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THE RADIO AMATEUR'S JOURNAL

KENWOOD

pacesetter in amateur radio

TR-7950, watts to see!

TR-7950/7930

The TR-7950/7930 has become the unanimous choice of the 2 meter FM operator! It stands alone in features, performance and reliability, with no other rig even close!

The TR-7950/7930 features a large L.C.D. display that is easy to read in direct sunlight and is back lighted for comfortable night-time viewing. It displays TRANS/REC frequencies, memory channel, repeater offset (t.s.-), sub-tone number (F-0, 1, 2, 3) tone, scan, and memory scan lock-out. It includes an LED S/RF bar meter, and LED indicators for reverse, center TUNING, PRIORITY and ON AIR. The 21 multi-function memory channels store frequency, repeater offset, and optional sub-tone channels. Memories 1 through 15 are for simplex or ±600 Hz offset. Memory pairs 16/17 and 18/19 are paired for non-standard repeater offset. Memories "A" and "B" set upper and lower scan limits, or are for simplex or ±600 kHz offset. In MEMORY mode, a circle of light appears around the memory selector knob. When the memory selector knob is rotated in either direction to channel 1, an audible "beep" sounds.

With 45 big watts, the TR-7950 is the most powerful 2 meter FM rig you can buy. The TR-7930 with a modest 25 watts is also available. A HI/LOW power switch allows power reduction to approx. 5 watts.

Other key features include: Programmable band-scan width, Center stop during band-scan, with indicator. Scan stops on busy channel and resume scan is automatic (time 5 sec. adjustable) or carrier operated. A scan delay of approx. 1.5 sec. is built-in. Scanning can also be accomplished with UP/DOWN microphone or "SC" key on front panel. Programmable priority alert can be set into any of 21 memory channels. With Alert switch "ON," a dual "beep" sounds when signal is present. The microprocessor is pre-programmed for simplex or ±600 kHz offset in accordance with the 2 meter band plan, with an "OS" key to allow manual changes in offset. The keyboard functions as a 16-key autopatch encoder during transmit. Frequency coverage is 142.000-148.995 MHz, and it has a repeater reverse switch and mobile mounting bracket. All these features are available in one compact, lightweight rig.

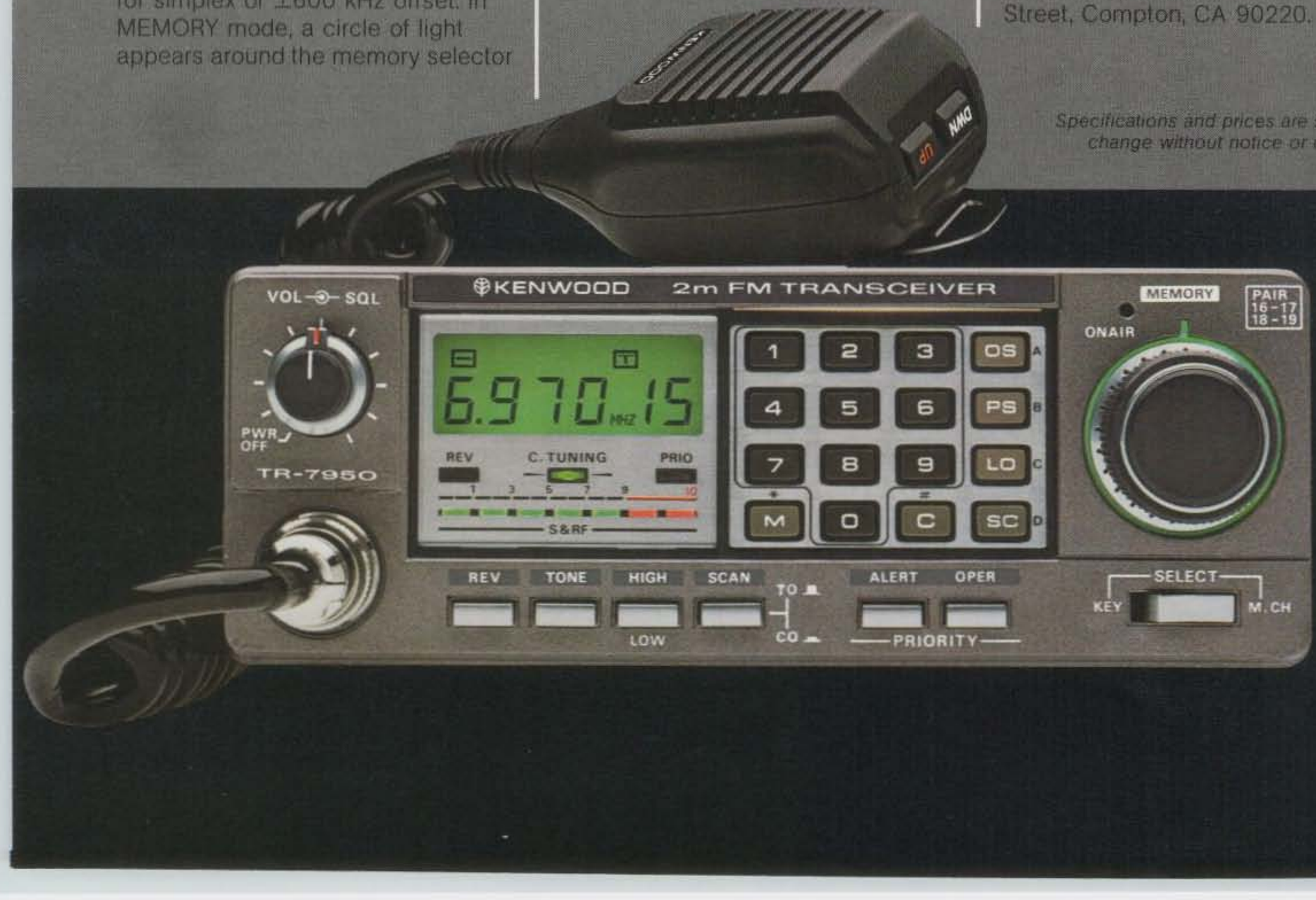
Yes, Kenwood is on top with the TR-7950! Its field proven reliability and matchless performance makes the TR-7950 the rig of tomorrow, today!!

TR-7950 optional accessories:

TU-79, three frequency tone unit, KPS-12 fixed-station power supply (7950), KPS-7A fixed-station power supply (7930), SP-40 mobile speaker, SP-50 mobile speaker, MC-55 mobile microphone with time-out timer, MC-46 16-key autopatch UP/DOWN mic, SW-100A/B power meters, PG-3A noise filter.

More information on the TR-7950/7930 is available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, CA 90220.

Specifications and prices are subject to change without notice or obligation.



KENWOOD

...pacesetter in amateur radio

TS-430S "Digital DX-terity!"

TS-430S

Digital DX-terity...that outstanding attribute built into every KENWOOD TS-430S that lets you QSY from band to band, frequency to frequency, and from mode to mode with the speed and ease that will give you a dominant position in DX operations.

KENWOOD'S TS-430S, a revolutionary, ultra-compact, HF transceiver has already won the hearts of radio Amateurs the world over. It covers 160-10 meters, including the new WARC bands (easily modified for HF MARS). Its high dynamic range receiver tunes from 150 kHz-30 MHz. It utilizes an innovative UP conversion PLL circuit for superior frequency stability and accuracy. Two digital VFO's allow fast split-frequency operations. A choice of USB, LSB, CW, or AM, with FM optional, are at the operators fingertips. All Solid-state technology permits inputs of 250 watts PEP on SSB, 200 watts DC on CW, 120 watts on FM (optional), or 60 watts on AM. Final amplifier protection circuits and a cooling fan are built-in.

Eight memories store frequency, mode, and band data, with Lithium battery memory back-up. Memory scan and programmable automatic band scan help speed up operations. An IF shift circuit, a tuneable notch filter, and a Narrow-Wide switch for IF filter selection help eliminate QRM. It has a built-in speech processor. A fluorescent tube digital display makes tuning easy and fast. An all-mode squelch circuit, a noise blanker, and an RF attenuator control help clean up the signal. And there's a VOX circuit, plus semi-break-in, with side-tone. All-in-all, it just could be that the expression "Digital DX-terity" is a bit of an understatement.

TS-430S Optional Accessories:
In typical KENWOOD fashion, there are plenty of optional accessories for this great HF transceiver. There is a special power supply, the PS-430. An external speaker, the SP-430, is also available. And the MB-430 mounting bracket is available for mobile operation. The AT-250 automatic antenna tuner was designed primarily with the TS-430S in mind, and for those who prefer to "roll their own," the AT-130 antenna tuner is available. The FM-430 FM unit is available for FM operations. The YK-88C (500 Hz) or YK-88CN (270 Hz) CW filters, the YK-88SN SSB filter, and the YK-88A AM filter may be easily installed for serious DX-ing. An MC-60A deluxe desk microphone, MC-80 and MC-85 communications microphones, an MC-42S mobile hand mic., and an MC-55 8-pin mobile microphone, are available, depending on your requirements. TL-922A linear amplifier (not for CW QSK), SM-220 station monitor, PC-1A phone patch, SW-2000 SWR/power meter 160~6 meter, SW100A SWR/power/volt meter 160-2m, HS-4, HS-5, HS-6, HS-7 headphones, are also available.

More information on the TS-430S is available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

Specifications and prices are subject to change without notice or obligation.

ICOM's IC-02A

Digital Readout, Scanning, Memories and...

ICOM introduces the new top-of-the-line IC-O2A and IC-O2AT to compliment its existing line of popular handheld transceivers and accessories. The new direct entry microprocessor controlled IC-O2A is a full-featured 2 meter handheld.

Some of its many features are: Scanning, 10 memories, duplex offset storage in memory, odd offsets, 32 keyboard selectable PL tones which store in memory, and internal lithium battery backup.

Keyboard entry through the 16 button pad allows easy access of frequencies, duplex, memories, memory scan, priority, dial lock, PL tones and DTMF in the IC-O2AT.

An easy-to-read custom LCD readout indicates frequency, memory channel, signal strength and transmitter output, PL tone, and scanning functions.

The new IC-O2A has a battery lock, frequency lock, and lamp on/off switch. An aluminum case back is provided for superior heat sinking when the IC-O2A is run at the standard 3 watt level or 5 watts (optional battery pack).

A variety of batteries will be available for the IC-02A including new long-life 8.4 volt and 13.2 volt packs. Charging may be done from a top panel connector for 13.8 volts which will also power transceiver operation.

ICOM's IC-2A(T) continues to be available...and its complete line of accessories work with the new IC-O2A.

The IC-O2A comes standard with BP3 NiCd battery pack, BC25U wall charger, flexible antenna, wrist strap and belt clip.

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Offices: 76 North Broadway, Hicksville, NY 11801. Telephone: 516 681-2922. CQ (ISSN 0007-893X) is published monthly by CQ Publishing Inc. Second Class postage paid at Hicksville, NY and additional offices. Subscription prices: Domestic—one year $16.00, two years $29.00, three years $42.00; Canada/Mexico—one year $18.00, two years $33.00, three years $48.00; Foreign—one year $20.00, two years $37.00, three years $54.00; Foreign Air Mail—one year $73.00, two years $143.00, three years $213.00. Entire contents copyrighted CQ Publishing Inc. 1984. CQ does not assume responsibility for unsolicited manuscripts. Allow six weeks for change of address. Printed in the United States of America.
Postmaster: Please send change of address to CQ Magazine, 76 North Broadway, Hicksville, NY 11801.

CQ The Radio Amateur's Journal

ON THE COVER: Dick Ball, WA2ZPX, owner of the Middletown NY Repeater (146.76) checks out the site at its hilltop location just outside of Middletown. Photo by Larry Mulvehill, WB2ZPI.

JUNE 1984 **VOL. 40, NO. 6**

FEATURES

DEPARTMENTS

Zero Bias AN EDITORIAL

It seems that those of the intrepid *CQ* Gang aren't the only ones taking to the air. Glen A. Davis, WA2PAZ, and Dr. Ron Apfelbaum, K2PQS, will be leaving this month in an attempt to set an around-the-world speed record for piston-driven aircraft. The pair will be flying Glen's Glasair RG, an experimental aircraft manufactured by Stoddard-Hamilton Aircraft Corporation of Arlington, Washington. The RG is powered by a 200 HP engine which will carry the duo more than 23,000 miles in (hopefully) less than 115 hours, thereby breaking the old record by more than 7 hours. While there isn't room on this page to give the full story of the venture, we do have a complete story in the works and it does promise to be exciting.

For us on the ground, there is a boon. If you missed out on working Owen Garriott, W5LFL (and most of us did), here is another shot at working a rapidly moving amateur. The plane will be equipped with a Kenwood 430S for h.f. work and a 2500 HT to be used when in range of repeaters. Using a trailing wire for an antenna, three h.f. bands will be in operation. Look for them at 14.260, 21.360, and 29.700 MHz (both s.s.b. and f.m.). The tentative departure date is June 21st (depending on the weather). There are eight planned stops, each lasting an hour. Consequently, there will be no operation for an hour before and an hour after takeoffs and landings. A special QSL card will be issued. The QSL Manager for the operation is the Harmonic Hills Radio League, W2AAD, 163 Bedford Center Road, Bedford Hills, NY 10507.

Congratulations

We congratulate Larry Price, W4RA, on his recent election to the office of President of the ARRL. It's a tough job, and we wish Larry every success.

We also offer *buono fortuna* to William Wilson, K6ARO. Ambassador Wilson has been selected to be the U.S. Ambassador to the Vatican.

Bring It Back!

At every hamfest we've been to folks have stopped by to ask about the availability of Capt. Paul Lee's *Vertical Antenna Handbook.* Simply put, it wasn't available. Well, we got together with Paul and updated the book, adding a bit here and there, and I'm glad to say that by the time you read this, the second edition of the handbook will be available. We will have the order form and the ad for the book in next month's issue, so make your plans to get a copy now before this edition becomes a collector's item, too.

On The Road

As this is written, we're still home and have been home since Charlotte. Next week (it's mid-April) we head out to Dayton. I've often thought of approaching the Disney organization to create a sort of permanent exposition called Dayton World, where hams could come all year around. There would be continual flea-markets, and instead of rides you would buy tickets to operate the most exotic stations imaginable. There could also be animated figures of great DXers from the past telling us about the good old days and how they did it. It's just a thought.

For the last couple of years we've been promising Harold Smith, K2HC, that we'd get up to the Rochester Hamfest in May. Well, we've got the plane tickets, Harold, and you can see your name in print at the *CQ* Booth when we get there in May.

The June plans call for Dallas; Atlanta; Washington, D.C. for the annual AFCEA Luncheon (leaving that night for the next stop); Friedrichshafen, Germany (for the European Dayton); and Barcelona, Spain for a visit with Boixareu Editores, the people who put out the Spanish edition of *CQ*. So, we'll have a lot to report on in the next few months, including the massive effect of jet lag and time shift.

This Month

This month we begin two new features in *CQ* designed to help those who want to become amateur radio operators and those with questions on the licensing system itself. Many would-be amateurs have their first exposure to amateur radio by buying a copy of *CQ* at a local newsstand. If what we do looks interesting to them (and apparently it does), they usually write to find out some basic information. We thought that we would get the ball rolling a bit earlier and supply that information in every issue. If you check page 11, you will see a one-third page piece on the various classes of amateur licenses and their basic requirements. This will run every month. You even might want to make copies of it to pass out when someone asks you what is required.

The second feature is a column called "Ticket Talk." As a column it obviously will change each month and will focus on questions that we have received asking about the licensing system itself. Most of you are aware of Dick Bash, the editor of this new column. Dick's Bash Educational Services has been publishing licensing material for many years, so he brings to this column a wealth of experience in the complete process of obtaining an amateur license. If you have any specific questions or suggestions for topics, both Dick and we urge you to write him. If you're in a real hurry for an answer, Dick says to give him a call on the landline.

The next item comes to us just as we go to press. We thank John Attaway, K4IIF, Chairman of our *CQ* DX Committee, for getting the good news to us in time.

KV4AA Recognized in Guinness Book of World Records

Through the selection of a segment of the QSO records achieved by Dick Spenceley, KV4AA, amateur radio has been awarded its first entry in the *Guinness Book of World Records.* The April 1984 edition of this prestigious chronicle of human achievement records the following in the section on radio broadcasting, page 262.

"*Most Assiduous Radio Ham.* Richard C. Spenceley (d. July 30, 1982) of KV4AA at St. Thomas, Virgin Islands, built his contacts (QSOs) to a record level of 48,100 in 365 days in 1978."

An effort had been made by Howard W. Mehrling, W4HN, and others to have the entry expanded to include Dick's single operator total of 203,100 QSOs achieved in a 6½ year period without the use of automated calling devices. However, Guinness selected the single-year segment for record purposes. Mehrling reported that "Ham radio accomplishments involve so many qualifying statements that it is almost impossible to meet the Guinness standards of acceptance. However, the KV4AA file is well supported with substantiating facts."

Dick Spenceley was one of the world's most prominent DXers during the 1950–1980 period. He served as DX Editor of *CQ* magazine from 1951–1957 and was the originator of *CQ*'s WPX Award Program. In the 1960s he introduced Danny Weil, VP2VB, and YASME to amateur radio, beginning one of the greatest worldwide DXpeditions in history. The YASME Foundation still exists today. He was selected by the *CQ* DX Awards Advisory Committee to be the fourth member of the DX Hall of Fame on March 1, 1969.

73, Alan, K2EEK

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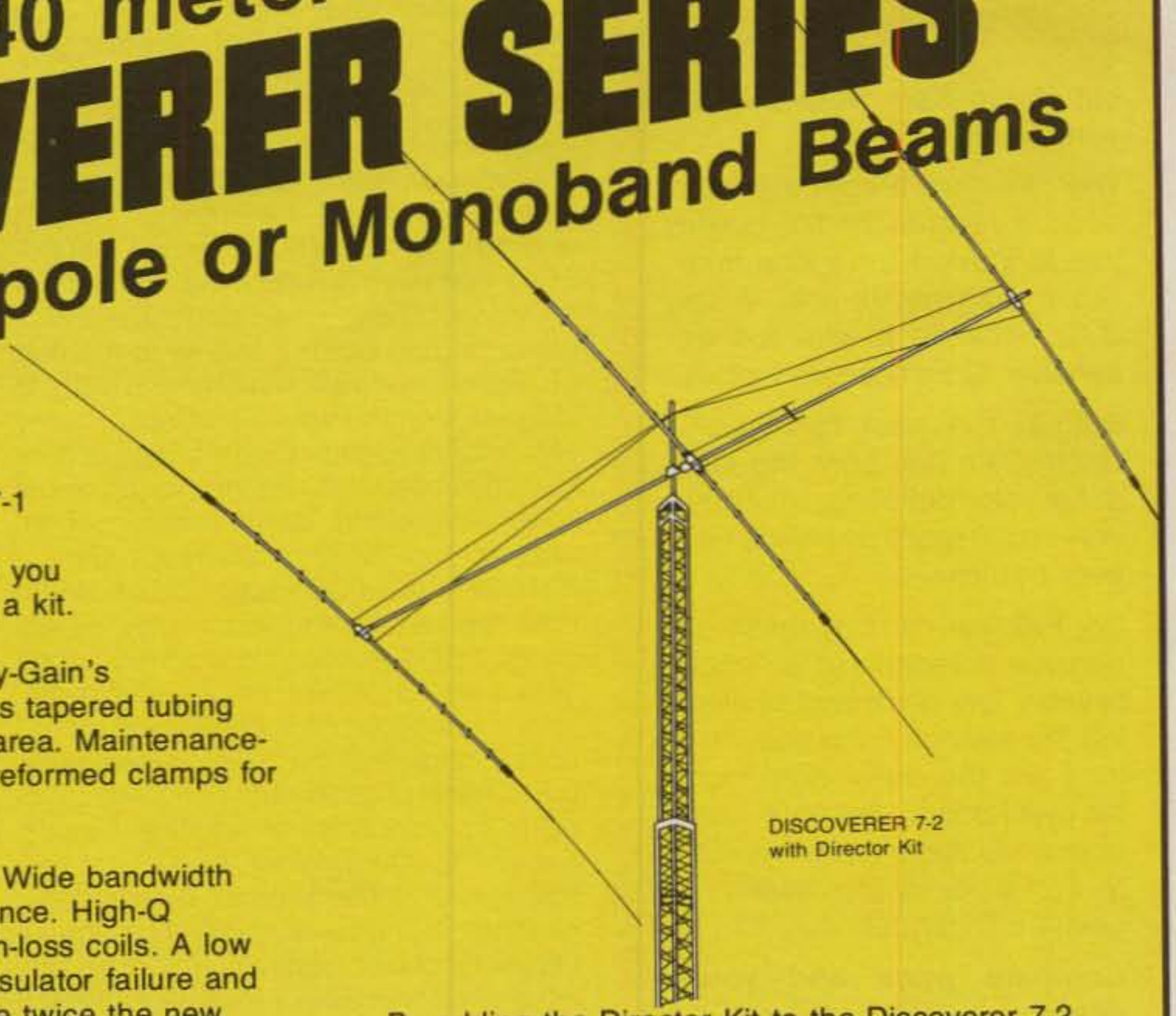
Rediscover 40 meters with the DISCOVERER SERIES Rotatable Dipole or Monoband Beams



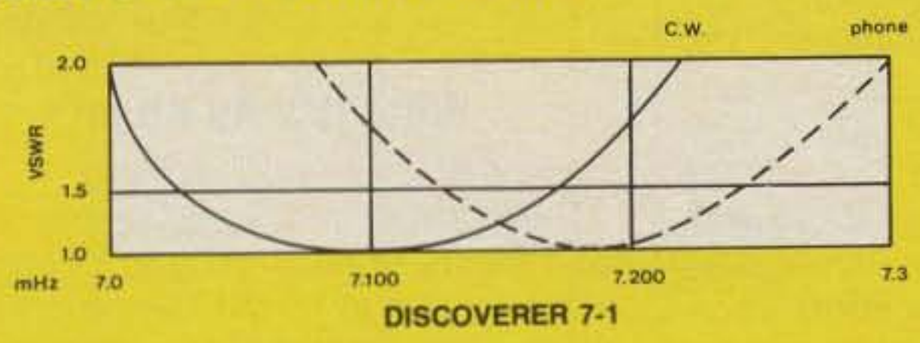
DISCOVERER 7-2
with Director Kit

This 40 meter antenna series gives you three choices. The Discoverer 7-1 which is a rotatable dipole. Or the Discoverer 7-2, a two-element beam you can upgrade to three elements with a kit.

