

No - 4#-42

signs and his series of HW-8 modifications have started many a ham on the road to low power. To also show what can be done, the ARRL's new President, Vic Clark, W4KFC, has earned DXCC using QRP.

Will My Transceiver Run QRP?

You probably already have a QRP rig and don't know it. I am constantly amazed at hams who have 100-watt transceivers and don't realize that simply by turning the gain down they can go QRP. Power bridges are easy to come by; I described the construction of one in Feb. 1982 *CQ*. So all one needs to do is feed a tone into the rig, even a whistle will do, and reduce the power output to 5 watts or so. *Voila*, you are running QRP! You can run c.w. or phone, but don't expect your meters to move. Also, there have been plenty of QRP rigs described by Ade Weiss in his QRP articles in *CQ*, and the *ARRL Handbook* is also a good source. My former boss, Doug DeMaw, W1FB, at the ARRL got on a QRP kick and did a lot of fine articles on QRP. Write to the ARRL Technical Service and ask for references. Believe me, they are loaded. I used to answer the mail.

Antennas—Or Get It Out

The most—and I do mean the most—important facet of getting a signal out is using a good antenna. This means getting the antenna as high as possible and as much in the clear as possible. Experiment with antennas. Play with antennas. Put up antennas. Take down antennas. Read books on antennas. Study antennas. After 30 or 40 years you'll know as much as I or the rest of the so-called experts do, and that isn't a heckuva lot. But no matter how one cuts it, antennas are the answer to QRP, or high power for that matter. I could spend pages writing about the towers I put up, the towers I lost. Would you believe I lost one yesterday? But one must keep trying, assuming the good wife doesn't go completely bananas, or your neighbors don't start to believe you are a ham and that you're not putting up clotheslines.

The answer to achieving in QRP or QRPp is really antennas. Equipment helps, but that's no big deal. Set your goals as I said earlier. You'll get a tremendous feeling of accomplishment when you make low-power (oops) QRP contacts. I have said this many times before, but I think it bears repeating: Whenever you are working DX or QRP and chasing a new contact, think positive! If you say to yourself that you know the turkey on the other end is going to come back to you, he usually will. But if you have negative feelings, you quickly become a loser. I am not saying ESP works, but it certainly helps! Remember QRP or QRPp is a real challenger, so you need all the help you can get to score. And may the force be with you! ▣

Here is another in the treasure-trove of modifications to the Heath HW-8.

Bandswitch Indicating Lights For The HW-8

BY WHEELER T. THOMPSON*, W4KMS

There have been a number of modifications to the HW-8, which is an excellent little rig in itself. I have made several of them to my own HW-8, but there was one improvement which I had not seen done before and which I had been wanting to do for some time.

I have my HW-8 sitting on a shelf on my desk from which position it is very easy to operate. However, sometimes it was hard to tell which bandswitch was pushed in. I thought it would be nice to have some kind of pilot light above each switch so that I could tell which bandswitch was pushed in. I decided to see what could be done.

At a local Radio Shack store I found just the size pilot light that I wanted. They had 2 LEDs on a card for 69¢. The voltage rating on these LEDs is 1.6 volts, so a dropping resistor had to be used with the HW-8 power supply. A 480-ohm, 1-watt resistor which I had on hand worked very well. The bandswitches have a set of contacts that are not used. By using these contacts, when each switch is pushed in the LED connected to each switch will light and indicate the proper band.

Modifications

Remove all knobs and take off the outside front panel and the cabinet top. Mount the LEDs in the center and just above each push switch. Measure the distance from the top of the chassis down to the wiring which runs along the bottom front of the chassis. Make sure the leads from the LEDs come through the chassis above the wiring and not into or below it. This measurement puts the holes to be drilled in the front panel on the top line of the darker painted part of the panel (see fig. 1).

*1112 Littlepage St., Fredericksburg, VA 22401

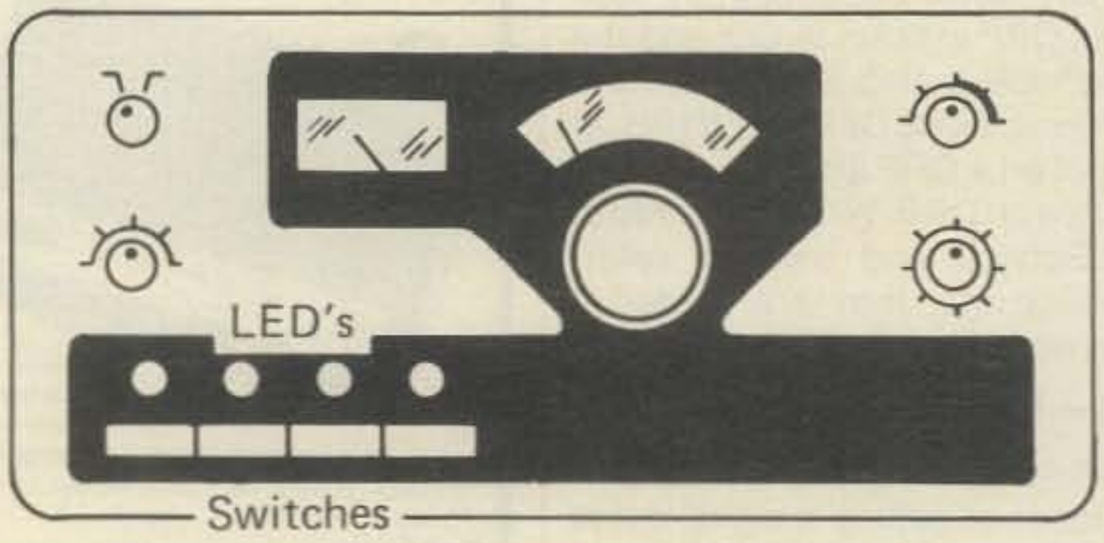

Fig. 1– Position of LED indicating lights.

Lay the front panel on a flat surface, painted side up, and with a punch make a slight indentation on the line above each switch. Then through the panel drill a hole just large enough for each LED to protrude through. Place the front panel back on the HW-8 and drill these same holes into the front of the chassis. Remove the front panel and enlarge the holes in the chassis. (Make sure the chassis wiring is pushed down so it will not be damaged.)

These LEDs normally have short leads, so add a small bare wire several inches in length to each lead. Then cover each wire with spaghetti tubing so the wires will not short together.

The hardest LED to put in is the one over the 3.5 MHz switch. Remove the capacitor and pull the leads through this hole just far enough so that the LED will protrude just outside of the chassis. Remount the variable capacitor. The other LEDs for the 7, 14, and 21 MHz bands are put into the front panel holes with a little cement before mounting the front panel. To mount the panel, guide the leads from each LED into and through their respective holes in the chassis. When the panel is close to the chassis, guide the other LED (3.5 MHz) into its hole in the front panel. Then push the panel to the chassis and secure it with the necessary hardware.

The unused contacts on the band switches are the fifth and sixth contacts from the front and on the left row (see fig. 2).

Connect one lead of each LED to pin 6 of each switch. Connect the other lead from each LED to the 480-ohm resistor, and then connect the resistor to the plus voltage (13 volts). Pins 5 of each switch are connected together and then to ground. When each switch is pushed in, the LED over it will light, as pins 5 and 6 are connected together, completing the circuit.

I have been using the arrangement for about 2 years now and have not had any trouble. 73

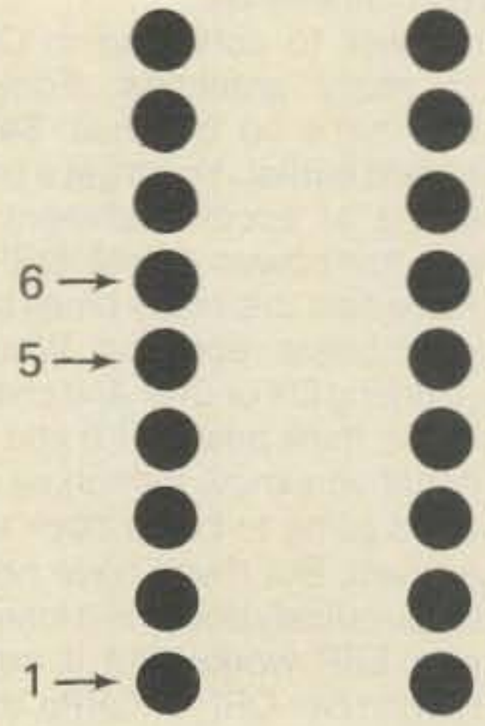

Fig. 2– Bandswitch contacts used in the simple modification.

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Flexible antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line, or tuner bypass for dummy load.

12 position efficient airwound inductor for lower losses, more watts out.

Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

Works with all solid state or tube rigs.

Easy to use, anywhere. Measures 8x2x6", has SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides.

4 Other 300W Models: MFJ-940B, $79.95 (+ $4), like 941C less balun. **MFJ-945, $79.95** (+ $4), like 941C less antenna switch. **MFJ-944, $79.95** (+ $4), like 945, less SWR/Wattmeter. **MFJ-943, $69.95** (+ $4), like 944, less antenna switch. Optional mobile bracket for 941C, 940B, 945, 944, $3.00.

MFJ-900 VERSA TUNER

MFJ-900

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Handles up to 200 watts output; efficient air-wound inductor gives more watts out. 5x2x6".

Use any transceiver, solid-state or tube.

Operate all bands with one antenna.

2 OTHER 200W MODELS:

MFJ-901, $59.95 (+ $4), like 900 but includes 4:1 balun for use with balanced lines.

MFJ-16010, $39.95 (+ $4), for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B VERSA TUNER II

MFJ-949B

$139.95 (+ $4)

MFJ's best 300 watt Versa Tuner II.

Matches everything from 1.8-30 MHz, coax, randoms, balanced lines, up to 300W output, solid-state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W, 50-ohm dummy load, SWR meter and 2-range wattmeter (300W & 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case 10x3x7".

MFJ-962 VERSA TUNER III

MFJ-962

$229.95 (+ $10)

Run up to 1.5 KW PEP, match any feed line from 1.8-30 MHz.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected.

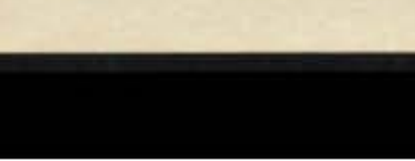
6 position antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines.

4:1 balun. 250 pf 6KV cap. 12 pos. inductor. Ceramic switches. Black cabinet, panel.

ANOTHER 1.5 KW MODEL: MFJ-961, $189.95 (+ $10), similar but less SWR/Wattmeter.

MFJ-10, 3 foot coax with connectors, $4.95.

MFJ-984 VERSA TUNER IV



MFJ-984

$329.95 (+ $10)

Up to 3 KW PEP and it matches any feedline, 1.8-30 MHz, coax, balanced or random.

10 amp RF ammeter assures max. power at min. SWR. SWR/Wattmeter, for./ref., 2000/200W.

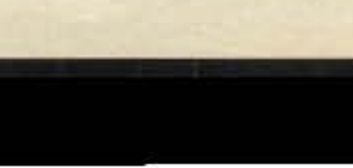
18 position dual inductor, ceramic switch.

7 pos. ant. switch. 250 pf 6KV cap. 5x14x14".

300 watt dummy load. 4:1 ferrite balun.

3 MORE 3 KW MODELS: MFJ-981, $239.95 (+ $10), like 984 less ant. switch, ammeter. **MFJ-982, $239.95** (+ $10), like 984 less ammeter, SWR/Wattmeter. **MFJ-980, $209.95** (+ $10), like 982 less ant. switch.

MFJ-989 VERSA TUNER V



MFJ-989

$329.95 (+ $10)

New smaller size matches new smaller rigs — only 10-3/4Wx4-1/2Hx14-7/8D".

3 KW PEP. 250 pf-6KV caps. Matches coax, balanced lines, random wires 1.8-30 MHz.

Roller inductor, 3-digit turns counter plus spinner knob for precise inductance control to get that SWR down.

Built-in 300 watt, 50 ohm dummy load.

Built-in 4:1 ferrite balun.

Built-in lighted 2% meter reads SWR plus forward/reflected power. 2 ranges (200 & 2000W).

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CQ Reviews:

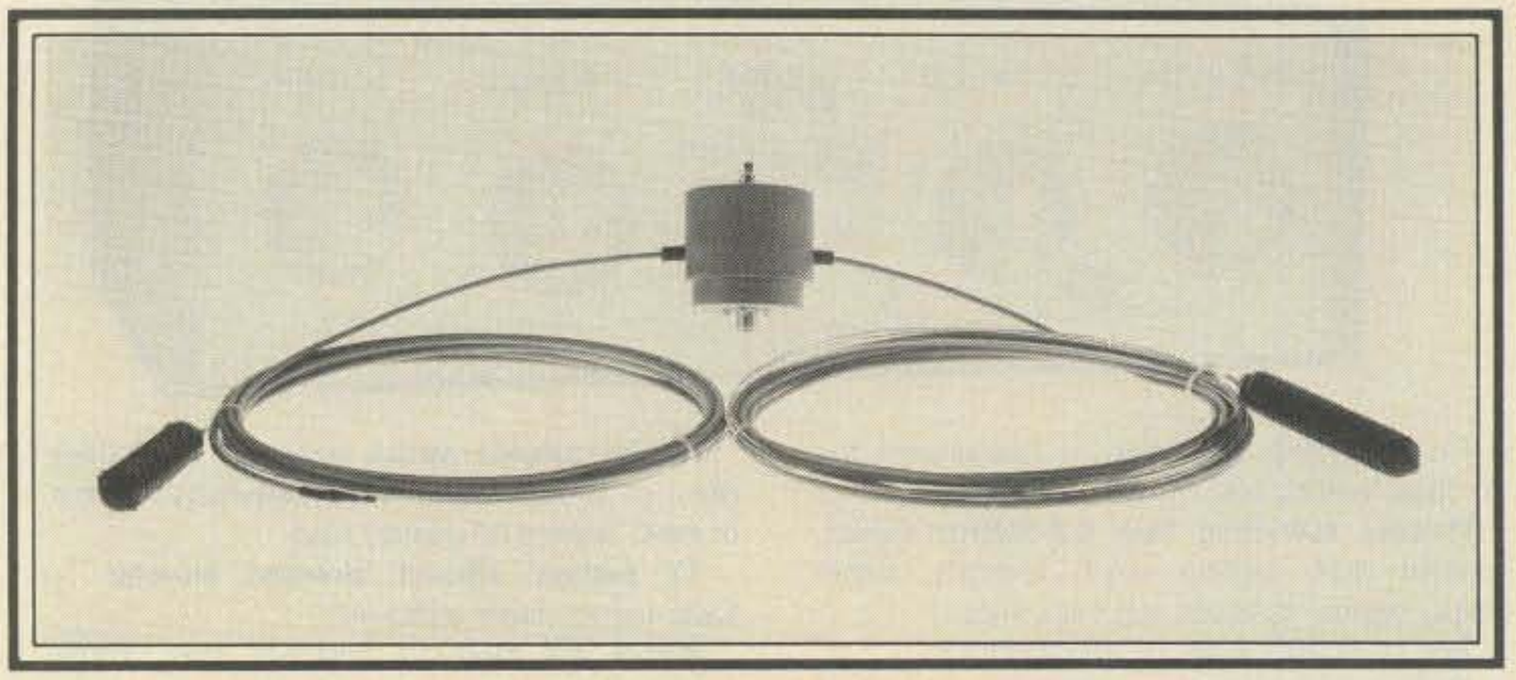
The Snyder Antenna Corp. 80 Meter Broad-Band Dipole

BY LEW McCOY*, W1ICP

Back in January 1982 I stated in my *CQ* article on s.w.r., "I have yet to see an antenna that would present an s.w.r. of less than 3 or 4 to 1 across the 80-meter band." I could have qualified the statement by discussing the "Wullenweber" antenna, which is used by the military and is flat from 3 to 30 MHz but costs several million dollars—not exactly a ham antenna! Actually, a dipole cut for 3750 kHz would run up to 7 or even 10 to 1 at the band edges simply because 80 meters is such a wide band, with a bandwidth ratio of 8 to 1 (500 into 4000).

In all my years of experimenting with 80-meter dipoles—and these included dual systems fed jointly for 3500 and 4000 kHz, matched dipoles also fed jointly on the same frequencies, and "Butterfly" types of dipoles—I never achieved what I considered a "flat" dipole for 50-ohm coax feed (and, I might add, these included the so-called "coaxial dipoles").

However, when my January article appeared, I received an "unsigned" letter taking me to task about my statements, and it appeared that the letter originated from someone in Snyder Antenna Corp. I received the letter on Christmas Eve, but I was determined not to let it spoil my holiday. Normally, I would never answer an unsigned letter, because that is like the ham who gets on the air, tells another ham he is breaking the rules, and then fails to sign his own call! It is just better to keep your mouth shut and forget it. But because it was the brotherly love season, I answered the letter, sent it to Snyder Antenna Corp., and pointed out a few facts of life about antennas. The unsigned letter I had received stated that the Snyder antenna was essentially flat across the 80-meter band. In my letter I had said that if they wanted to put their money where their mouth was, send me their antenna and I would check it out according to their specs and publish the results in *CQ*. I received a pleasant response from their board chairman apologizing for the unsigned letter and stating that they would send me an 80-meter dipole for tests, and it arrived shortly thereafter.



This is the 75/80 meter Snyder antenna. The heavy-duty construction is apparent.

The 80-meter model is extremely rugged, as evidenced by the photo. The installation instructions on the antenna drew me up short because they specified that the feed line should be an exact multiple of a half wavelength. This gets a little sticky, as without exception, the s.w.r. on a line (disregarding the losses in the line) is always established by the impedance of the antenna and the impedance of the line. The line value is always fixed at 50 ohms (assuming 50-ohm coax), so if one divides the impedance of the antenna by the line impedance, the result is the s.w.r., and that does not change regardless of the line length (except for losses). Technically, specifying a half-wave feed line could mean many things, one of which is that the feed line is part of the antenna, which of course is normally forbidden.

Well, I said, so be it, and I installed the antenna exactly as they specified with regard to height and feed-line length. To say I was shocked by the results is putting it mildly! The s.w.r. curve across 80 meters (3500 to 4000 kHz) was as good as or better than their specs! Their requested configuration was inverted V, or horizontal (and I tried it both ways) at least 40 feet high at the apex, and a multiple of a half-wave of feed line. Their s.w.r. curve and mine are shown in fig. 1. However, without getting technical and giving you a lot of reasons, I decided to try the "worst case condition" on that feed-line business, so I added an exact quarter wavelength of coax and tested again. The s.w.r. curve was just about the same as before—excellent!

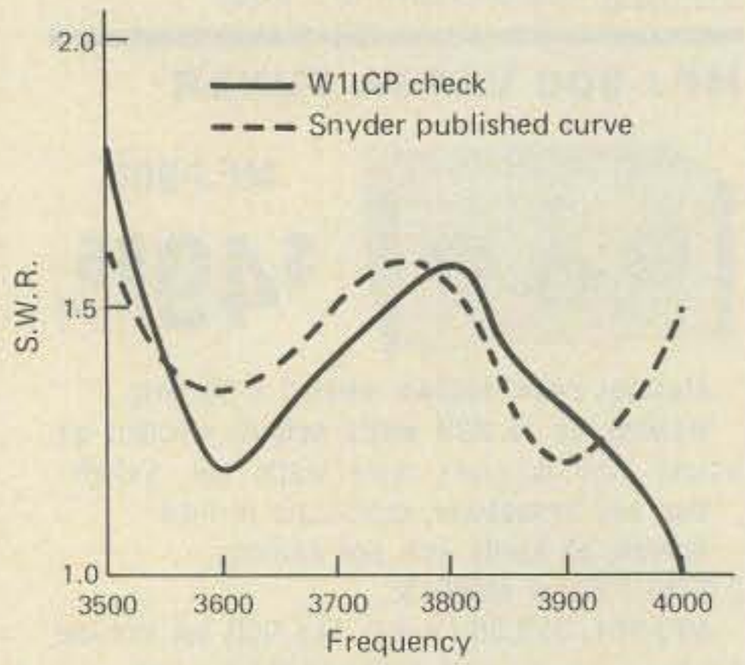


Fig. 1– These are the s.w.r. curves of the 80-meter antenna. The solid line is the one checked by the author, and the dotted line is the curve shown in Snyder's literature. Actually, the differences are small enough to be slight measurement errors. Also note that at no place on the band does the s.w.r. go above 2 to 1.

I talked to the Snyder people on the phone to elicit technical information, but it turns out that patents have been applied for, so in this case you'll just have to take our word that the antenna really works. I'll give you the physical specs in a

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moment, but I would like to add that it is a real pleasure to QSY from 3500 to 4000 without using a Transmatch. Heaven forbid that I would downgrade the use of a Transmatch, but facts are facts: if you don't need one, it is one less device to have to worry about. I worked all over the country with the dipole and got excellent reports—both on c.w. and phone.

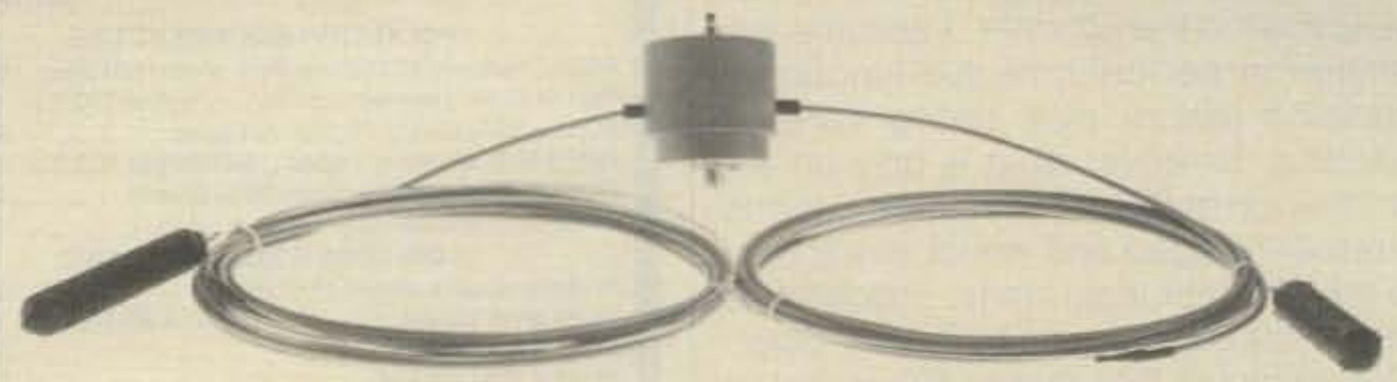
Physical Specs

The antenna appears to have two coaxial portions emanating from the center encapsulated transformer. I assume the transformer performs the dual function of balancing (balun) plus taking care of matching. However, that is only an assumption on my part. The whole system is extremely rugged and would easily handle the amateur legal limits. Following is the information given us by Snyder Corp.: "The company that makes the jacketed portion of the elements does not publish their specifications, and will not reveal them to us. We do know, however, that the materials will withstand 225 C, and will bend on a 5-inch mandrell at −55 C. The dielectric will not cold flow, and will tolerate ultra-violet for many years. They are totally non-contaminating. The rubber tubing used for strain relief at the junction of the element and the transformer case also provides a dam against the flow of transformer encapsulant during assembly. The transformers are doubly encapsulated, first with a rubbery compound to protect the toroidal core from distortion, and then with rigid material. The transformer case is coated to protect the plastic from ultra-violet degradation. The hardware and screws in the top of the case are stainless, of course. The SO-239 is Amphenol; we have had trouble with substitutes. The insulators are Telex. They are 6-inch ABS (Cycolac) and are rated at 500 pounds. The shipping weight of the FB-75/80 is 6 pounds; its length is 126'7". The latest price is $124.95 which includes shipping in the continental U.S."

That about tells the story on the antenna. Snyder also makes 160- and 40-meter versions. The instructions are detailed, and it is possible to move the s.w.r. curve by changing the antenna length, but with the very low s.w.r. that I had, I saw no need for changing anything. The antenna s.w.r. curve was plotted using a Collins bridge plus the bridge described by me in Feb. 1982 *CQ* (they both agreed on all checks). Two power levels were used: 25 and 1000 watts.

As you can probably surmise from this review, I would rate the antenna very highly—particularly for a contest or DX operator who likes to jump around 80 with a minimum of effort and maximum speed. One last thing: I checked the antenna with an ohmmeter from end to end, from ends to feed point, etc. There are no hidden resistors to provide that excellent s.w.r. curve!

CQ SHOWCASE



Snyder Full-Band, Monoband 40, 75/80, 160 Meter Antennas

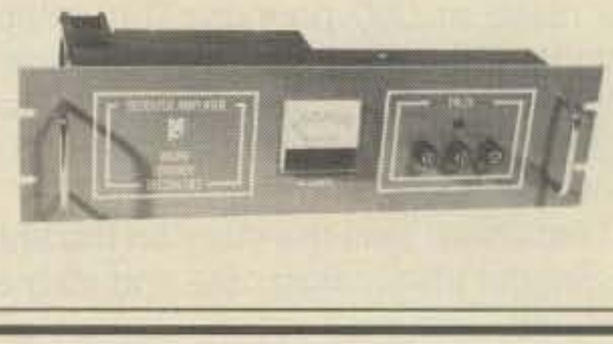
Snyder's Full-Band© antennas, as with conventional antennas, are dependent on their physical dimensions for their fundamental frequency characteristics. However, these antennas do not have to be tuned to accommodate minor changes in applied frequency. The elements are capable of changing electrical form without the introduction of any physical change or loss-inducing networks. The limits of change are finite, but bandwidths 6 times as broad as conventional antennas are common, maker says.

The antennas may be used in either inverted V or flat-top configuration, and come complete with end insulators, ready for installation. They connect directly to standard 50-ohm feedlines. The three dipoles serve the range from 1.8 to 7.5 MHz—Models FB-160, FB-75/80, and FB-40. Elements are copper-clad steel, copper, and aerospace dielectrics for maximum r.f. performance and weather resistance. For more information, contact Snyder Antenna Corp., 250 East 17th St., Costa Mesa, CA 92627, or circle number 106 on the reader service card.

Palomar 300-watt Antenna Tuner

The PT-407 Antenna Tuner is a general-purpose tuner for 1.8–30 MHz to match antennas fed with coaxial or open-wire lines, single-wire, or mobile antennas. The tuner has a large airwound coil, a large balun for open-wire feed, and ceramic insulation throughout. It is housed in an 8" × 4" × 7" aluminum cabinet with brushed aluminum control panel and black vinyl cover. All controls are on the front panel. Coaxial connectors are SO-239. Porcelain feedthrough insulators are used for balanced-line and single-wire inputs.

The PT-407 Antenna Tuner sells for $149.95. For more information, contact Palomar Engineers, 1924-F W. Mission Rd., Escondido, CA 92025, or circle number 102 on the reader service card.



Micro Control Amplifiers

A new line of continuous-duty power amplifiers for repeater service has been introduced by Micro Control Specialties. Three different models in the PA-75 series serve the repeater frequencies of 144–148, 220–250, and 420–450 MHz. Each model provides 75 watts output with 10 to 15 watts of drive from a repeater or base station. The PA-75 also includes a 3-section harmonic filter, a.c. power supply, front-panel fuse access, and metering in a handsome rack-mount package.

Continuous-duty operation is obtained by using a generous heat sink plus a quiet axial fan which cools both amplifier and power-supply components. Twenty-eight-volt transistors are used for reliability and

long life. For more information, contact Micro Control Specialties, 23 Elm Park, Groveland, MA 01834, or circle number 103 on the reader service card.

ICOM IC-25A 2-Meter Mobile

The full-feature 2-meter mobile rig, the IC-25A, is only 2 inches high and 5½ inches wide and fits into the newer, small cars. The unit features 5 memories plus 2 v.f.o.'s, HM8 touchtone microphone standard, priority channel, 2 scanning systems including automatic scan resume, and provision for memory backup when the unit is unplugged. Price of the rig is $349 including the HM8 microphone. For more information, contact ICOM America, Inc., 2112 116th Ave. N.E., Bellevue, WA 98004, or circle number 101 on the reader service card.

Heil Sound EQ 200 Microphone Equalizer

The Heil Sound EQ 200 Microphone Equalizer, for speech application to s.s.b. and f.m. transmitters, allows you to equalize your transmit audio in a technique similar to that used for broadcast stations and recording studios. This battery-powered device, which is 4" × 4" × 1½", plugs in series with the mic line and is adjusted by monitoring on a second receiver, using headsets, or with the help of a receiving station report. A helpful chart is included with the instruction manual. Three controls—mic gain, low and high frequency boost, and cut adjustments—adjust the peaking and shelving active filters. Distortion level is .09%. A wide impedance range will accept almost any mic. The EQ 200 gives a transmitter a 10 dB increase in talk power.

The EQ 200 is available for $49.95. For more information, contact Heil Sound, Ltd., 2 Heil Drive, Marissa, IL 62257, or circle number 105 on the reader service card.