Whichever you choose, you'll get Hy-Gain's superior mechanical design. Such as tapered tubing to reduce weight and wind surface area. Maintenance-free stainless steel hardware and preformed clamps for an easy, rugged assembly.

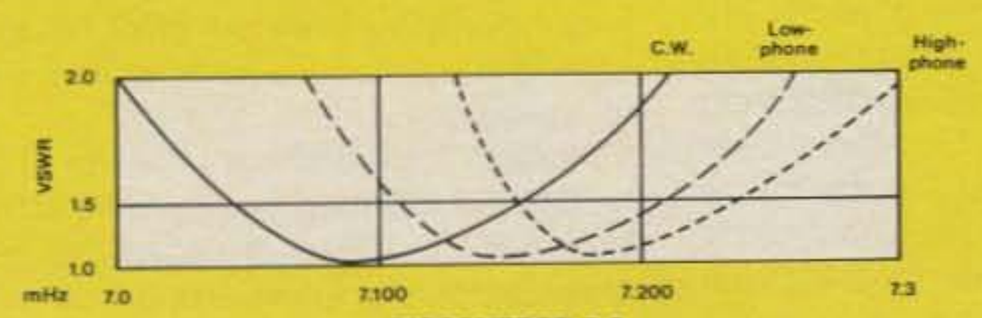
You also get superior performance. Wide bandwidth with SWR of 1.5:1 or less at resonance. High-Q efficiency because there are no high-loss coils. A low voltage feed point that eliminates insulator failure and assures that the antenna can handle twice the new legal power limit.

The Discoverer 7-1 dipole can be added to most existing rotatable beam installations. This model can be tuned to either 30 or 40 meters.



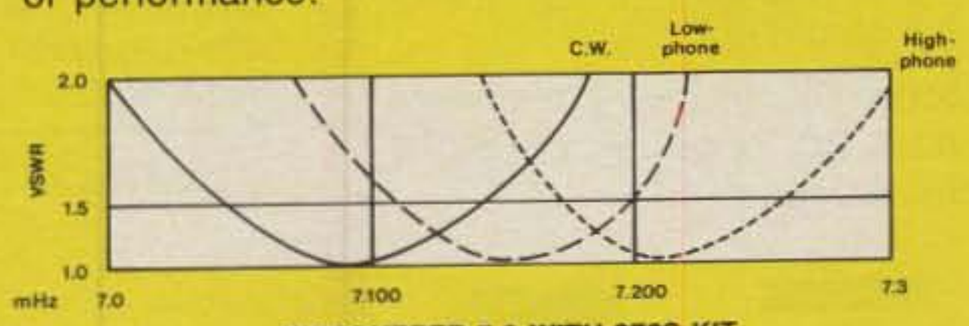
DISCOVERER 7-1

The Discoverer 7-2 requires only a 25 ft. (7.6 m) turning radius and opens communication doors you previously thought possible only on 20 meters. Combining the advantages of high forward gain and a high front-to-back ratio lets you hear and work stations you couldn't read on a dipole or vertical antenna. Best of all, you can upgrade this antenna anytime with the 373S Director Kit.



DISCOVERER 7-2

By adding the Director Kit to the Discoverer 7-2 you create a three-element beam on a boom of only 35 ft. (10.7 m), that outperforms many of the heavy-weight giants with much longer booms. In fact, the kit doubles the effective radiated power of the Discoverer 7-2, and nearly doubles the front-to-back ratio. And, because the antenna is still more compact than a "giant", you only need a medium-duty tower such as the HG52SS. All of which saves you money and space without compromising safety or performance.



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The Hy-Gain Discoverer series gives you three choices, just when declining sunspot activity lends renewed importance to the 40 meter band.

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Please send all reader inquiries directly.

Our Readers Say:

The Plain Language Rewrite

Editor, *CQ:*

Reference your interview with Raymond A. Kowalski, Chief, Special Services Division, Private Radio Bureau, FCC (March 1984 *CQ*). As one of many members of the amateur radio community who vigorously opposed the "plain language" rewrite of the amateur rules, I wish to respond to Mr. Kowalski's statement that the overwhelming rejection of this proposal was a rejection of the principle of deregulation. It seems to me that Mr. Kowalski is 180° out of phase with the amateur community on this issue; many of us opposed this docket because it included substantive changes which would have resulted in the imposition of *increased* regulation of amateur radio activities by the FCC: specific bandwidth limits on certain emission types as opposed to the existing deliberately vague standards of "good engineering practice," reduction of the power limit for AM phone to one half the existing maximum, curtailment of our existing privilege to retransmit recordings of amateur signals, even with the original operator's permission, and many other questionable changes in the rules. In addition, the juvenile language style of this proposal, which was specifically modelled after the CB regulations, was particularly offensive to most amateur licensees.

This proposed rewrite was far more than a mere rewording of the existing rules into simplified English. It was nothing less than a complete revision of the entire set of regulations governing the amateur service, which included many substantive changes that would have altered the very nature of amateur radio as we now know it. I can assure Mr. Kowalski that the majority of amateur licensees would support any genuine effort to reduce or eliminate unnecessary regulations while maintaining the existing integrity of the amateur radio service.

Donald Chester, K4KYV
Woodlawn, TN

Anyone Hear of Maritek?

Editor, *CQ:*

I hope that you can possibly help me. I am in possession of a six-channel HF-SSB marine transceiver made by Maritek, model number SB6-80, approximate date of manufacture 1973. I have been able to trace the company to the following address (information received via the U.S. embassy here in London): Maritek, 1819 South Central, Kent, WA 98031. However, my letters have been returned "addressee unknown," and the phone number was found to be disconnected.

I have at present no information at all on the Maritek SB6-80. I would like very much to have a copy of the workshop service handbook and/or circuit details, a copy of the operations handbook, and any other information (especially settings of the taps of the output stage). I can arrange to have these photocopied either in the U.S./Canada or here in the U.K. and the original returned. I am willing to reimburse any expenses incurred.

I hope that you can find space in your magazine for this request, and thank you for your consideration in this matter.

Kris Partridge, G8AUU
6 Blagdon Walk
Teddington TW11 9LN
England

A "Far Out" Club

Editor, *CQ:*

On September 17, 1983, I worked Ruth Ann, WD8BMK, who was operating Special Event station WB8SMC in celebration of the tenth anniversary of the Far Out Amateur Radio Club located in Dayton, Ohio. We exchanged the QSLs, and on March 3, 1984, I received a beautiful personalized plaque as a token of the club's thanks for being a part of their celebration. Three QSLs were drawn at random and I was lucky enough to be one of them.

I would like to publicly thank the Far Out Amateur Radio Club very much. A club like this which takes that "Extra" step has to go FAR! May they have 100 more anniversaries.

Dick Schott, KA2PHQ
Spencerport, NY

What It's All About

Editor, *CQ:*

There are so many interesting technical aspects of our hobby to occupy us, that it's easy to forget the personal rewards. I was reminded of them last night, however, while listening to one of our fraternity operating mobile on his journey from West Virginia. A few hours out a tremendous snow storm swept across his path. It was fascinating to hear his reports of accidents and driving conditions, which grew increasingly treacherous. What impressed me most was the way operator after operator checked in with him, hour after hour, to offer navigating assistance, encouragement, and, best of all, *company*.

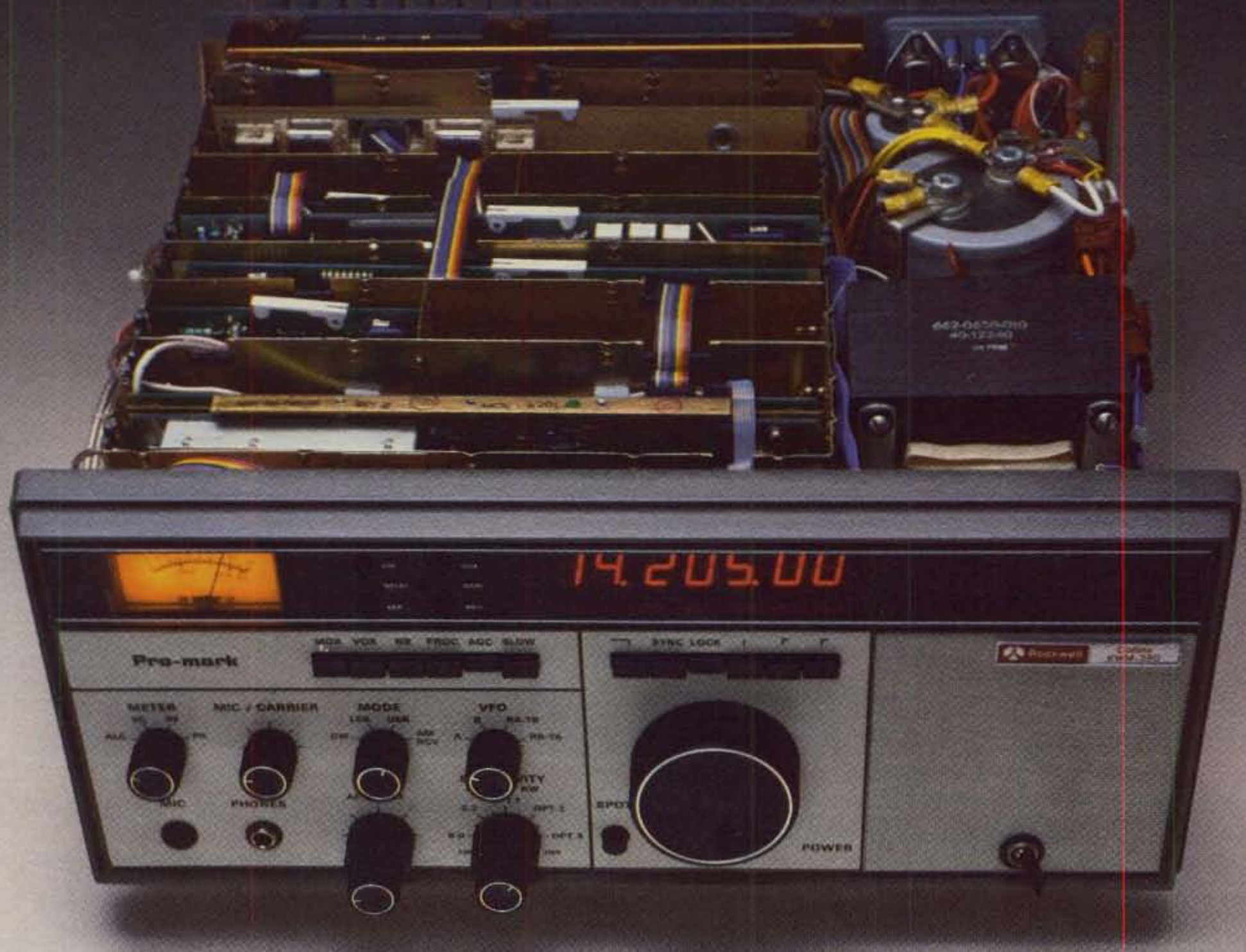
I finally turned off my receiver at about 3:30 in the morning, happy to hear he had reached the clear, dry roads of central Mississippi, the Louisiana border not far ahead.

Someone once said, "You're never alone when you have a radio." What a comforting truth that is!

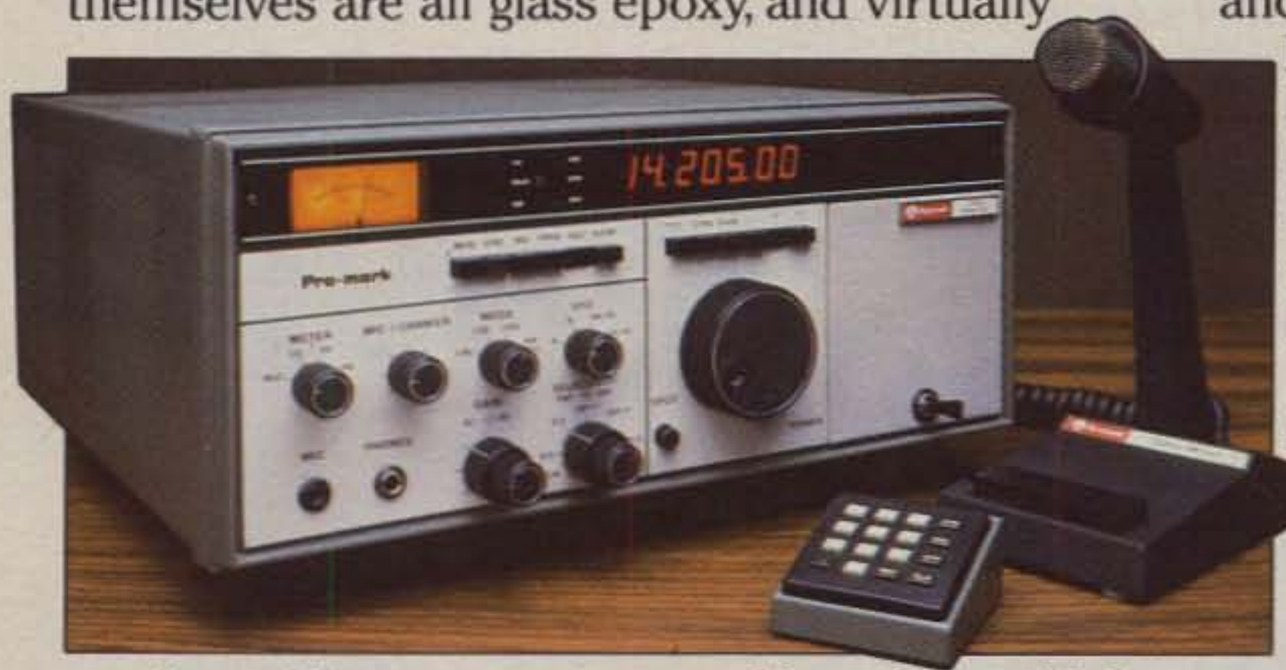
Pete Curry, KA2TTU
Palmyra, NJ

Please send all reader inquiries directly.

The real beauty of the Collins KWM-380 is behind the panel, not on it.



At Collins, we know serious amateurs won't settle for less than professional performance. So we build every KWM-380 to commercial rather than amateur standards. For example, our PC boards are connected by ribbon cables with gold-plated pinfield connectors. The boards themselves are all glass epoxy, and virtually



unaffected by temperature and humidity which cause intermittents in the more commonly used phenolic boards.

Once built, every KWM-380 undergoes 24-hour burn-in, then is aligned and tested to meet or exceed every spec on the data sheet. Which makes us very confident about warranting your KWM-380 for one full year.

The result is a radio with superior performance and lasting quality, not front-panel glitter.

Frequency stability is just one example of its beauty: typically, drift is as low as 10-12 Hz per hour for normal ham shack environments. Other companies haven't matched our performance because they don't match our quality behind the panel.

Add some real beauty to your station. See the KWM-380 at your nearest authorized dealer. Collins Telecommunications Products Division, Defense Electronics Operations, Rockwell International, Cedar Rapids, IA 52498. Phone (319) 395-5963. Telex: 464-435.

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- VALUES

Smart enough to be user friendly means the newest Santec radios are more useful in your hands. Without sacrificing features and functions you really want, you can have an easier to use, yet smarter handheld from the broad line of models for the most popular VHF and UHF bands 144, 220, and 440 MHz. Plenty of accessory items are available for the Santec radios to make your personal application of Santecnology (TM) the smoothest yet. And don't forget the transistor and semiconductors in all Santec products are guaranteed for two full years.

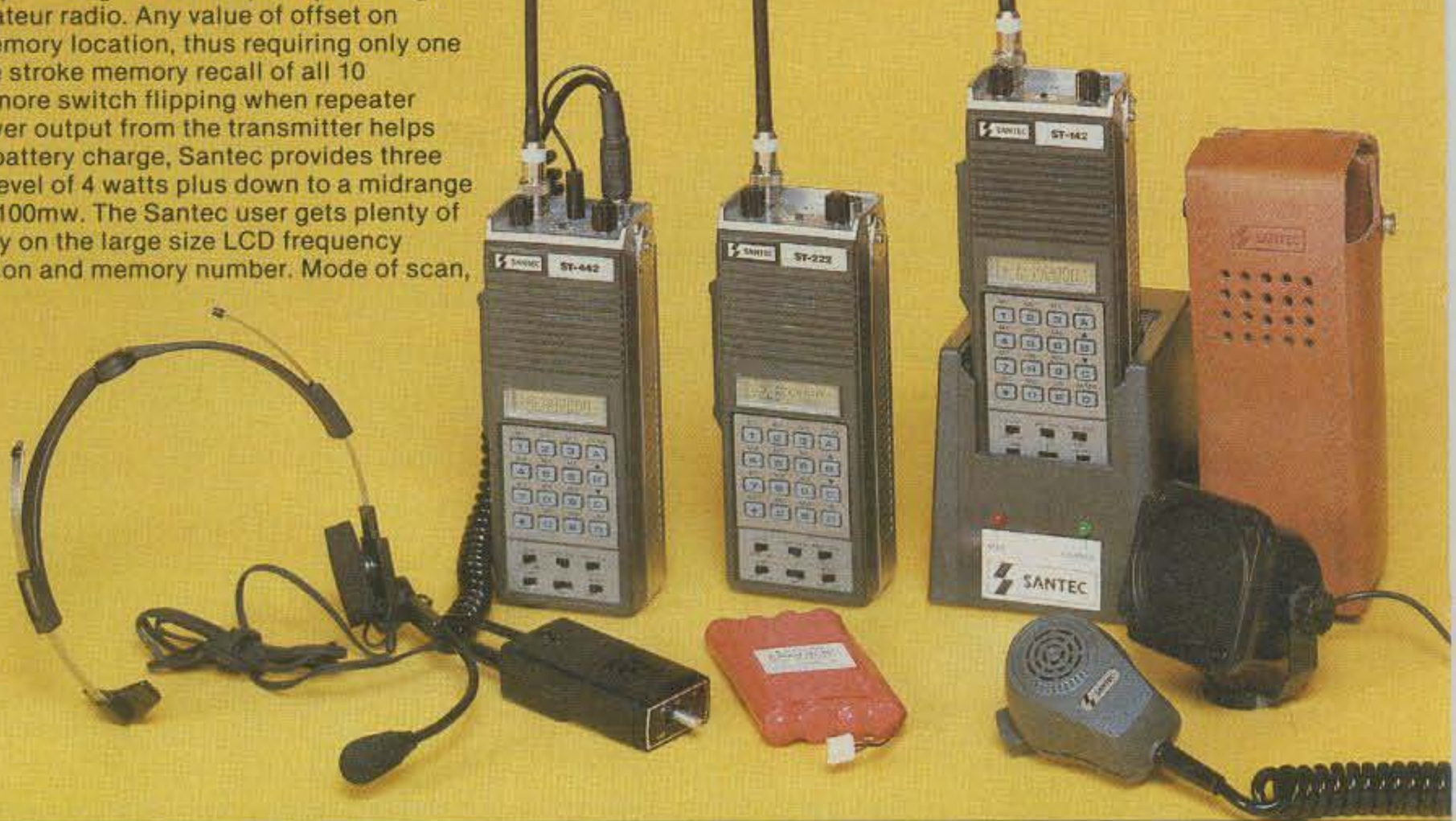
Santec's smarter handhelds help the user by providing widest frequency coverage for MARS and CAP operations as well as amateur radio. Any value of offset on 10 KHz steps can be set and stored in any memory location, thus requiring only one memory per transceive frequency pair. Single stroke memory recall of all 10 memories and the required offset means no more switch flipping when repeater frequencies are changed. Because lower power output from the transmitter helps the user to get longer service times on each battery charge, Santec provides three switchable power levels from the full power level of 4 watts plus down to a midrange of around one watt and a battery conserving 100mw. The Santec user gets plenty of helpful information from the complete display on the large size LCD frequency display using six digits plus the offset direction and memory number. Mode of scan, PLL lock and the receiver and transmitter indicator are all usable at the same time without any extra effort. All the neat features you expect plus a good, solid performing transceiver section with excellent sensitivity and high quality audio make Santec your best choice for a handheld transceiver.

For specifications and a full catalog of Encomm, Inc. products send us a QSL. Specifications subject to change without notice or obligation. Information in this ad does not constitute warranty.

SANTEC®

SIMPLY SMARTER HANDHELDS

144 MHz • 220 MHz • 440 MHz



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WELZ specializes in WATTS. Measuring Watts and switching Watts, radiating Watts and dissipating Watts is what the WELZ line of winners is all about. Welz is the source for top quality, superior performing, affordable products to compliment your mainframe radio equipment from any source. Increase the versatility of your measuring capability with WELZ WIDE-Z Sensor (TM) power and V.S.W.R. meters, precision 50 ohm terminations. Conserve your coax dollars with the dual band Diamond Antennas for 144/430-440 MHz for base and mobile applications. Welz dual band duplexers let you feed two antennas on two different bands with one feed line with no switching or two transmitters onto one dual band antenna simultaneously. WELZ has wattmeters and V.S.W.R. bridges from 200 mW to 2000 Watts from 500 kHz to 500 MHz frequency range. When you need to measure in RF Watts WELZ has a winner for you. The full line of Wattmeters encompasses many different models, some of which are shown in this family portrait. In addition to both in-line and terminating type wattmeters the WELZ line of Winners includes several high quality dummy loads for testing and tuning plus applications requiring precision 50 Ohm terminations. Frequency ranges of the WELZ loads are typically wider than similarly priced items from other sources. WELZ has winners in the economy circle also. The performance value of the economy line of Wattmeters from WELZ is really superior. The instruments from WELZ are extremely well built and very easy to view. The portable units such as the SP-10x and the SP-380 provide reliable service in the field as well as in the fixed station. Send QSL type card for complete catalog of WELZ products.

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FM-2033

2m 25W Mobile Maxpack

- Liquid Crystal Display with soft orange lighting for direct sunlight viewing plus night viewing.
- Repeater Offsets (+ , − ,S) Stored in memory along with the frequency information.
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- Memories with valid data scanned, blanks are skipped.
- Repeater reverse switch for monitoring repeater's input frequency.

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440 MHz—FM-7033
220 MHz—FM-4033

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Simplicity of operation has always been the mark of the KDK design team and the FM-2033 is no exception. From the single knob frequency and memory selection to the automatic recall from memory of the desired repeater offset, the FM-2033 provides relaxed, comfortable mobile operation.

Once the 10 memory frequencies have been selected, a single knob is all that is required for operation on the standard simplex or repeater channels. Using the audible beep as the end-of-memory marker allows setting to a particular channel without even looking at the radio.

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You want convenience, reliability and easy operation for your mobile station and a tough-to-beat dollar value, right? Then check out the FM-2033 at your local dealer TODAY or send QSL for specifications. We think you will want one for yourself.

Specifications are nominal and are subject to change. All KDK transceivers meet or exceed FCC regulations regarding spurious emissions.

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The THL line of antenna couplers provides fine quality hand crafted antenna matching networks for both low power applications and larger power amplifiers running the legal limit. The THL antenna coupler series has full features like built-in antenna switching for changing antennas or by-passing the coupler and an accurate V.S.W.R./power output indicator on all models. Sturdy construction and honestly rated components and capabilities make the THL series of tuners your best choice.

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Announcing

• **Atlanta Radio Club Scholarships** - The Atlanta, Georgia, Radio Club will present three $750 scholarships to licensed amateur high school seniors entering an accredited college or university in the fall of 1984. For additional information and application forms contact Phil Latta, W4GTS, Secretary, Atlanta Radio Club Scholarship Committee, 259 Weatherston Pkwy., Marietta, GA 30067. Applications with transcripts must be received no later than June 30.

• **Lewiston, Idaho, Special Event** - The Lewis-Clark ARC will operate W7VJD from 0200Z June 1, 1600Z June 2, and 1600Z June 3, all until the last games played, during the NAIA Worlds Collegiate Baseball Tournament. Frequencies: 14.270, 7.235, 3.940 phone (±QRM), and 14.130 and 7.125 c.w. (±QRM). For QSL send s.a.s.e. to WB7BQV, Dan Wenstrom, 630 Stewart, Lewiston, ID 83501.

• **Ohio Wine Week**—The Wireless Institute of Northern Ohio will be on the air on June 2–3 (2300 June 2 to 0300Z June 3, and 1500–2000Z on the 3rd). Frequencies will be 3910 and 7235 MHz on the evening of the 2nd and 7235 and 21360 MHz on the 3rd. The call used from Madison, OH, will be KO8O. For a certificate send a legal-size s.a.s.e. to KO8O—WINO Weekend, 7126 Andover Dr., Mentor, OH 44060.

• **Fairview, Kentucky** - Pennyroyal ARS will operate a special event station on June 2–3 from 1500Z to 0200Z each day. The event celebrates the birth date of Jefferson Davis. Members will operate on: phone 3.950, 7.260, 14.310, 21.410, 28.610; c.w. 3.730 and 7.130. Note to County Hunters: on Todd/Christian County Kentucky line. Certificate and QSL for large s.a.s.e. to PARS, P.O. Box 1077, Hopkinsville, KY 42240.

• **TK6JUN From "Utah Beach," France** - For the anniversary of D-Day, TK6JUN will be operated by members of the Association des Radio Amateurs de la Manche. The station will be QRV from June 2 to June 10 on the h.f. c.w. and s.s.b. bands (between 15 to 25 kHz from the band edge for c.w., and around 3780, 7080, 14205, 21305, and 28505 s.s.b.). A special QSL will be available from ARAM-50, Jacques Davy, Les Vieilles Maisons, Quettetot 50260, Bricquebec, France.

• **W9VCF Portable** - The Madison County ARC will operate W8VCF portable from the historic Eighth Street Festival in Anderson, Indiana, on June 8 and 9. A certificate will be available for contacting the club during this event or any club member in June. Frequencies: 28.785, 21.400, 14.340, 7.290, and 3.990 MHz. Send log info and $1.00 to Madison County ARC, c/o Frank M. Dick, WA9JWL, 921 Isabelle Dr., Anderson, IN 46013.

• **7SK From Stockholm** - During the annual conference of the European DX Council June 8-10, the Swedish Radio ARC will use the special events prefix "7SK" in connection with club station SKØAC. Frequencies for 7SKØAC will be 14060 and 21060 kHz c.w. during daylight hours, 3550 kHz during darkness, and 14320 and 21350 kHz s.s.b. during daylight, and 3700 kHz during darkness. There will also be some 2 meter operation. For more information, contact The Swedish Radio Company, S-105 10 Stockholm, Sweden.

• **Macomb Emergency Communications Assoc. Special Event** - On June 8-10 this club will operate near lower end of general portion of the bands. Operation will be s.s.b. and c.w./RTTY on h.f. and f.m. phone on 146.07/67. QSL to MECA, Box 488, Utica, MI 48087 (9" × 12" s.a.s.e.; DX stations send only QSL).

• **Galesburg Railroad Days Special Event** - The Knox County ARC will operate W9GFD on June 9-10 from 1300-2200Z on 7.235, 14.280, 21.375, and 28.630 MHz (±QRM). For a commemorative QSL send s.a.s.e. to Knox County ARC, Inc., W9GFD, 1694 Bluebird Dr., Galesburg, IL 61401.

• **N9BAT From Brookfield Zoo** - The Chicago Suburban Radio Association will operate N9BAT from the Brookfield Zoo in Brookfield, IL. Operation will be on June 9–10 from 1600–2400Z on 7.250 and 14.259 MHz phone. For a special QSL send your QSL and #10 s.a.s.e. to N9BAT Special Event, P.O. Box 383, Brookfield, IL 60513.

• **CY4CAT For Catfishpedition '84** - The Manitoba DX Group will operate CY4CAT during the rural municipality of St. Clemens 100th anniversary on June 9–10 on 7.200 and 14.250 phone and 7.100 and 14.075 MHz c.w. For special QSL send one IRC or stamps to Awards Chairman, c/o Manitoba DX Group, P.O. Box 28 Group 322 RR3, Winnipeg, Manitoba, Canada R3C 2E7.

• **Stone City, Iowa** - The Jones County ARC will operate on June 10 from 1500–2359Z to celebrate the Grant Wood Art Festival. Phone operation is planned 20 kHz up from the lower portion of each general band. Certificate for QSL to Call Book addresses of stations worked.

• **Special Event Station K8TII** - The Henry County ARC will operate K8TII from June 11–17 on 3740, 3965, 7065, 14265, 21150, and 21365. Contact with the club station or any of the club members will qualify for receipt of a certificate. Send s.a.s.e. to Roger C. Jaqua, W8SMW, 17136 Mercer Rd., Bowling Green, OH 43402.

• **Pony Express Day** - The Missouri Valley ARC will operate WØNH on June 16 from 9:00–17:00 and June 17 from 10:00–13:00 CST to commemorate this day. Frequencies: 10 kHz from the bottom of the phone bands on 15, 20, 40, and 75 meters; c.w. 28.150 on 10 meters, 21.150 on 15, and 7.125 on 40; on 10 meters 28.575. For a certificate send stamp and QSL to Missouri Valley ARC, 401 N. 12th St., St. Joseph, MO 64501.

• **NOARS From the USS Cod** - From Memorial Day weekend through Labor Day weekend K8KRG will be on the air from the USS Cod submarine in the lower portion of the general bands 10–80 meters, with special Novice operations on June 16, July 15, and August 18, and Extra operations on September 23. QSL's will be sent to all contacted, and a certificate is available upon request and $1.00. Send all QSL's to WD8RZG.

• **Tacumbia, Alabama** - The Muscle Shoals ARC will operate W4JNB from 1600–2100Z on June 29–30 and July 1 on 7270–7290 and 14280–14295 phone. Talk-in on 2 meters 14601/61. For certificate send business-size s.a.s.e. to Box 2745, Muscle Shoals, AL 35662.

• **Hannibal ARC Special Event** - The club will operate WØKEM from the Tom Sawyer Days celebration on June 30 and July 1 from 1500–2100 UTC both days on phone 7.245, 14.290, 21.400, and 28.770, and c.w. 7.125 and 21.125 MHz. For certificate send 8 X 10 s.a.s.e. and QSL to Hannibal ARC, WØKEM, 2108 Orchard Ave., Hannibal, MO 63401.

• **The following hamfests, etc., are stated for June:**

June 2, **Central Ontario Amateur Radio Fleamarket & Computerfest,** Guelph, Ontario. Contact Guelph ARC, P.O. Box 1305, Guelph, Ontario, Canada N1H 6N9, or call 519-824-1404.

June 2, **Northern Berkshire ARC Fleamarket,** Dalton, MA. Contact WB1HIH.

June 2–3, **Apple City Radio Club Hamfest,** Rocky Reach Dam, 3 miles north of Wenatchee, WA. Contact W7OVE.

June 3, **Wilkes-Barre Hamfest,** Kingston, PA. Contact Hamfest Committee, P.O. Box 1094, Wilkes-Barre, PA 18703.

June 3, **Starved Rock Radio Club Hamfest,** Princeton, IL. Contact SRRC/W9MKS, RFD #1 Box 171, Oglesby, IL 61348.

June 3, **Breeze Shooters Hamfest,** White Swan Amusement Park near Greater Pittsburgh International Airport, Pittsburgh, PA. Contact Don Myslewski, K3CHD, 359 McMahon Rd., North Huntingdon, PA 15642, or phone 412-863-0570.

June 3, **Chelsea Swap & Shop,** Chelsea, MI. Contact William Altenberndt, 3132 Timberline, Jackson, MI 49201.

June 3, **10th Annual Manassas Hamfest,** Prince William County Fairgrounds, south of Manassas, VA. Contact Bob Kelly, KA4NES, c/o Old Virginia Hams ARC, P.O. Box 1255, Manassas, VA 22110, or phone 703-361-9468.

June 3, **Southington ARC Fleamarket,** Southington, CT. Contact SARA, P.O. Box 284, Southington, CT 06489.

June 3, **Rome Ham Family Day,** Rome, NY. Contact Rome Radio Club, P.O. Box 721, Rome, NY 13440.

June 3, **Humboldt ARC Hamfest,** Humboldt, TN. Contact Ed Holmes, W4IGW, 501 N. 18th Ave., Humboldt, TN 38343.

June 9, **Bowling Green Hamfest,** Bowling Green, KY. Contact Ed Gann, N4HID, Rt. 19, Box 92, Bowling Green, KY 42101, or call 502-843-8911.

June 9, **Kootenai ARC Hamfest '84,** Coeur d'Alene, ID. Contact KN7K, S. 1555 Signal Point Rd., Post Falls, ID 83854.

June 10, **Six Meter Club of Chicago Hamfest,** Willow Springs, IL. Contact K9ZWV, 3420 South 60th Court, Cicero, IL 60650.

June 10, **NARL Fleamarket,** Newington, CT. Contact Tom Namnoum, KM1O, 55 Spruce St., Newington, CT 06111, or call 203-666-1615.

June 10, **Champaign-Logan ARC Hamfest,** Bellefontaine, OH. Contact Steve Kidder, N8ETD, Box 265, Russells Point, OH 43348, or call 513-843-6099.

June 10, **Jersey Shore Ham & Computer Fest,** Deal, NJ. Contact Arnold L. Halpern, W2GDS, 450 Brighton Ave., Long Branch, NJ 07740, or call 201-222-3009.

June 15–17, **MACC Computerfest,** Dayton, OH. Contact Computerfest '84, P.O. Box 24505, Dayton, OH 45424.

June 16, **SARC Hamfest & Fleamarket,** Cortland, NY. Contact Bud Jackson, K2ZER, Skyline ARC, 8 Sunnyfield Dr., Cortland, NY 13045.

June 16, **W2QW Hamfest,** Dunellen, NJ. Contact Jack, W2IWK, at 201-756-2546, or Ted, WB2TKU, at 201-725-3481.

June 17, **Frederick ARC Hamfest,** Frederick, MD. Contact Jim Devilbiss, WA3FUJ, 915 Pine Ave., Frederick, MD 21701, or call 301-662-5784.

June 17, **Santa Maria Swapfest,** Santa Maria, CA. Contact Satellite ARC Swapfest, P.O. Box 5117, Vandenberg AFB, CA 93437.

June 17, **Dad's Day Hamfest,** Crown Point, IN. Contact Bill De Geer, W9TY, 3601 Tyler St., Gary, IN 46408.

June 21–23, **Radiofest '84,** Elgin, IL. Contact Joe Willis, Box 14732, Chicago, IL 60614.

June 21–24, **YL Convention,** Las Vegas, NV. Contact Jan Weaver, N7YL, 2195 East Camero Ave., Las Vegas, NV 89123 (s.a.s.e.).

June 29–30, **ARRL Michigan State Convention,** Livonia, MI. Contact ARRL Michigan Convention Committee, 14468 Bassett Ave., Livonia, MI 48154.

June 30, **Saskatchewan Hamfest,** Swift Current, Sask., Canada. Contact VE5HB, 1433 Taylor Dr., Swift Current, Sask., Canada S9H 1M8.

June 30, **Independent Repeater Assoc. Hamfestival,** Grand Rapids, MI. Contact IRA, 562 92nd St. SE, Byron Center, MI 49315, or call WD8OHW at 616-457-1253.

June 30–July 1, **Maple Ridge ARC Hamfest,** Maple Ridge, BC, Canada. Contact Maple Ridge ARC, Box 292, Maple Ridge, BC, Canada V2X 7G2.

Amateur Licensing

This column lists the current requirements for obtaining the various Federal Communications Commission (FCC) amateur radio operator licenses. For the absolute latest information, please contact the nearest FCC office or else telephone Dick Bash, KL7IHP at (415) 278-8275.

NOVICE CLASS This is the typical beginning license. The applicant must pass a 5 word per minute (w.p.m.) International Morse Code test and then pass a 20 question written test on basic theory and rules from a properly licensed examiner. The examiner must be an amateur radio operator who holds a General, Advanced, or Extra Class license and meets the requirements specified in 97.31 of the FCC Rules. The examiner will grade the exam on the spot and, if the applicant passes, will complete and forward the applicant's FCC Form 610 to the FCC in Gettysburg, PA. The FCC will then mail the applicant his/her Novice license in about a month. The Novice licensee can only transmit in Morse code on the designated HF Novice Class bands. Legal details are in 97.27 through 97.33 of the FCC's Rules & Regulations. Anyone interested in the Novice Class or in examining a Novice applicant should read these rules.

TECHNICIAN CLASS This license gives the holder Novice Class privileges on the HF bands and full amateur privileges above 30 megahertz (MHz). The exam for the Technician consists of a 70 question written test and a 5 w.p.m. code test unless the applicant has already passed a Novice exam, in which case he/she doesn't have to retake the code test or the 20 Novice Class written questions. The "Tech" license gives you voice, television (fast- or slow-scan), radioteletype (RTTY), and facsimile privileges. It even lets you communicate via the amateur satellites that orbit the Earth!

GENERAL CLASS The General ticket gives you full amateur privileges above 30 MHz (just like the Tech ticket) but also gives you voice, RTTY, slow-scan television (SSTV), and facsimile privileges on the HF bands. You are also given additional frequencies for code. To get a General Class ticket, you must pass a 13 w.p.m. code test and the 70 question written exam mentioned in the previous discussion about the Tech license.

ADVANCED CLASS This license gives you additional HF privileges for voice, etc. If you presently hold a General Class license, you need only to take and pass an additional 50 question written exam.

EXTRA CLASS This is the highest level of license that the FCC currently has for amateur radio operators. This gives you all possible privileges and (if you presently hold an Advanced Class license) requires that you first pass a 20 w.p.m. code test and then pass a 40 question written test. All of the above licenses are valid for 10 years and are renewable.

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When he isn't working on a public-service event, Chester can often be found on the 40 and 20 meter phone bands.

A CQ Exclusive Interview With:

Chester R. Martin, W3EIL Secretary, OMIK and Capital City Amateur Radio Society

BY DR. THEODORE J. COHEN, N4XX

As the Federal City, Washington, D.C. probably plays host to more special-interest groups than any other city in the nation. With these groups come parades and other public functions that require an extensive network of city-wide communications for purposes of event coordination and public safety. Among the groups that provide such communications is the Capital City Amateur Radio Society, whose secretary is Chester R. Martin, W3EIL. Licensed for over 50 years, Chester now devotes his life to public service and to teaching young people the "ins and outs" of amateur radio. He is also the secretary of OMIK, a most interesting—but little known—national amateur organization. Chester lives in Washington, D.C. with his wife, Enez, and two daughters (the family also includes three married sons). Here he continues to enjoy a hobby that in one way or another has been a part of his life since childhood. It is with great pleasure, then, that CQ presents this exclusive interview with Mr. Chester R. Martin, W3EIL.

CQ: Chester, what do the letters OMIK stand for, and when was the club organized?

Martin: The letters OMIK stand for the states of Ohio, Michigan, Indiana, and Kentucky. When the club was formed in 1952, these were the states represented by the founding members, and so they decided to use the acronym OMIK. I joined the organization in 1968.

CQ: Could you give us a little background as to why OMIK was formed? What were its goals?

Martin: OMIK was organized to overcome minority-group difficulties in the handling of traffic in the four-state area. Its goals were to grow into a nationwide organization, both on a membership and on an on-the-air "participation" basis.

CQ: Was OMIK successful in meeting these goals?

Martin: The increase in size to almost 400 members today leaves no doubt that the original problem—that is, of having few traffic outlets across the country—has been solved.

CQ: How has the organization evolved over the years?

Martin: Ted, the club is more socially oriented today than when it was first organized. Identifying with the fellow on the other end seems more important than handling traffic.

CQ: What, then, is OMIK's purpose today?

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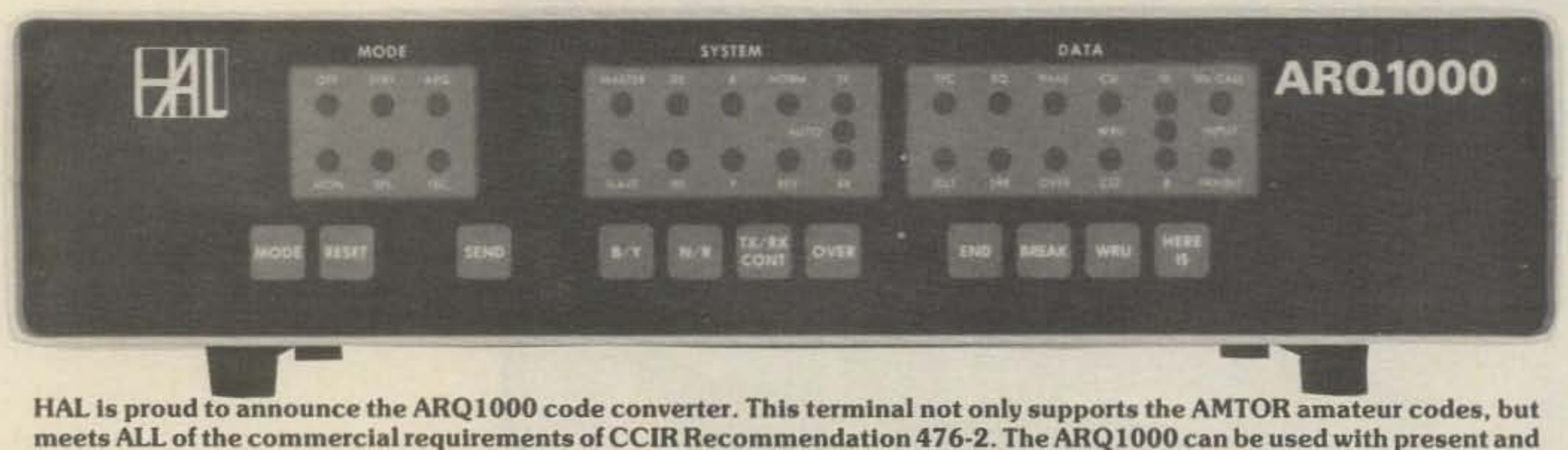

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• Tuning scope outputs (a MUST for AMTOR) • Built-in demodulator for high tones, low tones, "103", or "202" modem tones • 36 or 72 character display lines • 2 pages of 72 character lines or 4 pages of 36 character lines • Split screen or full screen display • Baudot or ASCII, 45 to 1200 baud • Full or half duplex • Morse code send/receive at 5 to 99 wpm • Send/receive loop connection • Automatic transmit/receive control (KOS) • Audio, RS232C, or Loop I/O • On-screen tuning and status indicators • Clearly labeled front panel switches, not obscure keyboard key combinations • Separate convenient lap-size keyboard • Internal 120/240, 50/60 Hz power supply • Attractive shielded metal cabinet

In addition, an update kit is available so that all CT2100 owners can update their CT2100's to include CT2200 features. The kit even includes a new CT2200 front panel! Rather than making a proven product obsolete, HAL put even more behind the buttons. Pick up a CT2200 at your favorite HAL dealer and join the RTTY fun. Write for our full RTTY catalog.

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"Heavy Duty" is Relative!

In our lineup of rotators, the CD45 II is rated as medium duty. Some of our worthy competitors offer similar rotators which they rate as "heavy duty" and, within their product line, they are. But if you compare all rotators, it's a different picture. Here is a comparison of our CD45 II, our HAM IV and the Alliance HD73 (Specifications as stated by the manufacturer).

	HD73	CD45 II	HAM IV
Output Torque	400 in. lbs.	600 in. lbs.	800 in. lbs.
Gears	Plastic and Steel	All Steel	All Steel
Control Box Weight	3.8 lbs.	6.8 lbs.	6.8 lbs.
Rotor Unit Weight	6.5 lbs.	8.5 lbs.	10.5 lbs.
Direction Indicator Potentiometer	Carbon	Precision wire wound	Precision wire wound
Rotation Limiter	Mechanical stop only	Limit switches with mechanical stop	Limit switches with mechanical stop
Braking Power	1600 in. lbs. "Windmilling"	800 in. lbs. "Holding"	5000 in. lbs. "Holding"
Antenna Size Rating	10.7 sq. ft.	8.5 sq. ft.	15 sq. ft.

Wind load rating is an important specification too. Unfortunately, there is no standard method of measurement. For example, a long boom antenna with an unbalanced wind load is a much tougher problem than the calculated square area of the antenna would suggest. So we take a conservative "worst case" approach and rate the CD45 II at 8.5 square feet. Yet, the HD73, a lighter unit, is rated at 10.7 square feet. You be the judge.

Here is a complete listing of Hy-Gain rotators and the typical antenna systems that each will comfortably and reliably manage.

AR40—Primarily used for small to medium size VHF and UHF beams. Can also be used with a 10 or 15 meter, 3 element Yagi.

CD45 II—Recommended for a 3 element tribander such as our Explorer 14. Will also manage a medium sized VHF stack and is a good choice for the Azimuth rotator on a good sized satellite system.

HAM IV—A favorite for long boom tribanders such as our TH7DX. Would also be a good choice for an Explorer 14 stacked with a VHF DX antenna or a satellite system.