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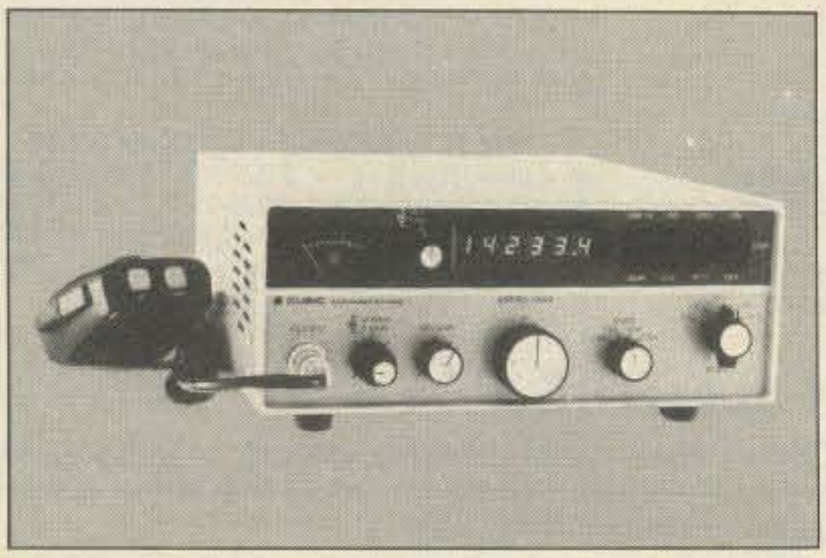

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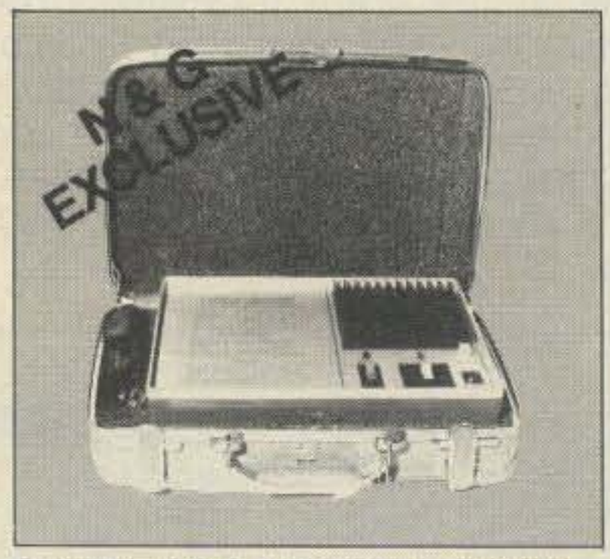

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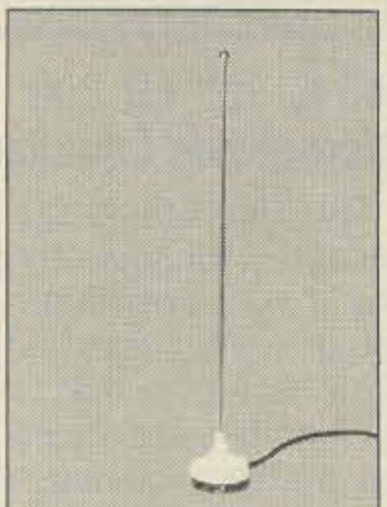

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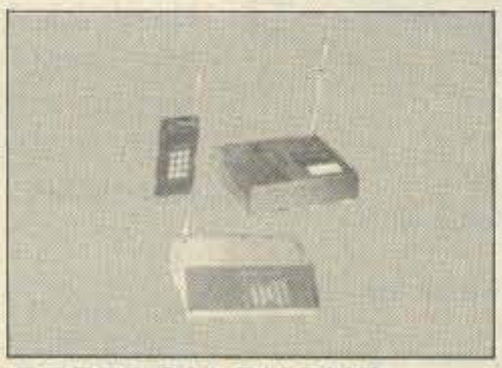

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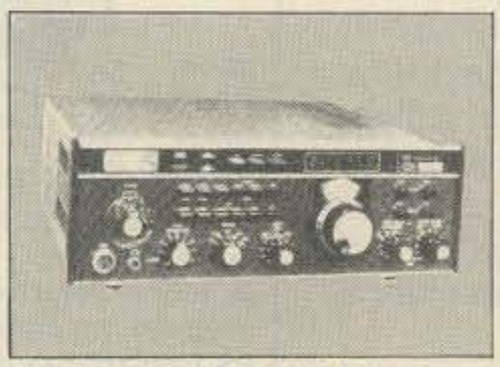

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1981 CQ WW DX C.W. Contest High Claimed Scores

The following are C.W. high-claimed scores as of March 1, 1982. These are raw scores only, subject to verification.

USA
Single Operator
All Band

K8LX	3,288,632
K1GQ	3,287,856
K1KI	3,169,751
N5AU	2,980,370
K1AR	2,916,822
K2VV	2,783,920
W2REH	2,777,236
N2LT	2,768,157
K9DX	2,651,744
W1KM	2,628,120
WA8YVR	2,561,316
N3AD	2,481,507
K5GA	2,436,352
W2VJN	2,374,930
N8II	2,346,724
K4POL/3	2,250,039
AE2A	2,227,357
N3BB	2,179,433
W4RX	2,157,120
W2IB	2,128,475
K3OO	2,046,268
N5JJ	2,042,482
K4CG	1,864,458
KQ2M	1,784,727
W6RR	1,780,800
K5KU	1,779,988
W1DA	1,748,810
W3AP	1,738,954
AI9J	1,732,590
WØWP	1,605,932
W1PH	1,581,306
K8GL	1,567,040
N3ED	1,564,620
N4RR/Ø	1,547,946
W2TA	1,517,820

28 MHz

N4ZC	387,105
WØUA	376,248
WØZV	347,520
N4ZZ	324,474
KØZZ	323,342
W8WPC	321,750
W5XZ	308,238
WØYK	299,707
W1WAI	292,125

21 MHz

K6EWL	454,648
N2AU	406,640
K4VX/Ø	397,764
K8CX	358,912
WØKEA	306,125
WAØMHJ	244,488
N4BU	217,695
W1GNR	217,002

14 MHz

W8UVZ	368,382
K9PPY	350,908
KØZX	327,228
W9OA	315,315
W9NUD	277,536
N8CC	280,250
W5FO	238,243
KC9T	237,336

7 MHz

KØRF	340,125
ABØI	335,775
W6YA	133,380
WD9IIX	133,118
W6AM	130,536
KG4W	93,351
WA9EKA	85,786

3.5 MHz

W1ZM	151,497
N4UM	36,045
K3FN	34,100
N5CR	30,355

1.8 MHz

W8LRL	8,234
K1PBW	6,160
K1MEM	5,964
N4IN	5,808
K5UR	4,477
K6SE	3,648
W4DR	3,500
WBØCMM	3,276

MULTI-SINGLE

N4AR	4,564,350
N1AC	4,149,032
W3BGN	3,930,997
K1XA	3,444,246
N4RJ	3,362,446
W4NL	3,253,040
AD8I	3,225,735
N1TZ	3,158,025
K1RU	3,001,200
W1RM	2,885,776
W5RRR	2,677,856
K1RQ	2,668,208
K1XM	2,463,570
N6ND	2,414,346
N6IG	2,369,760
N4RV	2,364,483
K8AQM	2,189,064

MULTI-MULTI

W2PV	10,503,535
W3LPL	9,650,456
K2UA	9,282,336
N9MM	8,966,379
K1ZZ	8,845,656
K9GL	8,481,440
K1OX	7,764,708
W3GM	5,612,000
N6RO	5,194,980

DX
SINGLE OPERATOR
ALL BAND

9Y4VT	5,843,622
CT3BZ	5,702,805
HK3A	4,478,204
N6BT/AHØ	4,260,550
8P6J	3,868,716
J6LZA	2,855,358
VE3IY	2,607,795
OHØXX	2,490,540
4N1U	2,463,105
SU1AA	2,453,814
9K2DX	2,325,275
UP2NK	2,303,160
UV9AX	2,299,443
KL7RA	2,076,984
AL7H	2,078,352
UB5LAW	1,978,291
DK8NG	1,894,810
SM5AOE	1,870,726
VE6OU	1,868,819
KH6ND	1,823,080
P47A	1,798,548
UB5EC	1,719,198
UQ2GDQ	1,702,107
HH2VP	1,655,866
UH8DC	1,651,674
ON4FD	1,553,140
OK2BLG	1,493,736
G3XTT	1,430,220
YV1NX	1,365,705
UB5MBP	1,322,010

28 MHz

YU4EJC	579,712
OH3XZ	546,360
YU3EW	466,570
JH1EDD	462,070
9Y4VU	443,504
G4GIR	423,456
VK4LX	408,237
JG1NBD	404,150
KH6DX	399,280
TF3YH	366,767

21 MHz

LU8DQ	1,351,280
YU3ZV	732,096
DK3GI	714,280
VE3BMV	659,589
4X4UH	617,088
JE3TBM	484,071
YU7OCV	459,801
OH7JT	418,071
4S7MX	408,375

14 MHz

OH8SR	672,600
SMØAJU	560,324
KG6DX	531,440
SM2CEW	479,820
UA9ADQ	447,874
JG1ZUY	339,031
UP2BAO	326,920
UQ2GDW	321,720
YV4BOU	306,737

7 MHz

UA1DZ	339,532
YU4AW	284,719
UB5JMR	241,440
JE3MCC	240,700
UH8EAA	231,595
HB9BUT	167,916
OK2BFN	167,295

3.5 MHz

UC2ACA	136,394
DJ2BW	130,972
UA9TS	122,567
YU2RA	109,755
G3VMK	98,118
HA5KDB	94,944
UR2QD	84,530
YU4VBR	74,008

1.8 MHz

EA8AK	40,755
GW3NYY	21,320
4X4NJ	18,252
UA9SAX	17,480
UP2BAW	16,785
OZ1LO	14,448
KH6XX	13,566
SP9DH	11,696
VE3INQ	10,944
UB5ZAL	10,260
OK1DFF	10,305

MULTI-SINGLE

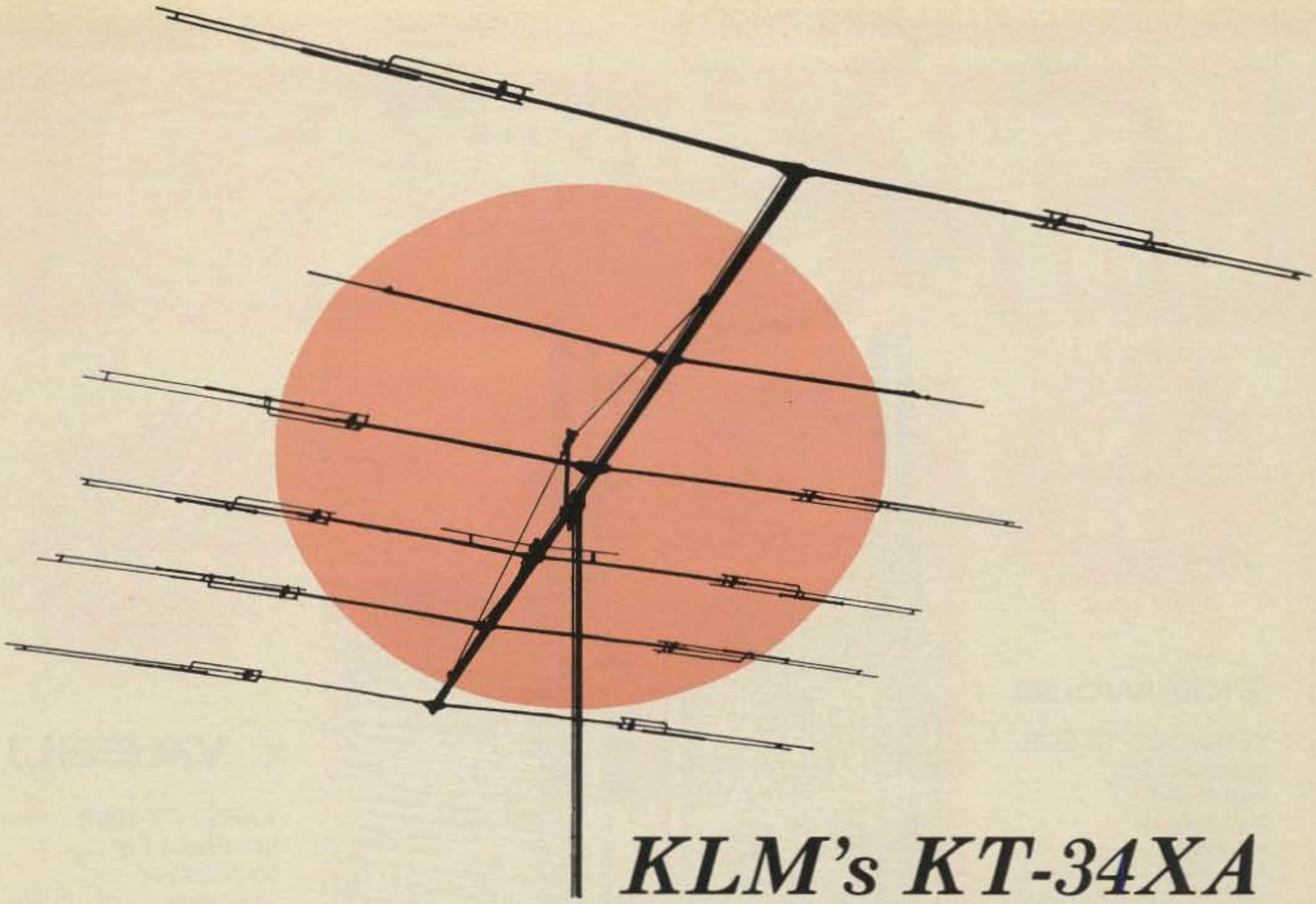
P41E	8,059,296
YU3EY	7,674,190
U2R	5,672,835
YW5A	5,481,975
R5I	5,110,378
UK2PCR	4,620,726
SM5GMG	4,100,240
HG6V	3,883,680
UK2PAP	3,813,199
UK2RDX	3,759,126
UK2BBB	3,735,270
VE3PCA	3,711,956
HG5A	3,685,515
UK9FER	3,355,520
OK1KRG	3,543,590
XE2BC	3,460,106
VE1DXA	3,357,354
GW3RRS	3,316,270
V3MS	3,307,920

MULTI-MULTI

OH3AA	9,442,972
YTØR	8,686,490
YU3APR	8,519,173
OH2AW	6,882,573
JA3YKC	5,257,083
ZK2RU	5,191,542
DLØKF	4,906,797
JA3YBF	4,779,522
PA6WW	4,325,715

QRP WORLD ALL BAND

AC2U	591,856
N3RS	577,205
UP2BFC	441,881
OK2PDL	321,984
N4BP	268,832
AJ7S	267,544
VE3KZ	261,632
HP1XAT	253,215
DF4RD	220,712
W8VSK	216,104
WA6POC	186,200
SMØBYD	185,656
WAØVBW	183,080
W9PNE	179,861
JA1KFX	106,470



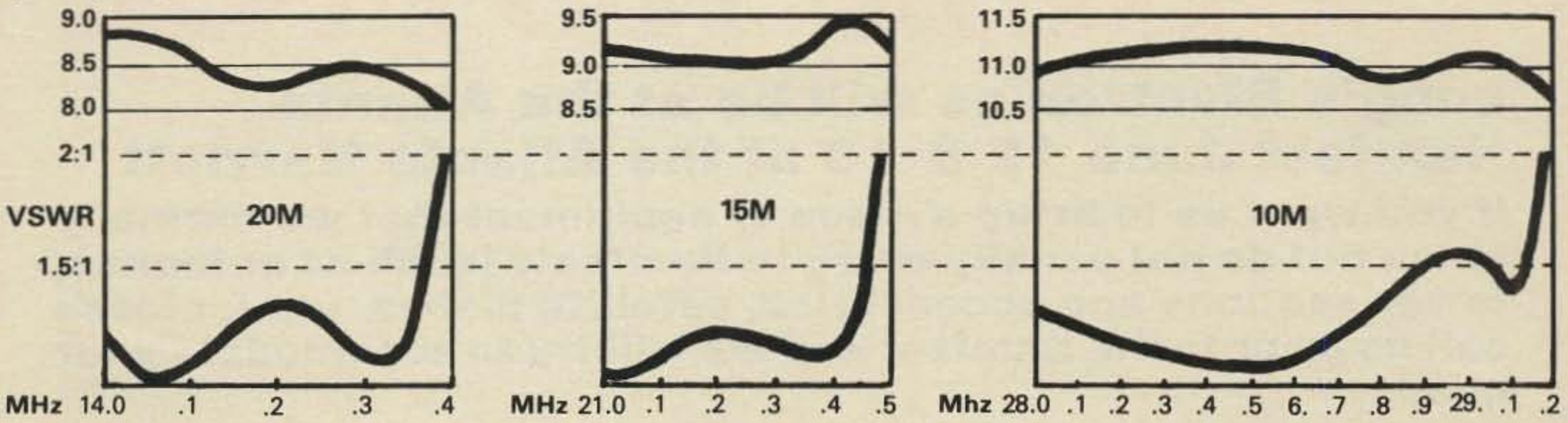
KLM's KT-34XA

Outperforms ALL commercially available tribanders and many monobanders, too!

KLM's KT-34XA TRIBANDER is the 2nd generation of a unique new series of antennas designed to provide superior **broadband** coverage on 20, 15, and 10 meters. The combination of lossless linear loading and hi-Q air capacitors enables the KT-34XA to outperform **all** commercial available tribanders and meet or exceed the performance of a conventional stacked monoband system. The lower weight and windload of a single antenna mean reduced tower and rotator requirements. Thus, overall system costs can be kept to a minimum while enjoying the best of monobander-type performance.

KLM's field proven KT-34A is the heart of the "XA" model. The boom length of the "XA", however, has been doubled, and one tri-resonant and one full size 10 meter element have been added. These changes increase the gain to **11-11.3 dBd** on 10M, **9-9.5 dBd** on 15M, and **8.5-9 dBd** on 20M. Two driven elements are used to make the KT-34XA unusually broadbanded (a concept applied to many KLM antennas). Gain is virtually flat across each band except for 10 meters which has been optimized for the DX'er, 28-29 MHz. The chart below shows the remarkable performance qualities of the KT-34XA.

KT-34XA GAIN vs. VSWR



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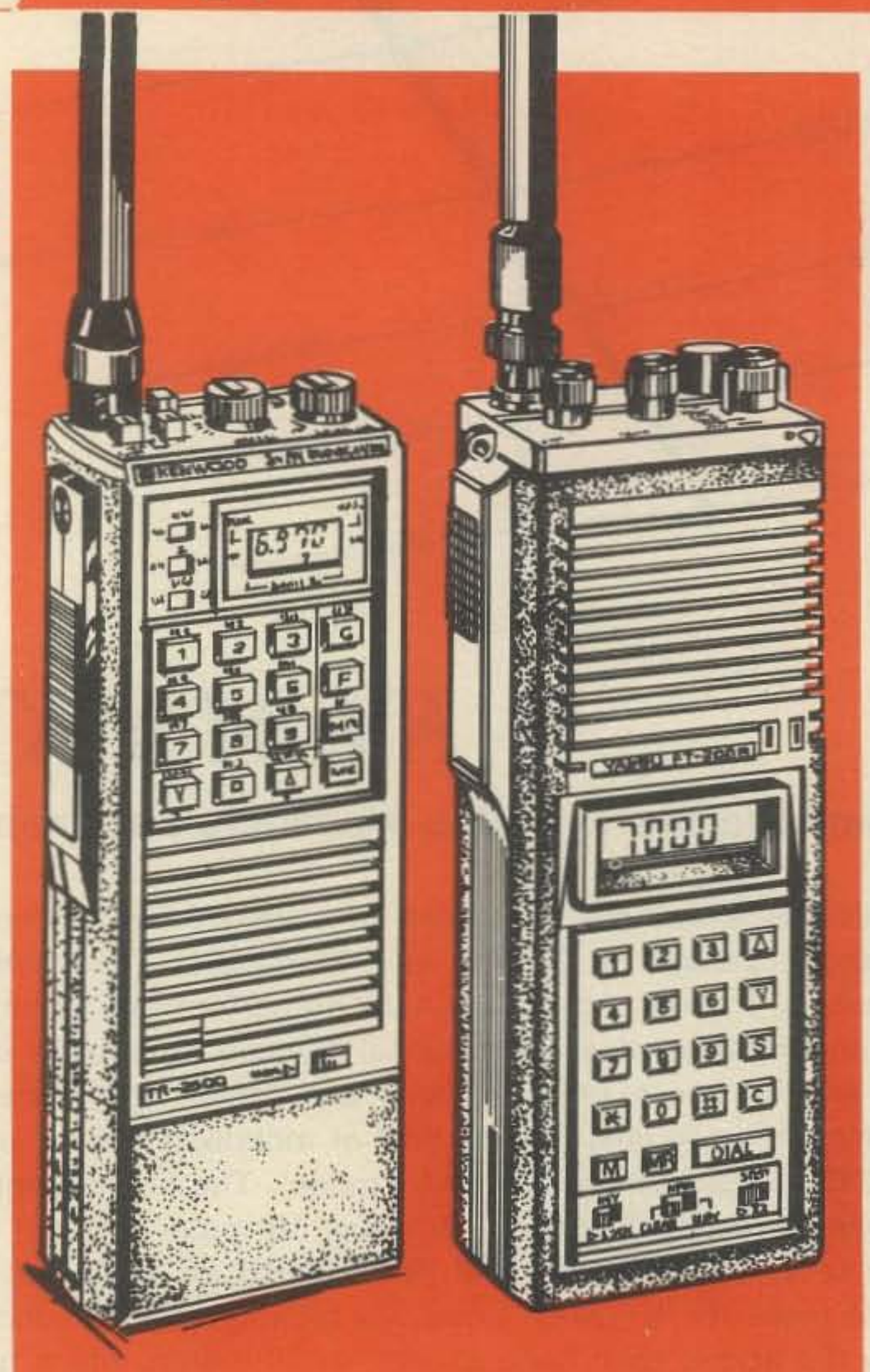

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KENWOOD TR-2500 compact 2m handheld transceiver

Extremely compact and light, the TR-2500 weighs just 1.2 lbs. and features 10 channel memory, UP/DOWN manual scan, programmable automatic band scan, 16 key autopatch encoder and memory scan. Switchable power. 2.5W HI and 300 mW LOW. Covers 143.900 148.995 MHz. Rubber antenna, NiCad pack and AC charger included.

296.95

List Price 329.95
Item No. KENTR2500
Add 1.87 shipping & handling

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YAESU FT-208R handheld FM transceiver

The versatile FT-208R features lighted LCD display, up/down scanning, manual/auto scan and 16 tone DTMF pad on the front panel. Frequency coverage is 144-146 or 144-148 MHz. RF output is 2.5W HI, 300mW LOW. Requires 10.8V DC. Comes with NiCad pack and flexible rubber antenna.

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4. KLM Sky Eye IV satellite receiver: Consists of two pieces, receiver and downconverter. Features video inversion, AFC defeat, slide rule tuning and latest single-conversion electronics.
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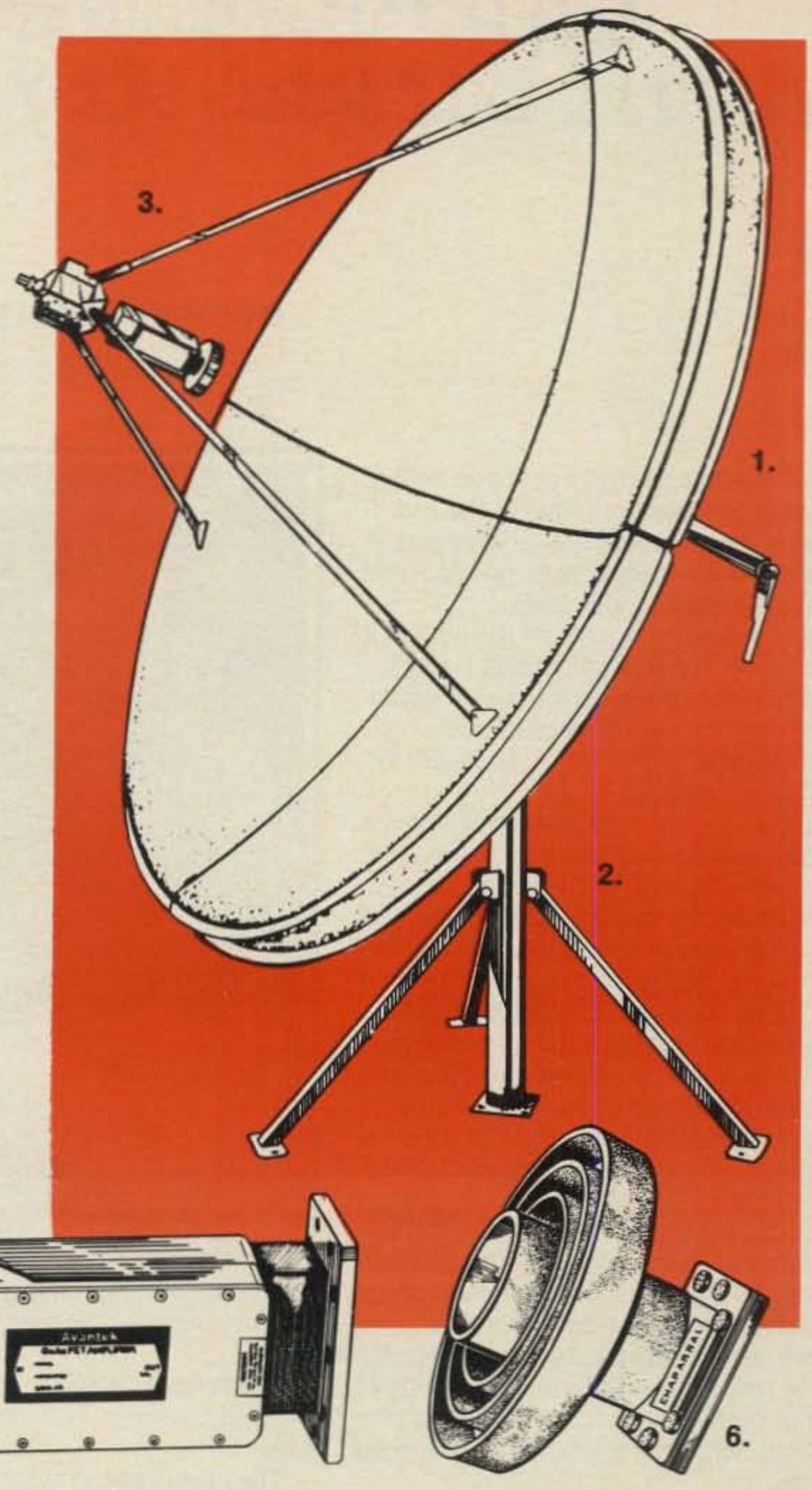
6. Chaparral feed horn: Provides 0.5 dB gain improvement over conventional rectangular horns. Virtually eliminates system noise.

Note: Customer provides small cables that run from downconverter outside to receiver inside (approx. cost $40). Customer can use conventional TV set tuned to channel 3 or 4.



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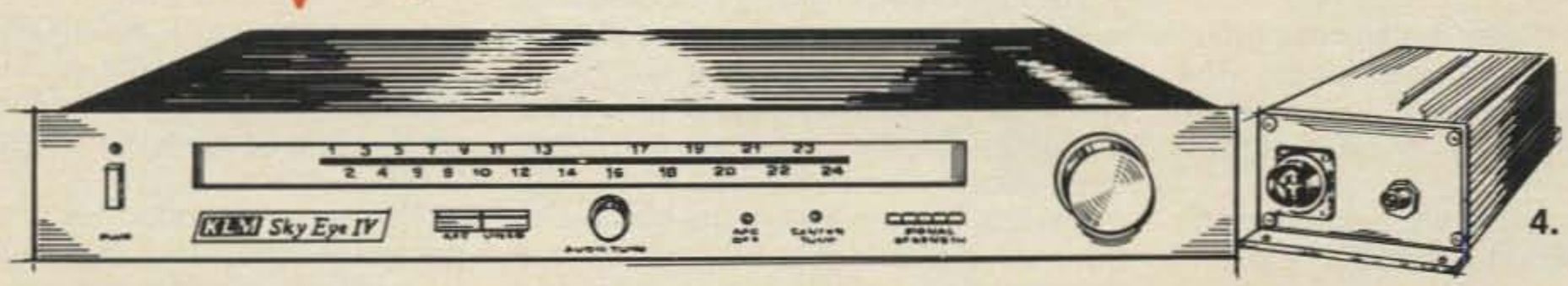

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CIRCLE 91 ON READER SERVICE CARD

K8EEG is not the only one to take to the hills with QRP gear. An accident prompted WB6ELI to combine two hobbies, and now he's rarely out of touch with the outside world while enjoying nature's beauty.

QRP "BACKPACK MOBILE" IN THE SIERRA NEVADA MOUNTAINS

BY CHRIS BRADLEY BOCK*

The sun had about an hour to go before it crept over the mountains. In the morning haze two backpackers, wrapped in bright day-glow cocoons of rip-stop and down, lay in motionless sleep.

A thin branch snapped off the limb of a nearby tree. Bill Bowes, WB6ELI, and his hiking partner stirred as the noise of footsteps reached their subconscious.

"Is anyone a doctor?" a desperate voice called out.

Neither of the men were physicians, but they yanked themselves into the cold, damp air, grabbed some warm clothes, and rushed to the campsite where a young man was prone, crying out in pain. His friends, gathered helplessly around him, were as frightened as the sandy-haired victim. His lower torso was discolored and swollen to a hard knot. He could not hold down food or water. The college student showed all the signs of internal bleeding, and he needed immediate medical attention.

About seventeen miles of rugged terrain separated the group from the nearest ranger station. The distance could well have been one-hundred miles.

"We took the wiry kid from the group," Bowes recalls, "gave him four pounds of gorp (a high-energy food), and sent him running toward the Hetch Hetchy Ranger Station."

Six long hours later the anxious group heard the clip of helicopter blades. The young hiker was whisked to a hospital and into surgery within an hour. He survived.

As Bowes sat at the troubled campsite, powerless, waiting for medical help, and trying to calm down the frantic student, he kept thinking, "If I only had my ham gear."

Bill Bowes, WB6ELI, at the operating position in Gabbot Meadows. A topographical map is superimposed on the picture to give an idea of the terrain.

The idea of packing a rig on a hiking trip jelled. A few years later the stocky, dark-haired man decided to test his Heath HW-7 on a backpacking trip to Gabbot Meadows, nestled in a deep canyon of the California Sierra Nevada.

Several months before the hiking trip, the final in his Ranger II succumbed to Murphy's Law just before a local contest took place. Not wanting to sit at home, yet at the same time unable to buy expensive new equipment, Bowes purchased the HW-7 to use "just for the weekend."

That was the beginning. Soon Bowes became hooked on small transceivers. He sold the Ranger and his Collins 32S1. The QRP quest was on!

"I got enthusiastic about QRP because it's a challenge to work with low-power signals," he said. "It's like the old days when I played with the DX-20 and the S-40B."

The ham gear added five pounds to his backpack. The HW-7 (a 40-20-15 meter transceiver) needed only a key, earphones, a 40 meter dipole antenna, and a self-contained pack of AA rechargeable batteries to get on the air.

After two leisurely days of hiking,

*445 N. First St. #1, San Jose, CA 95112

Bowes set up camp in a clearing with a brook trickling next to it. In three spins of a main tuning dial "backpack mobile" station WB6ELI was set up.

He began with the antenna. The dipole was raised by tying a rock to the end of a fishing line and tossing it over the branch of a tree, then attaching the antenna's insulator to the fishing line and raising it up.

"What I did," he explained, "was set up the station underneath the antenna where the feed line ran.

"The next day I periodically turned the set off and on to see what was going on. Since I was in a valley, the propagation wasn't the best for calling a CQ and getting results. So, basically what I did was stand by and try to contact hams calling CQ."

"Gabbot Meadows isn't the greatest place to set up a station," he confessed, "but it's been a favorite haunt of mine for years."

Over a period of two days Bowes was able to make eighteen contacts. During these ten hours of operating time he contacted hams in Utah, Nevada, Arizona, and various places in California.

Unfortunately, only one person caught on to what he was doing. Most of the contacts responded to "backpack mobile" with either "What's that?" or "Are you in a car?"

Bowes was determined to set them straight. So, he mailed a photo of "backpack mobile" along with his QSL. He superimposed the picture of a topographical map next to an exposure of himself and the station.

On his next trip Bowes plans to increase his air time by using solar cells to recharge the battery pack.

If you would like to pack a rig on a camping trip, here are some pointers which will help send your messages over the mountains and beyond.