HAM SP—A modified Ham IV with a special control unit for a blind operator. Single knob directional control system includes a compass rose with braille markings. An audible beep indicates rotator start and stop.

T2X—The well-known Tail Twister manages combinations such as a TH7DX stacked with a small 2 element 40 meter beam. Also a great choice for a substantial VHF "weak signal" array. Of course, the ever popular stack of 3 or 4 element 10, 15, and 20 meter monobanders is a safe match for the T2X.

HDR300—This 5000 inch pound torquer is our idea of heavy duty. This is the choice for stacked HF "Long Johns" or the full sized 3 element 40 meter monsters. A favorite too for the giant VHF "weak signal" systems where the 1° rotator control and indicator accuracy is a must.

CHOOSING THE RIGHT MODEL—The mistake most commonly made is selecting a rotator for the antenna being installed at the time and not looking forward to the antenna system that you ultimately plan. A rotator that is not over-loaded will deliver many years of reliable service. So, when you choose yours, plan ahead and buy the model that will handle the ultimate load. If in doubt, drop us a note. We will share our experience with you. Long term, you will save money.

HDR300

AR40

CD45 II

HAM IV

T2X

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Given a cost per unit budget for the CP-1, Al designed as much performance as possible into the Computer Patch, including a unique new tuning indicator, referred to by one of our customers as the "Dead Eye Dick" tuning indicator. This indicator is ideal for RTTY and CW, in that it is both fast to tune and (within 10 Hz) as accurate as scope tuning. It also performs under poor signal to noise conditions in which other indicators provide no useful data.

Al's variable shift tuning was designed to move the space filter center frequency from 2225 Hz to 3125 Hz without changing the bandwidth (by varying the Q of the filter). All this is accomplished using a precision ganged potentiometer to assure proper tracking of the multiple filter stages. We could have used a pot costing a tenth as much by simply using a two-pole filter design, but we feel the advantage of a sharper filter reduces the noise bandwidth significantly and allows the variable shift control to be used like passband tuning for extra elimination of adjacent channel interference.

Some manufacturers are concerned that amateurs might try calibrating their own equipment and, therefore, have used non-adjustable components, which results in sub-optimal performance. Although more costly, trimpots used in AEA equipment allow factory adjustment for performance to design specifications. Competently designed active filter circuits need not be adjusted after leaving the factory; however, for specialized use the owner can easily change filter parameters.

Mindful of the fact that many of our customers are new to RTTY, Al made the CP-1 tuning as forgiving as possible, while providing the most critical operator a piece of equipment in which he could be proud. Even old "pro's" are surprised at the poor signal conditions under which the CP-1 will still provide good copy.

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"OMIK was organized to overcome minority-group difficulties in the handling of traffic."

Martin: Our stated aim is to grow significantly in membership so that we can attract good speakers as well as new members who can make technical contributions to the radio art. We are also working to make our meetings more responsive to the needs of the group.

CQ: What are some of the organization's more noteworthy activities today?
Martin: I'd say that our most noteworthy activity is a concerted effort to introduce minority students to amateur radio.

"Our most noteworthy activity is a concerted effort to introduce minority students to amateur radio."

CQ: If someone wanted more information on OMIK, to whom and where should they write?
Martin: Just have them send a business-size s.a.s.e. to me at the following address: 1719 Franklin St. NE, Washington, D.C. 20018.

CQ: What about CCARS? What is its relationship to OMIK—if any—and what are some of its activities in and around Washington?
Martin: CCARS has OMIK connections, but not all of our members belong to OMIK. In the District of Columbia we are devoted to public service. Last year, for example, we handled communications for the D.C. Marathon, the 4th of July Parade, the Viet Nam Memorial Parade, the School Patrol Parade, the Martin Luther King Memorial March on Washington, and other city-wide events. Our communications van and portable units work in close liaison with the Mayor's Command Post and the D.C. Police and Fire Departments. By the way, CCARS members also monitor CB Channel 9 for the D.C. Police Department.

CQ: How many members do you have in CCARS, and what are their primary interests in amateur radio?
Martin: We have a total of 41 members. Our interests are many and varied, but primarily we work on public-service activities.

CQ: Chester, the ARRL recently awarded you a plaque and a 50-year pin for uninterrupted membership in that organization. When and how did you get your start in amateur radio?
Martin: I received my original and only call on January 5, 1934. Actually, I became fascinated with the Morse code at the age of seven, but it wasn't until I was in my late teens that a magazine article on how to build a code-practice oscillator got me going. From that experience came my interest in amateur radio.

CQ: Were there any barriers placed in your way during the early 30s that prevented you from fully enjoying the hobby?
Martin: I do not recall any barriers during the early part of my ham career. We had a few friends in the "majority group," but there were some who were not so friendly. As long as we stayed hidden behind the key or the mike—which was a common expression in those days—everything was fine. An erroneous assumption made by members of the majority was that every ham they heard on the air belonged to their group. They were completely frustrated when they came face to face with the truth.

CQ: What type of equipment did you use in your first station?
Martin: My first transmitter used a No. 47 tube in a crystal-oscillator circuit, with a No. 46 tube serving as a doubler. The receiver used a 58-58-56 tube line-up. Both pieces of gear were built from early *QST* articles.

CQ: Did your amateur activities influence your career choices?
Martin: No, Ted, they didn't. I entered the District's Fire Department in 1939, and retired in 1968 after 29 years of service.

CQ: Are you very active today? If so, what bands and modes do you enjoy the most?
Martin: I'm reasonably active on 40 and 20 meters, mostly on phone. In addition, 2 meter repeater activity takes up a great deal of my time.

CQ: Is anyone else in your family licensed and how has amateur radio shaped their lives and career goals?
Martin: My oldest son, Chester III, is licensed as KT5R; he lives in San Antonio, Texas, where he works for Executone. My youngest daughter, Karen, is KA3HEI; she lives at home. Amateur radio has certainly influenced Karen's career choice! She's a junior at the University of Maryland at College Park, working for a degree in electrical engineering.

"For many youngsters amateur radio is the beginning of a life-long career in the field of electronics."

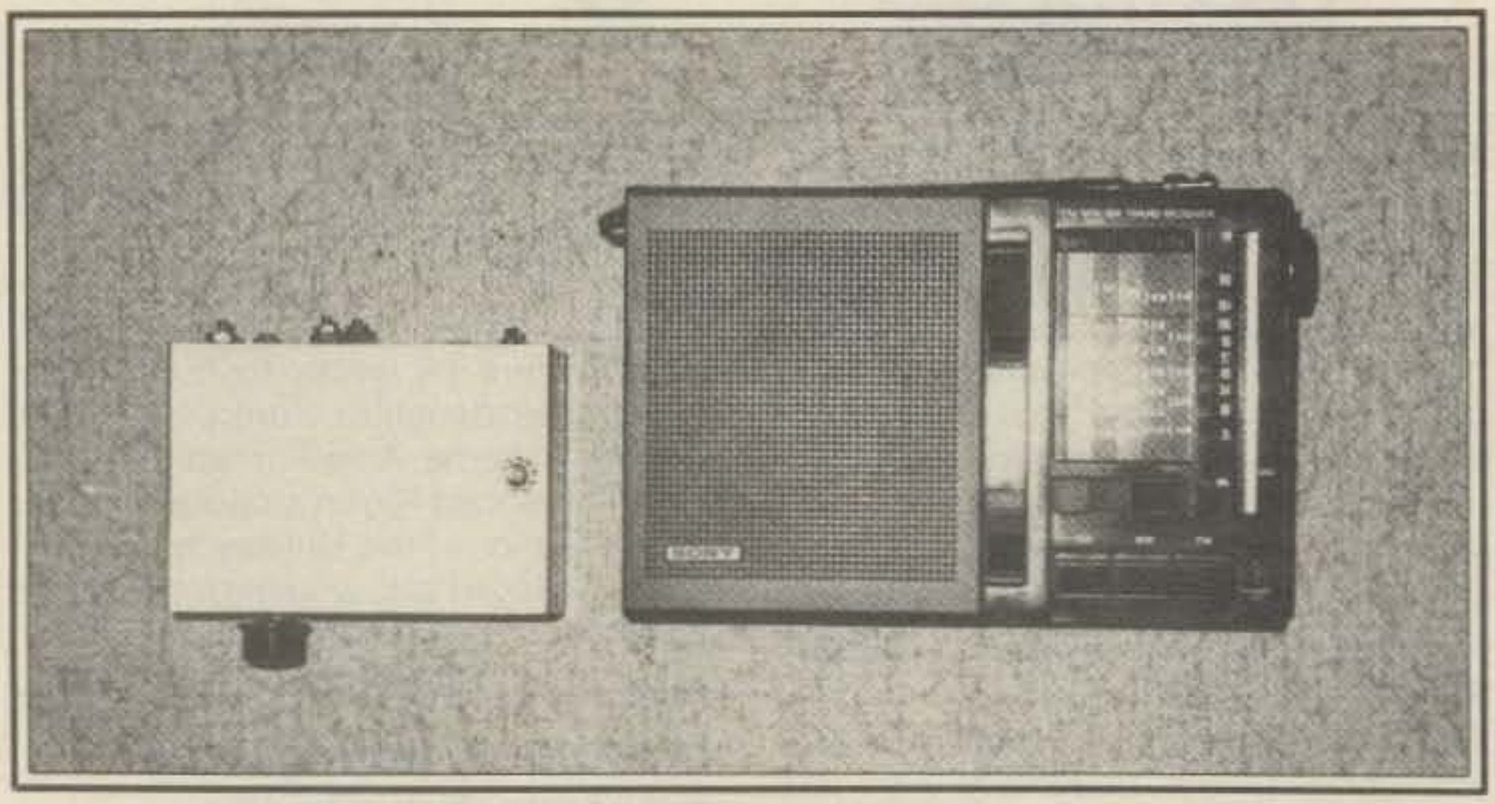
CQ: What do you think are the most important things that amateur radio has to offer today's youth?
Martin: For many youngsters amateur radio is the beginning of a life-long career in the field of electronics. However, in the last few years we can't get the young people to hold still long enough to get a ham ticket. Our classes today are attended entirely by adults, and in particular by an increasing number of retired persons. A recent class in one of the local junior high schools ended with only one adult teacher getting her ticket. Not one of the 26 students who started received a ticket, despite the fact that the students had been selected by their teachers because of their scholastic abilities! But we're not giving up!

CQ: With that kind of enthusiasm, Chester, I know you're going to succeed! Thanks for being with us today!
Martin: Thank you, Ted. I've enjoyed being here. CQ

Sometimes the makings of a good QRP portable station may be closer at hand than you think. W4FA takes us through the paces of assembling a portable rig for those QRP vacations.

A PORTABLE QRP STATION THE EASY WAY

BY JOHN J. SCHULTZ*, W4FA



The complete QRP station (less transmitter battery). The converted Sony ICF-7600 is at the right and the nominal 5 watt, v.f.o.-controlled, 40 meter transmitter is in the small enclosure on the left.

There is no doubt that QRP operation has a fascination for most amateurs regardless of how elaborate a station they can afford. Perhaps it's because of the challenge QRP operation offers when making contacts. Perhaps it represents a refreshing alternative to operating a station with more knobs and meters than a power generating plant. Or, perhaps it just represents the freedom of having the capability to operate a station almost anywhere and without dependence on commercial line power.

In any case, no matter what daydreams one might have about operating a QRP station, those thoughts usually grind to a halt when one considers the practical realization in terms of effort and cost when putting together such a station. Various extremely compact and sophisticated QRP stations have been designed by amateurs, but building them requires advanced building skills and lots of time. Extremely simple QRP stations have also been presented in amateur literature, but then a lot of the performance side has been compromised. On the other hand, one can purchase QRP equipment, but once one gets all the "boxes" together, the whole station hardly constitutes a book-size station that can be neatly tucked in the corner of a suitcase.

This article tries to present an approach to putting together a QRP station that is extremely compact but not too difficult to assemble nor overly expensive, while performing on a par with the best of QRP designs. Of course, it is just an alternative approach and does not in any way claim to be an ultimate QRP design—just a reasonable, all-around compromise.

The basic idea behind the idea of the QRP station to be described is to take advantage of commercially available equipment, or modules, modify them slightly, and then "package" them for proper interface and compactness.

A QRP station, by definition and especially if it is to be portable, must sacrifice transmitter power. However, on balance, most QRP station designs sacrifice more on the receiver side than on the transmitter side. One reason, of course, is that the construction of an extremely compact, low-current-drain, low-cost receiver of any design beyond the simplest direct-conversion type requires skills and materials that most amateurs simply do not have, to mention nothing of the time required. Therefore, it is surprising that in forming a QRP station few amateurs have taken advantage of the possibility to modify one of the various new, compact, consumer-type shortwave receivers which have appeared on the U.S. market in the last few years. Some examples are the Grundig "Yachtboy" series, the Panasonic "RF" series, and the Sony ICF-7600. Such receivers are very compact, fairly sensitive, and have band-spreaded coverage of various shortwave broadcast bands. All that one basically has to do to turn them into quite acceptable receivers for a QRP station is retune one or more of the shortwave frequency bands covered to coincide with an amateur band and add a b.f.o. for c.w. reception. In most cases one can retain almost all of the original features on the unmodified bands of the receiver. One can provide for amateur operation using such a receiver and still retain the capability for some shortwave and a.m./f.m. broadcast reception.

The receiver that was used by the author to assemble a QRP station was the Sony ICF-7600, but the basic ideas presented are applicable to the other receivers mentioned (plus probably to several more that will be on the market by the time this reaches print). The ICF-7600 has been on the market for several years now. It is an amazingly compact (18 × 11½ × 3 cm), battery-operated receiver (four AA cells) that covers the a.m./f.m. bands plus band-spreaded tuning on five

*c/o CQ magazine

shortwave bands: 3.9–4.0 MHz, 5.95–6.20 MHz, 9.5–9.8 MHz, 11.7–12.0 MHz, and 15.1–15.5 MHz.

The ICF-7600 is a very sophisticated design in terms of construction, but electrically it is a basic superheterodyne design with a conventional LC-tuned local oscillator and LC-tuned circuits in the r.f. amplifier stage. Therefore, once one understands the basic circuitry and determines which circuits have to be retuned to cover one or more amateur bands, the work can be done without any special test equipment or skills.

A partial schematic of the ICF-7600 receiver is shown in fig. 1. If one studies the

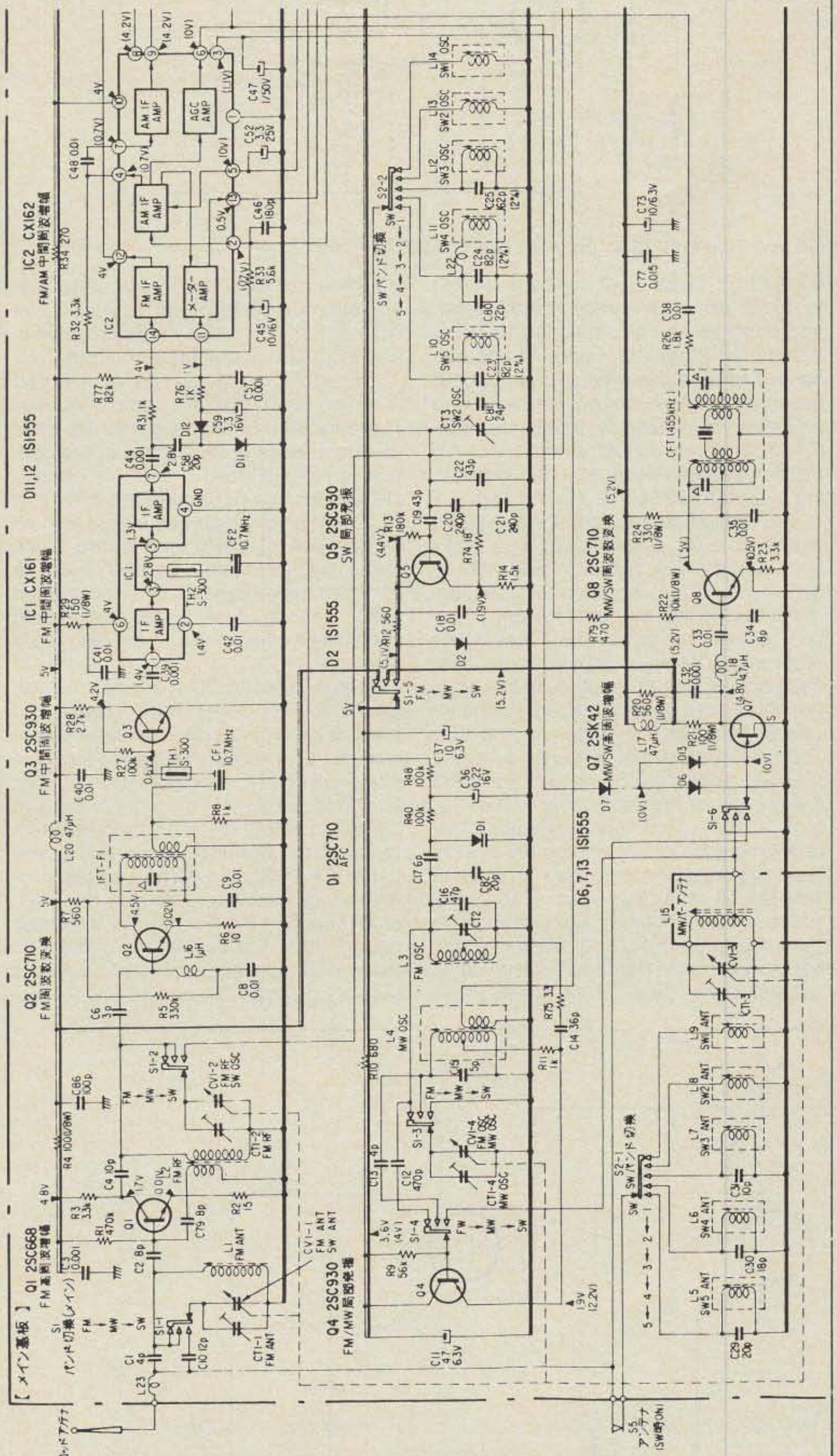


Fig. 1– A partial schematic of the Sony ICF-7600 showing the "front-end" of the receiver, which can be realigned to cover one or more amateur bands.

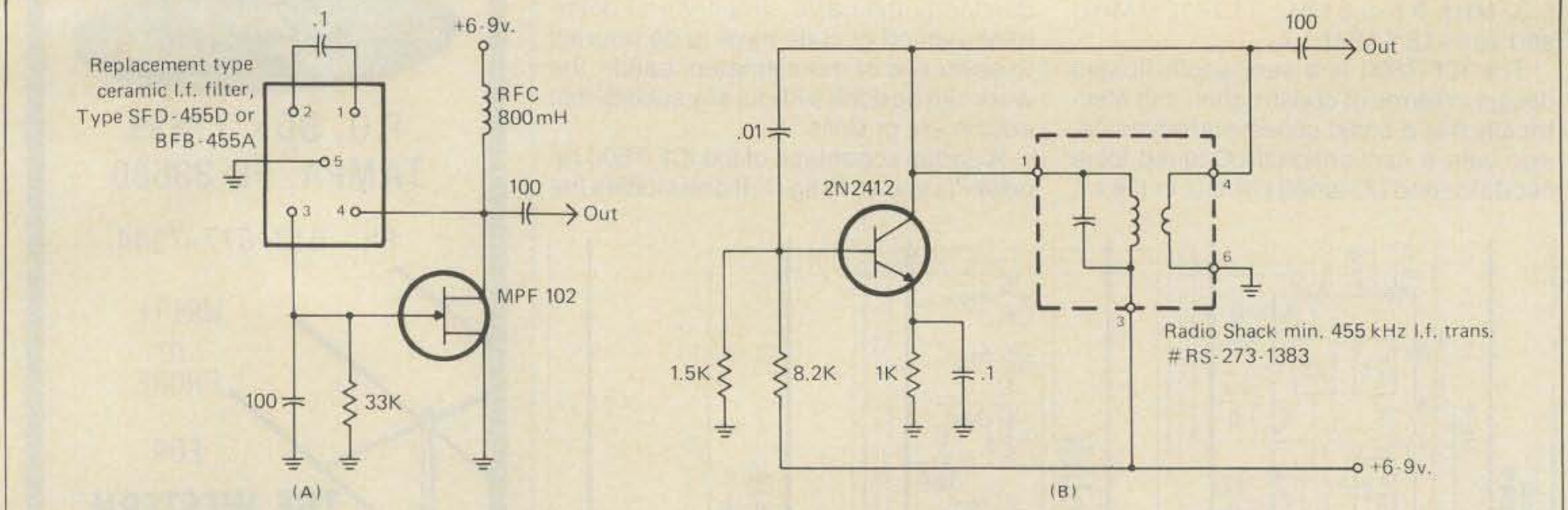


Fig. 2– Two simple b.f.o.'s, either of which can be added to a receiver such as the ICF-7600 to provide c.w. reception.

schematic a bit, it can be seen that the r.f. amplifier input circuits are shown in the lower left-hand corner and precede the FET r.f. amplifier stage, Q7. The output of the r.f. amplifier stage is not tuned (broadbanded) by L17, L18, and associated components). The stage to the right of Q7 is the mixer stage, Q8. It receives its injection signal from the local oscillator stage, Q5, via a buffer amplifier, Q6. The output from the mixer stage goes to an IC, shown in the upper right of the diagram, which contains the IC amplifiers, a.g.c. circuitry, etc. The LC circuits which are associated with the local oscillator stage are shown to the middle right of the diagram (labeled SW1 OSC to SW5 OSC). Both the r.f. amplifier input circuits and the local oscillator LC circuits are slug-tuned for alignment. Therefore, for instance, to convert band #2 on the receiver, which normally covers 5.95 to 6.20 MHz, to cover the 40 meter band starting at 7.0 MHz, one simply has to turn the slug in the SW2 OSC coil so 6.0 MHz on the receiver dial represents 7.0 MHz and then peak the SW2 ANT coil slug for maximum signal strength. The 7.0 MHz alignment signal can be obtained from a conventional signal generator or any low-power transmitter. In a similar manner, band #1 on the receiver can be realigned to cover part of the 75/80 meter band, and band #5 can be realigned to cover the entire 20 meter band. The band-spread, after realignment, remains about the same as when the receiver was used on a shortwave broadcast band (e.g., 6.0–6.1 MHz, which covers about 1 inch on the band-spread scale at a 100 kHz tuning knob rate, becomes 7.0–7.1 MHz).