- Keep your rig simple. A one watt transceiver, key, earphones, power source, antenna, and log sheet are all that is needed.
- Build or buy equipment that is crystal controlled to the desired band of operation. Multi-band sets are not worth the trade-off for a single band's reliability, lighter weight, and compact size.
- Do not let your rig and accessories weigh over ten pounds.
- Your battery pack should be able to supply at least three hours usage, with a transmit duty cycle of 30–40%, for each day of operation. Use rechargeable, nickel-cadmium or sealed Gel-Cell batteries; they are the most economical. If you plan to stay over in a base camp with 110 v.a.c., bring a charger along.
- For an antenna, use a dipole with miniature coax cable feedline cut for the operating frequency.
- Be sure to wrap all of your gear in tough, sealable, plastic bags to shield each part from dirt and water.
- When not in use, make sure the equipment is wrapped and placed in a protective covering such as a tent or pack.
- To prevent it from being damaged, always pack your gear in the uppermost portion of the backpack.
- Think about your safety. Do not climb a tree to tie the antenna up. It is not worth breaking a bone out in the middle of the wilderness. Practice throwing stones if you must.
- Always disconnect each piece of gear, especially the feedline and battery pack, when not in use.
- Never hook up your gear in stormy weather.

If you follow the above pointers, you should be able to operate successfully—and safely.

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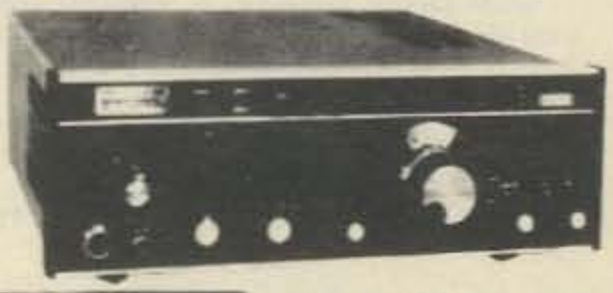
MURCH Model UT2000B



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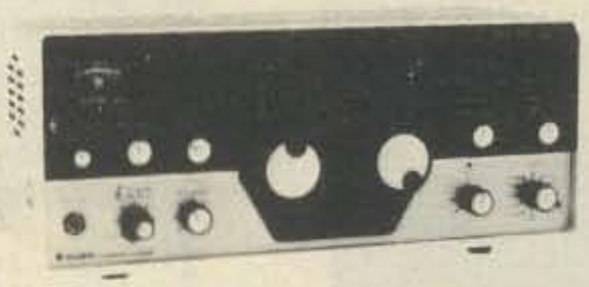


ASTRO 103 150A & 100 MXA DIPLOMAT 150

EIMAC 3-500Z 572B, 6JS6C 12BYZA & 4-400A

AEA 440

ROBOT 400 & 800

SANTEC
HT-1200,ST-7/T
ST-144/UP

TEMPO
S1, S2, S4, S5

ICOM
IC2AT
IC3AT
IC4AT

YAESU
FT-208R
FT-708R

DIGITAL FREQUENCY COUNTER

Trionyx-
Model TR-1000
0-600 MHz
Digimax-Model D-510 50Hz-1GHz

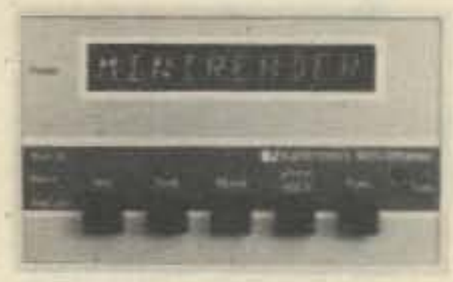
KDK FM-2025

MIRAGE
B-23, D-1010, B-1016

ICOM IC-720A, IC-730
IC-25A, IC-251A, IC-2KL, IC-451A

HY-GAIN TOWERS & ANTENNAS

KANTRONICS Mini-Reader Field Day



SPECIAL! FTV-720 RU Mobile Transceiver 440-450 MHz (also available 430-440 MHz) $299.00. FTV-720 RVH 144-148 MHz Super Special $299.00. WHILE THEY LAST!

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

Antennas

DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

We Get Letters

This month, after concluding a multiple-part tutorial on the h.f. Yagi, our Antennas columnist opens the mailbag to catch up on reader mail. He also updates some subjects discussed in previous CQ Antennas columns.

We make an honest effort to answer promptly all reader mail, with the exception of those very few letters received from certified nuts, or from folks who want "complete plans for antenna farms," and the like. We make it a point to answer those who thoughtlessly leave out an s.a.s.e. or IRC (the latter if writing from overseas), digging down into our own pockets for reply postage. We may have dropped the ball in a very few cases, but we do endeavor to keep our response batting average up—both in terms of timeliness and quality of reply.

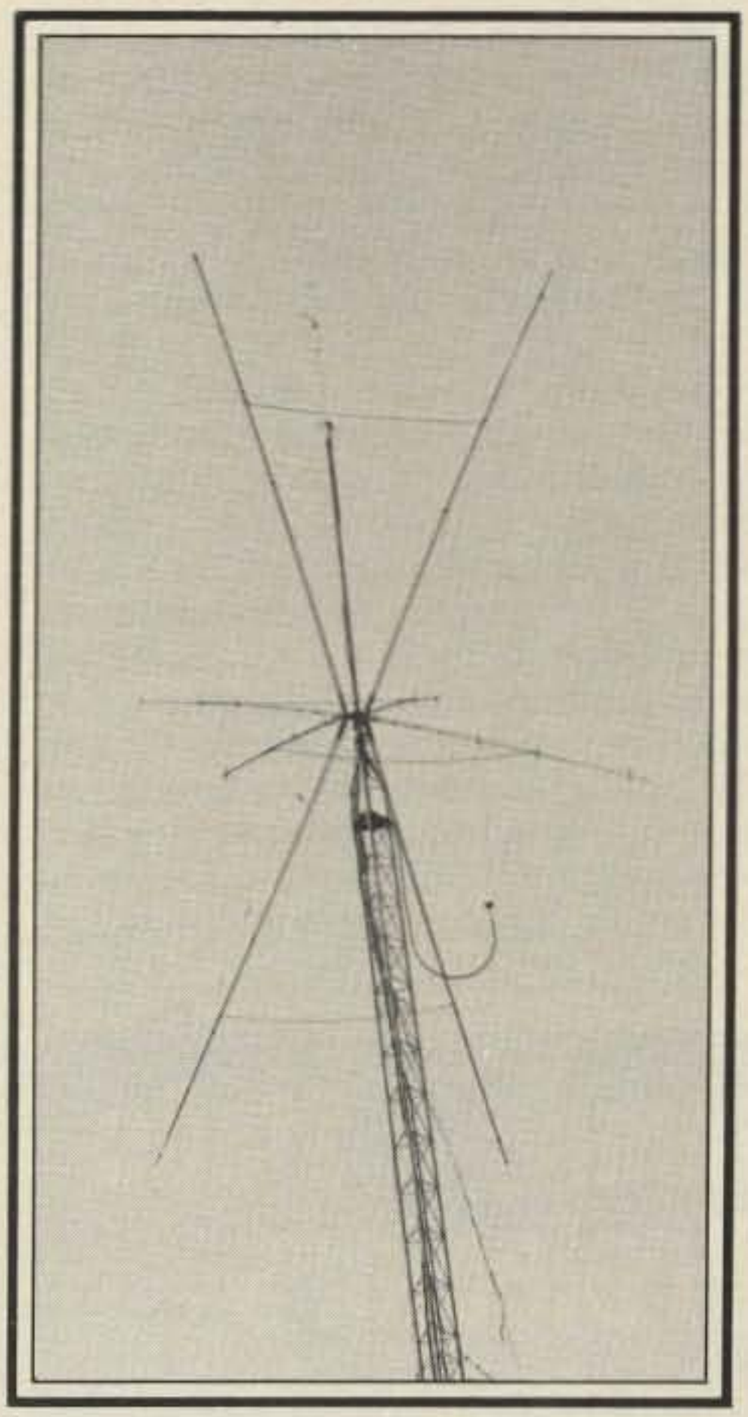
From the Mailbag

We do take the column seriously—perhaps too seriously, since we are often reminded that we're so busy pumping out "hard facts" that we usually have no space for a readers' letters column. So, we'll open this month's column by catching up on some publicly unanswered (but privately answered) correspondence.

Our first letter, written by A.E. (Al) Schwaneke, W0GS, and sent directly to *CQ* Editor Alan Dorhoffer, K2EEK, is on-target, and he gets our thanks for some kudos while pointing to an omission in our August 1981 column. Al writes:

"While thumbing through the August '81 issue, I suddenly realized that you don't have a readers' letters column! How about that? Suggest you might start one when you can find space to fit it in. All good magazines should have an open forum where the customers and the writers and the Editor(s) can argue it out! Just a good thought I pass along for your consideration." *(Editor's note: CQ does now run readers' letters when space permits, although I generally write so much each month that there is little room in this column for antenna-related inquiries!)*

317 Poplar Drive, Millbrook, AL 36054



Triband, boomless Gem-Quad (shown here) was reviewed in the July 81 issue of CQ. Included in this month's column is a followup explaining how the s.w.r. on 15 meters can be improved to align it with the very "flat" performance on 10 and 20 meters. (W8FX photo)

Al continues: "Also, we have been following Thurber's (W8FX) series on receiving antennas. Because I am involved somewhat with the SWL field . . . I might make a comment. First, I think the series was very well done and I pass along my kind regards for it and for W8FX for a good job . . . Only it's not yet finished—or 'done'! So, maybe he can comment on a slight oversight before he finishes.

"In the August issue, page 42, he has Table II, a list of prominent s.w.l. clubs, etc. I just want to comment that he missed the real 'Biggy'! SPEEDX runs around 1000 members or so and it is probably number two in the field. The real biggy is NASWA, the North American Short Wave Association. The last figures I heard about NASWA put the membership above 2100! Not to detract from any of the other clubs—because I belong to all three top ones, ASWLC, SPEEDX, and NASWA, plus a few others—NASWA's monthly bulletin, *FRENDX*, is naturally among the best. The Executive Director and Publisher for NASWA is Bill Oliver, 45 Wildflower Road, Levittown, PA 19057. Business Manager and Treasurer is Max Leonhardt, P.O. Box 13, Liberty, IN 47353, to whom memberships, and other business matters, should be sent . . . ."

Al concludes, "I might point out that the s.w.l. community also has the Handicapped Aid Program which may be of interest to some who only listen (and maybe some who talk, also! We can use all the help we can get!). Good luck, and Karl is doing a good job on the series. BCNU, Al."

Thanks, Al, for the big kudos and mild criticism. We try to present comprehensive and correct information in the column, but occasionally we miss something or a goof gets through, despite our best efforts.

Interestingly, although *CQ* is an amateur-oriented publication and our column is directed toward the antenna buff, our experimental forays into allied areas of interest, such as longwire antennas (in the April–May 1981 issues), receiving antennas (in the June–September 1981 issues), and scanner antennas (in the October–December 1981 issues), drew a surprising response from s.w.l.'s, scanner buffs, officials of s.w.l. and scanner associations, and, especially, hams who are all of these.

Stewart MacKenzie, General Manager of the American Shortwave Listeners Club (ASWLC), wrote to us last October: "Greetings from the ASWLC! Recently we have been receiving mail inquiries about our club. The letters indicate that they read of us in the August issue of *CQ*." *(Editor's note: the same issue Al Schwaneke, W0GS, referred to.)*

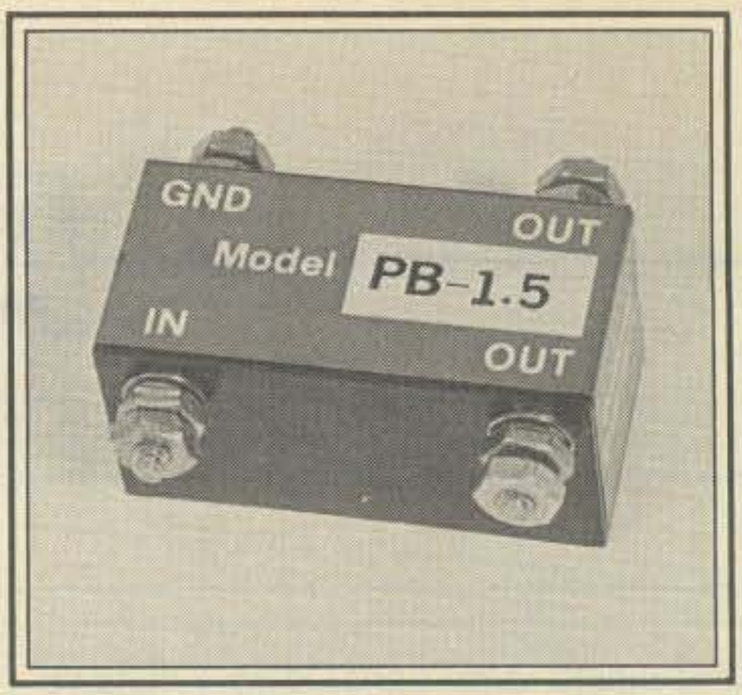
Stewart continues, "We want to thank you for the mention of the ASWLC. We hope that you can mention us from time to time in your articles. I am enclosing a current edition of our monthly bulletin, *SWL*. We hope that you will find it interesting reading. We have also enclosed information on the club . . . ."

We appreciate the information on the ASWLC which Stewart sent along. For those interested in the ASWLC, write to 16182 Ballad Lane, Huntington Beach, CA 92649.

Also in the August 1981 issue, we made mention of the International Radio Club of America (IRCA). The column promptly brought us a sample of the club's interesting bulletin, the *DX Monitor,* a thick (24-page) publication that is sent out 34 times per year. Particularly interesting to me are the technical activities the club pursues, including the technical articles on antennas and equipment in the *DX Monitor.* The club also offers a reprint service, appropriately dubbed the "IRCA Goodie Factory," that catalogs and offers at a very nominal fee reprints of the best articles that have appeared in the bulletin since the club started operations in 1964. Primarily oriented toward broadcast (BCB) DXing, the June 1981 reprint list showed over 200 available technical and semi-technical feature and article reprints, as well as a large number of reprints under classifications such as receiver modifications and construction, receivers, antennas, and other subjects. Also available are a technical guide and sunrise-sunset maps. If you're interested in these doin's, the address for membership information is IRCA, P.O. Box 26254, San Francisco, CA 94126. The IRCA Goodie Factory's address is P.O. Box 17088, Seattle, WA 98107. The National Radio Club, an organization with comparable objectives, offers a similar range of reprint and publications services. Write to the NRC Publications Center, P.O. Box 164, Mannsville, NY 13661.

As mentioned, the receiving antenna series generated a good deal of mail, from hams and non-hams alike. A Honolulu, Hawaii reader made a few good "points" with us: "I just recently subscribed to *CQ*. I am not an amateur, however. I am an s.w.l. and also monitor the h.f. and v.h.f. aviation communications . . . My reason for subscribing to *CQ* was due entirely to the article . . . written by Karl T. Thurber, Jr., "Antennas for the Listener," Parts I and II, and T.E. White's "A Primer of Lightning Protection," which appeared in the June and July '81 issues of *CQ*. The articles were very informative . . ."

Our Aloha state correspondent continues: ". . . Most antenna articles deal mainly with transmitting as do articles on accessories and components (equipment). s.w.l. types (like myself) can't always pick or sort out portions applicable to receiving. Consequently I appreciate articles directed at, or at least pointing out, receiving/listening aspects . . . I realize that *CQ* is devoted to the amateur as the title clearly indicates and that s.w.l., along with monitoring h.f. and v.h.f. aviation bands, doesn't exactly thrill most am-



Generally speaking, baluns are available in a limited number of fixed-ratio designs, such as 1:1 or 4:1, thus limiting matching flexibility, especially with regard to loops, quads, multiple-wire (folded) dipoles, certain longwires, etc. The new "PB" series of baluns from Palomar Engineers is available in a number of matching ratios. The series will match 50-ohm coax to 50, 75, 100, 150, 200, 250, 300, 375, 450, or 800 ohm balanced antennas. The low-cost line of baluns will handle power levels to 350 watts p.e.p. over a range of 1.7 to 30 MHz. Units are encapsulated to keep out moisture and have stainless steel hardware. (Photo courtesy Palomar Engineers)

Judging from the mail received by your Antennas column editor, interest in scanner antennas is high. As our series on scanners and their antennas indicated, many wideband amateur v.h.f. and u.h.f. antennas can perform double duty for monitoring purposes. On the other hand, specialized antennas can offer improved reception when optimized for the range of interest. Shown here, as one example, is a representative Larsen Kulrod u.h.f. mobile gain antenna, which offers coverage of 406–512 MHz in six discrete ranges, for a gain of 5 dB or more over a reference ¼-wave whip. The collinear shown can be mated with a half-dozen or so permanent or temporary mounts. (Photo courtesy Larsen Electronics, Inc.)

	10 Meters	15 Meters	20 Meters
Driven Element	34'8"	46'8"	69'8"
Attachment Point Length Up Arm	73" approx.	103" approx.	153" approx.
Reflector Element	35'8"	48'2"	71'3"
Attachment Point Length Up Arm	78" approx.	106" approx.	159" approx.
Director Elements	32'	44'	66'
Tuning Stubs For Director & Reflector	12"	12"	15"

Table I– Revised wire lengths for the Gem-Quad antenna.

ateurs. You might find, however, that by expanding your material to include more s.w.l. and receiving/listening articles, your circulation would increase and you may attract more s.w.l. types into the amateur ranks."

Very well put, and whenever the opportunity presents itself, we will highlight receiving and monitoring aspects of the antenna subjects we cover, keeping in perspective the primarily amateur-orientation of *CQ*.

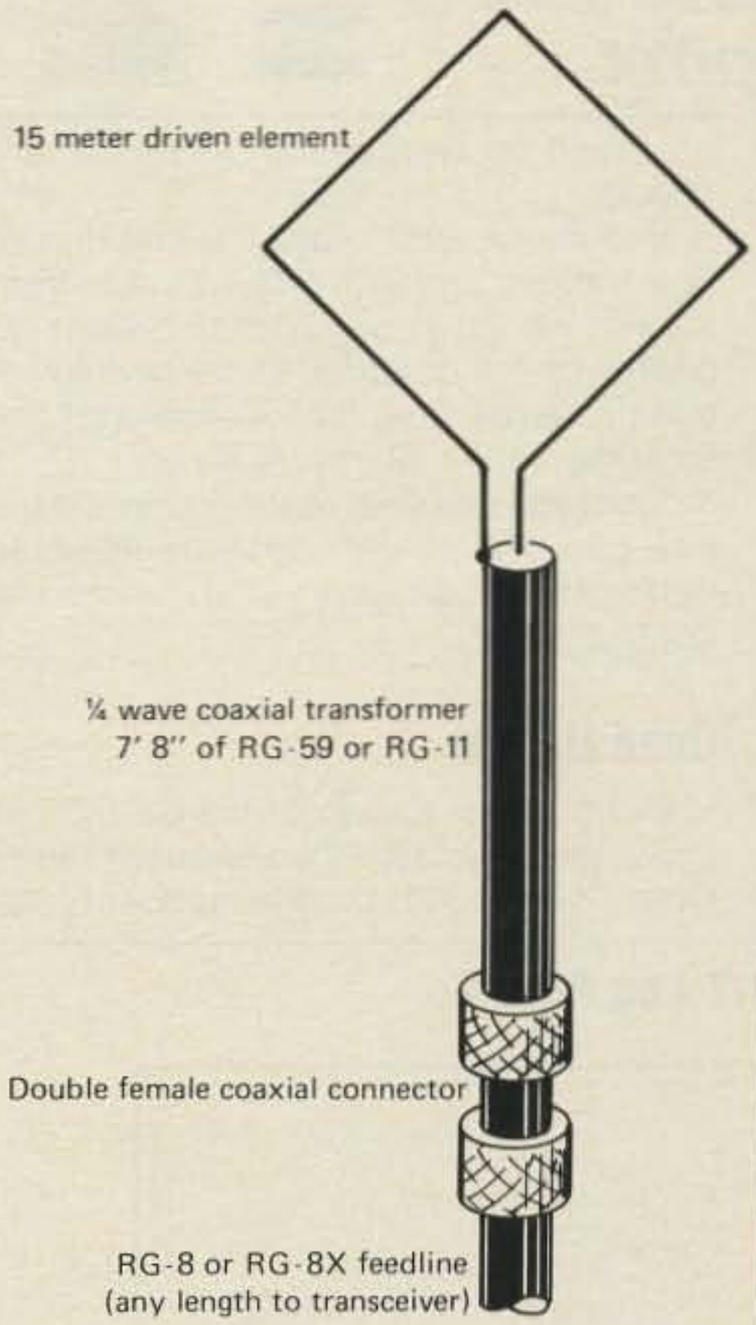
Our series on scanner antennas (October–December 1981) also drew considerable correspondence. One letter, from Robert A. Hanson, W9AIF, Managing Director of the Scanner Association of North America (SCAN), corrected and added to the list of scanner clubs and publications in the December issue. In response to our mentioning that there was a tie-in with the CB public service group, REACT, Bob wrote:

"I noted with interest your story on scanning . . . we appreciate the mention of SCAN! However, *please*, there is no connection whatsoever between SCAN and REACT or any other CB group. While at one time they had the same address as us, so does the Federal Home Loan Bank Board, Metropolitan Structures, and hundreds of other unrelated companies. Further, our association is skewed more towards licensed amateurs, commercial radio operators, public safety professionals, etc., than it is towards CB. A recent survey of renewing members indicates that over 25% are licensed "hams," over 33% are firefighters, and 11% are police officers."

Bob continues, "Besides writing to say thank you and set the record straight on SCAN, I would like to brief you on our new publication, *SCAN Magazine*. This new publication will be much larger than our current quarterly publication, have full color photo capability, and will be published bi-monthly starting next year." *(1982—ed.)*

Readers interested in SCAN's activities should contact the association at Suite 1212, 111 E. Wacker Drive, Chicago, IL 60601.

In the three-part scanner antenna series, we made mention of some of the more unusual designs that have appeared on the market recently. One of those mentioned was the scanner beam sold by Bob Grove, WA4PYQ, which was described on p. 70 of the November 81 issue. The log-periodic type antenna is designed primarily for *wide-band* 108–512 MHz scanner reception; it has a gain that approaches 8 dB over a reference dipole at several points. We pointed out that although the antenna is designed primarily for monitor applications, it also works on the 144, 220, and 432 MHz amateur bands.



Illustrated above is the separate feed configuration for the Gem-Quad as used by Al, W4CNQ, to alleviate a somewhat higher-than-desired s.w.r. on 15 meters. The 10- and 20-meter driven elements are still fed together through a balun. A coaxial switch is required at the transceiver to switch between the two separate feedlines.

Fig. 1– 15-meter feed for Gem-Quad antenna.

The antenna's designer, Bob Grove, had written us with an update on amateur use of the scanner beam, but it was too late to include his information in the November column. Bob wrote:

"I read with interest your tutorial piece in October *CQ* regarding scanner antennas and thought this might be a good opportunity to provide more information on our popular scanner beam. Since I last spoke with you, more hams have reported using the scanner beam successfully on the ham bands, with the latest received as a phone call from Dewey Myers, WA6APQ . . . He measured a v.s.w.r. of only 1.5:1 at 441.5 and 446.5 MHz, running 12.5 watts into the small balun we supply with the beam. He reports no degradation or overheating, and excellent results."

Bob concludes: "I use the unit myself on 2 meters, and with only 1.5 watts from my HT, I bring in our 20-mile distant repeater to full quieting. In the interim, it does a remarkable job of extending the listening range of my scanner . . . . I thought you and your readers might like a little practical insight into the remarkable performance of the little wideband beam."

Quad Update

Our product review of the Gem-Quad ("CQ Reviews: The Two-Element Gem-Quad," July 1981) drew a number of letters, mostly from readers curious about the boomless design, and wondering just how well the antenna really worked.

The antenna *does* work well, and it has continued to do so over the course of nearly a year. The biggest "problem," if it could be called that, is that we and some readers have experienced a relatively high s.w.r. on 15 meters (other bands have low s.w.r.'s and wide operating bandwidths). Our s.w.r. on 15 is acceptable, but higher than the manufacturer's v.s.w.r. curves that appeared in fig. 1 (p. 60) of the article in July 1981 *CQ*.

Al, W4CNQ, who collaborated with your Antennas editor in the original Gem-Quad installation, found a simple solution to the s.w.r. anomaly on 15 meters. Reckoning that the center feedpoint impedance was too high on 15 for a good match directly to RG-8X, he decided to *separately* feed the 15-meter driven element, leaving the 10- and 20-meter driven elements paralleled and connected through a balun to RG-8 (no change here, or to any of the tuning stubs).

In this arrangement, the 15-meter driven element is disconnected and independently fed through a quarter-wave coaxial transformer measuring 7'8" in length; the transformer steps up the 50-ohm cable to match the quad's higher feedpoint impedance. The coaxial transformer is simply a length of 75-ohm coax, such as polyethylene-dielectric RG-11 or RG-59. Details of the transformer matching technique are illustrated in the 1974 *ARRL Antenna Book* on p. 209, under the description of "A Three-Band Quad Antenna System."

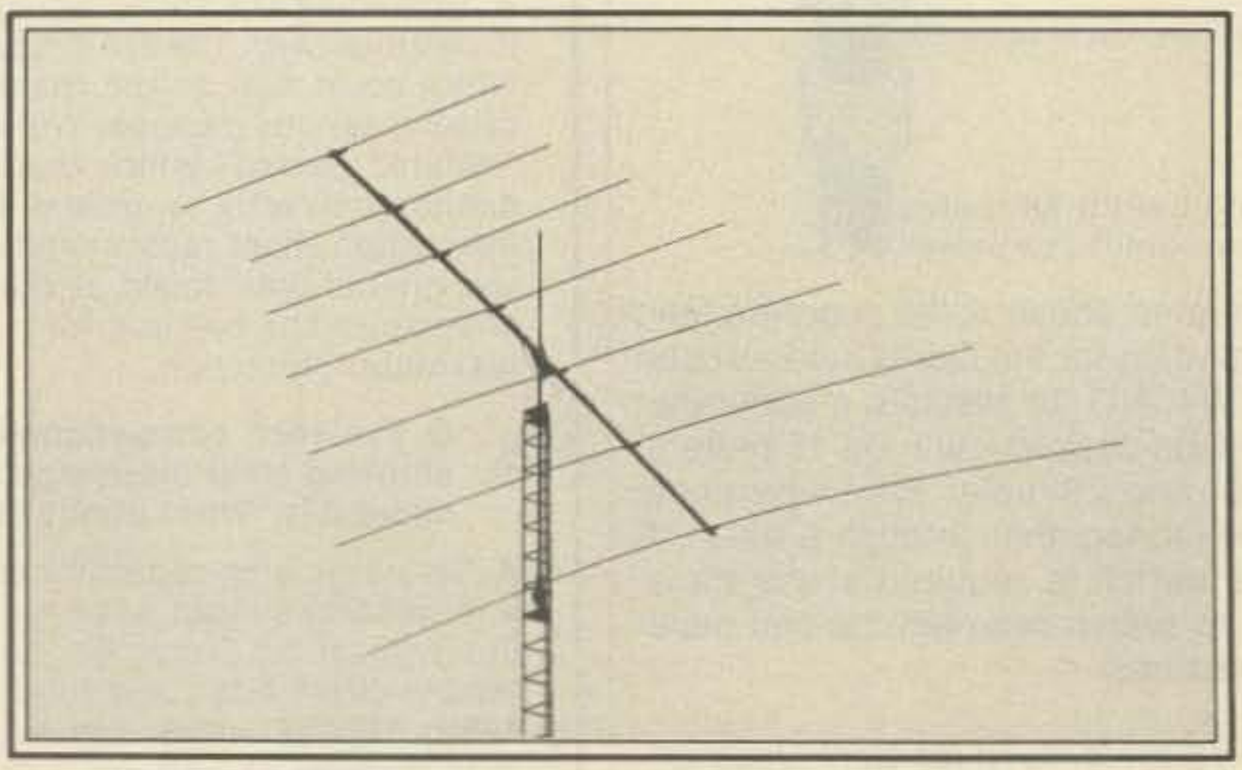
Despite the fact that no balun was used, Al reports no ill effects. A 3:1 balun could also be used, eliminating the need for the quarter-wave matching section. In any case, having two separate feed lines seems to be a small price to pay for even transmitter loading on all three bands. Fig. 1 shows the way in which the 15-meter driven element is now fed.

Just prior to our copy deadline for this issue, we received word from Mr. Haydn C. Brisley, VE4BR, of Gem-Quad, that the firm has recently completed additional experiments with the quad design, assessing various complaints, compliments, and suggestions which have been brought out. As a result, a few small changes have been made in the wire lengths for the three bands. The new dimensions are shown in Table I for the benefit of Gem-Quad owners who may wish to upgrade their antennas. Although we have not had the opportunity to evaluate the effects of these dimensional changes, Mr. Brisley advises that the new dimensions make it easier to obtain the desired s.w.r. on all three bands, particularly on 15 meters.

Next month, we'll be back in stride with a technical Antennas column of interest. See you then.

73, Karl, W8FX

Antenna Of The Month: KLM 10-30-7 Log Periodic



The KLM 10-30-7 LP antenna. (Photo courtesy KLM Electronics, Inc.)

It looks different—and it is. Popular in military and commercial circuits but relatively unknown on the amateur bands, log periodics are seeing a resurgence of popularity. KLM 10-30-7 LP is an efficient trapless beam with good gain and front-to-back ratio on 20, 15, and 10 meters. This 7-element log-periodic type provides coverage over a 3:1 frequency range, including WWV on 10 MHz and 15 MHz, MARS on 13, 14, 15, 17, and 19 MHz, and even 27 MHz CB. Gain is a nominal 7 dB referenced against the dipole, and F/B ratio is 15 dB. S.w.r. is typically less than 2:1, the 50-ohm coax feeder being routed through a 4:1, 4 kw p.e.p. balun. The range of the antenna can be extended to 40 meters with the addition of a special dipole module (No. 7.2-1) on the rear boom extension. The resultant performance is said by the manufacturer to be better than either antenna alone, mainly due to the interaction of the "log" as a director for the dipole. When combined, KLM calls the four-band antenna the "skip frequency log"; turning radius becomes 32 ft. and weight 100 lbs., representing a growth of 6 ft. and 30 lbs. to cover 40 meters.

a monthly feature by
A. EDWARD HOPPER, W2GT

Awards

NEWS OF CERTIFICATE AND AWARD COLLECTING

The June Story of the Month as told by Al is:

Albert Armitage, WD4HVZ
All Counties #313, 2-6-81

"I took up amateur radio as a hobby in December 1976 after reading an article in *Popular Mechanics*. Construction work on my job was slow, and I needed something to help pass the time.

"I got my Novice ticket 24 May 1977 and upgraded to General 17 April 1978. I started working counties in January 1979 and completed them in February 1981.

"I used a linear amplifier for about a year, and one day I happened to notice that my log book showed that I had used it for only eight contacts. I decided that I did not need that kind of power, so I sold it. As a result, my awards were worked with 125 watts or less. In the future I plan to start working with 1 watt c.w.; that should be a good challenge.

"My wife, Inez, and I are 49, and our beautiful daughter, Patricia, is 17. They have gone with me on 95% of my mobile trips to put out counties. Inez does the logging while I drive and work the rig. We have given out over 700 counties in 38 states. Inez and Patricia have joined a Novice class. *(Hope they have their licenses now—Ed.)*

"The base station equipment includes a Tempo One with a TH-3 beam on a 40 foot tower, and an inverted V for 40 and 75. The mobile rig was a Heathkit 104A. Since October 1980 the mobile equipment has included a Kenwood TS 130-S, and a Hustler antenna for 20, 40, and 75.

"Other awards include 5BWAS, WAC, WAS, and 10-10 International Net WAS. I belong to the Kentuckiana Radio Club here in Louisville, and I'm the Awards Manager for the Kentuckiana Colonel Award.

"It has been fun and enjoyable. CU all down the log."

Inez and Al Armitage, WD4HVZ.

Patty Armitage.

Awards Issued

Don Priebe, W2IN (ex-W2IAM), added USA-CA-3000 endorsed Mixed to his nice collection.

Dave Popkin, W2CC, keeps plugging away and got USA-CA-2000 endorsed Mixed.

Steve Byerly, N5AEP, has been chasing them for awhile and decided to claim USA-CA-500 through USA-CA-2000 endorsed All S.S.B., All 14 MHz, All Mobiles; and USA-CA-2500 endorsed All S.S.B.

Don Strom, WA0LKL, had me send him USA-CA-500, 1000, and 1500 endorsed Mixed.

USA-CA-500 certificates endorsed Mixed went to:

Scott Oakland, N1BCV,
Isamu "Isa" Satho, JF1KKV,
Ellis Fenical, KA9GZM.

USA-CA-500 certificates endorsed All S.S.B. were requested by:

Jan Holmgren, SM2HAG *(Sorry you lost your tower and antennas. Hope insurance covers all losses.)*,

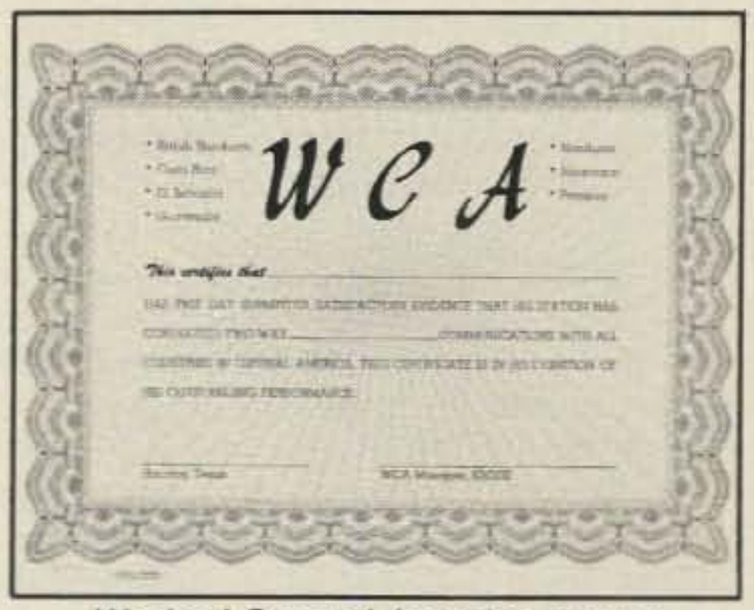
Rudolf Dvorak, DK4AP (first licensed 1-6-47 as DJ0WS, also ex-OK1NM, OK1VFI, OK1WFI, G5BCZ, F0DRS, C31OJ, DK4AP/W, /OE2, /OE7).

USA-CA Honor Roll

3000		1500		500	
W2IN	390	WA0LKL	565	N1BCV	1688
		N5AEP	566	SM2HAG	1689
2500				WA0LKL	1690
N5AEP	448			JF1KKV	1691
		1000		DK4AP	1692
2000		WA0LKL	696	N5AEP	1693
W2CC	502	N5AEP	697	KA9GZM	1694
N5AEP	503				

Awards

Worked Central America (WCA): Issued for working the seven countries in Central America: British Honduras (Belize), Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama. Send log data and $2.00 to Thomas T. Hoke, K5ODZ, 4805 Willowbend Blvd., Houston, TX 77035.



Worked Central America Award.

Worked South America (WSA): Issued for working the 13 countries in South America: Argentina, Bolivia, Brazil, Guyana, Chile, Colombia, Ecuador, French Guiana, Peru, Surinam, Uruguay, and Venezuela. Send log data and $2.00 to Thomas T. Hoke, K5ODZ, 4805 Willowbend Blvd., Houston, TX 77035.

P.O. Box 73, Rochelle Park, NJ 07662

Worked South America Award.

All American Alligator Award: In an effort to restore good operating practices to the amateur bands, a group of Morton Amateur Radio Club members have undertaken the sponsorship of this award. This probably least-coveted certificate will be issued to those stations which exhibit acts inconsistent with the spirit or law of amateur radio. We hope the award will be received in the same spirit as it is being issued. Contact the Morton Amateur Radio Club, 701 Columbus Ave., Morton, IL 61550.

All American Alligator Award.

Worked Italian Islands Award (W.I.I.A.): This award was formerly issued by the DX Old Timers Club (DXOTC), and it was discontinued when the Club ceased activity. The award has now been taken over by ARI. New awards will start with number 101.

Rules:

1. *Scope.* The award is issued in order to promote activity from islands belonging to Italy, and especially from minor islands.

2. *Mode.* The award will be issued for 2 × CW, 2 × SSB, and 2 × RTTY. No cross modes or mixed modes are allowed. The award is also available for s.w.l.'s with no mode restrictions.

3. *Bands.* Contacts (or heard for s.w.l.'s) can be made on any band between 3.5 and 29.7 MHz, including those allocated by WARC 79 as soon as they are officially allowed in Italy.

4. *Validity.* Contacts (or heard for s.w.l.'s) made on January 1, 1982 or after will count for this award.

5. *Contacts.* The award will be issued for contacts (or heard for s.w.l.'s) with not less than 10 islands or island groups according to the following list: Tuscan Archipelago IA5; Ponziane Islands IB0; Neapolitan Archipelago IC8; Eolie (or Lipari) Islands ID9; Island of Ustica IE9; Egadi Islands IF9; Pelagic Islands (Lampedusa, etc.) IG9; Island of Pantelleria IH9; Cheradi Islands IJ7; Tremiti Islands IL7; Minor Islands surrounding the island of Sardinia IM0; Sardinia Island IS0; and Sicily Island IT9 for a total of 13. A special endorsement will be mentioned on the award if all 13 islands are contacted (or heard). In order to be credited for the award, contacts (or heard) shall be made with stations permanently located on the islands or island groups. Credit will also be given for contacts (or heard) made with stations operating temporarily from such locations. These stations shall identify themselves by using their regular call followed by the prefix assigned to that specific island or island group.

6. *Application.* Applications must include all data regarding contacts (or heard) made, applicant's name and address in block letters, and should be forwarded with the QSLs or other type of written confirmations of the contacts made, (or heard) together with 3 US dollars or 10 IRCs, to ARI Awards Manager, G. Nucciotti, I8KDB, via Fracanzano 31, 80127 Napoli, Italy. GCR will not be accepted.

Ballarat Amateur Radio Group (B.A.R.G.) Awards Program (Australia)

Begonia Award: VK's are required to contact 10 Ballarat amateurs; DX (outside Australia), 5 Ballarat amateurs. Any band, mixed, and any mode. Send application and $2.00 to Maurie Batt, R.S.D. Rokewood Junction, Victoria 3351, Australia, or B.A.R.G., P.O. Box 216E, Ballarat East 3350, Victoria, Australia.

Welcome Stranger Award - Ten Ten Chapter: Prerequisite—be member of 10-10, and 10 meter contacts *only.* Basic award requires 10 points. Cost is $2.00 airmail. Send applications to Geoff Smith, VK3NLZ, 829 Laurie Street, Mt. Pleasant 3350, Victoria, Australia, or to P.O. Box 247E, Ballarat East 3350, Victoria, Australia.

Sovereign Hill Award: Required are contacts with 5 Sovereign Hill members, including one "local" identified by the letter "S" following the number. Stations outside Ballarat have either the "A" or "G" suffix with their number. Cost is $2.00 airmail. Send applications to Yvonne Slade, VK3VON, P.O. Box 68, Ballarat, 3350, Victoria, Australia, or P.O. Box 247E, Ballarat East 3350, Victoria, Australia.

Ballarat amateurs include: VK3DS, 3GM, 3GR, 3HW, 3IV, 3KU, 3KY, 3LJ, 3NU, 3PH, 3SE, 3VU*, 3ZL, 3AAG, 3ABI, 3ADT*, 3AGL, 3AJR, 3ALM*, 3AMH, 3ANH*, 3AQM, 3ARS, 3AXH, 3AGY, 3AZE, 3BMH, 3BML, 3BNC*, 3BNT, 3BPK*, 3BQE, 3BSC*, 3BTX, 3BWC*, 3NBN, 3NCU, 3NGL, 3NGY*, 3NHN, 3NHT, 3NIH, 3NLH*, 3NLY, 3NLZ*, 3NRS, 3NTG, 3NUC, 3NUI, 3NUY, 3NSA*, 3NVC, 3NVF, 3NVJ*, 3NVZ, 3NWN, 3NWV, 3NWS, 3VEE, 3VEZ*, 3VEI*, 3VOM, 3VON*, 3VMO, 3VQA, 3VQQ, 3VSE and 3WN. *(Note: *denotes 10X members.)*

NJDXA Silver Jubilee Award: Issued by the North Jersey DX Association (the ARRL *incoming* DX QSL Bureau for the 2nd call area—new QTH P.O. Box 599, Morris Plains, N.J. 07950). Work members during 1982, the 25th anniversary year. The award is free. Contacts required: USA (48 states) 25 members; DX 15 members, and Oscar 5 (DX only). All bands, all modes. Send log data to Ed Berzin, W2MIG, 47 Palisades Road, Elizabeth, NJ 07208, USA. Random drawing of award winners will determine the winner of the special Club Trophy. Please include return postage.

NJDXA Silver Jubilee Award.

Typical NJDXA member QSL.

NJDXA (Regular) Achievement Certificates: Also issued by NJDXA for contacts with members, no time limit, no band or mode restrictions. Send log data and return postage to Ed Berzin, W2MIG, 47 Palisades Road, Elizabeth, NJ 07208, USA. Issued to non-USA stations for working 5 NJDXA members via Oscar; to non-USA stations for working 15 NJDXA members; to USA (48 states) stations for working 25 NJDXA members.

NJDXA membership includes AI2K, K2AGJ, AIO, BZT, CM, DSV, KER, RW, VJE, YJ, N2DH, N2JD, W2AGW, AIW, BHM, BOK, BXA, CL, DEC, DIE, FG, FP, FZY, GK, GT, GUM, GW, GZZ, HTI, JB, JLH, JVU, LNB, LPE, LV, MIG, MJ, MS, MT, MZV, NZG, OEH, OKM, PK, QM, RQ, RS, SM, TO, TP, TQC, YD, YY, ZZ, WA2CBB, WA2DIG, WA2ELS, WB3CEI, W3CWG, K4JRI, W4ELM, and W8RT. Ex-members and old calls are K2GMO, K2OJD, K2QBW, N2YQ, W2DEO, DEW, DNG, EQS, FZA, HSC, JAE, JRP, MES, NHV, ODO, OST, QT, SUX, VCZ, YTH, ZGB, ZTV, WA2ERJ, WA2FQG, WA2RKK, and WB2UKP.

Notes

Yes, it is hard to keep up with things without a score card—Hi! So excuse me if I repeat myself, but many people miss important items. Yes, I do have a copy of the General license of WD4IUY, courtesy of Bill, WA3ZMY, so her QSO's/QSL's will count for USA-CA. Those which do *not* count include WB2HTX, WB5WOE, WB6CKU, W6NV and W6VK and KL7NV used by a pirate, WB9TKE used by a pirate, and W9HAT.

The cost of all CQ awards is $10.00 for non-subscribers and $4.00 for subscribers, who are required to include the mailing label (or a copy) from a recent *CQ*.

The cost of the POD 65 has gone up to $9.00.

Those interested in saving money on postage for QSLing, send s.a.s.e. to the Mobile QSL Bureau, P.O. Box 146, Lakeside, CA 92040 for details.

For information on the Mobile Amateur Radio Awards Club, send s.a.s.e. to Jon Fogdall, NØAGW, 7120 126th Street CT., Apple Valley, MN 55124.

The B & B Shop, 1348 Pinewood Drive, Woodbury, MN 55119, prints special mobile QSL cards and other booklets about County Hunting. Send an s.a.s.e. for details and costs.

My January column had data on different awards directories. Due to the *big* increase in postal rates in Canada, the cost of the directory sold by VE3GCO is now $8.00.

If you do not yet have the data on the 14th Annual MARAC-ICHN County Hunters Convention, San Diego, California, July 7–11, request this data from Dave, W6CCM. Good hunting.

73, Ed, W2GT

Here's another piece of fine gear put into QRP service simply and economically.

QRP Operation With The Ten-Tec Triton Transceiver

BY KENNETH D. GOULD*, WA0SLU

Are you the owner of a Ten-Tec Triton series transceiver? Have you considered the increased potential of these fine transceivers if power output could be switched at will? If so, here's a method of converting them to QRP power by using a few additional parts and slightly altering the back panel.

My good friend Philip Ott, WA0NLK, and I decided to operate QRP in a Field Day competition. My Triton I could perform well if the output could be adjusted to qualify for the QRP division in the contest. With this in mind, conversion of the Triton was necessary.

In preparing the Triton for contest competition, I became aware of its increased versatility as a portable h.f. transceiver when operated at low power. Since it's desirable to switch from high to low power at will, the rather inconvenient manner of bypassing the power amplifier block and cutting off B+ and bias voltages described in the manual is unsatisfactory. However, the method of modification presented here makes switching from high to low power simply a matter of flipping a switch and plugging prepared cables into the back of the transceiver.

Modification Preparations and Needed Parts

Cables and parts needed to complete the modification of the Triton are the following:

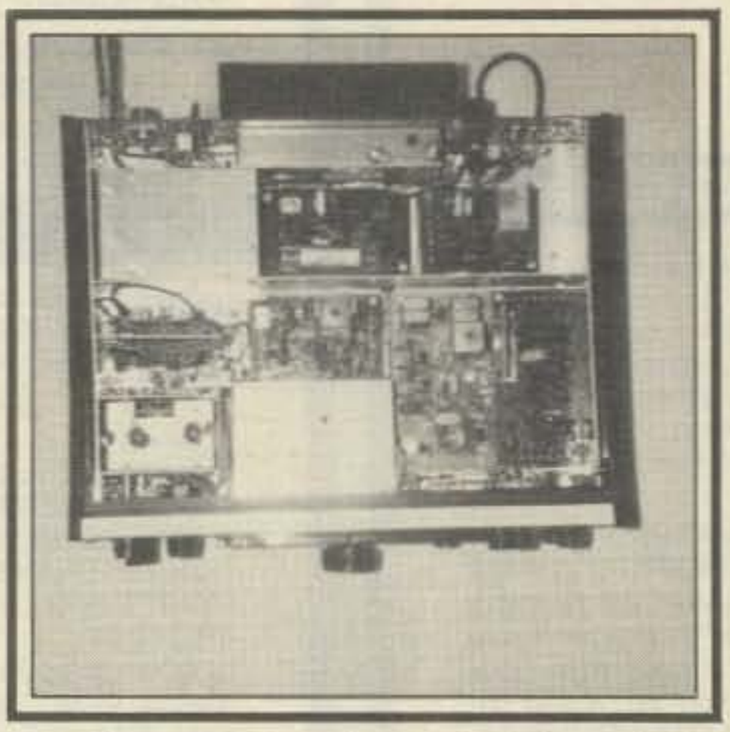
1. One 24" length of RG58/U with RCA phono plugs on each end.

2. Two 6" to 8" lengths of RG58/U with RCA phono plugs on each end.

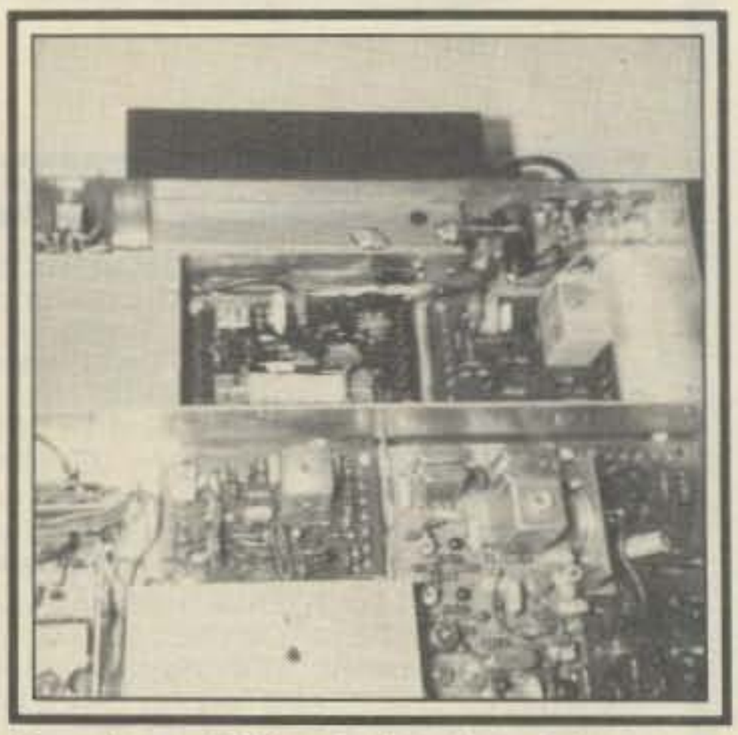
3. One D.P.D.T. toggle switch with 10A contacts, Radio Shack #275–1533 or #275–1546 (D.P.D.T. toggle with 18A contacts needed for Triton II).

4. Some RCA phono jacks.

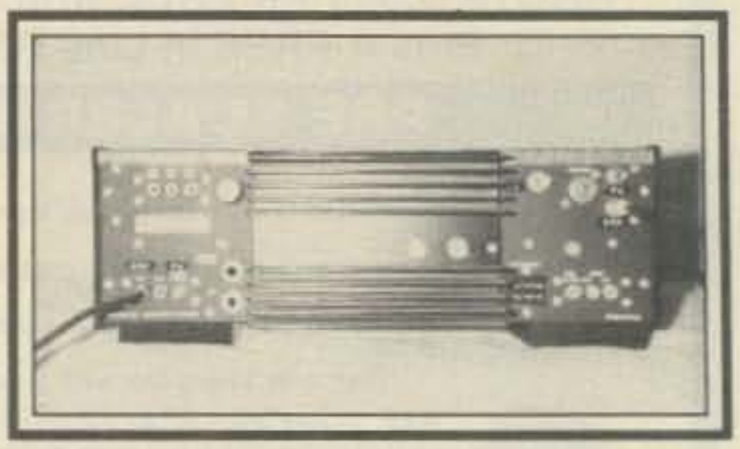
5. Lengths of RG58/U or RG174/U coax as needed to complete changes inside the transceiver.



Top view of Triton I showing the relative positions of the D.P.D.T. switch and the phono jacks.



Top view of Triton I showing wiring route to the D.P.D.T. switch for cutting B+ and bias voltages.



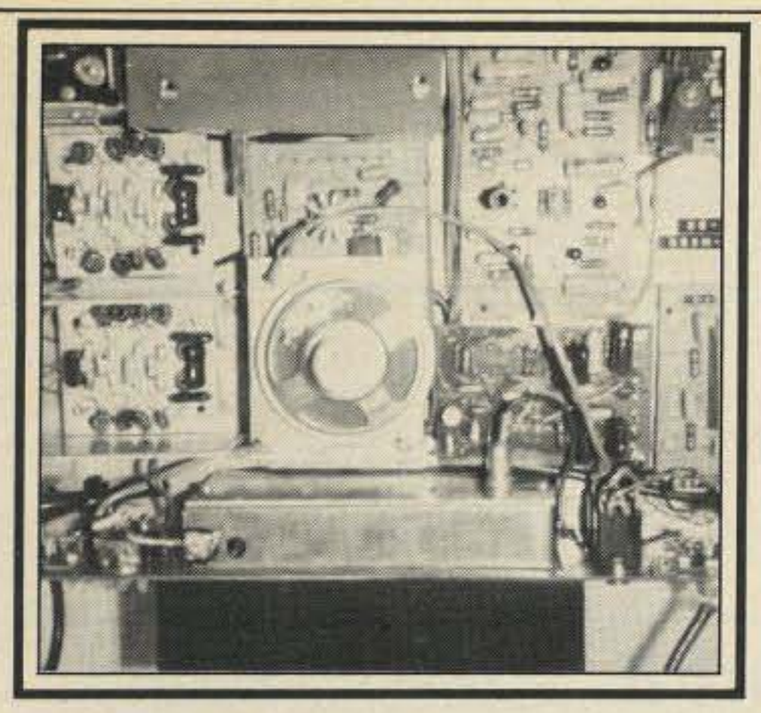
Back panel of the Triton I with cable connected for QRP (low power) operation. Notice the position of the D.P.D.T. switch cutting B+ and bias voltages.

Modification Procedure

First, remove the top and bottom covers of the Triton cabinet. Since access to four phono jacks on the back of the transceiver is required for completion of the modification, this may be accomplished by using the existing jacks, disabling those parts of the Triton circuitry considered unessential to the operator, or by installing additional jacks as desired. The D.P.D.T. toggle switch is mounted on the back cabinet panel to the right of the antenna connector (top view). The small coaxial cables to both the input and output of the power amplifier block are cut approximately in half. Each severed end is then connected to a vacant phono jack. If the existing cables are too short to reach the jacks, additional RG-174/U cable will be needed. B+ and bias voltage wires are disconnected from the power amplifier block and rerouted through the D.P.D.T. switch.

Upon completion, the cabinet is reassembled. For QRP operation, B+ and bias voltages are cut and the 24" cable is connected to the jacks bypassing the power amplifier block. For QRO operation, B+ and bias voltages are switched

*304 Walnut St., Tipton, IA 52772



Bottom view of Triton I. Cabling is connected for high-power operation.

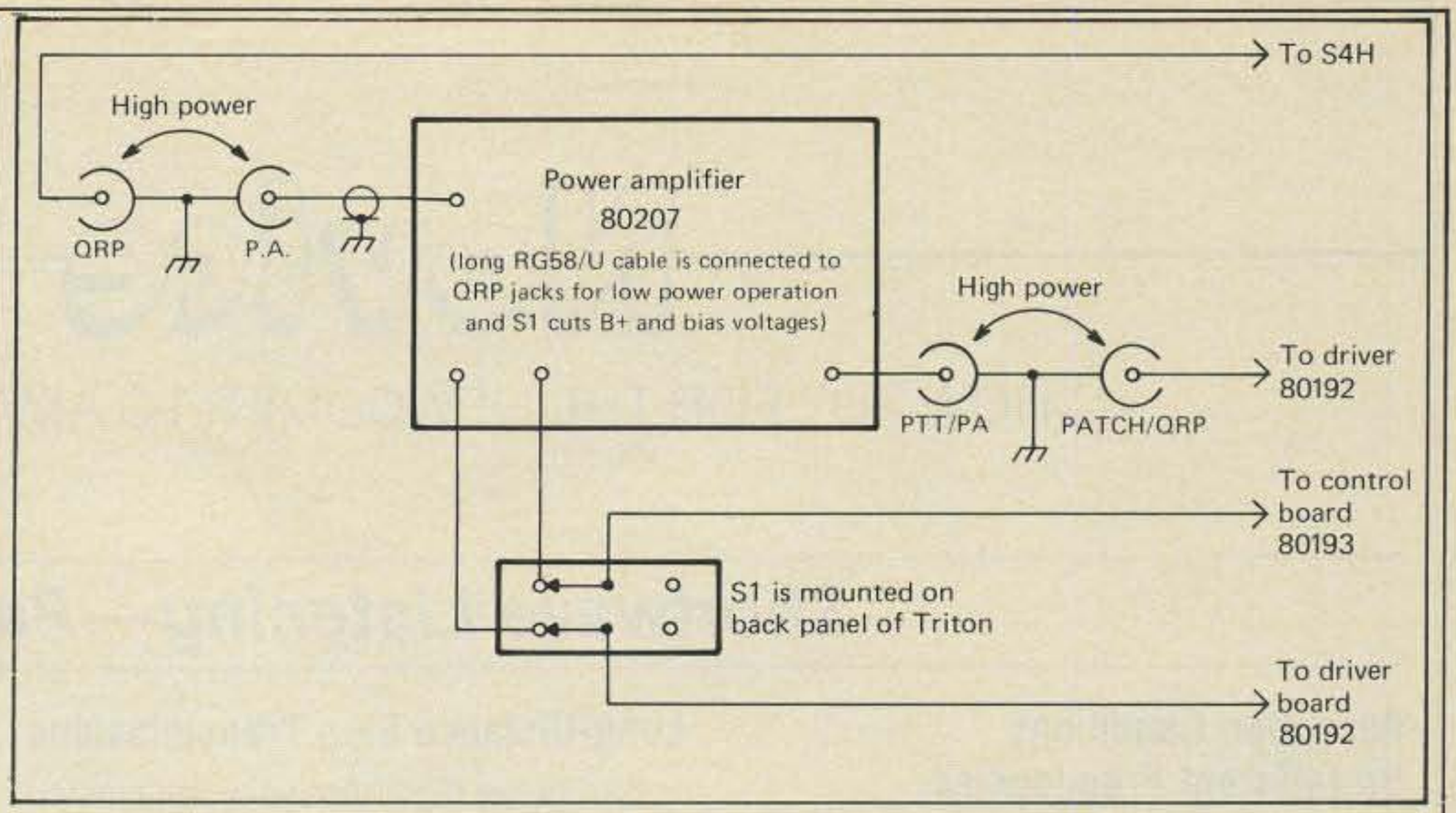
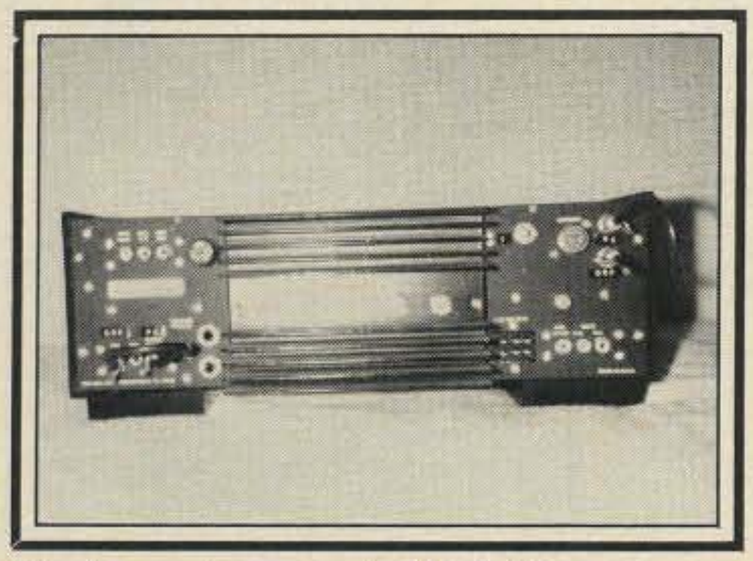


Fig. 1– The Triton I power amplifier schematic.



Back panel connected for high-power operation. Dymo tape labels are used for panel markings.

on with the D.P.D.T. switch and the short cables restore the power amplifier block to its original operating condition. Although a multi-sectioned rotary switch might be used in the Triton modification, the method described offers a relatively simple and inexpensive means of conversion to low power. When operating QRP, as stated in the Triton manual, the ALC, relative power meter, and s.w.r. meter will not operate, and some other means of determining adequate drive should be used (QRP Power/S.W.R. Meter).

Operation

During the Field Day Contest, the Triton I operated flawlessly at the 10 watt power level, garnering WA0NLK/P0 119 contacts, most of which were on 40 meters. Thirty-six states, including Hawaii and four Canadian provinces, were tallied by the end of the contest period using a rhombic antenna at 20 feet and a lawn mower battery for power.

So, if you like QRO and QRP, you will find the best of two worlds with the Triton.

No - 71 - 72

a monthly feature by
BILL WELSH, W6DDB

Novice

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Shortwave Listening—Part II

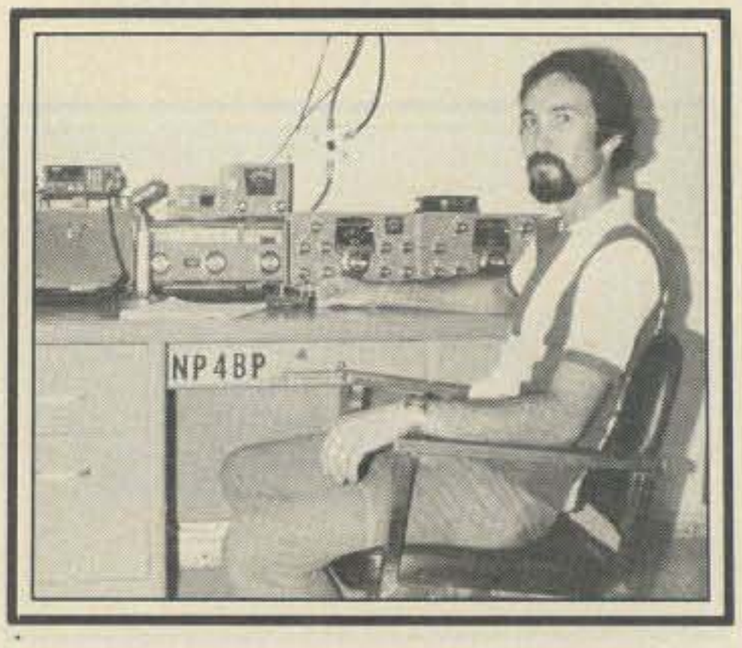
Reception Conditions On Different Frequencies

Frequencies below 10 Megahertz provide the best reception at night, and frequencies above 10 Megahertz normally provide the best reception during the day. In addition, these lower frequencies are generally more useful during the winter, and the higher ones provide the best results during the summer. Mid-range international broadcast bands (such as 31 and 25 meters) are usually good around the clock and throughout the year. The higher frequencies remain useful for a longer time in the summer than during the winter because the required ionosphere layers are energized more during the longer summer days.

*2814 Empire Ave., Burbank, CA 91504

Long-Distance Skip Transmissions

Part of the high-frequency transmitted signal travels skyward from the antenna until it encounters one or more layers of charged particles (called ionosphere layers) in space. These ionosphere layers surround the Earth and they refract (bend) high-frequency signals to the Earth's surface. The refracted signal returns to Earth hundreds (or thousands) of miles from the location of the transmitting antenna, and it can be heard in the return area. This refracted signal is reflected off the Earth's surface back up to the ionosphere, which may again refract the signal back to the Earth's surface at a still greater distance from the point of origination. The refraction and reflection is repeated until the signal is reduced (attenuated) to the point where it is too weak to be heard. Each time the signal is refracted back to Earth, it can be heard by those who listen for it in the area where it strikes the Earth.