The realignment procedure should be very simple for any amateur who really understands how a basic superheterodyne receiver functions. In fact, realignment takes only a matter of minutes *once* one locates the appropriate coil slugs that have to be adjusted. However, in no case should one attempt to do this without obtaining a service manual for the receiver involved. For instance, the ICF-7600 service manual is readily available by mail order from Sony, U.S. for $2–3 (Sony Corp. of America, Long Island City, N.Y. 11101). The service manuals for other manufacturer's equipment is similarly available. An immense amount of time will be saved by obtaining an appropriate service manual. For instance, in the case of the ICF-7600, there is a simple disassembly procedure involved to get at the coil "cans." If one doesn't have a guide as to how a few screws and a cover plate must be removed, however, one will wander around for hours on a miniature PC board in complete frustration.

The addition of a b.f.o. to a converted receiver is a relatively simple matter. There is room enough even in the most compact receiver for a small board containing a single transistor b.f.o. Two simple 455 kHz b.f.o. circuits are shown in fig. 2, either of which can be assembled on a piece of perforated board stock measuring less than 1″ by 1″. There is no particular advantage to either circuit and either can be constructed, depending upon which components are most readily available.

The circuit of fig. 2(A) uses a miniature, fixed 455 kHz ceramic i.f. filter as the feedback element in the oscillator circuit while fig. 2(B) shows the use of a subminiature 455 kHz i.f. transformer. Generally, all that is necessary to use the b.f.o. is to couple its output to the a.m. diode detector circuit in a given receiver. In the case of the ICF-7600, it involves a simple connection of the b.f.o. output to pin 9 (i.f. amp output) of the IC shown in the upper right of fig 1. The conversion of the a.m. diode detector stage in a receiver to a product detector for simple c.w. recep-

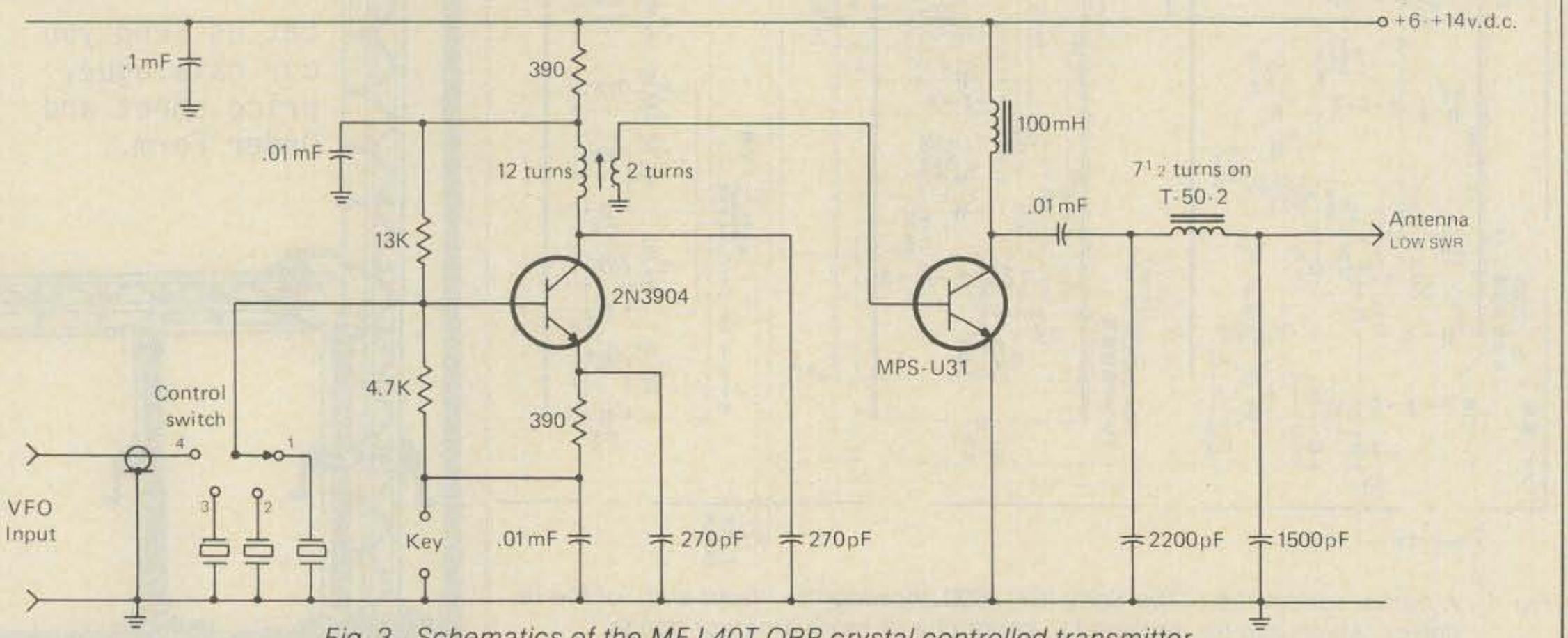


Fig. 3– Schematics of the MFJ-40T QRP crystal-controlled transmitter.

tion is really not warranted for QRP c.w. reception, although it would be another matter for s.s.b. reception to achieve less distortion. One thing, however, that must be provided for the b.f.o. is an on/off switch for use when the receiver returns to nonamateur band use. A simple switch to cut the supply voltage line to the b.f.o. will suffice but locating it in a miniature receiver can pose some problems. In the case of the ICF-7600, it contained an output jack for a tape recorder which was readily accessible but which the author did not intend to use. Therefore its mounting space was used for a miniature b.f.o. on/off switch.

Once converted in the relatively simple manner described above, the ICF-7600 proved to be a simple but excellent QRP receiver. The built-in whip antenna provided good signal reception on 40 meters, and the selectivity, helped by the built-in wide-range tone control, was adequate. In general, its performance can be placed several steps above a simple direct-conversion receiver, while of course not equalling that of a desk-top communications receiver.

Once satisfied with the receiver part of the QRP station, I turned my attention to the transmitter part. The result was rather surprising—a 5 watt input, single-band, v.f.o.-tuned transmitter complete with key in an enclosure (less power supply) smaller than the ICF-7600 receiver! The size comparison can be seen from the photographs.

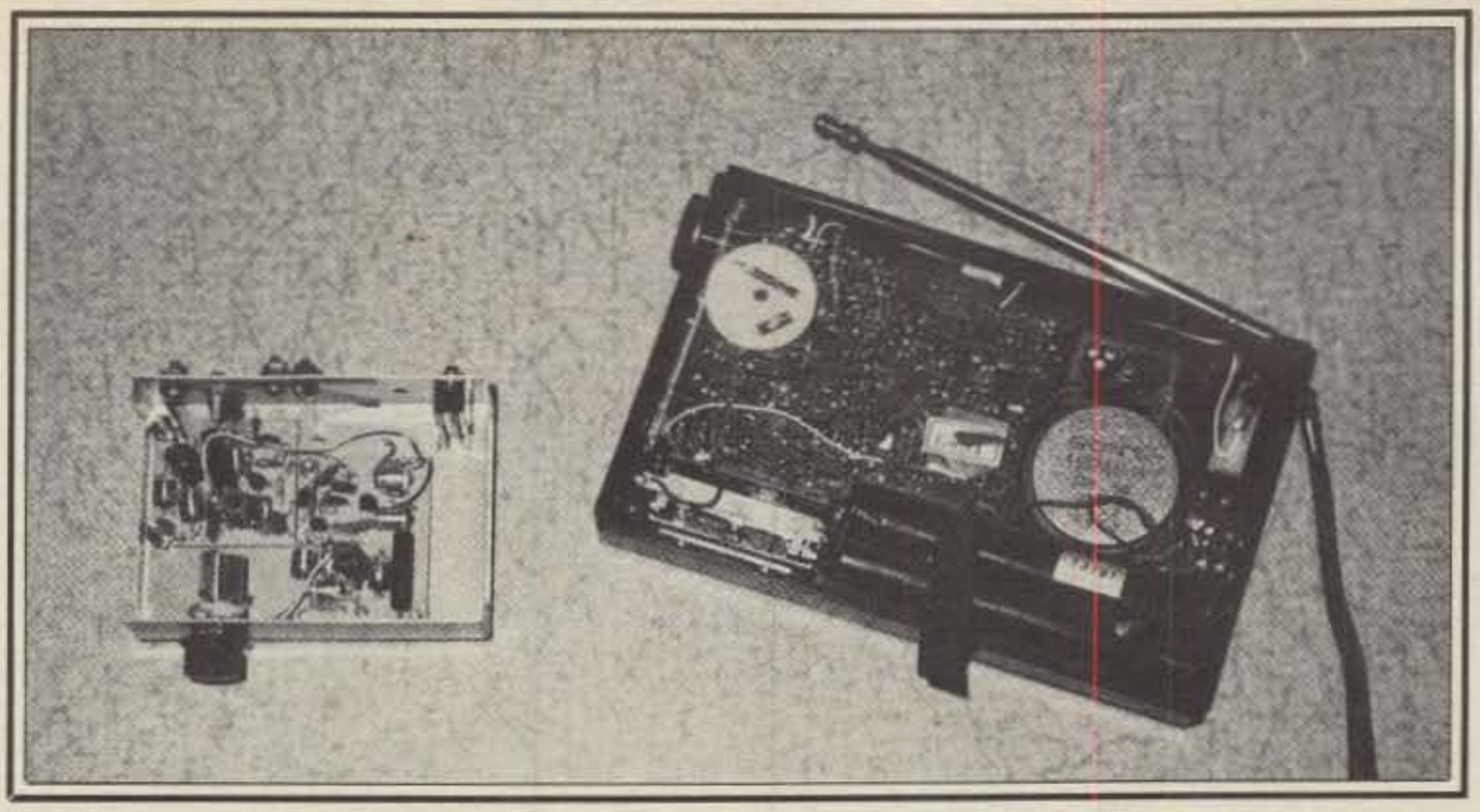
The transmitter is based upon the MFJ Enterprises MFJ-40T QRP transmitter and MFJ-40V v.f.o. In fact, all I really did was compact the MFJ-40T and MFJ-40V into a 3½" × 3" × 1" aluminum utility enclosure and add a key (push-button momentary switch), a simple send/receive/v.f.o. spot switch, and some connectors for a battery supply, antenna, and ground.

The schematic of the MFJ-40T is shown in fig. 3. Basically, it is a two transistor, crystal-controlled, no-tune transmitter designed for 40 meter operation. It will run ¾ watt input at a supply voltage of 6 volts to 7 watts input at a supply voltage of 14 volts. The Pi-network output provides for good harmonic attenuation, and it is extremely stable in operation with a good keying waveform. It can, of course, be used alone as a complete crystal-controlled transmitter. All that is necessary to use it is a suitable battery, key, and antenna.

The schematic of the MFJ-40V is shown in fig. 4. It consists of an FET oscillator and buffer stage and covers a 200 kHz range (7.0–7.2 MHz). Tuning is accomplished by the 4–40 pF variable capacitor. It will operate on 9–14 volts d.c., and the stability is entirely satisfactory, being about 100 Hz/hour.

The PC boards from the 40T and 40V were taken out of their enclosure and simply remounted in a new enclosure as shown in the photo. The 40V board is shown to the right of the v.f.o. tuning capacitor, and the 40T board is to the rear of the capacitor. The rear panel of the enclosure contains connectors for antenna, ground, and battery power (pin jacks, phono jacks, or any similar connectors will suffice), plus the slide-type send/receive/v.f.o. spot switch. The "key," which is a simple normally-open miniature pushbutton switch, is mounted in the cover of the enclosure. The very simple interconnection wiring is shown in fig. 5. The send/receive/v.f.o. spot switch does nothing more than apply battery voltage to both PC boards, to neither PC board, or to the v.f.o. board only. It does not switch the antenna.

The receiver is so sensitive that it operates using its whip antenna. Only a wire-type transmitting antenna is required. The use of the receiver's built-in whip an-



A look inside both the receiver and the transmitter. The b.f.o. added to the ICF-7600 is on a small circuit board directly above the loudspeaker magnet. The transmitter enclosure contains the separate v.f.o. and amplifier PC boards.

Fig. 4– Schematic of the MFJ-40V, which can be used with the MFJ-40T transmitter on 40 meters. It covers 7.0–7.2 MHz.

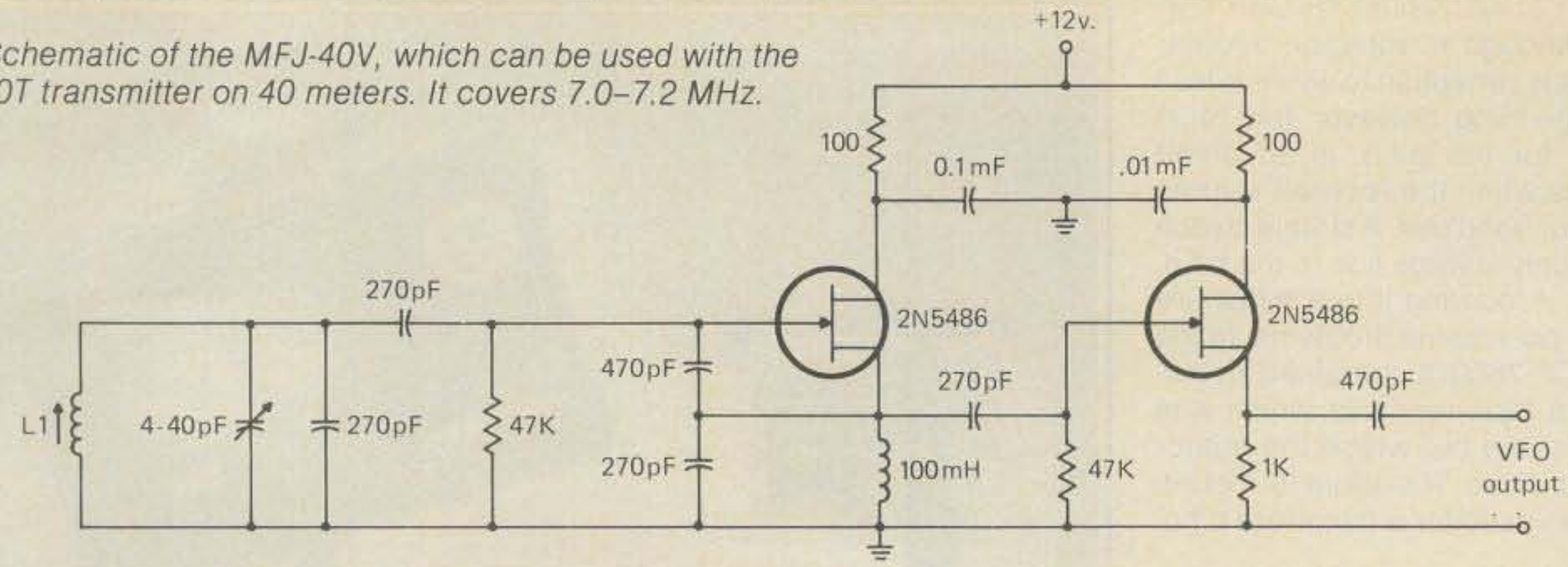
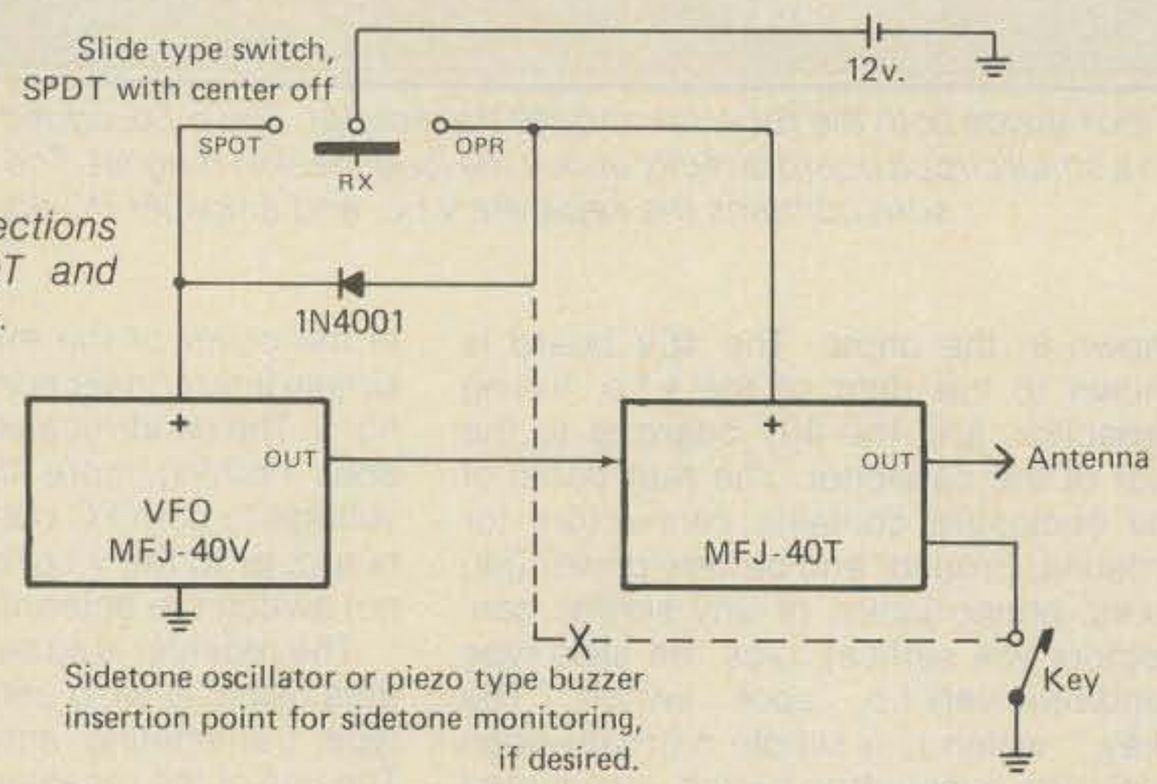


Fig. 5– Interconnections between the 40T and 40V boards.



tenna and wire antenna, which loads the transmitter properly, provides a nice balance between receive and transmit capabilities such that one does not have an S9 receive capability with only an S1 transmit capability. The PC boards do not require any readjustment after being remounted except perhaps to adjust the slug in the v.f.o. coil so 7.0 MHz corresponds to the fully meshed (9 a.m.) position of the v.f.o. tuning capacitor on the front panel of the enclosure.

Basically, that's all there is to it to construct a truly take-anywhere QRP station. Although one can duplicate the type of station described, many variations are possible. For instance, one can use just the MFJ-40T as a crystal-controlled transmitter and let it go at that. No switching of any sort is then necessary, since under key-up conditions the 40T will not draw any battery current. Both the 40T and 40V are no longer available from MFJ Enterprises. Some of MFJ's dealers may have them in stock, or they may turn up at a fleamarket. The schematics are simple enough to be easily duplicated.

One can take off in the other direction and add a few operating "comforts." A sidetone oscillator to monitor keying will fit easily into the transmitter enclosure, although one then will have to run the receiver audio into the transmitter enclosure and provide headphone switching between sidetone output and receiver output. A fairly good home-brewer should also find no difficulty in adding a forward/reflected power meter in the transmitter enclosure using a sensing element built around a ferrite-core transformer. Multiband operation might be provided by doubling in the 40T output stage, although a suitable 20 meter output low-filter would also have to be provided. On the receiver side, an active a.f. peaking filter could be built into a receiver such as the ICF-7600 such that it is only in the audio line when the headphone jack in the ICF-7600 is utilized. Even in such a compact receiver such as the ICF-7600 there is room enough around the loudspeaker area to add that "extra" circuit board. I wasn't skilled enough to try it, but who knows, perhaps it might even be possible to get the transmitter boards into the ICF-7600 enclosure. Now, won't that be a QRP station!

Look for the results of the 1983 CQ WW DX Contest in the September (S.S.B.) and October (C.W.) 1984 issues of CQ. Rules for the 1984 CQ WW DX Contest will also appear in the September issue.

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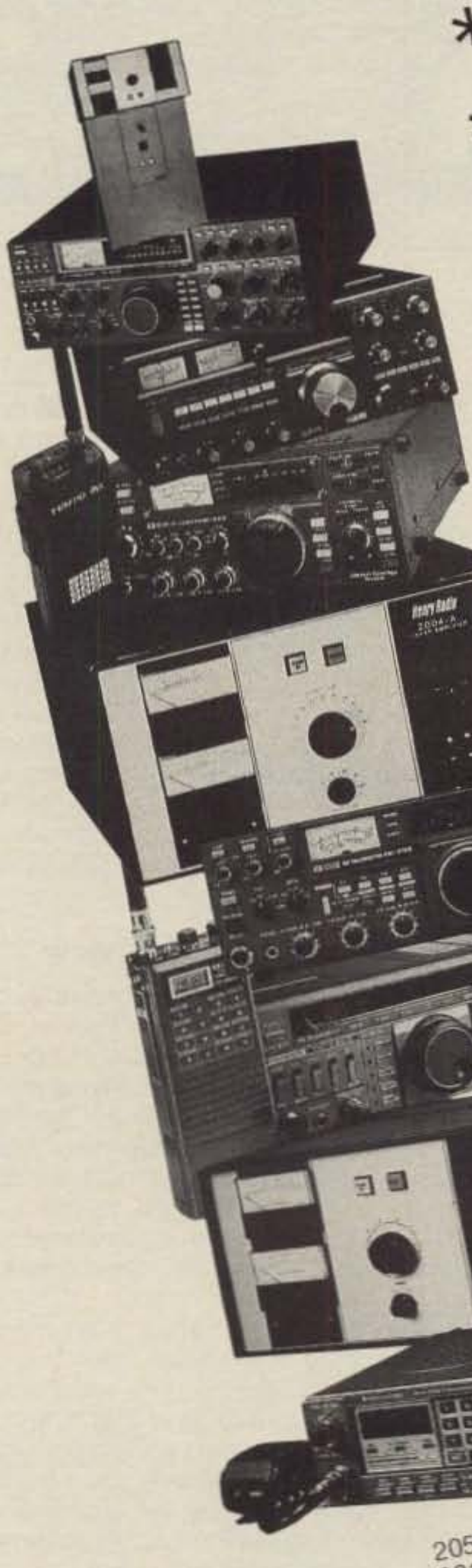

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BY DAVE INGRAM*, K4TWJ

The Yaesu FT-102 H.F. Transceiver

The Yaesu FT-102 high-performance h.f. transceiver. The unit offers internal a.c. power supply, triple 6146B finals, dual panel meters, and a host of other features.