This is Carlos Guzman, NP4BP, of Ponce, Puerto Rico. While operating as a Novice (WP4AOF), Carlos made more than 2000 contacts, including contacts with amateurs in 75 countries. Carlos obtained the Novice license May 1979 and he upgraded to General December 1980; he then upgraded to Advanced in June of 1981. Carlos is 25 years old and he is a member of the Ponce DX Club. His rig is the Heath combination of the SB-303 and SB-401 used with an electronic keyer and an antenna tuner. His antenna is a 2-element Manitoba quad which he is replacing with a Hy-Gain TH6DXX 3-band Yagi. Listen for Carlos on the 15 meter Novice band near 21,125 kHz.

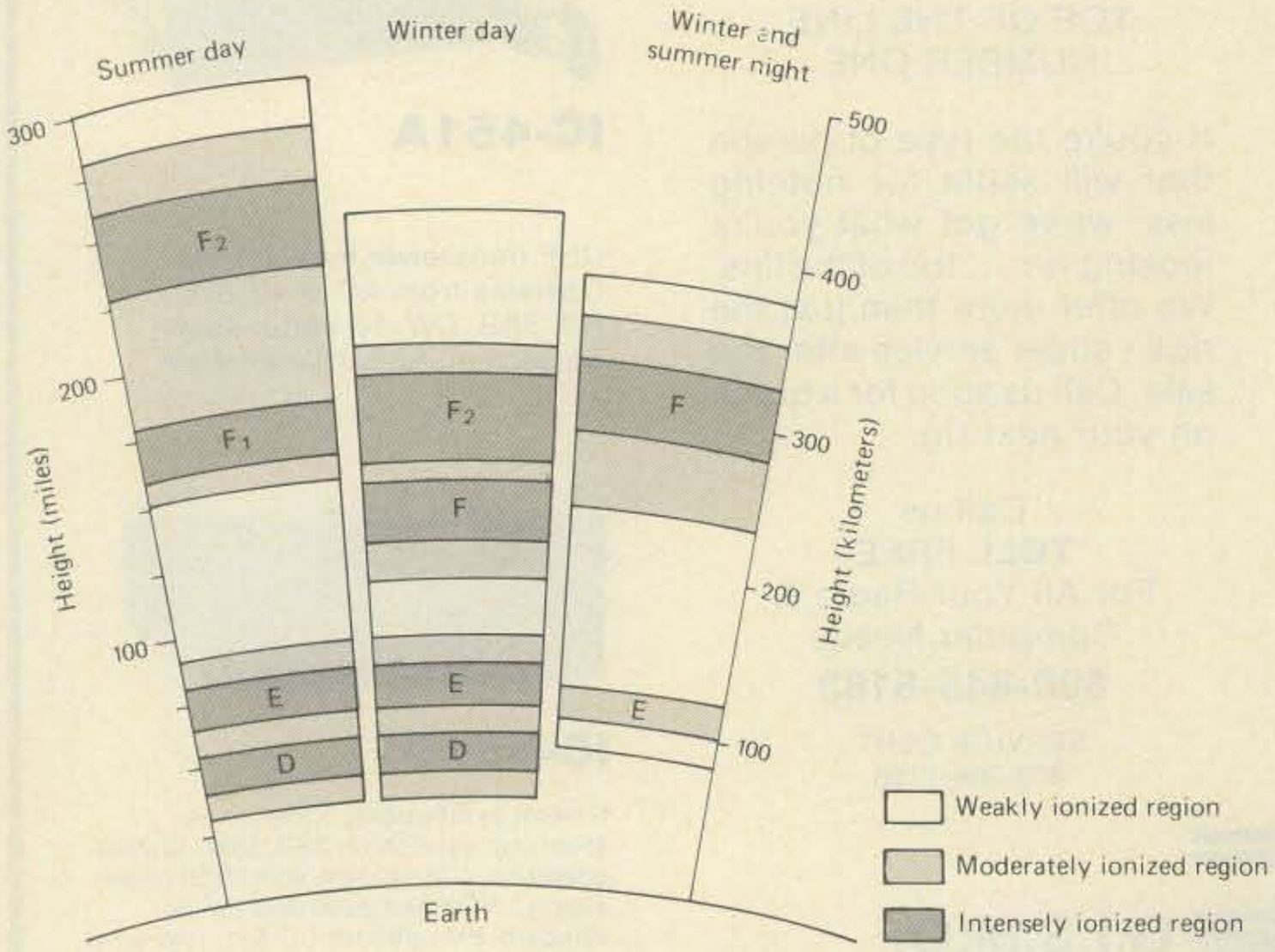


Fig. 1– Basic relationship of the Sun to the Earth and how the ionosphere works. (For complete information, see The Shortwave Propagation Handbook, *2nd edition, by George Jacobs, W3ASK, and Ted Cohen, N4XX, available from CQ's Book Shop.)*

Ionosphere

Since the ionization layers are energized by charges emitted by the Sun, it is understandable that ionization is strongest when the Sun's rays are directly overhead (about noon).

Layer Designations. Ionization layers are designed *F*, *E*, and *D*. It is easy to remember what designation applies to which layer if one remembers that these layers are fed from the Sun and, from the Sun towards Earth, they are designated *F*, *E*, and *D*, respectively. The *F* layer is at the greatest height above Earth and the others are closer to the Earth's surface.

Effects of Layers. During the maximum ionization period (about noon), the *F* layer splits into *F1* and *F2* layers. The *F2* layer is the highest one (150–250 miles) and it takes on the greatest ionization charge, making it the most useful layer for aiding

Transmission Description	Frequencies kHz	MHz
AERONAUTICAL		
ARINC-Worldwide	13,328	
British VOLMET		11.2
New York	6,540	11.367
	8,945	13.288
Russian Aeroflot	11,312	
U.S. VOLMET	3,001	8.868
	5,652	13.272
CANADIAN AIR FORCE BASES	11,233	
CLANDESTINE BROADCASTS		
Anti-Castro		7.03–7.09
Pirates	6,235–6,280	
	7,325–7,370	
Radio Free Granada	15,045	
CODE BEACONS	3,647	8.656
	6,792	10.570
	6,801	10.645
	8,645	
DIPLOMATIC		
U.S. State Department	6,925	12.023
USMAG-Latin America	7,430	13.95
FEDERAL AGENCIES		
Air-to-Ground		122.9
Fish and Wildlife		34.83
FLTSATCOM		240–270
INDUSTRIAL		
Gulf of Mexico Rigs	30,640	31.16
	30,700	31.20
	30,880	31.84
ISM	13,560	27.12
Petroleum Networks	4,634.5	4.6375
LICENSE-FREE		
Cordless Telephones	1,695	49.830
	1,725	49.846
	1,755	49.860
		49.875
		49.890
Experimental	160–190	
MARINE		
Coasts	4,125	6.2216
	4,143.6	8.793
	6,218.6	13.132
Great Lakes	6,516	
Inland Waterways	6,519	6.522
MILITARY AFFILIATE RADIO SYSTEM	4,010	4.58
	4,025	
MILITARY AIR-TO-GROUND		126.2
NUCLEAR TRANSPORT CONVOYS	5,751	11.555
	7,700	
SMUGGLERS	7,400–7,500	14.4–14.5
SPACE PROGRAM		
ATS-1		135.6
ATS-3		135.575
NASA	6,708	10.780
	7,675	11.205
	7,765	20.186
		20.192
Shuttle	259,700	296.8
SPY STATIONS	5,812	3.06
(Cuba Numbers)	8,418	3.09
TRAVELERS INFORMATION	530	1.61
U.S. AIR FORCE		
Andrews AFB	13,247	
Base Operations	165,112.5	165.1625
	165,137.5	165.1875
CAP	4,585	148.15
Fire/Crash	173,562.5	173.5875
MAC/Scott AFB	11,182	
MacDill AFB	11,246	
McClellan AFB	8,989	
NORAD	14,894	
SAC	9,027	311.0
	11,243	
	13,241	
Scott AFB	11,233	
U.S. ARMY		
Aircraft-Tower		41.5
Engineers	5,437.5	163.4125
		163.4375
Medical		38.5
Military Police		173.4125
Search and Rescue		40.5
U.S. COAST GUARD		
AMVER-Coasts	6,506.4	13.1132
	8,765.4	17.3073
Calling and Distress	500	121.5
	2,182	123.1
	3,023.5	156.8
	5,680	243.0
	8,364	282.8
Operations	5,692	157.05
	5,696	
U.S. NAVY		
Atlantic Fleet	6,997	11.267
Guantanamo Bay Telephone	10,222.5	
MARS Repeater		148.41
Project ELF	0.076	
Transit Satellite		150.0

Table I– Examples of unusual transmissions that can be monitored.

Bill McLean, KA8JRL, of Ann Arbor, Michigan, has been licensed since June of 1980. Despite limited operating time, Bill has contacted 47 states and 5 countries. His station includes a Ten-Tec Century 21 Transceiver, keyer, crystal calibrator, Autek QF-1 Active Filter, Micronta SWR Meter/Antenna Switch, Dentron dummy load, and an Antenna Supermarket AV-1 Vertical (with aluminum radials) mounted in his backyard. Bill is a 44 year old college teacher and industrial training consultant. He advises that this column helped him decide to get an amateur license after putting it off for about 30 years, and he urges everyone who wants to become an amateur to do so without further delay. Bill plans to upgrade by the time this picture is printed and to be working DX (distant stations) with a new Yagi beam antenna. He hopes to homebrew a solar powered QRP (low power) rig and to use it in the next ARRL Field Day Contest.

long-distance (skip) transmissions on high frequencies. The *F1* layer is closer to Earth and it is not as highly ionized. The *F1* layer refracts lower frequencies (longer wavelengths) back to Earth. The *E* layer forms daily by mid-day at a height of about 60 miles above Earth, and it refracts relatively low frequencies (about 5–10 Megahertz) back to Earth. The *D* layer is also maximum at mid-day and it absorbs radio signals below 3 Megahertz.

Ionosphere at Night. As nighttime nears, the Sun's ionization rays strike the Earth's ionized layers at increasingly oblique (less direct) angles, allowing the Earth's ionization layers to lose their charge. As this effect increases, the lower layers merge up into the composite *F* layer, which forms about 150 miles above Earth at night.

Reception Changes. As you probably know, shortwave radio reception is not constant. There is an 11-year sunspot cycle which caused shortwave signals to propagate exceptionally well around 1980 and which will help us again about 1991. In addition to the 11-year sunspot cycle, random explosions on the Sun's surface (called flares) emit unusually strong streams of charged particles in several directions throughout our Universe, with some bombarding the Earth. These extremely strong bombardments alter the normal refraction (bending back

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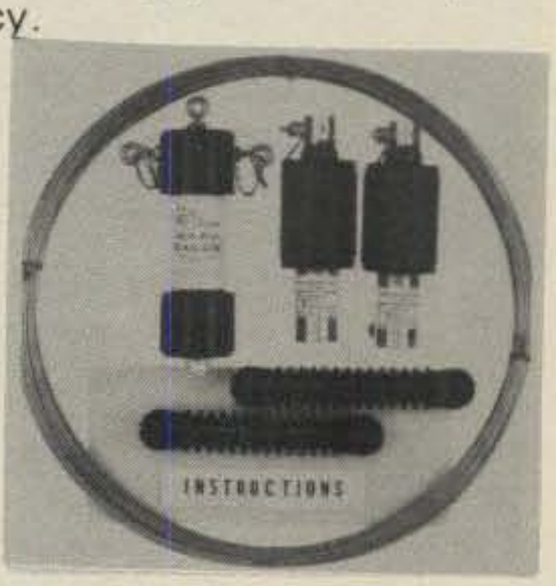

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110		160	Maritime Coastal Telegraphy
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285		325	Maritime Radionavigation
325		405	Aircraft Radionavigation
405		415	Maritime Mobile Direction Finding
415		510	Maritime Mobile Telegraphy
510		535	Mobile Government
535		1605	Amplitude Modulation (AM) Broadcasting
1605		1715	Public Safety (Police, etc.)
1715		1800	Public Service
1800		2000	Amateur and Loran
2000		2107	Maritime Coastal and Mobile
2107		2170	Maritime Mobile
2170		2194	Maritime Phone Distress
2194		2495	Maritime Mobile Phone
2495		2505	WWV, Official US Time and Frequency
2505		2850	Maritime Mobile Phone
2850		3155	Aeronautical Mobile
3155		3400	Public Safety
3400		3500	Aeronautical Mobile
3500		4000	Amateur
4000		4063	Aeronautical Fixed
4063		4438	Maritime Mobile
4438		4650	Aeronautical Fixed
4650		4750	Aeronautical Mobile
4750		4995	Aeronautical Fixed
4995		5005	WWV, Official US Time and Frequency
5005		5450	Aeronautical Fixed
5450		5730	Aeronautical Mobile
5730		5950	Aeronautical Fixed
5950		6200	International Broadcasting
6200		6525	Maritime Coastal and Mobile
6525		6765	Aeronautical Mobile
6765		7000	Aeronautical Fixed
7000		7300	Amateur
7300		8195	Aeronautical Fixed
8195		8285	Maritime Mobile Phone
8285		8745	Maritime Fixed and Mobile Telegraph
8745		8815	Maritime Coastal Phone
8815		9040	Aeronautical Mobile
9040		9500	Aeronautical Fixed
9500		9775	International Broadcast
9775		10000	Aeronautical Fixed
10000		10100	Aeronautical Mobile
10100		11175	Aeronautical Fixed
11175		11400	Aeronautical Mobile
11400		11700	Aeronautical Fixed
11700		11975	International Broadcast
11975		12330	Aeronautical Fixed
12330		12400	Mobile Phone
12400		13130	Maritime Fixed and Mobile
13130		13200	Maritime Fixed and Mobile Phone
13200		13360	Aeronautical Mobile
13360		14000	Aeronautical Fixed
14000		14350	Amateur
14350		14990	Aeronautical Fixed
14990		15010	WWV, Official US Time and Frequency
15010		15100	Aeronautical Mobile
15100		15450	International Broadcast
15450		16480	Aeronautical Fixed
16480		17360	Maritime Fixed and Mobile
17360		17700	Aeronautical Fixed
17700		17900	International Broadcast
17900		18030	Aeronautical Mobile
18030		19990	Aeronautical Fixed
19990		20010	WWV, Official Time And Frequency
20010		21000	Aeronautical Fixed
21000		21450	Amateur
21450		21750	International Broadcast
21750		21850	Aeronautical Fixed
21850		22000	Aeronautical Mobile
22000		22720	Maritime Fixed and Mobile
22720		23200	Aeronautical Fixed
23200		23350	Aeronautical Mobile
23350		24990	Aeronautical Fixed
24990		25010	WWV, Official US Time and Frequency
25010		25330	Industrial
25330		25850	Government
25850		26100	International Broadcast
26100		26480	Remote Pickup Broadcast
26480		26950	Government
26950		27540	Industrial, Medical, and Citizens Band
27540		28000	Government
28000		29700	Amateur
29700		30000	Aeronautical Fixed
30000		30560	Government
30560		32000	Loran and Transportation
32000		33000	Government
33000		34000	Public Safety, Industry
34000		35000	Government

kHz	to	kHz	Service
35000		36000	Transportation
36000		37000	Government
37000		38000	Public Safety, Industry
38000		39000	Government
39000		40000	Public Safety
40000		42000	Industrial, Public Safety, Mobile
42000		44000	Transportation and Maritime
44000		50000	Public Safety, Transportation
50000		54000	Amateur
54000		60000	TV, Channel 2
60000		66000	TV, Channel 3
66000		72000	TV, Channel 4
72000		76000	Fixed, Operational
76000		82000	TV, Channel 5
82000		88000	TV, Channel 6
88000		108000	Frequency Modulation (FM) Broadcasting
108000		118000	Aeronautical Navigation
MHz	**to**	**MHz**	**Service**
118		132	Airdome Control
132		144	Government
144		148	Amateur
148		152	Government
152		162	Transportation
162		174	Remote Pickup, Transportation
174		180	TV, Channel 7
180		186	TV, Channel 8
186		192	TV, Channel 9
192		198	TV, Channel 10
198		204	TV, Channel 11
204		210	TV, Channel 12
210		216	TV, Channel 13
216		220	Telemetering
220		225	Amateur
225		329	Government Civil Aviation and Limited
329		336.4	Aeronautical, Government, Public Safety (Police, etc.)
336.4		400	Government Civil Aviation and Limited
400		406	Meteorological Aids
406		420	Government
420		450	Amateur
450		460	Remote Pickup and Transportation
460		470	Citizens Radio
470		476	TV, Channel 14
476		900	TV, Channels 15–83, 6 Mc/s per channel
MHz	**to**	**MHz**	**Service**
900		940	Industrial Mobile
940		952	Studio Transmitter Link, FM
952		960	Industrial Fixed
960		1215	Aeronautical Navigation
1215		1300	Amateur
1300		1365	Aeronautical Radar
1365		1660	Radar
1660		1700	Radio Sonde, Transportation
1700		1850	Government
1850		1990	International Control
1990		2110	Studio Transmitter Link, Remote Control
2110		2200	Industrial Fixed
2200		2300	Government
2300		2450	Amateur
2450		2500	Industrial Mobile and Fixed
2500		2700	Industrial Fixed
2700		2900	Aeronautical Navigation
2900		3300	Radio Navigation
3300		3500	Amateur
3500		3700	Mobile Remote Pickup
3700		4200	Common Carrier Fixed
4200		4400	Aeronautical Navigation
4400		5000	Government
5000		5650	Radionavigation
5650		6000	Amateur, Industrial Mobile
6000		6425	Industrial Fixed
6425		6575	Mobile Remote Pickup
6575		6875	Industrial Fixed
6875		7125	Studio Transmitter Link
7125		8500	Government
8500		9900	Radionavigation
9900		10000	Government
10000		10500	Amateur
10500		10700	Industrial, Medical
10700		11700	Common Carrier
11700		12200	Mobile Remote Pickup
12200		12700	Industrial Fixed
12700		13200	Studio Transmitter Link
13200		16000	Government
16000		18000	Mobile Fixed
18000		21000	Government
21000		22000	Amateur
22000		26000	Government
26000		30000	Mobile Fixed
30000		100000	Experimental, Amateur, and Government

Table II– Frequency spectrum allocations.

of radio waves) characteristics of the Earth's ionosphere layers, disrupting normal communication patterns for minutes, hours, or days. These ion storms are least noticeable at the Equator and are most disruptive at the North and South Poles; consequently, communication deteriorates as the distance from the Equator increases. These ion storms produce spectacular lighting effects which we call Aurora Australis (South Pole) and Aurora Borealis (North Pole).

Ionosphere Drift. Scientists have discovered that the ionosphere lasts throughout the long polar nights, indicating that the ionosphere layers do drift or spill over from areas of normal activity.

Frequency Spectrum Allocations

Table II provides a rough introduction to the various radio services that can be heard throughout the radio frequency spectrum.

Even a list of frequency allocations as long as the one in Table II is shortened, since a detailed listing would fill several books. Police departments and fire departments operate in the 30 to 50 MHz and 152 to 174 MHz bands. Highway trucks operate between 35.78 and 35.94 MHz. Railroads operate from 159.63 to 161.79 MHz. Taxicabs operate between 157.53 and 157.71 MHz with their base stations on 152.27 and 152.45 MHz. You will find all of these stations simply listed as "transportation" in Table II.

You will find 9040 to 9500 kHz listed as aeronautical fixed, but actually, NSS (Navy, Washington, DC) uses 9425 kHz; 10100 to 11175 is also listed as aeronautical fixed, but actually, NBA (Navy, Balboa, Canal Zone) uses 11080 kHz. These are examples of the discrepancies which exist between actual frequencies and the general frequency allocations shown in Table II.

The *World Radio TV Handbook* supplies complete information on the frequency times of transmission and nature of the broadcasts from all shortwave stations throughout the world; this book is available from *CQ*'s Book Shop.

WWV is the official time and frequency standard station of the United States and can be heard on 2.5, 5, 10, 15, and 20 MHz; the best frequency for reception of this station is determined primarily by your distance from it and the time of day.

Conclusion

This completes this part of the series on shortwave listening. Part III covers publications, tapes, and clubs.

CQ BOOK SHOP

The Shortwave Propagation Handbook, 2nd ed.
by George Jacobs, W3ASK, and Theodore J. Cohen, N4XX
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Computers and the Radio Amateur
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The 10 Meter FM Handbook
by Bob Heil, K9EID
Gives all of the simple details for converting many CB rigs, h.f. transceivers, and commercial gear to operate on 10 meter FM, complete with VHF transverters for use on 6, 2, or 1¼ meters. Also explains the unique systems and propagation characteristics that occur on 10 meter FM. 80 pages, paperback, $4.95. Order #M150.

Amateur Radio Equipment Fundamentals
by Albert D. Helfrick, K2BLA
A highly intriguing and informative guide to all phases of communications equipment from simple receivers and transmitters through slow-scan TV and radio teletype. Includes two chapters of construction projects. 284 pages, hardcover, $17.95. Order #P180.

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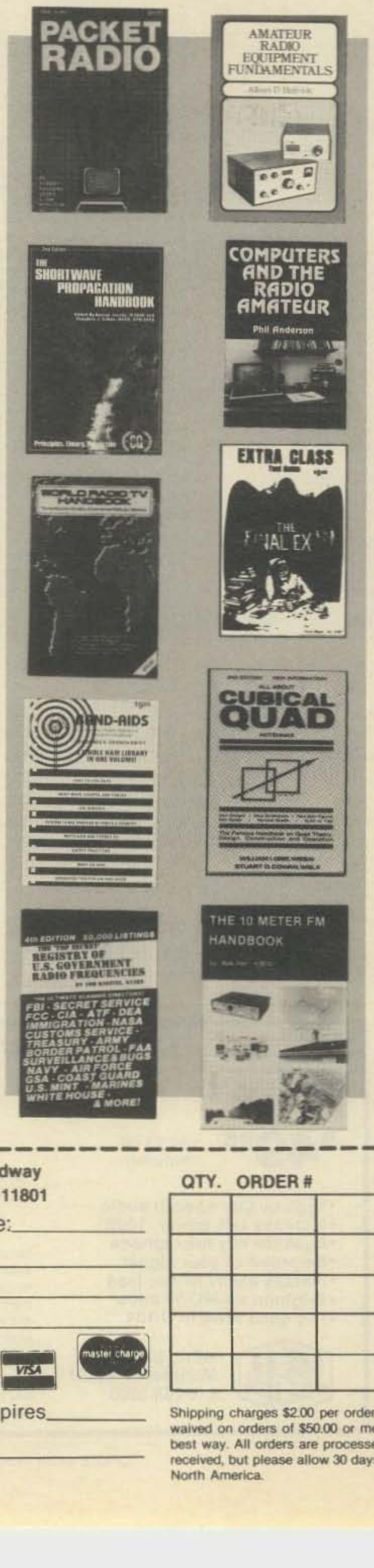

CRB Research Series
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World Press Services Frequencies
by Thomas Harrington
A comprehensive manual covering the field of radioteletype news monitoring—antennas, receivers, terminal units, monitors, and more. Contains 3 master lists of times of transmission, frequencies, plus ITU list of over 50 news services worldwide. 72 pages, paperback, $5.95. Order #U173.

The Radio Publications Group—The "Bill Orr Series"
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Interference Handbook, by W.R. Nelson, 247 pages, paperback, $8.95. Order #R172.

World Radio TV Handbook 1982
The world's only complete directory of international broadcasting and TV stations—the established, authoritative guide endorsed by the world's leading broadcasting organizations. A comprehensive listing of short-, medium-, and long-wave stations revised and updated to reflect actual conditions. Also includes special features on listening gear, how to adapt older receivers for use today, and DX club activities. 560 pages, paperback, $16.50. Order #B097.

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Band-Aids
by James E. Dersch, KB7FT
An encyclopedia of miscellaneous amateur radio information that every ham will treasure. Includes s.w.r. nomographs, details on WWV broadcasts, time zone data, frequency charts, and much more. 162 pages, wirebound, $9.95. Order #B183.

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- KDK continues the tradition of being the ultimate in VHF FM mobile operations. We make maximum use of multiple function, multiple shaft controls and only three sets of knobs are located on the front panel. Still many new features have been added, such as digital RIT, reverse button, memory channel readout number and more!
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- Nicads for memory retention built in, nothing extra to buy. Disconnect the FM2030 from the power source and the memories remain!
- Easy to use mobile mount with instant disconnect knobs for fast, simple removal. DC Cable and mounting hardware, spare fuse, external speaker plug and complete simplified instruction book includes circuit diagrams and even complete alignment instructions! No extras to purchase!
- Control functions: Select memories, show memory channel number, or select memories and show frequency of channel, or dial frequencies with two speed selectable control. Instant choice of either 5 or 100 hz tuning steps. Band scan or frequency scan selectable.
- Frequency shown in 5 bright LED digits. LED indicator shows when signal is received (unsquelched), LED indicator shows transmit.
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The World of Video

A LOOK AT THE WORLD AROUND US

SSTV Doing Great

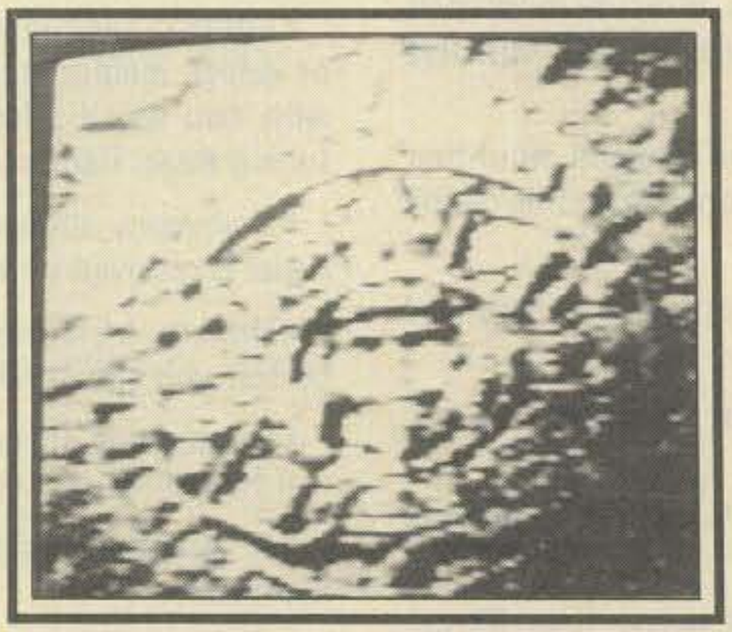
Slow Scan TV activity on our h.f. bands continues to flourish in a never before attained manner, and this move shows absolutely no signs of waning. The recent inclusion of General Class operators to our video ranks has also opened a Pandora's box of exciting and enjoyable operations which promise to dominate the limelight of amateur interest for many years. Each day's SSTV activities reflect a kaleidoscope of scene exchanges from around the world, as one-of-a-kind personalized views roll down the screen of monitors in a rapidly increasing number of amateur setups. If you've been considering trying a new mode or aspect of amateur radio for renewing a possibly declining interest, SSTV is almost guaranteed to bring back the excitement of those first days in amateur radio.

As we've mentioned in previous columns, getting started in Slow Scan TV doesn't require a large outlay of cash. Today's most popular arrangements involve initial startups using hamfest-obtained P7 gear (an inexpensive way), and later progressing to a digital scan converter. An unmodified portable television can be used as an SSTV monitor with that converter, either temporarily or permanently as desired. A general mixture of luck, enthusiasm, and ham trading usually results in a CCTV camera which can be used with the digital scan converter for transmitting SSTV pictures. The budding SSTVer is then well on the way to establishing a top-notch video setup. What else might we say except to coin the old proverb of "one picture is worth a thousand words."

Leaning in that direction, we've included several off-the-screen SSTV photos in this month's column hopefully to catch your curiosity and spark your interest for joining our numbers. You've little to lose, and a never-ending term of fascination, interest, and pleasure to gain. Come on in—the viewing's grand! Hams should be heard *and* seen!

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

Although reproduced here in black and white, this color SSTV picture was transmitted from G3NOX to WB0UMB via 20 meters. The view was taped, retransmitted to K4TWJ, retaped, and photographed. A loss of quality is apparent, but the view is still good.



SSTV view of Aztec calendar, along with description of its use, compliments of XE2JOF. Were you in on that night's 20 meter activities?

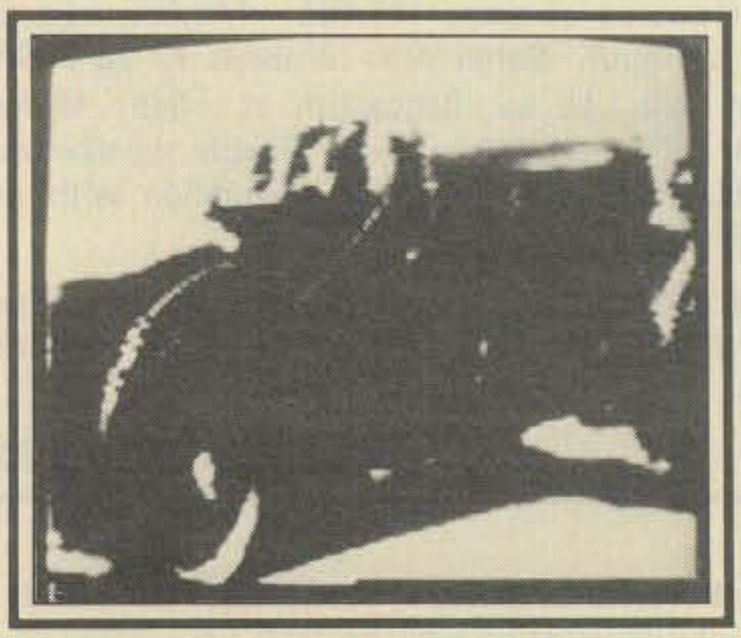
Start Your Own Microwave TV?

Have you ever thought of the possibilities and enjoyment associated with securing an income in a field closely related to amateur radio? Somehow that sounds more like pleasure than work, and we all know when someone truly enjoys his work, he's a winner in his field. The recent flurry of low-power microwave TV stations is such an example, and one which could set a video-oriented amateur pondering the possibilities of his joining the action of this exciting field. The opportunities for such systems are numerous, particularly for today's microwave enthusiasts living in high-population areas.

During a recent jaunt through Florida's western coastal region, for example, we noticed a vast number of beach-area motels and condominiums in their final stages of construction. One particular area hosted a large TV-viewing audience situated in an almost straight-line pattern for at least 12 miles, with a perfect microwave transmitter site located near the middle of that area. Talk about MDS heaven!