If you were an active radio amateur during the 1960s, your selection of an h.f. transceiver was basically a simple matter. There were only a few models from which to choose, and special "bells and whistles" were relatively unknown in the commercial market. Home constructing was popular because it allowed us to personalize our setups with one or two special frills at a reasonable cost. Over the years situations changed. The cost of electronic components began to rise and homebrewing began to decline. American-produced gear became more expensive for its capabilities, while the price of Japanese gear declined. Significant advancements have transpired, and today's array of imported amateur gear offers a variety of features to fulfill anyone's desires. During recent months we have seen the introduction of some high-performance, imported transceivers capable of producing exceptionally good results and clean signals.

The FT-102 is a medium-size and extremely professional-looking h.f. transceiver. Dual panel meters, a perfectly balanced and rubber-coated tuning knob, plus numerous chrome and skirted knobs give the FT-102 a very sleek appearance. There's more than mere appearance in the FT-102, however, as the prime focus of this transceiver is high-quality signal transmission and reception. The receiver's high dynamic range and selectivity are complimented by three 6146B finals which produce a very clean transmitted signal. If you prefer tube-type finals and front-panel loading controls rather than solid state and broadbanded rigs (no tune-up), you'll love the FT-102. It's a classic in the "one v.f.o. and tube final" category. The unit is slightly wider but not quite as tall as Kenwood's TS-830. Exact dimensions are 368 by 129 by 310 mm (W, H, D), and the unit weighs approximately 15 kg. The front panel and back cabinet areas are very dark gray. The digital display and panel meter illuminate light green. A massive power transformer is situated in the mid-rear area, and the complete transceiver is cooled by a muffin fan mounted behind the final amplifier compartment. Bottom access holes permit adjustment of transmit audio bass and treble, sidetone volume, and frequency. A hand-held mike with "up" and "down" buttons is supplied with the FT-102, but the optional FV-102DM synthesized and scanning v.f.o. is required for scan operation.

As supplied, the FT-102 is operational on all amateur bands 160 through 10 meters including WARC bands. Indeed, the unit produces a quite respectable signal on the new 30 meter band. R.f. output power is nominally 120 to 140 watts, although heavy loading can push that figure slightly above 160 watts. The unit's speech processor is also a gem, providing a creditable amount of talk power.

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

First Impressions

Unlike broadband and minimum-adjustment transceivers, the FT-102 might easily be considered a "knob twister's delight." There are four knobs for transmitter tuning (preselector, drive, plate load, and tune), plus several other variables which are not apparent until the transceiver is put to use. S.s.b. operation, for example, includes setting the mike gain and compression while watching both panel meters. Switching to c.w. involves retuning the final's controls for that portion of the band and switching on the monitor (if it wasn't used for s.s.b. transmission monitoring) for sidetone. If VOX wasn't previously employed, that control must be pushed (it pops out slightly), increased to approximately 9 o'clock, and returned to its recessed position. Other "extendable" controls which come into action are the VOX/c.w. delay, noise blanker level, mike gain, compression, and squelch (for use on 10 meter f.m.). Controls for setting transmitted audio response, c.w. sidetone volume (which is independent of front-panel volume settings), and frequency are recessed under the rig's bottom. An alignment tool is provided for reaching those adjustments.

The FT-102 includes both RIT and XIT with a liberal ± 4 kHz range, a very useful feature for checking/working adjacent frequencies, etc. The concentric **I.F. Notch** and **Audio Peak Filter** controls are fairly effective—better than many rigs, but not quite equal to the classic FT-901DM. The **I.F. Notch** can also be used in conjunction with the noise blanker to produce an additional one or two S-unit drop in line or band noises. LED indicators are not provided for these controls, so you'll need to watch against leaving them "on" accidentally. The a.l.c. metering circuit includes a selectable "peak hold" circuit for precise adjustments—a nice feature which takes only a few seconds to appreciate. Considering all these variables along with our natural laziness brought on by today's fully solid state rigs, we must say the FT-102 lets you do a little work for those QSO's.

FT-102 Circuitry Overview

There is a substantial amount of circuitry packed inside the FT-102's cabinet, resulting in what initially may seem a complex unit (see fig. 2). As a means of simplifying our discussion, let's briefly ignore some of the "support" or "extra" blocks and step through the rig's basic circuits. Since this diagram isn't published in color, I suggest following receive paths with a blue pen and transmit paths with a red pen; the resultant color codes should prove quite helpful.

During receive, signals from the antenna are directed through preselector coils to a front-panel-controlled relay which enables or bypasses r.f. amplifiers Q1001 and Q1002. The S meter indicates an approximate 15 dB gain in this stage; thus, its use is primarily for weak signal reception. An approximate 5 dB increase in dynamic range is achieved when the r.f. amplifier is not used—an important

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850 Hz and 170 Hz shifts on receive **and** transmit.

Has mark and space outputs for scope tuning.

Normal/Reverse switch eliminates retuning.

True dual channel mark and space active filters and automatic threshold correction gives good copy when one tone is obliterated by QRM or selective fading.

Easy, positive tuning with twin LED indicators.

Narrow 800 Hz active CW filter. Automatic PTT.

Exar 2206 sine generator for AFSK output.

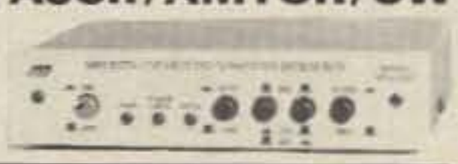
Shielded XCVR AFSK/PTT interface cable provided. Plus or minus CW keyed output. FSK out.

Powered by computer (few ma.), no power adapter to buy or extra wire to dangle or pick up/radiate RFI.

Glass epoxy PCB. Aluminum enclosure. 4½x4½x1".

UNIVERSAL SWL RECEIVE ONLY COMPUTER INTERFACE FOR RTTY/ASCII/AMTOR/CW

MFJ-1225 $69.95



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Use MFJ, Kantronics, AEA and other RTTY/ASCII/AMTOR/CW software.

Copies all shifts and all speeds. Twin LED indicators makes tuning easy, positive. Normal/Reverse switch eliminates tuning for inverted RTTY. Speaker out jack. Includes cable to interface MFJ-1224 to VIC-20 or Commodore 64. 4½x1¼x4¼ inches. 12-15 VDC or 110 VAC with optional adapter, MFJ-1312, $9.95.

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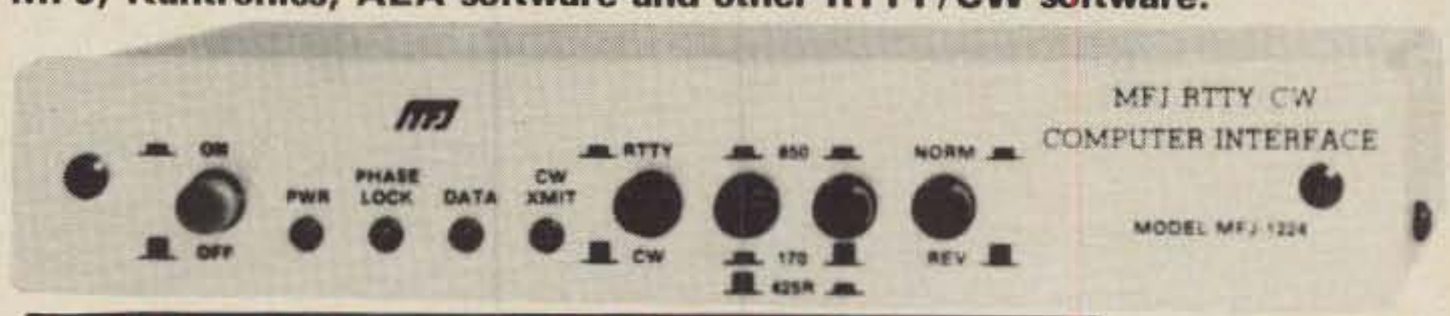
Lets you send and receive computerized RTTY/ASCII/AMTOR/CW. Copies all shifts and all speeds. Copies on both mark and space. Sharp 8 pole active filter for 170 Hz shift and CW. Plugs between your rig and VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64 or other personal computers. Uses MFJ, Kantronics, AEA software and other RTTY/CW software.



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Use MFJ software for VIC-20, Commodore 64 and Kantronics for Apple, TRS-80C, Atari, TI-99 and most other software for RTTY/ASCII/AMTOR/CW.

Easy, positive tuning with twin LED indicators.

Copy any shift (170,425,850 Hz and all other shifts) and any speed (5-100 WPM RTTY/CW and up to 300 baud ASCII).

Copies on both mark and space, not mark only or space only, to improve copy under adverse conditions.

Sharp 8 pole 170 Hz shift/CW active filter gives good copy under crowded, fading and weak signal conditions. Automatic noise limiter suppress static crashes for better copy.

Normal/Reverse switch eliminates retuning. +250 VDC loop output drives RTTY machine. Speaker jack.

Automatic tracking copies drifting signal.

Exar 2206 sine generator gives phase continuous AFSK tones. Standard 2125 Hz mark and 2295/2975 Hz space. Microphone line: AFSK out, AFSK ground, PTT out and PTT ground.

FSK keying output. Plus and minus CW keying. CW transmit LED. External CW key jack.

Kantronics compatible socket.

Exclusive general purpose socket allows interfacing to nearly any personal computer with most appropriate software. Available TTL lines: RTTY demod out, CW demod out. CW-ID input, +5 VDC, ground. All signal lines are buffered and can be inverted using an internal DIP switch.

Use Galfo software with Apple, RAK with VIC-20, Kantronics with TRS-80C, TI-99, N4EU with TRS-80 III, IV. Some computers with some software may require some external components.

Metal cabinet. Brushed alum. front. 8x1¼x6 in. 12-15 VDC or 110 VAC with adapter, MFJ-1312, $9.95.

MFJ-1223, $29.95, RS-232 adapter for MFJ-1224.

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High performance CW interface cartridge. Gives excellent performance under weak, crowded, noisy conditions. Works for both VIC-20 and Commodore 64. Plugs into user's port.

4 pole 100 Hz bandwidth active filter. 800 Hz center frequency. 3 pole active lowpass post detection filter. Exclusive automatic tracking comparator.

Plus and minus CW keying. Audio in, speaker out jacks. Powered by computer.

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GENERAL

Frequency coverage:

Band	Range
1.8	1.8–2.0 MHz
3.5	3.5–4.0 MHz
7	7.0–7.5 MHz
10	10.0–10.5 MHz*
14	14.0–14.5 MHz
18	18.0–18.5 MHz
21	21.0–21.5 MHz
24.5	24.5–25.0 MHz
28, 29	28.0–29.9 MHz

Operating Modes:
LSB, USB(A3J/J3E); CW(A1/A1A); AM(A3/A3E) and FM(F3/F3E)**

Power requirements:
100, 117, 200, or 234 VAC, 50/60 Hz

Power consumption:
Receive: 95 VA (73 VA with heaters off)
Transmit: 440 VA (for 100 W output)

Dimensions (WHD):
368 x 129 x 309 (mm)

Weight:
Approx. 15 kg

TRANSMITTER

Power Input:	(1.8–25 MHz)	(28–29.9 MHz)
SSB, CW	240 W DC	160 W DC
AM**	80 W DC	80 W DC
SSTV, FM**	–	120 W DC

Carrier suppression:
Better than -40 dB at 14 MHz

Sideband suppression:
Better than -60 dB (14 MHz, 1 kHz tone)

Spurious radiation:
Better than -40 dB

Transmitter audio frequency response:
300–2900 Hz (-6 dB) adjustable

Third order intermodulation products:
Better than -40 dB (14 MHz, 100 W PEP)

Negative feedback level:
Approx. -6 dB at 14 MHz

Frequency stability:
Less than 300 Hz drift during the first 30 minutes after 10 minutes warm-up; less than 100 Hz every 30 minutes thereafter.

Modulation types:
A3J/J3E: balanced modulator
A3/A3E**: low level amplitude modulator
F3/F3E**: variable reactance modulator

Microphone input impedance:
Low, 200 to 600 ohms

RECEIVER

Image rejection:
Better than 70 dB from 1.8–21.5 MHz
Better than 50 dB from 24.5–29.9 MHz

IF rejection:
Better than 70 dB

AF output:
1.5 W minimum (8 ohms, 10% THD)

AF output impedance:
4–16 ohms

Selectivity: (-6 dB/-60 dB):
SSB, CW, AM; 2.7/4.8 kHz (with no optional filters), Width adjusts continuously from 2.7 kHz to 500 Hz (-6 dB)
Options:
SSB nar.; CW wide; 1.8/3.1 kHz with XF-8.2HSN filter
CW nar.; 600/1300 Hz with XF-8.2HC filter
CW nar.; 300/800 Hz with XF-8.2HCN filter
CW nar.; 500/1000 Hz with XF-455C filter
CW nar.; 270/600 Hz with XF-455CN filter
AM; 6/12.4 kHz with XF-8.2GA filter

IF notch depth:
Better than 40 dB

* No reception at 10.33 MHz ($f_{LO1} - f_{LO2}$)
** Optional AM/FM Unit required for AM transmission and FM operation.

Fig. 1– FT-102 specifications.

point for "busy band operators." Incoming signals, along with a first local oscillator signal, are then applied to Q1005 and Q1006, a dual FET balanced mixer. The resultant 8.2 MHz first i.f. signal is then fed to Q2001 and Q2002. All of the previous stages are operated at the 24 volt level for high signal-handling ability.

Following the "externally controlled" gate (D2001 through D2003), signals are applied to ceramic filters and then to the second i.f. (Q2003). The FT-102's supplied filter (XF2001) is 2.9 kHz, 8 poles. Optional filters are 2.9 kHz or 1.8 kHz, 8 poles (s.s.b.); 600 Hz or 300 Hz, 8 poles (c.w.); and 6 kHz, 3 poles (a.m.). I might add that adding the 1.8 kHz and 600 Hz filters here is the key to creating a super FT-102.

Signals are next converted to the second i.f. of 455 kHz (Q2004) and passed through a second filter, CF2001 (455 kHz center, with 2900 Hz bandwidth, 3 poles). Next, it's on to the Q multiplier, notch filter, 455 kHz i.f. amplifier (Q2010), and product detector. Two signals are felt on D3021 through D3024: 455 kHz ± 2900 Hz (audio) from Q2010 and 455.000 kHz from Q3018 (driven from third L.O. in v.f.o. unit). The "difference signal" (300 to 2900 Hz audio) then passes through Q3022, Q3023, Q3019, Q3030, and Q3025 to the speaker.

Now let's use another color pen and trace the s.s.b. transmit path. Signals from the mike proceed through the three amplifiers Q3001, Q3002 (note VOX takeoff), and Q3003. Tunable filters "between" Q3003 and Q3004 tailor audio to personal voices (adjustments underneath the cabinet). Follow the left side line from Q3004 to D3002 through D3005. Here audio and 455 kHz r.f. from Q3017 (and the v.f.o. unit) are applied to this balance modulator. That suppressed carrier double-sideband 455 kHz signal proceeds through Q2005 and CF2001 (attenuate one sideband, giving s.s.b.), on through Q2010, Q2015, and Q2016 to Q2017. This mixer beats the 8.6 MHz second L.O. with 455 kHz, producing an 8.2 MHz signal which proceeds through XF2001 and Q2003 and over to Q1008. This mixer heterodynes 8.2 MHz with the first L.O., producing the desired output frequency. That signal is amplified by Q1007, Q1009, Q1010, the 12 by 7 driver, and the three 6146B's, and applied to the antenna.

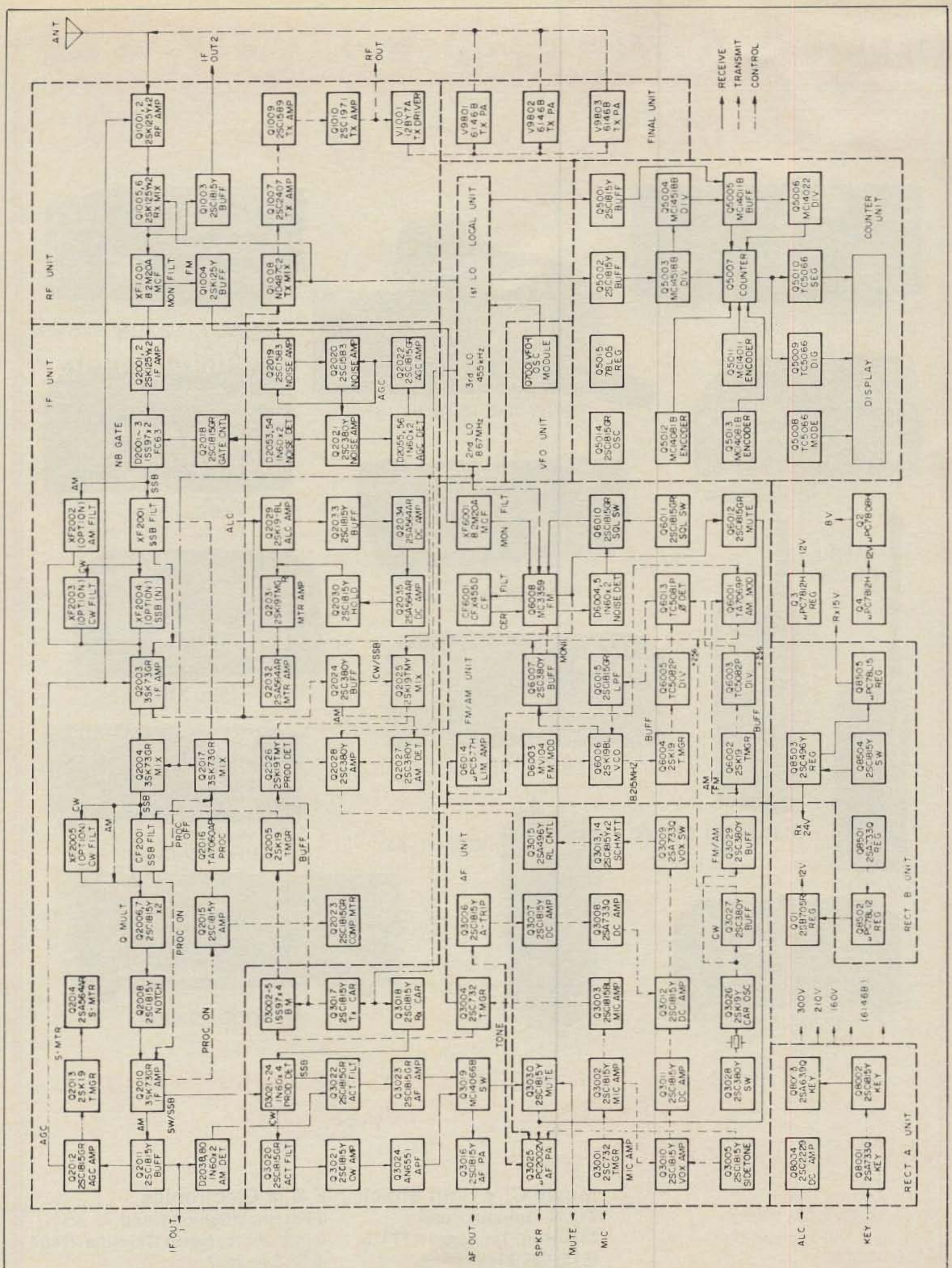

Fig. 2– Block diagram of the Yaesu FT-102. A discussion is presented in the text.

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Giving an overview of the full diagram, right bottom blocks comprise the v.f.o. proper. Beside it are blocks comprising the a.m. and f.m. circuits. Additional support circuitry is "blocked" on the far left and bottom.

Comparing the FT-102's block diagram with those of other transceivers reveals some interesting similarities. The receiver's front end, for example, uses 25K125's—a device used in the TS-830, TS-930, and TS-430. The 3SK73's (Q2003, Q2004) were also used in this configuration in the TS-830. The FT-102 noise blanker's gating (D2001 through D2003) is similar to that of the other rigs, but its control and detectors are a mite new. All aspects considered, the rig seems relatively straightforward and reasonably traditional rather than strangely new in design. Armed with a color-coded and simplified block diagram (as we've just done), few difficult problems should be encountered in the future.

Operating the FT-102

The FT-102 is quite enjoyable to operate from several standpoints. Amateurs consistently compliment the transmitter's audio quality, while ample talk power is available for driving larger amplifiers to maximum output. Likewise, the independent controls provide the capability of handling a wide variety of operating conditions.

The receiver's on-the-air sensitivity and selectivity are comparable to other top-of-the-line competitive rigs, and the r.f. amplifier may be left off during normal activities on 160 through 30 meters. As previously mentioned, the optional 1.8 kHz s.s.b. and 600 Hz c.w. filter are definitely worth their cost when adjacent frequency interference mounts. The i.f. width and shift controls are useful for tailoring received audio and attenuating minor QRM, but that's about all. These two controls, incidentally, are independently adjustable, but also friction-track with a single knob. In other words, the bandwidth can be changed as desired, and the resultant i.f. center can be moved across the bandpass. The separate bandpass filters still perform better. The noise blanker is only fair in reducing power-line noises; I would classify it between that of an FT-901 and an Icom 740 or TS-830. The blanker provides slight "woodpecker" attenuation, however. Since a monitor LED isn't included for the notch filter or audio peak filter, we continuously forget to switch them out after use—a minor point, I'm sure. These circuits, incidentally, can be used for either c.w. or s.s.b. operations.

The a.l.c hold circuit is quite useful for precise setting of the mike gain. The other panel meter can be used simultaneously for setting the speech processor's level. The end result is a very accurately set level.

Our first contacts with the FT-102 barefoot included UA0, 3B8, and VK7 on 20 meters s.s.b. Switching to 15 meters, we worked GI's and DL's on the first calls. The rig definitely gets out! At times our trusted old wattmeter indicated average s.s.b. levels approaching our smaller 100 watt rig and kw amplifier (when used without a processor). I haven't tried the FT-102 with that amplifier. It would probably overdrive it significantly.

The FV-102DM External V.F.O.

This optional item adds a completely different character to the FT-102, and must be experienced to be appreciated. In addition to functioning as a regular second v.f.o., it contains 12 programmable memories, scanning at two rates, and direct frequency entry (to dial or memory) via a front keypad. Memory-stored frequencies may be used as fixed frequencies (no tuning) or as separate tuned v.f.o.'s (store one frequency, tune to a new frequency, switch to v.f.o.'s, etc., and then return to the new frequency in memory). The clarifier button can also be used with the **M-VFO** button for quick memory checks without interrupting dial settings or QSO's. Actually, the FV-102DM's capabilities are almost unlimited. Operators heavily into contesting will love the many functions, the frequency control mixing, and rapid check capabilities. It's great!