All that glitters may not be gold, however, and getting such a TV system rolling may require a certain amount of personal ingenuity and business "know how." Since the FCC stipulates separate ownerships for the MDS transmitter and TV studio setup, a partnership arrangement may be necessary. A local franchise must be secured for the projected MDS-coverage area. Assuming that particular area isn't already covered by an existing cable TV franchise and that the city council is favorably impressed, the major hurdles are past. The final steps include setting up a satellite TV receiving system (TVRO); rigging the necessary video processors, recorders, etc.; and providing a signal for the awaiting MDS transmitter.

Individual 2.1 GHz MDS downconverters are available in 100-lot prices from



Applications of SSTV are truly unlimited, as exemplified by this view and subsequent s.s.b. description of classic European sports cars.

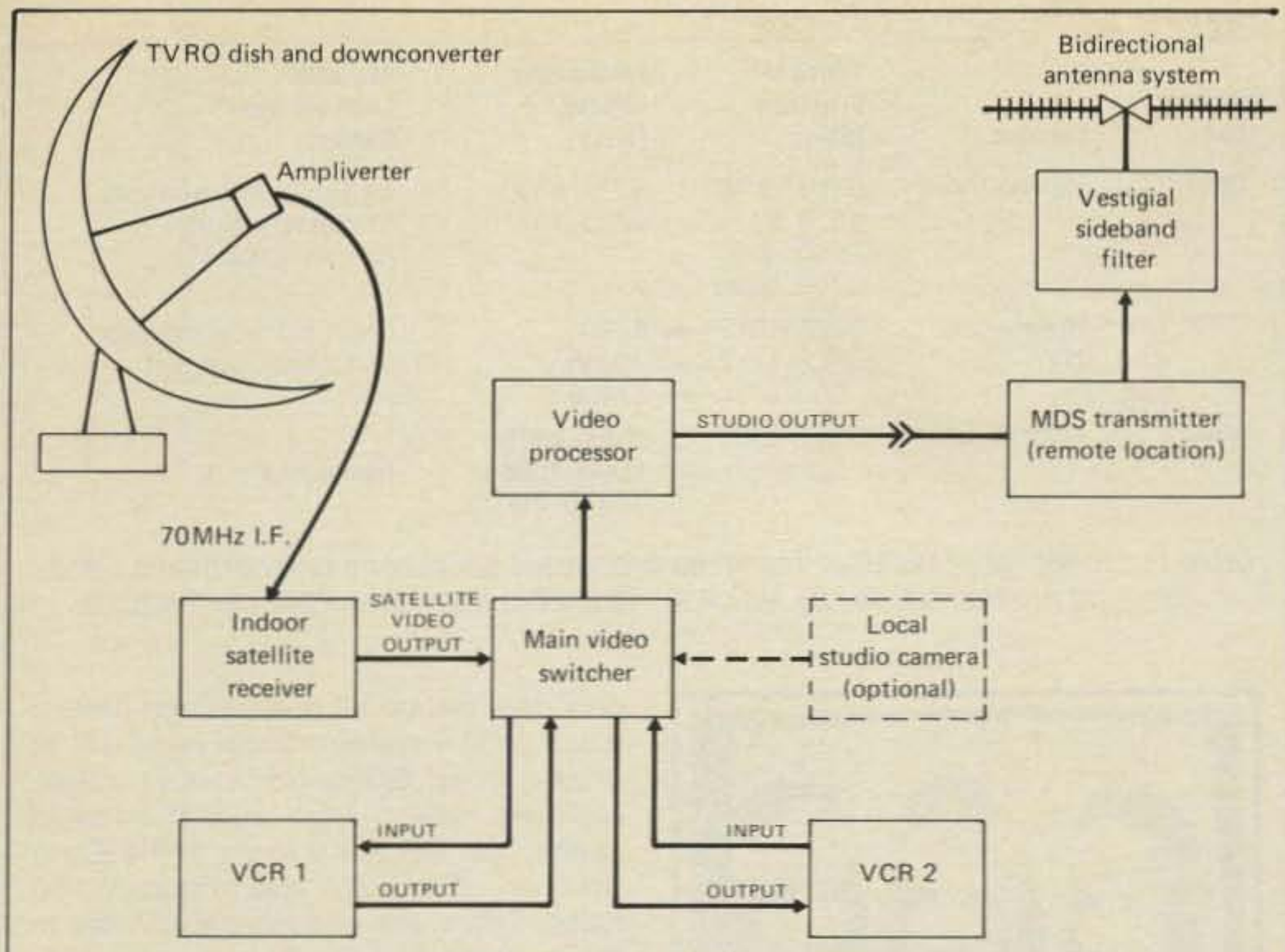


Fig. 1– Basic layout of microwave TV setup consists of TVRO, video recorders, switcher, processor, and microwave transmitter. A substantial number of MDS-subscribing downconverters complete the system.

suppliers such as Universal Communications in Arlington, Texas. A simple scrambler and multiple descramblers could provide a cost-effective yet efficient means of cloaking the signal from air piracy. A brief calculation tends to indicate that one or two years of operation of the overall system should amply cover all initial expenditures and place the operation in a profitable category. Interesting idea, eh?

Column editor K4TWJ as viewed in his dimly illuminated shack by high-sensitivity camera. Fair warning, gang—send your SSTV views, or we'll be inclined to show more of this shady character.

Weather Watching Video Style

Generally speaking, today's seasonal weather variations might be classified as anything but mild-mannered and predictable. As a result of this situation, many amateurs are rigging their own forms of weather-monitoring setups. Progressing beyond conventional weather band converters and home-constructed rain gauges, amateur video enthusiasts are using modified digital scan converters or specially interfaced home computers for receiving weather radar displays or cloud-cover views from our many facsimile sources (GOES, OSCAR 9, etc.).

While the National Weather Service maintains a network of telephone-available weather radar transmissions (with a format closely akin to SSTV), they frown on "unauthorized access" to their system by non-subscribers (some area weather services may be congenial, while others may change telephone numbers the instant they feel "invaded"). Fortunately, however, the National Oceanic and Atmospheric Administration conducts a group of similar weather facsimile broadcasts on various frequencies in the h.f. spectrum. A partial list of those transmissions is shown in Table I. The usual transmission format consists of approximately 840 lines per picture scanned at the rate of 2 lines per second (120 lines per minute).

Assuming a Robot 400's sync circuit (U60) were slowed from 1/15 second to 1/2 second (maybe, as George, W2RZQ, suggests, by the addition of resistance in series with the 400's width control), various portions of each picture could be stored and viewed. The addition of a "sliding ramp" vertical reset could also be included to sequentially shift each series of 128 lines for time-elapse viewing of each area in the full 840-line display (*example:* first picture equals weather fax lines 1–128; second picture equals weather fax lines 128–256; etc.). A few lines at the picture bottom would be lost, but if the 400 were switch-modified, its

Station Call	Location	Times of Operation (GMT)	Frequencies Utilized (kHz)	Facsimile Transmission Content
CFH	Halifax, NS	0316, 0916 1516, 2116 0500, 1100 1700, 2300	4271, 6330 9890, 13510	Earth surface analysis of Western North Atlantic area
WFK	Brentwood, NY	0712–1212→ 0712–1212→ 1950–2350→	9290 11035 17436.5	Earth surface analysis and 24 hr. forecast
NAM	Norfolk, VA	0000–0050	3357, 4975, 8080, 10865, 16410, 20015	Naval FAX

Table I– Partial list of weather facsimile broadcast operations on shortwave bands. Systems are maintained by N.O.A.A. Additional details are given in the text.

Yes, it's all one lady, not triplets. That's a single, 8-second, 120-line view. We'll let you ponder how it was done.

original SSTV capabilities would remain intact.

Several amateurs have rigged their own setups for direct reception of weather satellite transmissions, and the results have been very good (remember W1BGW's retransmitted weather pictures during the SSTV Net?). One of the simplest and easiest ways of pursuing this trend involves rigging one of the 1691 MHz band receiving converters also offered by companies such as Universal Communications. These units are similar to 2 GHz downconverters, except larger cans are used for the associated lower frequency ranges. The resultant views can be displayed on either a modified facsimile unit or a home computer-interfaced printer. (The Epson MX80 and TRS-80C setup seems particularly appealing for this display.)

OSCAR 9 should be settled into a routine schedule of "visual imaging" transmissions of known format by the time this information appears in print. The simplicity of this system should make it quite appealing for mass amateur reception. The basic required ingredients consist of a 2 meter receiver tuned to 145.825 MHz, an AFSK demodulator similar to those used in SSTV monitors or RTTY converter "front ends," and a "time readout device" (either modified facsimile or small computer/printer arrangement).

Each of the previously described weather display systems offers different capabilities, so there's no reason to rig only one. Set up all of them and have a blast! NOAA systems show weather "at ground level," GOES indicates cloud systems as viewed from 20,000 miles in space, and OSCAR 9 looks at the Earth from an altitude of approximately 800 miles. There are enough capabilities in these combined systems to turn your shack into a full-blown weather bureau!

Tidbits Here and There

In addition to the color SSTV activity of Jeramy, G3NOX, Richard, G3WW, reports that both he and G4CZT are heavily involved in color operations. Both amateurs use Robot 400's equipped with W9NTP's dual memory boards. G3WW interfaces color video to the TV via the red, green, and blue amplifiers, while G4CZT uses an r.f. modulator directed to the monitoring TV via its antenna terminals. Both arrangements report very good results. Watch for these fellows on 14,230 and 28,680 kHz.

Reflecting the support of almost every SSTVer, *A5 Magazine* has switched from bi-monthly to monthly publication. Editor Mike Stone is also getting some doggone good information from SSTV innovators, so the video magazine's future looks very bright. Congratulations and good luck, Mike.

If you're looking for Africa on SSTV, keep an eye on 14,230 kHz around 0230 GMT Wednesdays and 0230 GMT Fridays (during the Thursday night SSTV Net). Several ZS and other DX stations have checked into the net with quite strong signals.

Several South Pacific SSTV stations have been noted on 28,680 kHz. The best time to catch these slow scanners seems to be right before the band closes each evening (between 0000 and 0200 GMT).

Finally, a serious encouragement (appeal!) for notes on your own activities and SSTV projects which you would like to share with others. We'll rush information into print and ensure that you are credited. Remember, this is *your* column, so drop us a note or letter (and photo) to my home address given in this column. See you on 20!

73, Dave, K4TWJ

Announcing

(continued from p. 8.)

Spangled Banner, on June 12–13 commencing at 1600 GMT. Operation will be within the first 25 kHz of the General and Advanced bands both c.w. and s.s.b., plus Novice operation, and on 20, 15, 40, 2 and 6 meters. For a special certificate send QSO number and s.a.s.e. to WB3KUH, 1806 Willann Road, Rosedale, MD 21237.

● **Strawberry Festival W8FW** - The Miami County ARC will operate W8FW from the site of the Troy, Ohio, Strawberry Festival from 1600Z June 12 until 0200Z June 14. Frequencies will be 25 kHz from the lower end of the General phone and Novice subbands on 10, 15, and 40 meters, and 25 kHz from the lower end of the General phone subband on 20 meters. To receive a certificate, send QSL and s.a.s.e. to W8FW, Box 214, Troy, OH 45373.

● **The following hamfests, fleamarkets, etc., are slated for June:**

June 4, 5, 6, **Ham-Comp 82,** San Diego, CA. Contact Dr. Mel Zeddies, P.O. Box 81537, San Diego, CA 92138, or call 714-274-4087.

June 5, **North Area Repeater Assoc. Amateur Fair,** St. Paul, MN. Contact Amateur Fair, P.O. Box 30054, St. Paul, MN 55175.

June 5, **Arctic ARC Hamfest,** Fairbanks, Alaska. Contact Herb Walls, KL7JLF, P.O. Box 1625, Fairbanks, AK 99707.

June 5, **Grand Rapids Festival Swap & Shop,** Byron Center, MI. Contact Independent Repeater Assoc. Swap, 562 92nd St. S.E., Byron Center, MI 49315, or call 616-455-2926.

June 5, **Superfest 5 Colorado Hamfest,** Loveland, CO. Contact Gene Bellamy, WDØDRM, 3124 West 6th St., Greeley, CO 80631.

June 6, **Starved Rock Hamfest,** Princeton, IL. Contact Starved Rock Radio Club, W9MKS/WR9AFG, RFD #1 Box 171, Oglesby, IL 61348, or call 815-667-4614.

June 4–6, **Oregon State Ham Convention,** Seaside, OR. Contact Don McLendon, W7GWC, P.O. Box 920, Seaside, OR 97132.

June 6, **Jersey Shore Hamfest,** Deal, NJ. Contact Jersey Shore Hamfest, P.O. Box 2078, Ocean, NJ 07712.

June 6, **Rome Ham Family Day,** Rome, NY. Contact Rome Radio Club, Inc., P.O. Box 721, Rome, NY 13440.

June 6, **Chelsea Swap & Shop,** Chelsea, MI. Contact William Altenberndt, 3132 Timberline, Jackson, MI 49201.

June 6, **Manassas, Virginia Hamfest,** Manassas, VA. Contact Jim Lascaris, WA2QEJ, 11053 Camfield Ct., Manassas, VA 22110.

June 12, **Kootenai ARS Hamfest 82,** Kootenai County Fairgrounds, north of Coeur D'Alene, Idaho. Contact Avon Anderson, WB7WBZ, N. 1035 Highland Ct., Post Falls, ID 83854.

June 12, **Staten Island ARA Fleamarket,** Staten Island, NY. Contact George Rice, Jr., WA2AMJ, 480 Jewett Ave., Staten Island, NY 10302.

June 13, **Champaign Logan ARC Hamfest & Fleamarket,** Bellefountaine, OH. Contact Bud Griswold, W8JXM, P.O. Box 301, Urbana, OH 43078.

June 13, **Goodyear ARC Hamfest,** Goodyear Wingfoot Lake Park, east of Akron, OH. Contact Don Rodgers, WA8SXJ, 161 S. Hawkins Ave., Akron, OH 44313.

June 13, **Monroe County Radio Communications Hamfest,** Monroe, MI. Contact Fred Lux, WD8ITZ, P.O. Box 982, Monroe, MI 48161, or call 1-313-243-1088.

June 13, **Hall of Science ARC Hamfest,** Kew Gardens, Queens, NY. Contact KA2DTB at 212-738-8887.

June 13, **Egyptian Radio Club Hamfest,** Granite City, IL. Contact Egyptian Radio Club, Inc., P.O. Box 1079, Alton, IL 62002.

June 19, **Yankee Hamfest 82,** Oxford, ME. Contact Bernard R. Langley, W1EZR, RFD #4 Box 208 L17, Auburn, ME 04210.

June 19, **Raritan Valley Radio Club Hamfest & Fleamarket,** Dunellen, NJ. Contact Bob, KB2EF, 201-369-7038.

June 19-20, **Fifth Annual Treasure Valley Hamfest,** Payette, ID. Contact Samuel K. Sower, N7DOV, 1909 Grant St., Caldwell, ID 83605, or call 208-459-8132.

June 20, **Lake County ARC Dad's Day,** Crown Point, IN. Contact Denny Tokarz, KA9FCG, 6930 Lindbergh, Hammond, IN 46327.

June 20, **Jacksonville Area ARC Hamfest,** Jacksonville, IL. Contact Arthur Hipkins, Jr., W9SBV, 1171 King St., Jacksonville, IL 62650.

This month by
JOHN A. ATTAWAY, K4IIF

DX

NEWS OF COMMUNICATIONS AROUND THE WORLD

After over twelve-month's rest from regular deadlines, it's a pleasure to write another column for you, and at the same time to provide a little R and R for Hugh, WA6AUD.* I also appreciate the opportunity to thank Rod Linkous, W7OM, for the many years of faithful service he has rendered to the DX readers of *CQ*. Job responsibilities require that Rod step down as Assistant DX Editor. We all will miss the unique flavor and Pacific Northwest perspective his columns have provided. *Good luck Rod and Donna!*

The DX Hall Of Fame

"A public not to be bribed, not to be entreated, and not to be overawed, decides upon every man's title to fame."
Ralph Waldo Emerson

In 1967, the *CQ* DX Department established the DX Hall of Fame as the ultimate honor for those very few who have made major contributions to the sport of DXing at significant personal sacrifice. The original yardstick was "they have given more *to* DX than they could ever hope to receive in return," and the award was perceived as providing the DX community with an opportunity to say thanks for unselfish gifts of time and resources which have made a major impact on all of us.

Members of the DX Hall of Fame fall into several categories: DXpedition operators, QSL Managers, DX writers, and those whose efforts have smoothed the way for others. The man we honor this year fits the mold in several ways, particularly as a DXpedition operator and QSL Manager.

Franz Langner, DJ9ZB, has been an exceptionally active QSL Manager since 1969, and today he confirms contacts for 90 different rare DX stations and DXpeditions. This fact alone would entitle him to consideration for the DX Hall of Fame.

P.O. Box 205, Winter Haven, FL 33880

**K4IIF was DX Editor of CQ for many years and still serves as Chairman of the CQ DX Awards Advisory Committee.*

Franz Langner, DJ9ZB, has been named to the DX Hall of Fame for this year. This is the ultimate honor for a DXer.

However, over the past 8 years he has also taken part in 16 DXpeditions to 14 different countries on 4 separate continents. This achievement would also merit nomination to the Hall of Fame.

Langner's first DXpeditions took place in March 1975 when he operated from Yemen and Jordan as 4W1ZB and JY8ZB, respectively. In October 1976 he returned to the Middle East to sign TA2ZB from Turkey during the *CQ* Worldwide DX Phone Contest.

Traveling extensively, Franz activated 5 different callsigns in 4 separate countries in 1977. These included 4U1ITU from Geneva, DU1ZB and DU9ZB from the Philippines, FC0ZN from Corsica, and C31LY from Andorra.

In 1978 DJ9ZB was off to Africa, where he signed C5ABL from The Gambia, and in January 1979 he activated Rhodes as SV1JH. In May 1979 he took part in the first of the great Red Sea DXpeditions to Abu-Ail, OE6XG/A, and Djibouti, J20BS.

Franz had another big year in 1980, including expeditions to the Canary Islands, DJ9ZB/EA8; the Madeira Islands, DJ9ZB/CT3; Liechtenstein, HB0BOE; and the second of the big DXpeditions to Djibouti, J20CP, and Abu-Ail, J20A. He also appeared at the Fresno DX Convention in 1980 as one of the highlights of the program. His 1981 plans included another stint at HB0BOE, plus a long weekend at C31LY. Extensive efforts are underway toward permission to operate from 4W1, 70, and A6. Let's keep our fingers crossed.

DJ9ZB manages the cards for his own DXpeditions and for those of others as well. The list of stations includes the following:

A6XN	FO8WR
A7XA	G5ACX
A7XAH	HB0LL
A7XB	HB0BOE
A7XSD	HB9BOE
A7XAB	JY3ZH
C31LY	JY5HH
C31LO	JY8ZB
C31YL	JY9HQ
C5ABL	VU2CP
DU1ZB	VU2FC
DU9ZB	YK1AA
DL2AA/W1	YK1AN
DK6CX/W1	TA1SU
EP2AH	ST2SA
FM7WN	ST0SA
FC0ZN	OD5HQ
HZ1AB (1975–76)	VK8GK
JY9KP	VK8GK/LH
KG6JAC	TF3PT
KZ5WH	3A2AE
N1DL	9A1AA
NZ1ITU	VP5BG
WX1ITU	VP2LAB
SV1JH (1976 & 79)	VP2LAG
SV5JH	5W1AB(EU)
PJ8KG (1971)	FH0RX
VP5KG (1971)	OD55JP
9K2FN	A7XM
4W1AF	ET3PG (op. Tenesay)
4W1ZB	HZ1SH
4W1CW	HZ1FM
4U1ITU (Mar. 4–6, '77)	FW0BE
TA1TT	J20CP
TA1MT	KP4A
TA2ZB	YS1X
TA6JB	A71AA
FM0RX	A71AH
FG0RX	A71AM
FG0RX/FS7	FK8DH
F0ZN	HZ1BS/8Z4
F0IF	J20A(EU)
F0ABI	KN1FPQ/C6A
FK8BB	

Franz was first proposed for membership in the DX Hall of Fame by Raymundo Rodriguez Diaz, YS1RRD/YS1X, President of the El Salvador DX Association, in December 1980. In the interim, his accomplishments were carefully tabulated by the Committee, who agreed that he should receive this high honor.

Seconding the nomination was Rudi Knobloch, DJ3HJ, of Breisach, Federal Republic of Germany. Rudi cited not only DJ9ZB's accomplishments as QSL Manager and DXpedition operator, but added other achievements as well. These included his excellent QSL Manager's Directory, his DX Awards Log, and his photo compilation from the 1979 expedition to Abu Ail.

The 1982 Atlanta HamFestival and ARRL Southeastern Division Convention June 12~13, 1982

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CIRCLE 98 ON READER SERVICE CARD

At presstime, arrangements are being made for the Hall of Fame plaque to be presented directly to Franz by John Attaway, K4IIF, Chairman of the *CQ* DX Awards Advisory Committee, at a meeting to be held in Germany in May.

Congratulations to Franz Langner, DJ9ZB, DX Hall of Fame!

De Extra

Early this year we received a copy of a widely circulated letter from J. W. Hambright, K5SF (ex-K5JZY), regarding the ARRL policy of allowing guest operators to compete as *single operator* entries in the ARRL DX contests. This letter was accompanied by copies of correspondence between K5SF and ARRL headquarters which pertained to a specific case and is too lengthy to present in its entirety in this column. However, we feel that the basic issue is of interest to DXers, who are among the most active participants in DX contests.

Mr. Hambright's letter summarizes the ARRL position in favor of the present League policy as follows:

"ARRL personnel say this is good, for it encourages and allows some hams, unable to afford or to properly erect a competitive station and antennas, to visit a different station, use that call during the contest, and if the high score is made, to receive the single operator winner's award. Both hams get credit—the listing in *QST* shows the station callsign and the operator's callsign in parentheses. So, you get enhancement of the sport, increased participation in the contest, more logs, more happiness for a greater number, it is thought."

He presents his own position in opposition to the League policy as follows:

"Wrong, the sport is not enhanced, and in fact you probably get less, not more participation. First, it is basically unfair since it allows double-teaming in the *combination* of effort. The engineering or construction skill of one man is added to the operating interest of a different man, and the sum of these 2 separate forces—really a partnership—is allowed to compete using a single call and is free to win as a *single operator* entry.

"Secondly, guest operations differ markedly from regular single operator stations. The ARRL contest rules state that a single operator entrant must perform *all* operating functions, and such is the case with regular single operator stations. By contrast, FCC regulations state that 'The licensee of an amateur radio station may permit any third party to participate in amateur radio communication from his station, provided that a control operator is present and continuously monitors and supervises the radio communication to ensure compliance with the rules.' Because two operators are required, guest operation is not consistent with the letter or spirit of the single operator contest rules.

"Thirdly, ARRL would probably receive more logs than the current number if the majority of hams in the U.S. who build or assemble their own stations, and operate their own stations as individuals, were not discouraged from entering logs, i.e., if they were assured that their logs would really count for something."

The DX Hall Of Fame

Gus M. Browning, W4BPD
Nov. 1, 1967

John M. Cummings, W2CTN
March 23, 1968

Stewart S. Perry, W1BB
Aug. 16, 1968

Richard C. Spenceley, KV4AA
March 1, 1969

Danny Weil, VP2VB
Sept. 15, 1969

H. Dale Strieter, W4DQS
May 23, 1970

Stuart Meyer, W2GHK
Oct. 31, 1970

Martin Laine, OH2BH
Jan. 22, 1972

Ted Thorpe, ZL2AWJ, and
Chuck Swain, K7LMU
Aug. 6, 1972

C.J. Joe Hiller, W4OPM
March 30, 1973

Ernst Krenkel, RAEM
April 14, 1974

Frank Anzalone, W1WY
June 19, 1976

Lloyd Colvin, W6KG, and
Iris Colvin, W6QL
Nov. 12, 1976

Geoff Watts
Editor & Publisher
June 11, 1977

Don C. Wallace, W6AM
Sept. 23, 1978

Joe Arcure, Jr., W3HNK
Dec. 1, 1979

Hugh Cassidy, WA6AUD
April 26, 1980

Erik A. Sjolund, SM0AGD
April 25, 1981

Franz Langner, DJ9ZB
May 9, 1982

In the specific case which initiated this controversy, a winning 20 meter, single band, c.w. entry had involved the operation of an amateur Extra class station by a General class operator. According to a letter from the ARRL to K5SF, the General class operator "assures me that he spent very little time in the Extra class subband, and he says that he worked only DX stations in countries with which we have [third party] agreements while in the lower 25 kHz of 20 meters."

"De Extra" does not wish to take sides in this specific case, as it is clearly an administrative matter for the League. However, we do see a gray area of concern to contest participants which may require some thought by contest administrators.

These charming folks are from the North Florida Amateur Radio Society. Left to right are WD4IGP, N4BZH, WA4SGF, WD4ETG, N4UF, and WD4KKF. N4UF is Billy Williams, CQ's DX Award Manager. If you are interested in applying for our country award on either c.w. or s.s.b., write to Billy at P.O. Box 9673, Jacksonville, FL 32208.

For example, suppose it is necessary to perform some service function on the station during the contest. Whether it be changing a fuse or climbing the tower to replace the antenna rotator, it will take effort and energy, valuable commodities during a grueling contest. If the station owner performs this function, rather than the operator, do we have a multi-operator situation? And, in the case of the General class operator in the Extra class subband, if he is working a PY station on 14005 (we have a third party agreement with Brazil), and he is called by a rare station in a non-third-party country which he desperately needs for a multiplier, will he ignore that call? In an intense competition the temptation will be great. He knows that for practical purposes it is unenforceable. Anyone monitoring the frequency is hearing an Extra class callsign. This is not to infer that this happened in the specific instance cited, but it could happen under similar circumstances in the future.

This is an interesting problem for those who administer contests. Do you have a solution? If so, drop the League a line. We're sure they will be happy to hear from you.

Here and There

VP2V. Applicants for licenses to operate in the British Virgin Islands under the reciprocal agreement should send a copy of their current General, Advanced, or Extra Class U.S. license, with a postal money order in the amount of $15.40, to Arthur M. Swain, VP2VJ, Telecommunications Officer, Ministry of Communications, Works and Public Utilities, Tortola, British Virgin Islands. The money order should be made payable to the Accountant General. Novice and Technician class licensees are not eligible for reciprocal privileges. All B.V.I. licenses expire Jan. 31 of the succeeding year, and if the

The WPX Program

Mixed

974	K4FPF	977	AG1K
975	N3KR	978	VE2PD
976	AE1X	979	LA9BM

S.S.B.

1474	NI4Y	1479	KK5P
1475	W5GZI	1480	K2UVG
1476	I2KKL	1481	EA8SH
1477	I2YJO	1482	VE2PD
1478	SM2HAG		

C. W.

2132	VE3FEA	2136	PY1BVY
2133	AC6H	2137	IS0XIE
2134	Y47XN	2138	DF3FN
2135	KC1X		

Endorsements

Mixed: 450 AG1K. 500 AG1K. 550 AG1K. 600 AG1K. 650 K5PR. 700 VE3FEA, K5PR. 750 VE3FEA, KO8T. 950 HI8LC. 1000 HI8LC. 1050 N6JM, IT9HLO, 4X4FU. 1100 4X4FU. 1150 KF2O, 4X4FU. 1200 KF2O, JH1VRQ, K9BG, 4X4FU. 1250 4X4FU. 1400 YU4HA. 1450 YU4HA. 1500 YU4HA. 1550 YU4HA. 1600 YU4HA. 1650 YU4HA. 1700 YU4HA.

S.S.B.: 350 Y47XN, W5GZI, SM2HAG, VE2PD, KK5P. 400 KØREF, Y47XN, SM2HAG, JA9DDM. 450 K7CU, SM2HAG. 500 SM2HAG. 550 I2SYG, W6BCQ. 600 WØULU, W6BCQ. 700 W3GXK. 750 K4CKS, OE1PC. 800 HI8LC, K4CKS, W1DYH, OE1PC. 850 HI8LC, W1DYH. 900 HI8LC, W1DYH. 950 HI8LC, KF2O, W1DYH. 1000 KF2O. 1050 I6SF. 1100 W4BQY.

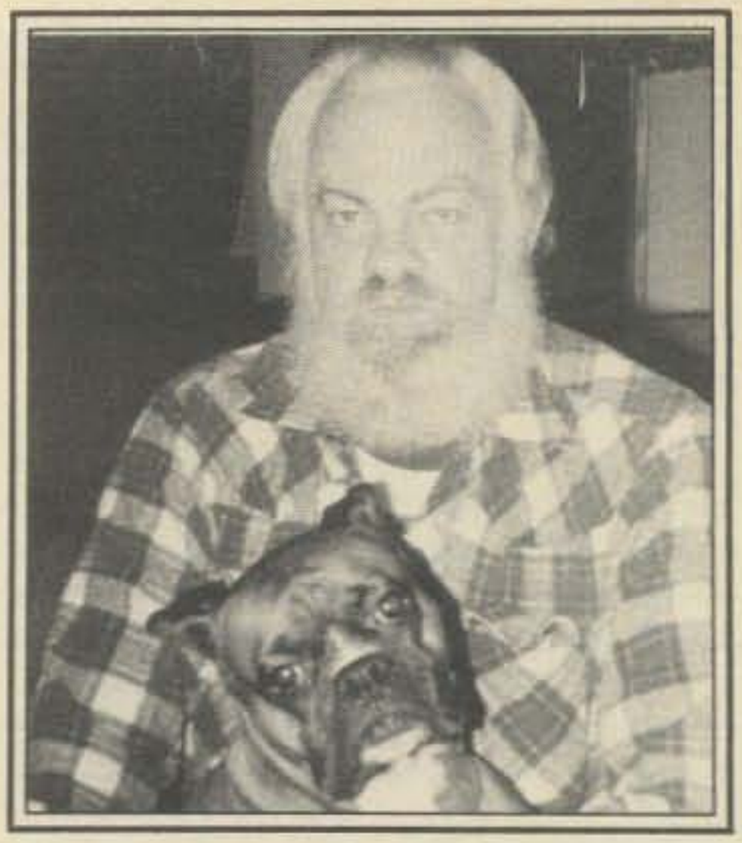
C.W.: 350 DF3FN, VE1ACK. 400 ZL2AWW, VE1CK. 500 W1IHN, K9TI. 550 W1IHN. 600 HI8LC, W1IHN, DK5WQ. 650 W1IHN, K7CU. 700 OE1KJW, W1IHN, I1YRL. 750 I1YRL. 800 I1YRL. 850 OK1DKR. 950 CO2OM. 1000 VE1MF, CO2OM. 1750 W2NC.

10 meters: KF2O, WA7OBH.
20 meters: ZL2AWW, AK9Z.
80 meters: WA4OIB, KK5P.
160 meters: OE1KJW, W5GZI.