Summary

The FT-102 transceiver is a very good rig in the tube final category, filling a need expressed by many old-time and/or full-duty-cycle operators. The number of controllable variables and the wide s.s.b. bandpass provide often sought audio quality that is lost with many rigs. The optional 1.8 kHz filter, however, can change the unit to a DX machine quite easily.

Some amateurs prefer single v.f.o.'s, tuned finals, and calm operating. Others prefer multiple v.f.o.'s and numerous bells and whistles. Study your own particular situation, and then consider the FT-102. Might this be the rig of your dreams? You're the most logical one to answer that question.

The retail price of the FT-102 is $1149.00; FV-102DM external v.f.o. is $329.95; XF-8.2HSN 1.8 kHz filter is $40.00; and XF-8.2HC 600 Hz filter is $40.00. For more information, contact Yaesu Electronics Corp., P.O. Box 49, Paramount, CA 20723. CQ

Russian shown in this article has not been spelt correctly and this has been done deliberately in order that the pronunciation could be taken literally straight from the text. The other reason why this has been done is that when consulting the various Russian/English guides that are available, it has been found that if the Russian phrases in general as printed in these books are not understood by European Russians, they perhaps were intended for confusion rather than assistance.

Russian For English-Speaking Radio Amateurs

BY IAN FOSTER*, VK3ST

I read the following article in the December 1983 issue of Amateur Radio, *the journal of the Wireless Institute of Australia. It drew my attention, and I thought that CQ readers might also find it interesting and useful. I would like to thank the Institute and* Amateur Radio*'s Editor, Gil Sones, VK3AUI, for their kind permission to use the article in* CQ. *—K2EEK*

The following phrases will be sufficient to at least allow a very simple contact to be realised, and it is certainly not intended as a guide for the experienced linguist or Russian language expert.

It should be remembered that if a contact is to be attempted, one must speak slowly, as the *accents* are worlds apart, let alone the languages. In general I have found nearly all Russian speaking people only too willing to assist in respect of language difficulties, provided, of course, that they know what is required of them. Remember, most of the English speaking Russians have a limited English vocabulary and also have difficulty in understanding if you speak too fast.

From January to May 1983, I had over 400 contacts with stations in European Russia and at least 200 of those contacts were all in the Russian language. I might add that I only started to learn the Russian required to establish contact in January and for a person who was a very poor French scholar many years ago in school, I have found it to be a very rewarding and challenging exercise.

The Russian alphabet is quite different from our own, as are various vowel groups, and any of the phrases shown in this article are shown purely for pronunciation. Any attempt to write Russian, using the methods shown here, to a Russian speaking person will quite probably send the recipient into peals of uncontrollable laughter. If you would like to write in Russian, then I suggest a more serious look at appropriate courses on the subject, as this is not the intent of this article.

*Box 77, Bairnsdale, Victoria 3875, Australia

First, The Russian Phonetic Alphabet

A—ÁNNA	N—NICKOLÍ
B—BORÍS	P—PARVÍL
C—CENTRÁLI	Q—SHÓOGAR*
D—DÍMA	R—ROMÁN
E—ELÉNA	S—SÉGAY
F—FÉEDER	T—TAKYÁNA
G—GRIGÓRY	U—OOLYÁRNA
H—HARITON	V—ZOOK
I—IVÁN	W—VASÍLY
J—IVÁN KROSKY	X—ZNÁK
K—KÓSTYA	Y—EEGRÉK
L—LÚBA	Z—ZÉENA
M—MARÍA	

´Accent
*Liable to be confused with "Sugar" for S

Russian Numbers

0—NULL	8—VÓSYEM
1—ODÍN	9—DYÉVIT
2—DVA	10—DYÉSIT
3—TREE	15—PITNÁTSAT
4—CHITÉRYA	20—DVÁTSAT
5—PYAT	30—TRÍDSAT
6—SHEST	100—STO
7—SYÉ-EM	

73—SYE-ÉM DYÉSIT TREE

The following is a typical very short QSO between VK3ST and UK9ACP. The English will be first to give the guide followed by the "Russian" to be spoken. For the sake of brevity, only the transmission from VK3ST is given, and responses will be able to be gauged with practice and usage.

QRZ . . . Who is calling me?
KTO MENYÁ PRIZIVÁYET?

("QRZ" works just as well)

Thank you, UK9ACP this is VK3ST
SPASÍBA UNIFORM KILO DYÉVIT
ALPHA CHARLIE POPPA YA VICTOR
KILO TREE SIERRA TANGO

(International Phonetics Preferred)

Good morning—DÓBRI ÓOTRA
Good afternoon—DÓBRI DÉEN
Good evening—DÓBRI VYÉCHER

My name is Ian
MANYA ZOVÓOT IAN (spell phonetically)
(INDIA ALPHA NOVEMBER)

Your signals are 5 9
VASH SIGNÁL PYAT DYÉVIT

My city/town is . . . . . .
MOY GÓOROD . . . . . .

My transceiver is a Drake TR7 and my antenna is a four element yagi
MOY TRÁNSCEIVER, DRAKE TAKYÁNA ROMÁN SYÉ-EM, MOY ANTÉNNA CHITÉRYE ELEMÉNTA YÁGI

UK9ACP this is VK3ST over
OOLYÁRNA KÓSTYA DYÉVIT ÁNNA CENTRÁLI PARVÍL YA ZOOK KÓSTYA TREE SÉGAY TAKYÁNA, PRIÓN

Listen to the reply and with care you should be able to piece together the response using the information already given.

UK9ACP this is VK3ST, thank you my friend Gene, excellent
OOLYÁRNA KÓSTYA DYÉVIT ÁNNA CENTRÁLI PARVÍL YA ZOOK KÓSTYA TREE SÉGAY TAKYÁNA. SPASÍBA MY DRÓOK GENE, PRIKRÁSNA

Thank you for the signals (report) 5 9
SPASĪBA ZA SIGNĀL PYAT DYĒVIT

Thank you my friend Gene for the beaut contact
MOY DROOK GENE, SPASĪBA ZA HORŌSIA SE-ĀZ

I will QSL 100% via the bureau to Moscow
QSL STO PROSYĒNTOV BUREAU MOSKVA

Until we meet again on the air, good luck to you my friend
DO-NŌV-OY VSTRĒTCHIE VA VĒERIE, VSYEVŌ VAM DŌBROVŌ MOY DROOK

SYĒ-EM DYĒSIT TREE

UK9ACP is is VK3ST. Goodbye, thank you (very much)
OOLYĀRNA KŌSTYA DYĒVIT ĀNNA CENTRĀLI PARVĪL YA ZOOK KŌSTYA TREE SĒGAY TAKYĀNA. DOS-VID-ĀNIA. SPASĪBA. (BOLSHYŌYE)

The above should be enough to get you through a very basic QSO, and remember that most Russians speak a limited amount of English, so don't be afraid to change language if you lose track, can't understand, or want to know/respond to some other comment. Some other useful phrases that may help are:

How do you say in Russian the word (or phrase) "EAST"?

KAK BŌODET PARÚSKI "EAST" (last word is English for translation or KAK PA-RÚSSKI SLOV "EAST"?

Good
HOR-OSHA-YŌ (HOROSHŌ)

I am sorry
YA Ō-CHEN SOZ-OLÁYOO

What is your callsign?
KAKOYÍ VASH POZNÍVOY?

Please
PAZHÁOOSTA

Please give me your name? (QTH)
PAZHÁOOSTA DAÍTYE SNÓWA VASH ÍMYA? (GÓOROD)

Repeat your name? (QTH)
POV-TOR-ÍTA SNÓWA VASH ÍMYA? (GÓOROD)

Thank you very much my friend
BOLSHÓYE SPASÍBA MOY DROOK

I hope to see you again
YA NAD-E-YÓOS RAZ-GOV-ÁRIVAT SVÁMI SNÓWA

I—YA . . . Yes—DA . . . No—NIET . . . Friends (plural)—DROOZ-YÁ . . . If speaking to a lady, one should say "MOYÁ PADRÓOGA" My friend

The temperature is 20 degrees (above freezing)
DVÁTSAD GRA-DÚSAF (TIPLÁ) or TEMPERATOŌRA DVÁDSAT GRADOŌSOF

Today is good weather
SIVŌD-NYA HOR-ŌSHO-YA PA-GŌ-DA

Today it is
SIVŌD-NYA (Warm) TIPLO . . . (Very hot) ŌCHEN ZHÁRKO . . . (Hot) ZSÁRKO . . . (Cool) PRA-KHLÁDNA . . . (cold) KHOLŌDNA

Please speak slowly
PASZÁLSTA GAVA-RÍ-TYE M-YED-LYÉNNA

I do not understand you
YA NYE PANI-MÁYU VAS

To those of you who are willing to give it a go, I am sure that you will find that contrary to popular belief, learning to use a language can be very satisfying and will certainly put some value on those QSL cards that are received via Box 88 in Moscow.

In conclusion, I would like to thank Gene Shcumat, UA9AAP, and the many other Russian speaking amateurs who have assisted me during my initial learning period. I feel that a special bond grows and develops between those who try to help others, and this should be encouraged wherever and whenever possible. Remember that we are in a specialized area that involves communication and communicating. Let us get out there and communicate and learn from one another.

VK3AUI's Note

Thanks are due to R. Hancock, VK5AFZ, for checking and, where necessary, correcting a few phonetic equivalents and also for the following notes.

Use of the Russian phonetic alphabet is not really necessary, as all Russian amateurs are familiar with the International Phonetic Alphabet. However, the Russian system is used to a greater extent between Russians themselves, so it is handy to know if you want to "eavesdrop" on USSR stations. Personally I would advocate that everyone uses the International Phonetics on all occasions for the sake of uniformity and to avoid confusion. CQ

It looks like a beam. It's shaped like a beam. However, there's something about white aluminum tubing that looks funny. It should, as you'll find out when you read N4HCR's novel approach to element design.

A Cheap, Easy-To-Build 10 Meter Beam

BY WAYNE RASH, JR.*, N4HCR

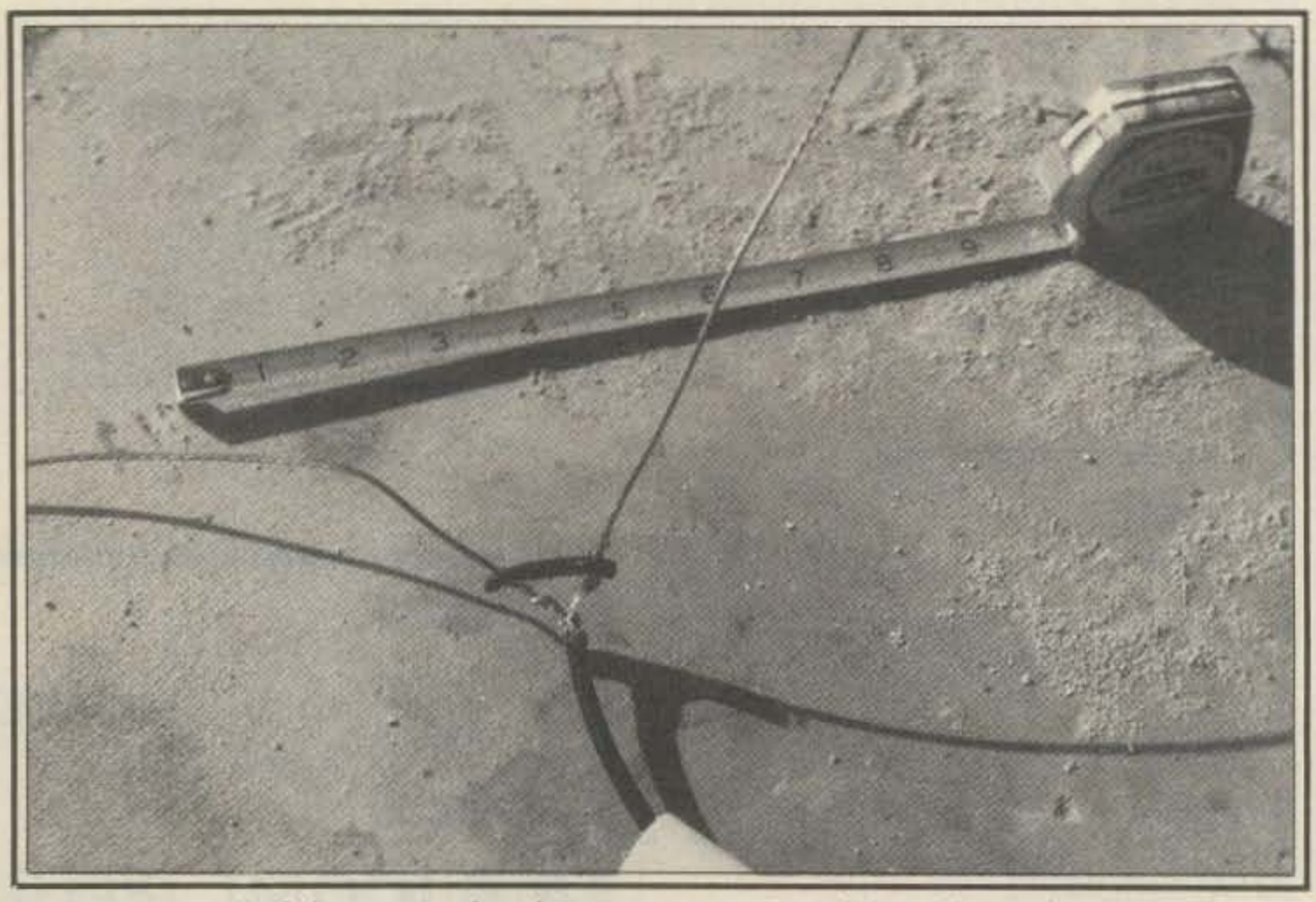
My renewed interest in the 10 meter band coincided with the beginning of the decline in 10 meter activity. Just about the time when I really began to enjoy the band, it became obvious that I was going to have to get a beam of some sort to continue using it. No longer was I going to be able to work the world with my vertical on 10 meters.

Unfortunately, the future level of 10 meter propagation closely matched my budget for a new beam this year. For that reason I set out to build an operable beam for less than $10. Well, I didn't quite make that goal, but I did come out spending less than $15.

Since I lived at the time in Florida, less than a half mile from the ocean, the antenna had to be able to withstand a fair amount of corrosion from salt spray. In addition, it had to be light enough to be rotated by a television antenna rotator, since that was what was available. It made little sense to spend $15 on the antenna and $150 on the rotator. Of course, the antenna also had to be cheap.

The answer to all of the requirements was to build the antenna out of plastic. Since plastic antennas are not known for their performance on 10 meters, I put a copper conductor inside the plastic where it would be protected from the weather but would still act as the actual radiator.

The antenna is a two-element Yagi using dimensions from the ARRL *Antenna Book*. The boom is constructed using ¾ inch schedule 40 PVC water pipe. The inner portions of the driven elements are ½ inch schedule 40 PVC water pipe. The outer portions of the driven elements are ½ inch CPVC water pipe. Inside the pipes the radiators were made of braided antenna wire similar to that available from Radio Shack.



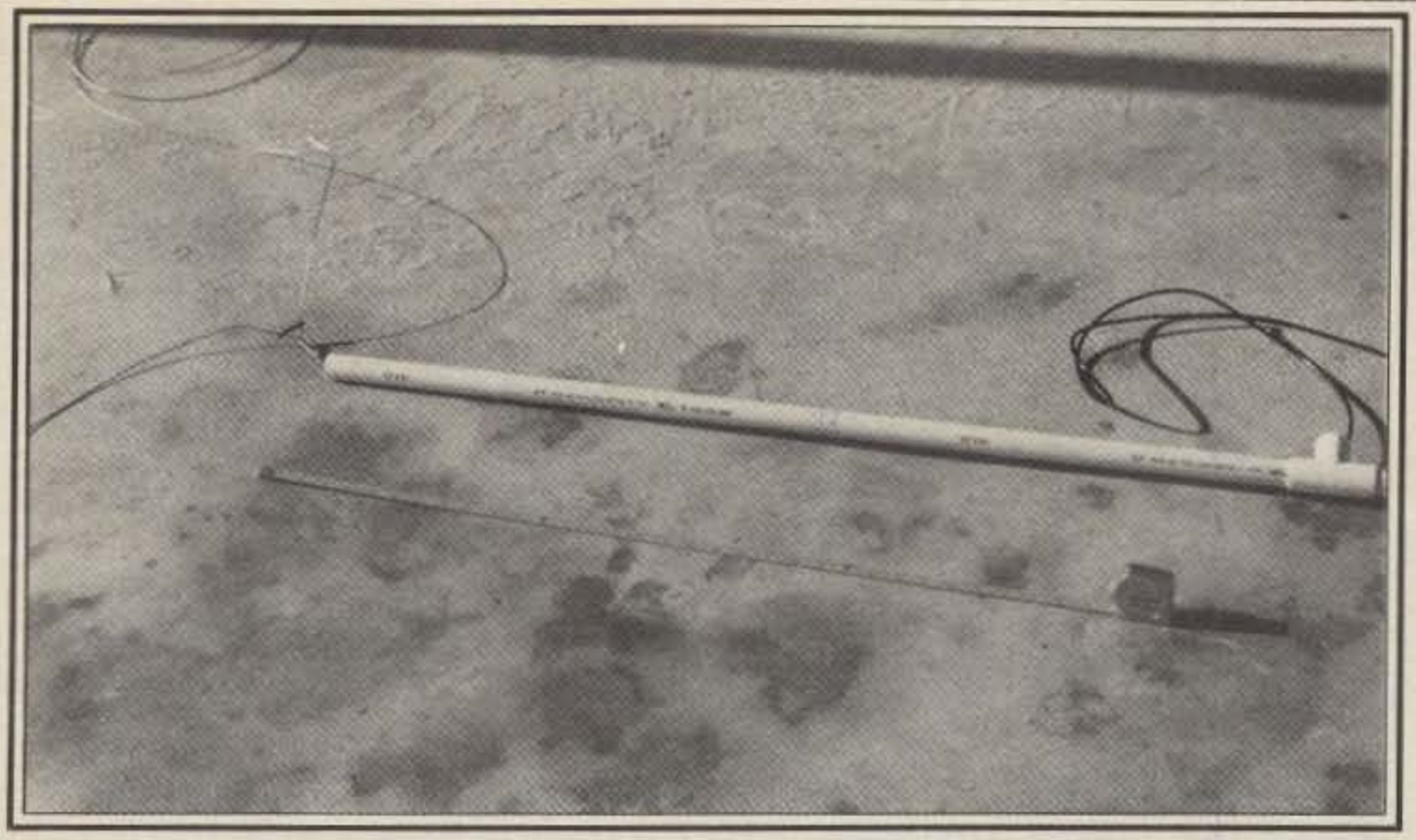
Detail of the center-insulator construction of the driven element.

Selection of the materials is fairly important, since use of a lighter PVC pipe will yield an antenna that is not strong enough to hold itself up, and the use of a heavier pipe will cost more and weigh more. Most of the weight is supported by the boom, and for that reason I used the ¾ inch pipe. In addition, fittings for reducing the diameter from the ¾ inch pipe to the ½ inch pipe for the elements are not readily available for other sizes, as far as I could determine.

Once you have gathered the proper materials, construction is fairly simple. Begin by cutting the two 10 foot sections of ½ inch schedule 40 tubing in half to form four sections each 5 feet long. Use a sharp knife or rasp to trim the rough edges at the ends, since you will be fitting the smaller CPVC pipe in one end later. Two pieces of the ¾ inch tubing should be cut, each measuring about 38 inches long, and then trimmed as above.

Locate the ¾ inch "T" fitting and one of the two ½" × ¾" "T" fittings. Using PVC cement, glue one end of a 38 inch

*4465 Wrangell Place, Columbus, OH 43230



Here the driven element is completed and is ready to be pulled through the pipe for final installation.

section of ¾ inch pipe into the ¾ inch "T." On the other end of the same piece of pipe glue one of the ½ × ¾ "T" fittings, making sure to orient the fitting 90 degrees from the other, so that your polarization will be horizontal.

After the glue has had a chance to dry, thread the RG-58 coaxial cable through one of the "T" fittings, through the 38 inch pipe, and out the other "T" fitting. Remove a 1 inch section of outer insulation from the cable at the end nearest the ¾ × ½ inch "T" fitting. Save this piece of insulation. Unbraid the shield of the cable enough so that it can be twisted together at one side of the cable, and then remove ½ inch of insulation from the center conductor.

Your next step will be to form a dipole antenna which will become the driven element of your beam. Cut two pieces of antenna wire each about 8½ feet long. Attach one of the pieces to the center conductor of the coaxial cable you just prepared and solder it in place. Likewise, attach one end of the other piece of antenna wire to the shield of the coaxial cable and solder it in place.

The center insulator will be prepared using the insulation from the cable you saved earlier. Using a pocketknife or similar sharp object, make a hole in the side of the piece of insulation at each end. Push the free ends of the antenna wire through the holes, and slide the insulator down the wires until you reach the coaxial cable.

Now that you have completed wiring the driven element, pull the coaxial cable back through the boom until the center insulator is inside the ½" × ¾" "T" fitting. Pull one end of the driven element through each side of the ½ inch openings in the "T" fitting. Locate two of the 5 foot sections of schedule 40 ½ inch PVC pipe. Making sure the wires for the driven element go through the center of the pipes, fit one end of each pipe into the ½ inch section of the "T" fitting and cement these in place. There will be a little over 3 feet of wire hanging from the ends of the elements at this point. This will be inside the CPVC pipe, or will be cut off when you adjust the antenna to frequency.