Asia: VE3FEA, KF2O.
Europe: ZL2AWW, VE1ACK, PAØLUS.
No. America: VE2FOU, WD9IIC, AC6H, AE1X, WA2CNF, KK5P.
So. America: 4X4FU.

Current Plaque Holders: K6JG, W4WSF, W4WSF, W4CPW, K5UR, K6XP, WA2EAH, VE3GCO, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, YU2DX, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, IØJX, WA1JMP, KØJN, K4IEX, WA2AUB, WB8CNL, W1JR, F9RM, W5UR, W8RSW, WA4QMQ.

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.



Norm Koch, K6ZDL, is CQ's Mr. WPX. As our WPX Manager, Norm handles all WPX applications and requests for information. Write to him at P.O. Box 1351, Torrance, CA 90505. Norm is the big fellow with the beard. The little one with the dark eyes is his boxer, Jake.

license is first granted after Aug. 1, the fee is 50% of the above stated amount. *(Tks VP2VJ.)*

Northwest DX Convention. This event, held every August, will be hosted by the Vancouver (Canada) DX Club this year. In 1983 it rotates to Seattle under the auspices of the Western Washington DX Club and in 1984 to Portland, Oregon. *(Tks Totem Tabloid.)*

W6TI Bulletins. The Northern California DX Club Memorial Station, W6TI, broadcasts DX bulletins each Sunday at 1800 GMT or Monday at 0200 GMT on 14.002 MHz. The W6TI Trustee is Bob Vallio, W6RGG. *(Tks Northern California DXer.)*

IDXF Slide Shows. Slide shows of DXpeditions to Campbell Island, ZL4LR/A, and to Desecheo 1981 are available from the International DX Foundation. If interested, write to P.O. Box 117, Manahawkin, NJ 08050. Another IDXF group operated from Navassa Island as KP2A/KP1 in March. QSL to WB2MSH. *(Tks IDXF Newsletter.)*

AC3PT Silent Key. We are saddened to report the death of the Maharajah of Sikkim, AC3PT, in January. He gave a new country to many happy DXers before being placed under house arrest by India 7 years ago. *(Tks DXers Magazine.)*

DXers Notebook. One of the most complete logbooks for all major worldwide DX awards is the *DXers Notebook* published by Nao Akiyama, JH1VRQ. It may have been sold out, but it's well worth a query to Nao.

Landline DX Service. The *DXers Bulletin* is now offering a telephone service for its subscribers. It is a toll-free (800) number. If interested, you may contact the *Bulletin* at 306 Vernon Ave., Vernon, CT 06066.

DX Club Officers

Among the most important contributors to the DX world are your local club officers. They are the glue which binds us together in the sharing of the world's most interesting and enjoyable hobby. Here are the 1982 officers for 3 clubs. If you would like to have your club officers listed in a future issue, drop a line to WA6AUD or to K4IIF.

Southern California DX Club: President, Jim Stevenson, KM6B; Vice President, Neil Kaltman, K6SMF; Treasurer, Don Moses, W6UY; Secretary, Joe Locascio, K5KT; and Directors, Bob Cobb, W6CN, Lee Graves, WB6VTE, and Jan Perkins, N6AW.

North Florida Amateur Radio Society*: President, Steve Morgan, WD4NYT; Vice President, Fred Roberts, WD4JWR; Secretary, James Womack, WD4RPB; Treasurer, Bill Bryan, KA4CIZ; and Bulletin Editor, Billy Williams, N4UF.

**NOFARS is not strictly a DX club, but its members include active DXers and contest participants.*

The WAZ Program

10 Meter Phone

182	KJ0M	186	KL7Y
183	WB3JVU	187	W5GZI
184	G3MCS	188	I1BSN
185	K4XO	189	WB8JDA

15 Meter Phone

121	JF2ACK	123	K4XO
122	G3MCS		

20 Meter Phone

394	12YKV	397	K1RB
395	G3MCS	398	N7AM
396	K4XO		

40 Meter Phone

14	G3MCS		

80 Meter Phone

15	4Z4DX	16	G3MCS

10 Meter C.W.

32	DF2NJ	33	JA1EF

15 Meter C.W.

61	N4YB	63	JA1MDK
62	K4XO	64	JH1VRQ

40 Meter C.W.

31	K4XO	33	SM4CAN
32	N4WJ		

All Band WAZ

S.S.B.

2383	DL4YAH	2396	N2BJ
2384	N5BQR	2397	JH7NRE
2385	W1NW	2398	K3SWZ
2386	WD5HUH	2399	N4BLX
2387	DK7ET	2400	DU1EFZ
2388	PA0POB	2401	WB7FDE
2389	JA1FUF	2402	W4ZCB
2390	I6MRD	2403	I1HBU
2391	I1GYN	2404	JA3JN
2392	I1TLJ	2405	TG9GI
2393	W5BCU	2406	EA3AKN
2394	N0BKY	2407	WB4FNH
2395	WA4VCC	2408	WB0RSC

C.W. and Phone

5310	JA9BAB	5324	WB3JVU
5311	DL1XT	5325	OX8XW
5312	DK5ZO	5326	JH2WBI
5313	DF2KA	5327	K1HDO
5314	F6EXY	5328	KC2CZ
5315	G3XTT	5329	WB7TFT
5316	GW3GWA	5330	AG1C
5317	AF1U	5331	W9EIZ
5318	I1WXY	5332	HC1HV
5319	I8SCV	5333	HB9BYZ
5320	K1VKO	5334	YU2CBV
5321	JA2JRG	5335	W2YC
5322	KO5D	5336	JA7BVA
5323	DJ1NG		

Applications and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (37 cents) size 4½ × 9½ to the WAZ 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.

Central Arizona DX Association: President, Mike Cortright, WB7FDQ; Vice President and Secretary, Larry Molitor, W7IUV; and Treasurer, James McDonald, N7US. This club is located in the Phoenix area.

Southern Arizona DX Association: President, Donald E. Birch, K7NN; Vice President, Theodore E. Downing, W7KEY; and Secretary, Dr. Damon S. Raphael, WA7IVZ. This club is located in the Tucson area.

Southeastern DX Club: President, Harry Early, KC4M; Vice President, Carl Henson, WB4ZNH; Secretary, Ken Thrash, KN4H; and Treasurer, Harry Saunders, K4GFH.

Dr. Vince Thompson, K5VT, is shown here operating TN8VT on his most recent African swing, which included 9Q5VT, TN8VT, 9U5AV, 7P8BZ, S79WHW (guest op.), 5Z4AB, EL2FA, S9VCT, 3V8VT for a grand total of 17,000 QSO's. Vince also conducted over 400 surgical procedures in relation to his medical teaching activities with 17 African surgeons, which in part satisfied his working and playing time combination. QSL route is to Dr. Vince Thompson, K5VT, P.O. Box 32487, Phoenix, AZ 85064-2487, USA. (Photo via Jack, W2LZX)

Japan DX Radio Club: President, Takao Kobinata, JA1AIB; Directors, Miss Nana Ihara, JI1VLV, and H. Kubita, JF1PJK; Overseas Liason, I. Tomita, JA1NRH; Award Manager, Ken-Ichi Suzuki, JA3BG, and Bulletin Editor, Nana Ihara, JI1VLV.

Acknowledgements

The DX Department appreciates the many fine DX bulletins from which we draw material for the DX column. These include the following, listed randomly, with the callsign of each bulletin editor shown in parentheses: *QRZ DX* (K5FUV), *The DX Bulletin* (K1TN), *The DX Newssheet* (Geoff Watts), *Long Island DX Bulletin* (W2IYX), *DX'Press* (PA0GAM), *DX-NL* (DL3RK), *DX'ers Magazine* (W4BPD), the *W6GO/K6HAD List, International DX Foundation Newsletter* (K2UQ), *The DXer* (AC6V) available only to members of the Northern California DX Club, *Totem Tabloid* (K7ZR), *Balanced Modulator* (N4UF), and the *Southern California DX Club Bulletin* (W6YQ).

Are you interested in VP5 operation? The Kittina Hotel on Grand Turk Island caters to DXpedition-minded hams. They have a 3-element beam available for use by their visitors, but bring your own rig. Air Florida flies from Miami to Grand Turk four times weekly. For further information, write to the Reservation Center at 4197 Braganza Road, Suite 201, Miami, FL 33133.

CQ DX Awards Program

S.S.B.

1100	I8ZJZ	1106	WA2VEE
1101	I5HOR	1107	F6DHI
1102	I2YKV	1108	N5BQR
1103	I2YJO	1109	SM2HAG
1104	IT9YSW	1110	VE2PD
1105	I1POR	1111	N6CYL

C.W.

521	I8ZJZ	525	W6MUL
522	JA5PWW	526	K9AYK
523	G3BBR	527	SM5DAC
524	I0AOF		

S.S.B. Endorsements

310	I4ZSQ/317	275	WA2VEE/279
310	I8KDB/317	275	I5EFO/275
310	K9MM/314	200	I0SGF/236
275	W2FGY/293	200	SM2HAG/220
275	XE1NI/289	200	N5BQR/210
275	I2MQP/283	150	IT9YSW/155
275	KK0C/282	3.5/7 MHz	AG9S
275	K1VHS/280		

C.W. Endorsements

310	DL7AA/318	275	W0IZ/285
310	W9DWQ/317	275	WB4RUA/279
310	K9MM/312		

With the addition of SMOM, the total number of active countries is now 319. 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.

QSL Information

A4XGY to K2RU
A6XJA to PA0LP
AH2AI to WA3HUP
AH2L to W4PKM
C31UN to EA3AOC
C31XO to F6GOW
C53AP to G3LZZ
CG5AE to VE5AE
CN8NO to WB3KGY
CR9AN to Box 468, Macao
CR9UT to Box 798, Macao
CX5RV to G5RV
D68AM to WB2OHD
EA6KC to Box 231, Palma de Mallorca, Balearic Islands, Spain
ED9IFP to EA9HY
FH8CL to Box 37, 97610 Mayotte Island, France
FH8OM to DJ1TC
FK8CR to F6EWK
FK8VU to DB9CI
HB0XIW to DJ5CD
HI8LC to W2KF
HK0COP to W9UCW
HL1PW to JR1RTE
HS1BV to N2BQL
HV3SJ to I0DUD
HZ1AB to K8PYD
J6LDB to VE3GMT
J6LOV to K2QIE
JW5IJ to LA5NM
JY9AF to WB9UWF
KH0AC to K7AC
LU5ZI to LU2A
OH0XX to OH2BBM
SP2BHZ/JW to SM5DQC
ST0AN to DL1MO
TA2SRO to W1CKA
TL8CK to F6EWM
TYA11 to ON5NT
VE3NFR/4U to VE3IDW
VK9NR to ZL1BQD
VK9XW to VK6RU
VK9ZD, VK9ZG & VK9ZH to VK6YL
VK0AN to VK9NS
VP2KBS to W2GHK
VP2MH to W8HM
VP2VHR to W9NUF
VP2VI to W1GNC
VP5WJR to KA5BPE
VP8QG to WA4JQS
VQ9JB to WD5BHP
WA2UUK/DU2 to WB9MFC
W3WAP/DU2 to WA3HUP
W6YB/3D6 to KB7VD
XE1FR to W5QK
YB3MD to JH8RTP
YB6ADZ to DK4QT
YI1AS to DK2OC
YJ8VB to PA0GMM
YJ8VU to DK5EX
YK2EC to OE2CUS
ZS3HL to KA1JP
1A0KM to I0MGM
3C0AC to N4NX
3C0BC to K4PHE
3V8BZ to DL1HH
3X1Z to W4FRU
4K1A to UA3AEL
4S7IQ to DL6IQ
4S7MX to SM3CXS
4U1UN to W2MZV
5V7RE to DJ5RT
5Z4BM to PA3BMW
6D5AE to XE1AE
6E5MX to XE2MX
6W8DY to VE4SK
7P8CF to JA2KLT
9H1EU to I3ZVY
9K2EU to W2AE
9N1BMK to JA8MWU

73, John, K4IIF

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, with no fees required for up-dates.

MIXED

2250	YU2DX	1637	N6CW	1235	KF2O	1001	YU3APR	775	WB8YQX
2230	F9RM	1622	W9DWQ	1230	W0SFU	951	KL7AF	757	AJ6O
2025	K6XP	1584	DJ7CX	1220	K9BG	921	YU2CBK	754	KO8T
2017	K6JG	1542	N4NO	1205	DL1MD	918	LA7JO	750	W6YMH
1968	W2NC	1542	N6JV	1200	W8RSW	901	I2MQP	707	W0JIE
1938	K2VV	1525	N2AC	1198	JH1VRQ	893	JA1KRU	700	I1ZQD
1912	VE3GCO	1504	N9AF	1180	WA1JMP	879	N4IB	700	NN4Q
1790	N4MM	1415	AA4A/8	1175	IN3ANE	865	DA2DC	643	WD9IIC
1762	YU7BCD	1370	I6SF	1170	SM3EVR	850	KA3A	633	K7CU
1723	W3PVZ	1368	YU7ODS	1149	YU1OBA	826	K2QF	618	JA9FAI
1718	W7LLC	1325	N6AV	1145	N6AW	820	K7AGJ	608	K9TI
1716	W4BQY	1282	N6FX	1076	W7CB	807	WB8ZRL	600	OE1KJW
1713	N4UU	1240	K6ZDL	1056	N6JM	793	DK2BL	600	KJ7N
1651	K5UR	1238	K5DB	1050	K8LJG				

S.S.B.

2140	F9RM	1331	I0MBX	1121	DJ6VM	940	KC4OV	802	I4LCK
1976	I0ZV	1303	W0YDB	1108	W4BQY	901	G4CHP	750	AC2J
1868	I0AMU	1285	W9DWQ	1100	WD8MGQ	901	I1MQP	743	PY4OD
1797	K6XP	1276	OZ5EV	1072	DL1MD	870	N2AC	743	WB8YQX
1733	K6JG	1262	N4UU	1060	DJ7CX	852	CT1UA	716	EA3KW
1732	K2POA	1234	PA2TMS	1037	OE2EGL	851	I8KCI	702	WB8ZRL
1607	K2VV	1201	AA4A/8	1014	N6FX	850	WA4OIB	700	N4IB
1594	N4MM	1198	N2SS	1011	KF2O	833	TG9GI	681	W3GXK
1552	ZL3NS	1189	HP1JC	996	JA1VRQ	828	I0RIZ	629	YU3APR
1510	I8KDB	1170	WA4QMQ	993	W2CC	820	WA2FKF	619	VK3NDY
1483	I4ZSQ	1154	I6ZJC	981	W6YMV	810	I6NOA	606	VK6YL
1421	YU7BCD	1134	N4NO	954	ZP5RS	805	KL7AF	606	W8RSW
1403	K5UR	1127	YU7ODS	944	W2NC				

C.W.

1823	W8RSW	1467	DL1QT	1317	W4BQY	1069	LZ1XL	750	K8LJG
1745	W2NC	1443	K2VV	1293	K5UR	1066	YU7ODS	750	N4YB
1680	W8KPL	1420	YU7BCD	1259	N4MM	1056	N6FX	735	DL1MD
1599	ON4QX	1415	N4UU	1205	VO1AW	1000	VE7CNE	731	AA4A/8
1586	WA2HZR	1344	W3ARK	1127	W1WLW	965	JE1JKL	701	KL7AF
1516	K6JG	1342	G2GM	1122	I6SF	853	DJ3LR	690	DJ1YH
1502	N6JV	1336	N2AC	1108	VK2SS	827	I1YRL	689	KA3A
1475	K6XP	1324	N4NO	1077	K6ZDL	799	JH1VRQ	682	JA5MG

CIRCLE 36 ON READER SERVICE CARD

a monthly feature by

GEORGE JACOBS, W3ASK

Propagation

THE SCIENCE OF PREDICTING RADIO CONDITIONS

The Royal Observatory of Belgium, the world's official keeper of solar data and sunspot cycle records, reported a monthly mean sunspot number of 163 for February 1982. Daily levels varied from a high of 258 on February 1st to a low of 97 recorded on the 23rd. This mean level of activity results in a 12-month running smoothed sunspot number of 140.4, centered on August 1981. The sunspot cycle is measured by the value of smoothed sunspot number. A smoothed sunspot number of 120 is predicted for June 1982.

Mother Nature continues to cooperate with amateur radio! For the past nine months the sunspot cycle has remained practicaly constant at an exceptionally high level ranging between the 140 to 143 mark. This high level of solar activity continues to produce an exceptionally strong ionosphere, and generally excellent propagation conditions on the h.f. bands between 3.5 and 29.7 MHz.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for June 1982

	Expected Signal Quality			
Propagation Index	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 17, 23, 29	**A**	**A**	**B**	**C**
High Normal: 1-2, 4-5, 15-16, 18-19, 26, 28	**A**	**B**	**C**	**C-D**
Low Normal: 3, 6, 8-10, 12, 14, 20, 22, 24-25, 27, 30	**A-B**	**B-C**	**C-D**	**D-E**
Below Normal: 7, 11, 13, 21	**B-C**	**C-D**	**D-E**	**E**
Disturbed: None	**C-E**	**D-E**	**E**	**E**

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9 + 30 dB.**

B—Good opening, moderately strong signals varying between S9 and S9 + 30 dB, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, 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 good (B) on June 1st and 2nd, good-to fair (B-C) on the 3rd, good again (B) on the 4th, etc.

For updated information, subscribe to bi-weekly MAIL-A-PROP, David D. Meisel, Editor, 54 Westview Crescent, Geneseo, NY 14454.

Summertime Propagation Conditions

June marks the changeover from equinoctial to summertime propagation conditions on the h.f. bands. Solar absorption is expected to be at seasonally high levels, resulting in generally weaker signals during the hours of daylight, when compared to reception during the winter and spring months. Thunder storm activity, and the associated level of static, increases considerably during June and the summer months, and higher static levels should be noticeable on all h.f. bands, particularly the *40, 80,* and *160* meter bands.

Maximum usable frequencies during the daytime hours are considerably *lower* during June and the summer months than during the other seasons, and considerably *higher* during the hours of darkness. This changeover should have its greatest impact on the *20* meter band, which during other seasons is a near-optimum daytime DX band, but during the summer months becomes the optimum DX band during the hours of darkness.

Sporadic-*E* propagation peaks during June and the summer months, increasing the number of short-skip openings possible on the h.f. bands, and often making possible openings up to 1300 miles and sometimes beyond on the *6* and *2* meter bands.

This month's *CQ* Propagation Charts contain DX predictions for the period June 15 through August 15, 1982. Short-skip Charts for June, for openings between 50 and 2300 miles and from Hawaii and Alaska, appeared in last month's column.

June Forecast

While fewer east-west openings are expected, *10* meters should continue to provide excellent daytime propagation, particularly on north-south paths to Central and South America, Africa, Asia, and the Pacific areas. Conditions should peak during the afternoon hours. Short-skip openings, primarily as a result of sporadic-*E* ionization, should be possible between approximately 500 and 1300 miles. While sporadic-*E* openings occur most often during the hours of daylight, some may occur at night as well. Some *F2*-layer openings for distances beyond 1300 miles should also be possible, mainly during the afternoon hours.

The *15* meter band will likely be the optimum DX band during the daytime hours of June. It is expected to open shortly after sunrise, peak during the afternoon hours, and remain open for DX through the early evening hours. During this span, openings should be possible to most areas of the world. Conditions will favor paths towards Central and South America and Africa during most of the daylight hours, with signals peaking towards Europe during the late afternoon, and towards Asia and the Pacific area during the late afternoon and early evening. Don't be surprised if on some days the band remains open for DX to as late as midnight! Short-skip openings ranging between 500 and 2300 miles should be possible throughout the daytime hours and well into the evening.

The *20* meter band should open to some area of the world or another for the entire 24-hour period on most days of the month. Signals should peak in all directions just after local sunrise. Intense solar absorption, however, will reduce DX openings considerably from about mid-morning through the early afternoon hours, although fairly good openings still should be possible towards the Caribbean area, Central America, and the Northern tier countries of South America. By late afternoon, however, signals should begin to increase considerably, peaking towards the east and the south during the early evening hours. During the hours of darkness, propagation should be possible to almost all areas of the world, with signals peaking towards Asia and the Pacific after midnight. Exceptionally high signal levels may often be noted during nighttime openings on this band. Short-skip during the day should extend from 250 to 2300 miles, and during the hours of darkness from 500 to 2300 miles. During the late afternoon and evening hours conditions may often peak for both short and long skip, resulting in an exceptionally high level of interference.

The *40* meter band should continue to provide good DX conditions during the hours of darkness despite the higher static levels mentioned earlier. The band may not sound as good as it did during the spring months, with some of the long in-

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ter-hemispheric openings gone, but the DX will be there, and signals often will be exceptionally strong. Look for openings towards Europe and Africa as early as sunset. Signals should peak towards the east and the south before midnight, and towards the south and the west after midnight. The best bet for DX towards Asia and the Pacific area would be an hour or so before daybreak. Short-skip should be possible out to about 750 miles during the daylight hours. During the hours of darkness, short-skip should extend out to the 2300 mile limit.

Look for some DX openings on *80* meters, following the same east-south-west pattern as on *40* meters, during the hours of darkness. Signals should peak from an easterly direction before midnight and from the west before sunrise. Expect considerably higher noise levels and much weaker signals on this band compared to *40* meter openings. Daytime short-skip openings will be limited to approximately 250 miles due to intense solar absorption, but at night openings should extend out to beyond 1800 miles.

Not much DX is expected on *160* meters until the fall, when static levels should subside and solar absorption decrease. An occasional opening, however, towards the Caribbean, Central America, and the northern tier countries of South America, may be possible during the nighttime hours. At best, however, openings will be weak and noisy. Fairly frequent nighttime short-skip openings should be possible over a range of approximately 1000 miles. It is very unlikely that any daytime skip openings will be possible on this band due to very intense solar absorption.

V.H.F. Ionospheric Openings

Seasonally high levels of sporadic-*E* ionization are expected to result in frequent *6* meter short-skip openings over a range between 1000 and 1400 miles. During intense and widespread sporadic-*E* ionization, two-hop openings well beyond 1400 miles may also be possible at times. An occasional sporadic-*E* opening on *2* meters may also occur, particularly when ionization is very intense, over distances between approximately 1200 and 1400 miles.

Not much meteor shower activity is expected this month, although a minor shower may take place June 4–6.

June is a month in which infrequent, but relatively intense, auroral activity can occur. *E*-layer ionization often associated with auroral displays can result in unusual short-skip openings on both *6* and *2* meters. The best times to check for auroral activity are when h.f. conditions are expected to be Below Normal or Disturbed. The Last Minute Forecast appearing at the beginning of this column shows the days during June which are likely to be in these categories.

73, George, W3ASK

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate 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.

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. wetc. Appropriate *daylight* time is used, *not* GMT. T 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 c.w., or 1 kw, p.e.p. 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 10dB 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.

June 15—August 15, 1982
Time Zone: EDT
EASTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Central Europe & North Africa	16-18 (1)	08-09 (1) 09-12 (2) 12-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-21 (1)	09-15 (1) 15-16 (2) 16-18 (3) 18-00 (4) 00-03 (3) 03-05 (2) 05-07 (3) 07-09 (2)	20-21 (1) 21-22 (2) 22-23 (3) 23-01 (4) 01-02 (3) 02-03 (2) 03-04 (1) 21-22 (1)* 22-23 (2)* 23-00 (3)* 00-01 (2)* 01-02 (1)*
Northern Europe & European USSR	15-17 (1)	11-15 (1) 15-18 (2) 18-19 (1)	09-15 (1) 15-17 (2) 17-19 (3) 19-22 (4) 22-01 (3) 01-03 (2) 03-06 (1) 06-09 (2)	21-22 (1) 22-23 (2) 23-00 (3) 00-01 (2) 01-02 (1) 22-01 (1)*
Eastern Mediterranean & Middle East	16-18 (1)	11-13 (1) 13-17 (2) 17-18 (3) 18-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	12-16 (1) 16-18 (2) 18-20 (3) 20-00 (4) 00-01 (3) 01-03 (2) 03-06 (1) 06-08 (2) 08-09 (1)	20-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Western Africa	11-13 (1) 15-17 (1) 17-19 (2) 19-21 (1)	10-12 (1) 12-15 (2) 15-17 (3) 17-23 (4) 23-03 (3) 03-04 (2) 04-05 (1)	14-16 (1) 16-17 (2) 17-18 (3) 18-03 (4) 03-04 (3) 04-05 (2) 05-07 (1)	20-22 (1) 22-00 (2) 00-02 (1) 22-00 (1)*
Eastern & Central Africa	17-19 (1)	09-12 (1) 12-14 (2) 14-17 (3) 17-19 (4) 19-22 (3) 22-23 (2) 23-00 (1)	14-16 (1) 16-18 (2) 18-20 (3) 20-00 (4) 00-02 (3) 02-03 (2) 03-05 (1)	21-00 (1)

Southern Africa	10-13 (1)	08-10 (1) 10-11 (2) 11-12 (3) 12-13 (4) 13-14 (3) 14-15 (2) 15-16 (1) 01-03 (1)	23-01 (1) 01-03 (3) 03-05 (2) 05-08 (1) 14-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	21-22 (1) 22-00 (2) 00-02 (1) 23-01 (1)*
Central & South Asia	NIL	09-10 (1) 10-12 (2) 12-13 (1) 17-19 (1) 19-22 (2) 22-23 (1)	17-20 (1) 20-23 (2) 23-03 (1) 03-06 (2) 06-08 (1)	19-21 (1) 04-06 (1)
Southeast Asia	NIL	10-14 (1) 14-16 (2) 16-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-19 (1) 19-21 (2) 21-23 (1) 23-02 (2) 02-03 (1)	04-06 (1)
Far East	NIL	09-10 (1) 10-12 (2) 12-18 (1) 18-20 (2) 20-22 (1)	06-07 (2) 07-09 (3) 09-10 (2) 10-12 (1) 18-21 (1) 21-23 (2) 23-02)3) 02-04 (2) 04-06 (1)	04-06 (1)
South Pacific & New Zealand	16-18 (1) 18-20 (2) 20-22 (1)	09-11 (1) 14-16 (1) 16-18 (2) 18-19 (3) 19-21 (4) 21-22 (3) 22-00 (2) 00-01 (1)	18-20 (1) 20-23 (2) 23-01 (3) 01-04 (4) 04-05 (3) 05-06 (2) 06-09 (3) 09-10 (2) 10-12 (1)	01-03 (1) 03-05 (2) 05-06 (3) 06-07 (2) 07-08 (1) 04-06 (1)*
Australasia	18-19 (1) 19-21 (2) 21-22 (1)	10-12 (1) 17-18 (1) 18-20 (2) 20-22 (3) 22-23 (2) 23-00 (1)	21-23 (1) 23-01 (2) 01-03 (3) 03-05 (4) 05-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 16-18 (1)	03-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
Caribbean, Central America & Northern Countries of South America	09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	08-09 (2) 09-12 (4) 12-14 (3) 14-21 (4) 21-01 (3) 01-03 (2) 03-08 (1)	06-07 (3) 07-10 (4) 10-11 (3) 11-15 (2) 15-17 (3) 17-03 (4) 03-05 (3) 05-06 (2)	19-20 (1) 20-21 (2) 21-23 (3) 23-03 (4) 03-04 (3) 04-05 (2) 05-06 (1) 22-23 (1)* 23-04 (2)* 04-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	10-14 (1) 14-16 (2) 16-17 (3) 17-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	07-08 (1) 08-11 (2) 11-15 (1) 15-16 (2) 16-17 (3) 17-23 (4) 23-01 (3) 01-02 (2) 02-03 (1)	10-16 (1) 16-18 (2) 18-19 (3) 19-02 (4) 02-04 (3) 04-07 (2) 07-09 (3) 09-10 (2)	20-21 (1) 21-22 (2) 22-02 (3) 02-04 (2) 04-05 (1) 22-03 (1)*
McMurdo Sound, Antarctica	15-17 (1)	16-18 (1) 18-21 (2) 21-22 (1)	17-19 (1) 19-22 (2) 22-03 (3) 03-05 (2) 05-06 (1) 07-09 (1)	02-05 (1)

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

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

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

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

* Indicates best time for eighty meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2), or higher.

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Vancouver, B.C., V5T 2C4 Phone 604-872-8517

CIRCLE 81 ON READER SERVICE CARD

a monthly feature by

FRANK ANZALONE, W1WY

Contest Calendar

NEWS/VIEWS OF ON-THE-AIR COMPETITION

The dates and rules of the USSR "CQ-M" Contest (CQ-Peace) as announced in the May Calendar are correct. I received official confirmation after we had gone to press last month. Therefore, you can now score your log if you got involved in the contest and send it to Box 88. Don't be surprised if you come up with one of the many awards that usually are unclaimed each year. It's worth a try.

I passed the following information to some of the high-scoring stations I contacted in our 160 S.S.B. Contest last February. Don Busick, K5AAD, of the West Gulf A.R.C., is also donating two additional plaques in the S.S.B. Contest. As in the C.W. section, they are for the top single operator scores in the U.S. and Europe, and they are retroactive for the 1982 contest. A couple of you fellows are going to be pleasantly surprised when you read the results of the '82 contest.

Now how about somebody picking up the sponsorship of a World Trophy for the 1983 S.S.B. Contest?

The one major DX contest this month is the JARL All Asian Phone Contest. With favorable propagation this could be a very interesting competition. The results of last year's contest appeared in my April column. That will give you an idea of what kind of competition you will be up against, and you can plan your strategy accordingly.

Don't forget, mailing deadline for the logs for our recent WPX C.W. Contest is July 10th, and they can be sent to either W8IMZ or the CQ office, whichever is more convenient for you, but do send them in.

A reminder: deadline for material for the September issue is June 15th, and July 15th for the October issue.

73 for now, Frank, W1WY

Billings, Montana Centennial

Sat. through Mon., May 29–31
1500 to 0300 UTC each day

The Yellowstone Radio Club is sponsoring a Special Events Station to commemorate the Centennial of the city of Billings, Montana.

The club station, K7EFA, will be on the air each day on the following frequencies:

Phone—3950, 7260, 14330, 21330, 28650. *C.W.*—3650, 7110, 14150, 21225, 28225. *Novice*—3725, 7125, 21150, 28150.

A special certificate will be awarded to all stations confirming their contact with a QSL and $1.00 to cover expenses, etc. No s.a.s.e. necessary.

Mail your request to: YRC Centennial, 640 North 15th - #3, Billing, MT 59101.

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

May	29-31	Billings Mont. Centennial
June	5-6	RSGB National Field Day
June	12-13	ARRL VHF Contest
June	12-13	South America CW Contest
June	18-20	SMIRK QSO Party
June	19-20	All Asian Phone Contest
June	26-27	ARRL Field Day
July	1	Canada Day Contest
July	3-4	Venezuelan Phone Contest
July	10-11	IARU Radiosport
July	17-18	A5 SSTV DX Contest
July	17-18	International QRP Contest
July	24-25	Venezuelan C.W. Contest
July	25-26	County Hunters CW Contest
Aug.	7-8	A5 FSTV UHF Contest
Aug.	7-8	DARC WAE C.W. Contest
Aug.	21-22	SARTG RTTY Contest
Aug.	21-22	Alaska QSO Party
Aug.	28-29	All Asian C.W. Contest
Sep.	11-12	G-QRP Activity
Sep.	18-19	Scandinavian CW Contest
Sep.	25-26	Scandinavian Phone Contest
Sep.	25-26	Delta QSO Party
Oct.	2-3	VK/ZL/Oceania Phone Contest
Oct.	9-10	VK/ZL/Oceania C.W. Contest
Oct.	16-17	ARCI QRP C.W. Contest
Oct.	16-17	Pennsylvania QSO Party
Oct.	**30-31**	**CQ WW DX Phone Contest**
Nov.	13-14	DARC WAE RTTY Contest
Nov.	**27-28**	**CQ WW DX C.W. Contest**

RSGB National Field Day

1700 to 1700Z Sat./Sun., June 5/6

Activity for this c.w.-only Field Day is not confined to Great Britain. You will also hear some portable activity out of Germany and Switzerland.

Although overseas stations are not directly eligible, they are invited to participate and submit a report of the stations worked.

A certificate will be awarded to the overseas station in each continent that shows the most contacts.

Send your logs to: D. Lawley, G4BUO, 24 Glen View, Gravesend, Kent DA12 1LP, England.

ARRL VHF Contest

1900 to 0600Z Sat./Mon. June 12–14

Action will be found on the 50, 144, 220, and 420 MHz bands, and even higher up in the spectrum.

The scoring varies with the different bands used, and there are certain requirements and restrictions in the rules.

Working WAS on 6 meters is a possibility.

Complete rules will be found in the May issue of *QST*.

I strongly recommend that you write to ARRL Headquarters for official forms. Include an s.a.s.e. with your request to: ARRL VHF Contest, 225 Main St., Newington, CT 06111.

ARRL Field Day

1800 to 2100Z Sat./Sun., June 26–27

Without a doubt, this activity generates more stateside participation in manpower than any other amateur radio activity. It is mostly a club-organized activity, and therefore requires that the coordinator be knowledgeable about what is required.

Entries are separated into many classes. Rules and requirements are quite extensive and will be found in the May issue of *QST*. It is advisable that you read them thoroughly.

Official log forms are a must. Direct your request with a large s.a.s.e. to the ARRL, Att.: Mark Wilson, AA2Z, 225 Main St., Newington, CT 06111.

South America C.W. Contest

1500Z Sat. to 1500Z Sun., June 12–13

Sponsored by *Electronica Popular* magazine of Brazil, and supervised by the Grupo Argentino de CW of Buenos Aires, this will be an annual affair the 2nd weekend of June.

It's c.w. only on all bands 3.5 through 28 MHz with activity between South America and the World.

Classes: Single operator both single and all bands, and multi-operator, single transmitter, all band only.

1981 Scandinavian Contest Results North America

(Number groups after call letters denote QSO's, Mult., Score.)

C.W.

AK1A	166	74	14,652
W1END	188	76	14,288
W1CNU	155	74	11,470
KA1CLV	108	49	5,592
K1TO	131	38	4,978
KA1GEY	149	31	4,619
KB1Q	75	35	3,150
W1OPJ	42	26	1,092
WA1DRP	35	19	665
K2SX	187	84	20,076
W3GM	396	121	65,461
W4KO	123	70	8,610
WA4OML	175	14	2,450
W4YN	25	15	375
KD4PP	7	5	35
LA4LN/W4	3	3	9
W5EIJ	35	26	910
W5UNW	42	21	882
W6UA	199	87	20,793
N6MU	203	82	19,598
AA6EE	35	21	735
W7PQE	66	33	2,178
W8UVZ	119	73	13,978
W8DWP	71	34	2,550
AI9J	355	140	70,700
K9BG	323	116	54,172
K9ECE	120	57	6,840
VO1AW	164	84	19,438
VE2WA	137	70	12,950
VE1ALJ	103	58	6,670
VE3BR	94	51	4,794
VP2MFL	283	104	38,896
HP1AC	72	36	3,096

AI9J was #3 in World

Phone

AK1A	89	48	4,272
KB1Q	79	41	3,239
N2VW	68	42	2,852
KB2DE	68	39	2,652
WA2UDT	27	21	567
KA2BXH	13	11	143
W3ICM	48	27	1,286
W3ARK	37	26	962
LA4LN/W3	30	20	600
WA3DMH	24	7	168
LU3YL/W4	34	26	884
KD4PP	1	1	1
W5IU	52	27	1,404
W5EIJ	19	13	247
W6EUF	55	28	1,540
AA6EE	1	1	1
AI9J	204	83	18,260
K9ECE	94	40	3,760
W9SS	76	37	2,812
KBØC	41	25	1,025
KAØD	24	12	288
VO1AW	36	24	864
VP2MFL	74	37	2,738

AI9J was #5 in World

1981 WAEDC Contest U.S.A. Results

(Boldface denotes certificate winners.)

C.W.

K1GQ	**1,128,330**
W1ZM	**1,041,913**
KC1F	**760,377**
K4PQL	**705,030**
WB2SJG	**680,732**
W3GM	**564,896**
K5RC	**549,360**
	(Opr. K5ZD)
K1HI	**380,316**
K9BG	**361,384**
K5KLA	**320,175**
W8UVZ	**308,250**
W3AP	**273,775**
AK1A	225,530
N4SA	**216,225**
K9CLO	180,438
W6AM	**157,046**
W3ARK	147,050
N5JB	146,922
K8SIA	126,868
W3AKD	108,990
AK1B	101,802
K3CR	99,765
	(Opr. N3BPY)
W6OKX	98,953
AA8S	84,258
WD8ALG	80,652
W2GUP	64,900
WØYCR	**60,112**
W7JYW	**59,950**
WA1UAX	54,240
W4BV	52,164
K7STK	50,960
N1EE	48,144
W3BGN	39,010
N4BP	31,110
DJ6LK/W4	29,694
WD9GGY	26,672
W4DNZ	20,910
N3KR	20,003
K3TX	19,980
WB2QEU	19,964
N3GB	18,952
N6JM	17,138
W1CNU	15,416
K8EF	15,120
KC2CK	14,994
AD8P	14,348
K9TUS	13,736
N6ZZ	13,182
W1OPJ	12,382
N8CQA	12,040
KA2CGV	11,560
W4KO	10,872
KC4FD	10,152
W3ICM	8,829
W9RE	7,900
W4KMS	6,162
AA6EE	5,888
W5NR	5,760
AB2E	5,454
K6ZH	4,444
WA9MRU	2,736
W5EIJ	2,176
NØAX	2,128
W4MLA/m	1,700
W1BET	896
W7JKA	570
KA1GEY	414
K6NA	304

C.W. Multi-Opr.

W1IHN	**669,708**
K3FD	**171,870**
W6BIP	**103,912**
KA2INC	**14,787**

Phone

W1ZM	**1,483,758**
AK1A	**1,182,852**
N1GL/4	**562,562**
KC1F	**505,233**
W2DKM	**406,120**
K9CLO	**226,320**
N6AW	**225,720**
K5KLA	**215,912**
AK1B	213,180
K1XM	76,160
W3CM	**72,712**
W9RE	72,494
K2QF	69,252
W3KTW	62,280
WB2YOF	47,136
N3GB	44,672
K8EF	**44,014**
WA7JYW	**43,884**
WA5IYX	26,496
N2VW	24,288
KF8K	15,318
K6XT	14,416
KAØD	**12,986**
W9QWM	11,650
N6ZZ	9,672
KA2EAO	8,246
KB3NE	7,992
N1BIZ	6,512
W5EIJ	4,368
W7PQE	3,990
WA3DMH	2,596
WD9GGY	2,478
N9UN	2,304
W1CTR	682
W1CNU	104
K6NA	60

Phone Multi-Opr.

K1AR	**729,476**
KC4SM	**146,688**
K6OKW	**140,592**

Exchange: RST plus a QSO number starting with 001.

Scoring: Two points per QSO multiplied by the number of different South American country prefixes worked on each band. A station may be contacted once on each band for QSO and multiplier credit. (South American stations may work other S.A. stations for multiplier credit only. They will use the DXCC Country list for their multiplier.)

Awards: Certificates to the top scoring stations in each country and the three top scorers in each class.

Use a separate log sheet for each band and the usual summary sheet with scoring information, etc.

Mailing deadline is July 31st to: Grupo Argentino Contest Manager, P.O. Box 18003, 20772 Rio de Janeiro, RJ, Brazil.

Six Meter QSO Party

0000Z Sat. to 2400Z Sun., June 19–20

This is the 8th annual QSO party sponsored by the Six Meter International Radio Klub. The party is open to all, members and non-members, but it seems to be geared for membership participation.

Cross-band contacts are not permitted, and competition is for single-operator stations only. Operation, of course, is confined to the 6 meter band.

Exchange: SMIRK number, ARRL section, VE province, and country. (ARRL U.S. only, KH6 and KL7 count as countries, VE use provinces.)

Scoring: Contacts with members count 2 points, with non-members 1 point. Multiply total QSO points by the number of ARRL sections, VE provinces, and foreign countries worked.

Awards: Certificates to the top-scoring stations in each ARRL section, VE province, and country. There are two trophies for the overall winners in the U.S./Canada and foreign areas.

Since the party is geared for membership participation and requires the use of official log forms, it is suggested that you write for more details. Include a large s.a.s.e. with your request to the address below.

Mailing deadline for entries is July 11th to: Spencer F. Ritchie, KA2MHT/5, 5122 Sagamore, San Antonio, TX 78242.

All Asian DX Contest

Phone: June 19–20 C.W.: Aug. 28–29
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

This is the 23rd year of this activity sponsored by the JARL. The exchange is between Asian countries and the rest of the world.

Classifications: Single operator, both single and all band. Multi-operator, both single and multi-transmitter, all band only (one signal per band only).

Club stations are classified as multi-

operator and each operator will give his age in the exchange.

Exchange: For OM's—RS(T) plus age of operator. For YL's—RS(T) and ØØ.

Scoring: 3 points for contacts on 160; 2 points for contacts on 80; 1 point on all other bands. (KA contacts do not count.)

Multiplier: For Asians the multiplier is determined by the number of different countries worked on each band (DXCC list).

For non-Asians it is determined by the number of different Asian prefixes worked on each band (*CQ* WPX list).

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

Keep in mind that non-Asians use Asian prefixes as their multiplier, not countries.

Note: JD1 stations on Ogasawara (Bonin and Volcano) are in Asia, and JD1 stations on Minamitori Shima (Marcus) are in Oceania.

Awards: Certificates to the top scorers, both phone and c.w., in each country and each U.S. call area. In each class, both single band and all band, up to the fifth rank, depending on the number of returns. Medals to the all-band continental leaders, both single and multi-operator.

Logs: Keep all times in GMT. Use a separate column for the country or prefix multiplier, and fill in only the first time it is worked. Use a separate log for each band. Include a summary sheet showing the scoring and other information, and a signed declaration that all rules and regulations have been observed.

There is a strict disqualification clause for taking credit for duplicate contacts in excess of 2% of the total on each band, as well as other infractions.

Logs must be received no later than Sept. 30th for the Phone section, and Nov. 30th for the C.W. section. They go to: JARL Contest Committee, P.O. Box 377, Tokyo Central, Japan.

Asian Country List: A4; A5; A6; A7; A9; AP; BV; BY; CR9; EP; HL/HM; HS; HZ/7Z; JA-JR; JD1; JT; JY; OD; S2, TA; UA/UK/UV/UW9-Ø; UD6; UK6C, D, K; UF6/UK6F, O, Q, V; UG/UK6G; UH8/UK8H; UI8/UK8A, G, I, L, O, T, Z; UJ8/UK8J, R; UL7/UK7; UM8/UK8M, N; VS6; VS9M/8Q; VU; VU (Andaman & Nicobar); VU (Laccadive); XU; XV/3W; XW; XZ; YA; YI; YK; ZC4/5B4; IS (Spratly); 4S; 4W; 4X/4Z; 70 (S. Yemen); 70 (Kamaran); 8Z4; 9K; 9M2; 9N; 9V; (Abu Ail).

Canada Day Contest

0000 to 2400 UTC Thursday, July 1

Sponsored by the Canadian Amateur Radio Federation, this contest follows the same pattern as the one held in December.

Everyone can work anyone, 2 through 160 meters, both on phone and on c.w. Single operator, single band and all band, multi-operator, single transmitter all band only. There is also a QRP (5 watts) and non-Advanced license classification.

The same station may be worked on each band and mode for QSO and multiplier credit.

Exchange: RS(T) and QSO number starting with 001. VE1's are requested to indicate their province.

Scoring: 10 points for each QSO with a Canadian. One point if with anyone else. Add 10 bonus points for each contact with any CARF official news station using the suffix TCA or VCA.

Multiplier: Number of VE prov./terr. worked on each band and mode (12 prov./terr.). Contacts with stations outside Canada count for QSO points but no multiplier.

Frequencies: Phone—1810, 3770, 3900, 7070, 7230, 14150, 14300, 21200, 21400, 28500, 50.1, 146.52. C.W.—1810, 3525, 7025, 14025, 21025, 28025, 50.1, 144.1. Try phone on even hours, c.w. on odd hours.

Awards: A plaque to the overall single operator, all-band winner. Certificates to the top scorer in each category, in each VE province/territory, U.S. call area, and each DX country.

Include a summary sheet with your log showing the scoring, etc., and a dupe sheet. Official log forms are available.

Mailing deadline is July 31st to: Canadian Amateur Radio Federation, P.O. Box 2172, Station D, Ottawa, Ont. K1P 5W4 Canada.

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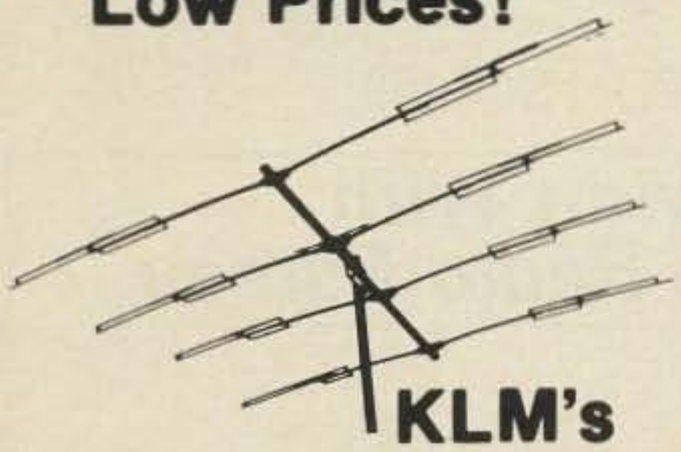

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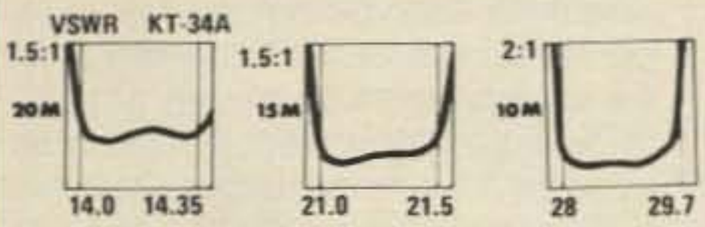

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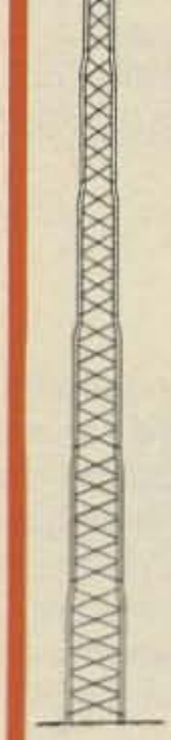

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And — Save even more — include antenna and rotor of your choice with the order and we will ship them along freight prepaid also! Hows that for good old fashioned savings?

Tower Model	Tower Ht.	Load Rating	Ship Weight	Tower Base	Tower Price	Base Price	Total Price
HBX40	40 ft	10 sq ft	164	BXB6	269	24	293
HBX48	48 ft	10 sq ft	303	BXB7	349	26	375
HBX56	56 ft	10 sq ft	385	BXB8	419	30	449
HDBX40	40 ft	18 sq ft	281	BXB7	313	26	339
HDBX48	48 ft	18 sq ft	363	BXB8	399	30	429

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STR KIT	Stub Tuned Radial Kit	$ 20
2MCV	2 mtr. Trombone Vertical	$ 29

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A3	3-El. Triband Beam	$169
A4	4-El. Triband Beam	$209
A743	40 mtr. Add-on Kit for A3 Antenna	$ 59
A744	40 mtr. Add-on Kit for A4 Antenna	$ 59
R3	New Motor Tuned 20/15/10 mtr. Vertical	$229
AV5	80-10 mtr. Trap Vertical	$ 89
20-3CD	3-El. 20 mtr. Beam	$169
20-4CD	4-El. 20 mtr. Beam	$239
15-3CD	3-El. 15 mtr. Beam	$ 89
15-4CD	4-El. 15 mtr. Beam	$ 99
10-3CD	3-El. 10 mtr. Beam	$ 69
10-4CD	4-El. 10 mtr. Beam	$ 89
A50-5	5-El. 6 mtr. Beam	$ 59
617-6B	6-El. 6 mtr. "Boomer"	$169
214B	14-El. 2 mtr. "Boomer"	$ 66
214FB	14-El. 2 mtr. FM "Boomer"	$ 66
228FB	28-El. 2 mtr. FM "Power Pack"	$189
32-19	19-El. 2 mtr. "Super Boomer"	$ 79
220B	17-El. 220 MHz "Boomer"	$ 69
ARX2B	2 mtr. "Ringo Ranger II"	$ 36
ARX450B	450 Mhz "Ringo Ranger II"	$ 38
A147-20T	2 mtr. Vert. & Horiz. 10-El. Beam	$ 59
A144-10T	10-El. 2 mtr. Satellite Antenna	$ 45
A144-20T	20-El. 2 mtr. Satellite Antenna	$ 66
A432-20T	20-El. 432 MHz. Satellite Antenna	$ 45
A14T-MB	Dual Antenna Mounting Assembly	$ 24

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TH7DXX	New 7-El. Triband Beam	$339
TH3MK3S	3-El. Triband Beam	$199
TH3JRS	3-El. Triband Beam	$159
TH2MK3S	2-El. Triband Beam	$139
HY-QUAD	2-El. Triband Quad	$249
402BAS	2-El. 40 mtr. Beam	$189
205BAS	5-El. 20 mtr. "Long John"	$289
155BAS	5-El. 15 mtr. "Long John"	$169
105BAS	5-El 10 mtr. "Long John"	$119
204BAS	4-El. 20 mtr. Beam	$219
203BAS	3-El. 20 mtr. Beam	$119
153BAS	3-El. 15 mtr. Beam	$ 72
103BAS	3-El. 10 mtr. Beam	$ 59
DB1015AS	3-El. 10/15 mtr. Beam	$159
64BS	4-El. 6 mtr. Beam	$ 49
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5BTV	80-10 mtr. Vertical	$ 99
G6-144B	2 mtr. Base Vertical	$ 69
G7-144	2 mtr. Base Vertical	$ 99

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7.0-7.3-4A	4-El. 40 mtr. Beam	$629
144-148-13LB	13-El. 2 mtr. Long Boomer	$ 79
432-16LB	16-El. 432 Mhz. Long Boomer	$ 69
144-150-16C	16-El. 2 mtr. Circular Pol. Beam	$ 99
420-450-18C	18-El. 435 MHz. Circular Pol. Beam	$ 59

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TA-33 Jr.	3-El. Triband Beam	$149
TA-36	6-El. Triband Beam	$309
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HBX48	48 ft. Free Standing (rated 10 sq. ft.)	$289
HDBX48	48 ft. Free Standing (rated 18 sq. ft.)	$319
HBX56	56 ft. Free Standing (rated 10 sq. ft.)	$349
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THE INS AND OUTS OF THE WASHINGTON SCENE

CQ Publishes Exclusive Interview With James C. McKinney, Chief, Private Radio Bureau

Elsewhere in this issue readers will find an in-depth interview with Mr. James C. McKinney, Chief of the FCC's Private Radio Bureau (PRB). This interview, McKinney's first with the amateur press since he assumed the reins of the PRB last September, provides a wealth of information and opinion on topics such as a code-free license, advanced communications technology, malicious interference, radio-frequency interference (r.f.i.), spectrum sharing, and amateur access to the new 10, 18, and 25 MHz bands. Given that the PRB is responsible for administration of the amateur service (among other services), the opinions expressed by McKinney could affect us all. For this reason, *CQ*'s exclusive interview with the Chief of the PRB is "must" reading for all U.S. amateurs.

Time Still Remains To Comment On Expansion Of H.F. Phone Bands

Amateurs still have time to comment on the FCC's inquiry into the expansion of the U.S. high-frequency (3–30 MHz) telephony subbands (Docket 82-83; comments due 1 July 1983). The Commission's combined Notice of Inquiry (NOI) and Notice of Proposed Rule Making (NPRM) in the matter, according to John Johnston, Chief, Personal Radio Branch, PRB, is based on seven petitions received by the Commission, all of which, in one way or another, asked for expansion of these subbands. Said Johnston, "There was little consensus among the petitions as to what should be done, though expansion of the 20 meter phone band by 50 kHz (down to 14,150 kHz) was called for in a number of cases."

The NOI addresses questions related to the expansion of the h.f. telephony subbands between 3.5 and 29.7 MHz, excluding the 14 MHz subband (which is the subject of the NPRM). The Commission is not proposing expansion of these telephony bands because it feels that the issues involved are too inadequately defined at this time. Thus, those wishing to comment on expansion of the telephony subbands other than the band at 14 MHz are urged to address the following questions:

- Would expansion of the telephony subbands have a major detrimental impact on domestic telegraphy operations?
- Do non-U.S. stations still have a legitimate requirement to be protected, on some frequencies, from U.S. telephony operations?
- Does the current trend toward the use of transceivers make the reservation of frequencies suitable for contacting foreign stations using "split operation" unnecessary or undesirable?
- Should additional subband allocations for telephony be contiguous with the existing telephony subbands?
- Would it be appropriate to relocate the existing Novice subbands to new frequencies within the same h.f. bands in order to make a telephony subband expansion more orderly?

Turning to the 20 meter band, James McKinney, Chief, PRB, noted that because of the crowded conditions encountered here, "we are planning to move faster with expansion of the 14 MHz telephony subband." Thus, the Commission proposes to add the 14,150-14,200 kHz frequencies to those currently authorized for such use. Further, the FCC is proposing to make all of the additional telephony subband frequencies available to amateur Extra Class, Advanced Class, and General Class operators. However, comments are invited as to whether it would be desirable to delete from General Class operators the privileges between 14,150 and 14,200 kHz, and instead to add privileges between 14,225 and 14,275 kHz to those authorized for General Class operators. In this way, the telephony subbands available to General Class operators would be contiguous.

In accordance with the Commission's Rules, formal participants must file an original and five copies of their comments and other materials. Participants who wish each Commissioner to have a personal copy of their comments should file an original and eleven copies. The original and its copies should be sent to Federal Communications Commission, Reference: Docket 82-83, 1919 M St., NW, Washington, DC 20554. Again, comments are due 1 July 1982. All documents received by the Commission will be available for public inspection during regular business hours in the Commission's Public Reference Room at the above address. Reply comments on the documents received are due 2 August 1982.

Controversy Continues Over 220 MHz Band

At this writing, debate continues within the FCC (which is responsible for non-government telecommunication services) and within the NTIA (the National Telecommunications and Information Administration, which is responsible for government telecommunication services) regarding allocations in the band 220–225 MHz. As readers are aware, WARC-79 approved allocation of this band to the amateur, fixed, mobile, and radiolocation services. But details pertaining to spectrum allocations within any given country are the responsibility of that country's licensing authority. The Commission is aware that amateurs have made a significant investment in 220 MHz equipment and repeater systems, something which will be taken into account as the FCC examines the allocation matter. But just what decisions will evolve from joint FCC/NTIA negotiations are difficult to predict at this time.

8603 Conover Place, Alexandria, VA 22308

Riddle Involving Mystery Satellite Appears Solved

A recent AMSAT Satellite Report indicates that the Earth satellite transmitting in the amateur 13 cm (2300 MHz) band is probably Soviet COSMOS 1217. Launched on 24 October 1980, this vehicle is intended as an early-warning satellite, and is supposed to transmit on 2292 MHz. According to AMSAT South African President Greg Roberts (ZS1BI), however, transmissions from this satellite have been heard at precisely 2304 MHz for several months in western Europe, with both c.w. and telemetry signals copied.

It is not clear whether the COSMOS satellite is intended for operation on 2304 MHz or whether a malfunction has occurred. As noted by AMSAT, use of 2304 MHz for radiolocation purposes is permissible on a "primary" basis, with amateurs given a "secondary" allocation. Exactly what constitutes "radiolocation," though, is open to interpretation. It is possible that the Soviet Union interprets "early warning" applications as "radiolocation," since early warning satellites use a variety of sensors to detect ICBMs during the very early stages of launch.

A report on the Soviet satellite's operation has been filed with the ARRL's Intruder Watch.

Intel Makes Major Donation To Phase III Satellite Program

As noted in an AMSAT Satellite Report, Intel, one of the largest integrated-circuit houses in the world, recently donated over 400 ICs to AMSAT for use with Phase III satellite ground command stations. The ICs, type 2141L static RAMs (random access memories), are worth nearly $4000, and are highly valued because of their 120 nanosecond access times and low power consumption. Carl Stevenson, WA6VSE/0, was instrumental in arranging the gift to AMSAT. Stevenson, who is Managing and Technical Editor of *Communications* magazine, contacted Intel on AMSAT's behalf and managed the negotiations for the donation.

The staff of *CQ* joins amateurs worldwide in expressing appreciation to the Intel Corporation for its generous gift and, specifically, for hardware that will be used to ensure the timely integration of stations required for the successful operation of the new Phase IIIB satellite, which will be launched this summer.

For more information on the Phase III satellite program, and on AMSAT in general, write to The Radio Amateur Satellite Corporation (AMSAT), P.O. Box 27, Washington, DC 20044.

Hi-Tech Companies Move To Counter "Crisis In Engineering Education"

As reported in *Business Week*, the Massachusetts High Technology Council (MHTC) has endorsed a proposal whereby member companies—all in high-technology industries—will donate up to 2% of their annual R&D budgets to universities. The funds will be used to hire engineering faculty and to buy computer equipment.

The drive for R&D funds is being sponsored by the American Electronics Association (AEA) to counter what many consider to be a crisis in engineering education. This crisis has resulted from a number of factors, not the least of which are a shortage of engineers, slippage in the quality of a college education, lack of investments in computer laboratories, and overcrowded college laboratories which contain obsolete equipment. In addition, the lure of high-paying jobs in industry has enticed students to leave college before entering graduate school, and it has lured many professors to leave academic life as well.

Industry members in MHTC consider the proposed donations to be "investments," not charitable contributions. In focusing their aid on the faculties and labs of electrical and computer engineering schools, they know that future engineers must be better trained if the U.S. is to remain a leader in the development and use of new technologies for commercial, industrial, and defense-related applications.

AMRAD Continues To Work Towards Integration Of Computers And Communication Technologies

Operating at the leading edge of communication technology, the Amateur Radio Research and Development Corporation (AMRAD) continues to investigate applications of spread spectrum and packet radio communication techniques to the amateur service. Through tutorial material presented in the Corporation's journal, *AMRAD Newsletter*, readers are introduced to the new modulation techniques and data network approaches now only beginning to be used by amateurs. Information is also presented on the work of various groups in the U.S. and Canada, ensuring that advances which further the state of radio art are quickly disseminated throughout the community.

If you want to be a part of the growing movement towards the use of computers and new communication technologies, contact AMRAD: Mr. Paul Rinaldo, W4RI, President, AMRAD, 1524 Springvale Avenue, McLean, VA 22101.

HBO To Scramble TV Signals

In a move designed to block unauthorized reception of its satellite-distributed programs, Home Box Office (HBO), the pay-television service of Time, Inc., recently announced that it will begin scrambling its satellite signals in late 1982. This will mark the first time that a major pay-TV network in the U.S. scrambles its signals, and others—such as Viacom International Inc.'s Showtime and Getty Oil Co.'s Entertainment Sports Program Network—may shortly follow suit. All of these pay-TV services have been grappling with problems related to theft of service, and the move to scramble signals is meant to thwart the owners of noncommercial home satellite receiving systems who do not pay HBO's subscription fees.

It is estimated that there are about 30,000 such home satellite receiving systems in the U.S., with 2,000 to 3,000 new systems coming on-stream each month. In some cases, owners of such systems have indicated to HBO that they are willing to pay for their service. However, according to the *Wall Street Journal*, HBO and the other pay-TV networks have said that it is against corporate policy to service individual subscribers. Besides noting that they would still have to address the problem of unauthorized users (so-called "pirates"), the networks are simply unwilling to burden themselves with administrative problems involved.

Piracy of HBO's programs, which are transmitted by a Multipoint Distribution Service (MDS), is also of concern. Thus, there is a possibility that the pay-TV network will require MDS operators to scramble HBO's signals at the transmission site. If this occurs, a decoder would be required at the home or apartment of each authorized subscriber.

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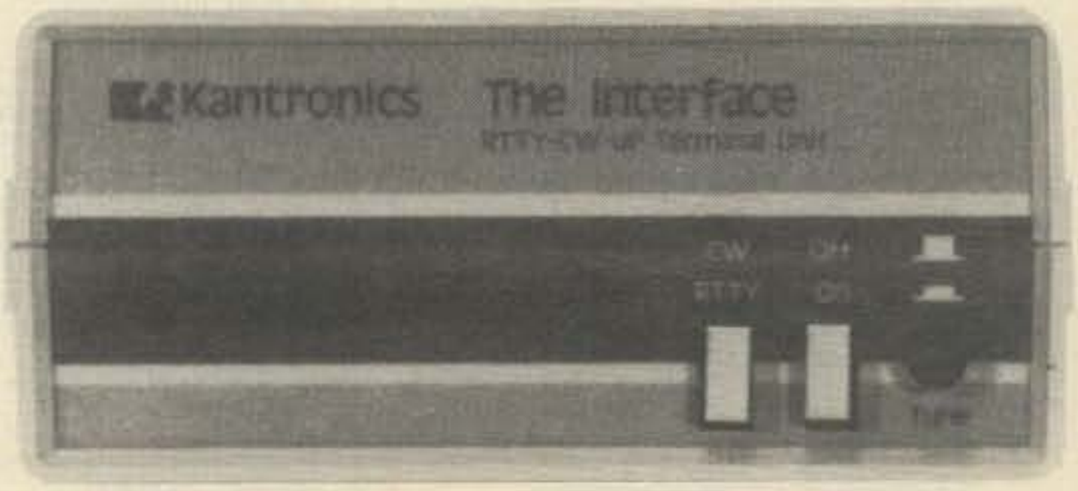

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