At this point you have the option of making the other element either a director or a reflector. I chose to make a direc-

No-33-34

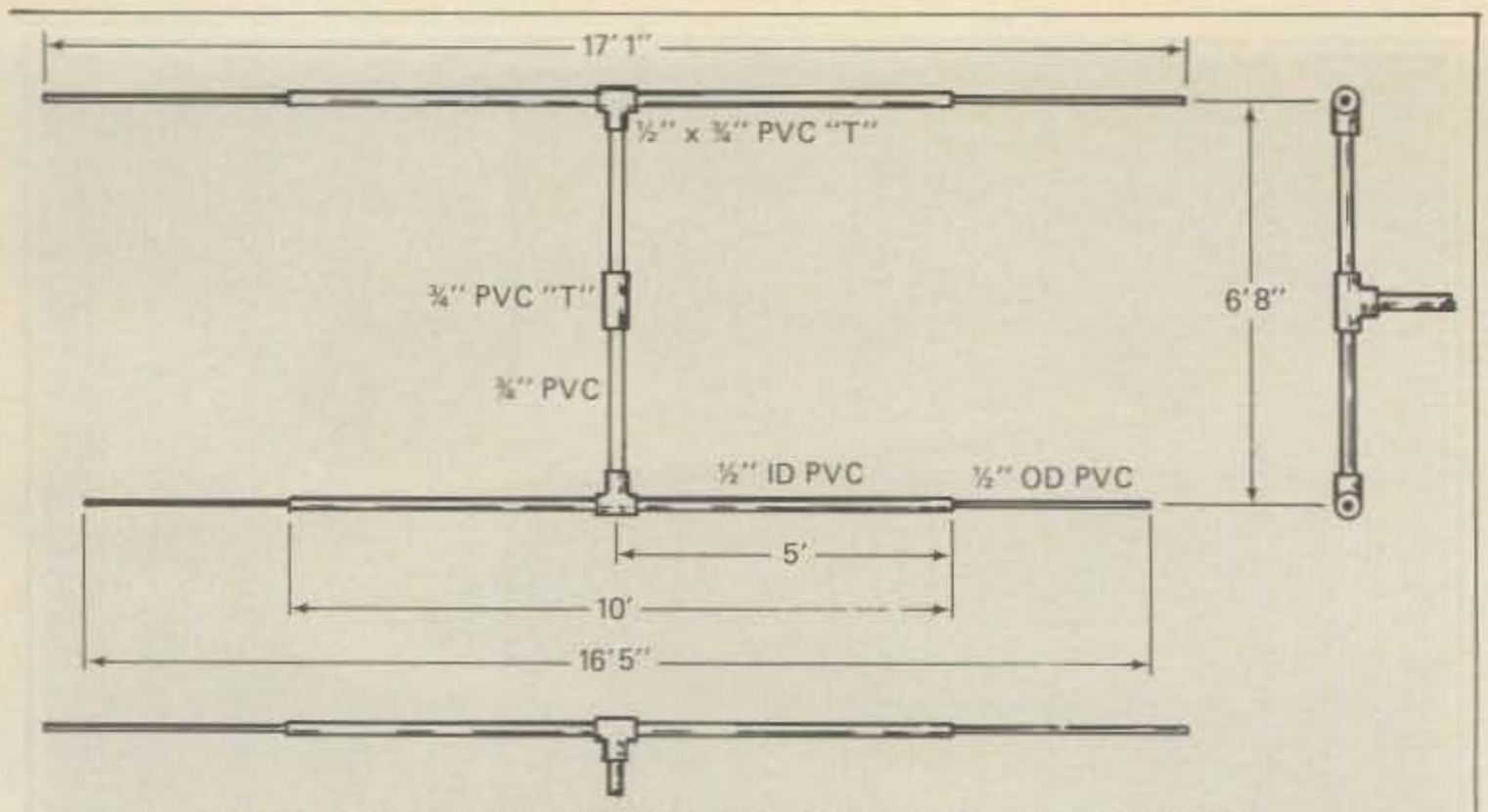
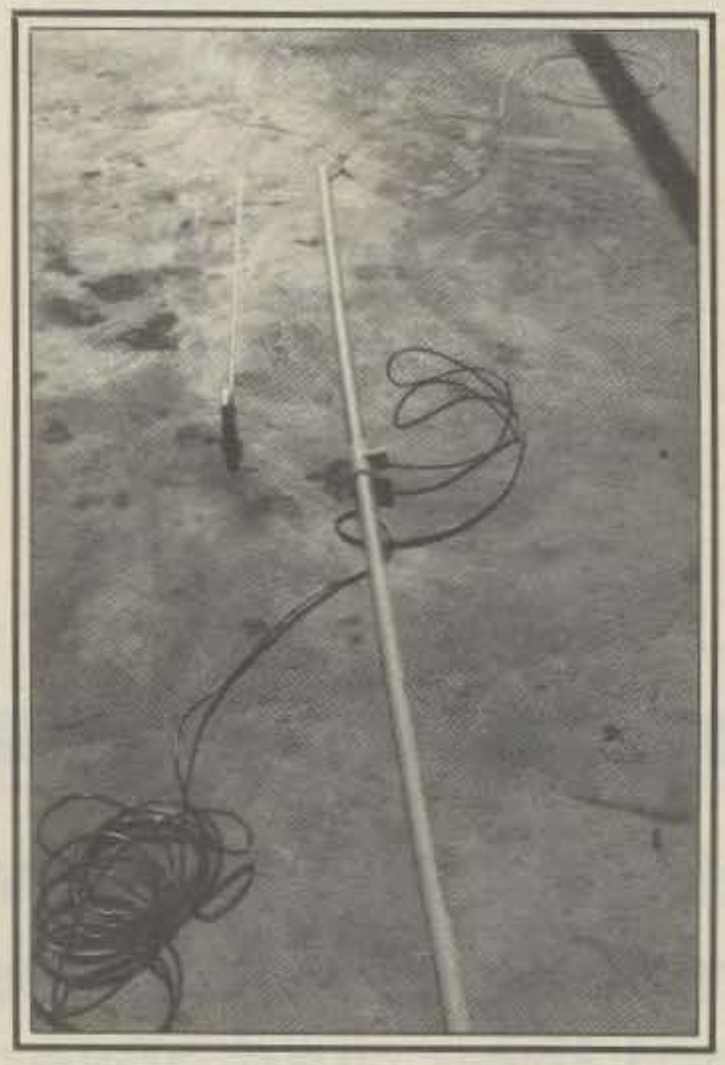


Fig. 1– Overall dimensions for the 2 element, 10 meter beam.



The driven element is installed in the pipe and is ready for final assembly.

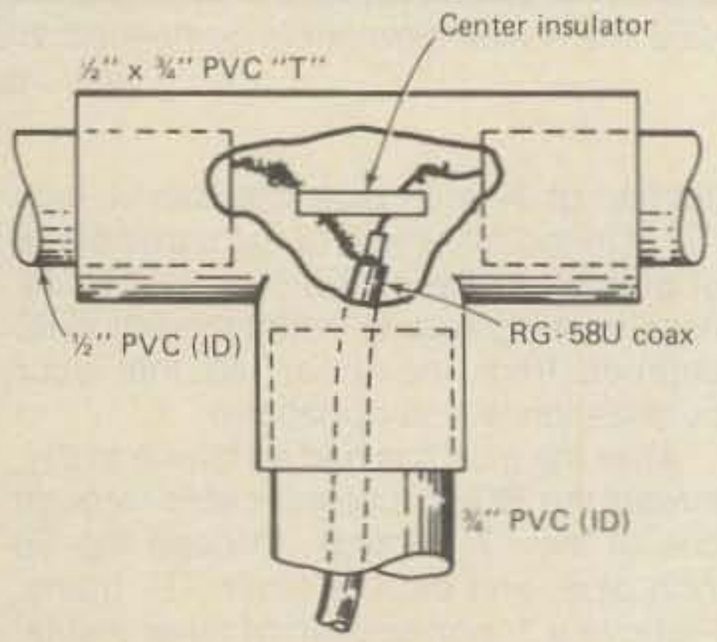


Fig. 2– Details of the ½" × ¾" PVC "T" fitting.

tor, because of the slightly shorter length required. Again, I used the measurement from the ARRL *Antenna Book* and cut a single piece of antenna wire 15 feet 10 inches long. This will go inside a structure similar to the driven element.

To form the structure for the director, cement the remaining 38 inch long piece of ¾ inch pipe into the remaining ½" × ¾" "T" fitting. Locate the other two 5 foot sections of ½ inch PVC pipe and cement these to the same "T" fitting. After the glue has a chance to dry, cement the whole assembly to the driven-element assembly, making sure that the director is parallel to the driven element. Following this, slide the antenna wire that you cut earlier through the director assembly. You should have about 3 feet of wire hanging from each end of the director.

You are now ready to cut the driven element to length. Place the antenna assembly on top of a piece of mast, or as I did, on a tall stepladder, and connect the other end to your transmitter via an s.w.r. bridge. Carefully cut the antenna to length at the center of your favorite portion of the 10 meter band. I recommend that you remove no more than an inch or so at a time while doing this. I found that I had a 1.1 to 1 standing-wave ratio at 29.6 MHz after I finished cutting the antenna to length. I should add that the plastic pipe does not appear to significantly change the length of the antenna, despite predictions to the contrary. According to the *Antenna Book*, the driven element of a Yagi antenna should be 16 feet 5 inches long at that frequency, while on my antenna the actual measurement was only about 2 inches shorter. I also reduced the length of the director about 2 inches.

The ends of the elements are made of sections of CPVC tubing about 3½ feet long. Since the outside diameter is ½ inch, it will fit tightly into the inner sections of the elements, although depending on the individual piece of tubing, some filing may be required. The exact length of the tubing depends on the length of the wire that has to go through it, so measure carefully before you cut. Use PVC cement to glue each of the element ends in place. Complete the elements by cementing caps on the end of each one.

Attaching the completed antenna to a

Parts List

Item	Quantity	Price
¾ inch PVC Schedule 40 Water Pipe	10 ft.	$2.85
½ inch PVC Schedule 40 Water Pipe	20 ft.	$4.20
½ inch CPVC Water Pipe	15 ft.	$1.85
½" × ¾" "T" fittings	2	$ .48
¾ inch "T" fitting	1	$ .24
½ inch CPVC End Caps	4	$ .44
PVC Cement	2 oz.	$ .95
RG-58 Coaxial Cable	10 ft.	$1.60
Stranded antenna wire	33 ft.	$2.25

The plastic pipe and assorted fittings can be found at most building supply houses, or for slightly more money at some department stores, such as K-Mart. The wire and cable can be found at electronics suppliers, or at Radio Shack. If you purchase your pipe at K-Mart and your wire at Radio Shack, you could possibly spend nearly $20 for the antenna—still a cheap 10 meter beam by most standards.

The completed beam antenna is installed on the N4HCR combination amateur radio tower/swing set for preliminary tests.

mast may be done in several ways. The easiest way is to use the remaining 3 feet or so of the ¾ inch PVC pipe and attach it to the "T" fitting in the center of the antenna. This then may be inserted into the end of a section of mast and held tightly by a clamp, or attached directly to the rotator. The coaxial cable will extend down the center of the mast in this case and may be accessed at the rotator.

I have found that this antenna to be effective in actual use. While it will never perform like a five-element commercially manufactured antenna, it doesn't cost as much as one either. In informal tests carried out with the cooperation of local amateurs, I have noticed a substantial increase in my transmitted signal strength at their location. In addition, the received signal strength shows a similar improvement. In each case the difference is about five "S" units at either end. The difference over longer distances is slightly less, since the difference between horizontal and vertical polarization is less pronounced, but the improvement is still substantial.

Mechanical strength is also important to any antenna that must be placed outside on a mast. The first six months that this antenna was used it proved the equal of frequent Florida thunderstorms and high winds. The elements are fairly flexible, but this does not seem to affect their ability to withstand weather.

There are some compromises in this antenna, but for the most part performance is not seriously affected. The lack of a balun is the most notable compromise. The pattern of the antenna is probably distorted by the lack of a balun, but so far it has not been a handicap. To have added one would have increased the cost, and would have required a different type of construction.

I welcome comments and questions regarding this project. However, I can only promise an answer if the question is accompanied by a self-addressed, stamped envelope. CQ

1983 CQ WW DX C.W. Contest
High Claimed Scores

The following are C.W. high-claimed scores as of February 1, 1984. These are raw scores only, subject to verification.

USA
Single Operator
All Band

W1KM	2,702,817
W2REH	2,406,804
K1AR	2,374,344
N2LT	2,201,625
W3GRF	2,042,880
K1TD	2,040,300
N5AU	1,972,048
W4RX	1,877,837
K2VV	1,872,582
N6QR	1,696,662
N2FB/3	1,603,980
K4VX/Ø	1,578,260
W2VJN	1,550,060
N3AD	1,544,634
K9DX	1,506,505
K4RZ	1,461,575
W3XU	1,346,616
K1XA	1,312,934
K2RD	1,250,762
W7IR	1,172,592
N5JJ	1,108,485
K1EA	1,090,575
N8II	1,028,040

28 MHz

KZ5M	37,345
WA6FGV	23,394
W4ORT	19,728
K1UO	16,388
KØKX	13,725
KA8NUV	8,200
W6GMZ/3	4,400

21 MHz

N4WW	380,424
NA5R	348,066
K1ZX	274,040
W6YA	226,200
W5VX	217,160
WB4TDH	190,592
N4VZ	184,576
N4ZZ	165,600
WØYK	133,860

14 MHz

WØZV	412,416
W8TA	346,622
N5CR	315,980
WB8JBM	308,085
W1IHN	303,232
N9NC	275,443
K9PPY	245,641
W5FO	223,695
W4AAV	216,000
KI2P	203,962
W6BH	197,456

7 MHz

W6AM	270,249
K1KI	262,680
K4XS	230,139
K1BW	171,392
N3BJ	146,327
K5RX	141,588
N4UA	114,712
K7UR	112,008
K1VR	111,222
N8RA	104,967

3.5 MHz

W1FV	83,729
W9LT	37,062
N7RM	26,376
WA8DXB	24,817
KA5W	22,490
N4MO	21,681
W8LNO	20,596
N2AU	20,216

1.8 MHz

K1ZM	15,677
AA1K	15,006
W8LRL	12,996
K5UR	10,835
K1NA	9,306
N6DX	7,686

Multi-Single

K1GQ	3,712,412
W3BGN	2,919,478
W4NL	2,704,248
N3BB	2,502,864
K2BU	2,085,424
WA7NIN	1,878,755
N2RM	1,767,676
KS8S	1,702,176
K2GHV	1,682,230
K1YR	1,456,248
N6VV	1,388,306
N4KG	1,258,650
N6MG	1,146,504
K4CEF	1,123,584
W6TMD	1,117,830
NB6G	1,078,446
K9RF	1,038,608
N3LR	1,022,250

Multi-Multi

KN3O	6,595,512
W3LPL	5,357,664
K6UA	4,618,170
N9MM	4,275,270
W3GM	3,510,500
K5LZO	3,425,861
K1RX	2,781,475
K3ZUF	2,507,618
N6TU	2,446,732
WØAIH/9	2,417,435
K6RU	2,337,750
AA6T	2,136,816
N6RO	1,993,620
K1XM	1,154,198

QRP

KZ2E	345,321
K8IA	273,408
K3WS	88,810
WR4K	50,172
AA2Z/1	41,293
WØRSP	36,261
N7FLF	30,586

DX
Single Operator
All Band

9Y4VT	7,153,434
NP4A	6,027,752
ZS1CT	5,549,304
OH2MM/EA8	4,923,660
KV4FZ	4,917,768
CT3BQ	4,708,626
4V2C	3,113,226
N6XI/4X	3,109,722
VP2MEV	2,156,454
VE7WJ	2,076,000
VP2KBZ	2,070,396
4ZØDX	2,017,355
ZF2HF	1,982,396
HK3NBB	1,944,162
UA9SAX	1,814,424
UB5EC	1,780,680
I4IND	1,587,900
JI1QPU	1,525,658
FOØJO	1,493,152
F2CZQ	1,431,565
UF6FER	1,342,750
OK2FD	1,308,438
KC7UU/5N6	1,159,350
YCØVM	1,127,705
VK9NL	1,093,542
HH2CQ	1,077,020
UA9SBM	1,062,742
YU3EA	1,043,280
G4BUO	1,034,208
UB5ILO	1,010,808

28 MHz

C51T	290,472
N4TO/KP4	232,845
CT1BOL	116,510
YV7QP	106,812
VK4XA	65,559
YV3BNJ	48,960
G3UKS	44,233
JH1RNZ	43,344
YU3TXU	36,248
DJ5PA	29,281
UA9SEU	24,750
UB5ZCW	23,305
CT1AIU	21,797

21 MHz

YX5A	899,151
5Z4MX	820,338
CX5AO	691,515
YZ4GD	675,414
ADØO/VP9	395,520
JY8KV	364,344
LU4FDM	326,025
G3HCT	208,620
YU1DW	199,410
4D1RU	185,185
UJ8JAS	178,542
G4FAM	174,758
SVØCT/SV5	149,877
UA3AMB	146,013
UJ8JDR	144,210
JF2EZA	127,450

14 MHz

PY4OD	780,626
YW5R	756,756
OF8AV	583,080
KD7P/KH2	574,332
EA2IA	435,375
UF6FFF	358,722
JA1BWA	347,936
UP2NK	332,640
TR8JLD	325,844
VP2EAG	311,310
G4CNY	279,756
UA9ADQ	276,996
JR1RNC	272,280
UA6HFO	268,088
UR2REE	267,561
JG1NBD	258,335
C53V	246,753
YU2AW	246,078
JA6GIJ	244,400
JA1HGY	229,584
JI2NEM	218,360
OH6EI	213,802
FO8JP	205,200

7 MHz

VP2KAA	837,366
VP2EEW	562,080
UB5JMR	450,708
LU8DQ	438,783
VE3BMV	361,845
EA7TL/9	354,308
EA8RL	329,080
UA1DZ	317,800
4O4A	299,169
YT3M	292,342
JM1RFT	288,090
ZL1AMO	279,672
UQ2GDQ	277,211
OH8SR	275,724
YU4WE	235,600
DK8NG	208,260
SM2EKM	198,880
JA1RWI	174,400
UB5UCR	149,330
UAØSGN	143,964

3.5 MHz

VP2KAC	358,915
EA9EU	229,150
UV9AX	173,445
UA4PCI	151,606
HA8KQX	151,008
UL7LCZ	140,630
4M3AGT	135,864
YU3VM	126,000
OH6TI	121,408
I4EAT	118,524
UY5OO	115,632
HC1SK	107,942

1.8 MHz

UP2BBT/U6V	83,160
PAØHIP	45,066
G3SZA	40,887
YU3EF	39,000
YU4CF	37,752
4X4NJ	34,200
G3XWZ/A	33,088
UA9ADY	31,038
DL1YD	30,290
UB5ZAL	23,880
UA9CBO	21,042
UC2AA	18,700
OH3JR	17,649
OZ1W	17,014
YV2IF	16,728
UA3PFN	15,860
OK2BWM	15,000

Multi-Single

HH2VP	7,226,122
RF6V	6,326,963
V3A	4,947,600
5H3WCY	4,204,032
NP4Z	4,029,705
RVØWCY	3,817,377
OK1KPU	3,501,498
HG5A	3,268,350
RV9WCY	3,152,843
HG6N	3,129,540
OHØBH	2,827,361
CX7CO	2,757,552
OK7AA	2,740,572
RV4WCY	2,711,790
GD4UFB	2,600,780
UK2RDX	2,478,112
UK2FAA	2,461,888
RL7WCY	2,459,040
UK9FER	2,347,576
RT5WCY	2,234,947
AI6V/KH6	2,055,944
GJ3SXW	2,014,524

Multi-Multi

RW9A	8,467,476
XE2SI	7,898,814
YT3A	7,220,223
JA3YKA	4,692,792
DLØKF	4,060,628
OH1AA	3,487,000
JA3ZRT	3,390,000
HZ1AB	3,120,307
JA3YKC	3,066,750
VE3PCA	2,493,424
JA3YBF	2,455,916
KL7Y	2,361,594

QRP

UB5UCJ	416,939
DF4RD	232,674
UB5AAL	207,603
UA3AGW	101,871
SM5CCT	92,700
DL9CE	73,805
JA7AS	66,148
UP2BFC	53,856
OK1DKR	53,605
F9YZ	52,704

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The world of CW, RTTY, and new DUAL AMTOR is as close as your fingertips with the new brilliantly innovative state-of-the-art microcomputer controlled* EXL-5000E.

Automatic Sender/Receiver: Due to the most up to date computer technology, just a console and keyboard can accomplish complete automatic send/receive of Morse Code (CW), Baudot Code (RTTY), ASCII Code (RTTY) and new ARQ/FEC (AMTOR).
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Characters: Alphabet, Figures, Symbols, Special Characters, Kana.
Built-in Monitor: 5" high resolution, delayed persistence green monitor — provides sharp clear image with no jiggle or jitter even under fluorescent lighting. Also has a provision for composite video signal output.
Time Clock: Displays Month, Date, Hour and Minute on the screen.
Time/Transmission/Receiving Feature: The built-in timer enables completely automatic TX/RX without operator's attendance.
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Large Capacity Display Memory: Covers up to 1,280 characters. Screen Format contains 40 characters x 16 lines x 2 pages.
Screen Display Type-Ahead Buffer Memory: A 160-character buffer memory is displayed on the lower part of the screen. The characters move to the left erasing one by one as soon as they are transmitted. Messages can be written during the receiving state for transmission with battery back-up memory or SEND function.
Function Display System: Each function (mode, channel number, speed, etc.) is displayed on the screen.
Printer Interface: Centronics Para Compatible interface enables easy connection of a low-cost dot printer for hard copy.
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Pre-load Function: The buffer memory can store the messages written from the keyboard instead of sending them immediately. The stored messages can be sent with a keyboard command.
"RUB-OUT" Function: You can correct mistakes while writing messages in the buffer memory. Misspellings can also be erased while the information is still in the buffer memory.
Automatic CR/LF: While transmitting, CR/LF automatically sent every 64, 72 or 80 characters.
WORD MODE operation: Characters can be transmitted by word groupings, not every character, from the buffer memory with keyboard instruction.
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Cursor Control Function: Full cursor control (up/down, left/right) is available from the keyboard. Test Message Function: "RY" and "QBF" test messages can be repeated with this function.
MARK-AND-BREAK (SPACE-AND-BREAK) System: Either mark or space tone can be used to copy RTTY.
Variable CW weights: For CW transmission, weights (ratio of dot to dash) can be changed within the limits of 1:3-1:7.
Audio Monitor Circuit: A built-in audio monitor circuit with an automatic transmit/receive switch enables checking of the transmitting and receiving state. In receive mode, it is possible to check the output of the mark filter, the space filter and AGC amplifier prior to the filters.
CW Practice Function: The unit reads data from the hand key and displays the characters on the screen. CW keying output circuit works according to the key operation.
CW Random Generator: Output of CW random signal can be used as CW reading practice. **Bargraph LED Meter for Tuning:** Tuning of CW and RTTY is very easy with the bargraph LED meter. In addition, provision has been made for attachment of an oscilloscope to aid tuning.
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Color: Light grey with dark grey trim — matches most current transceivers. **Dimensions:** 363(W) x 121(H) x 351(D) mm: Terminal Unit.
Warranty: One Year Limited

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CIRCLE 124 ON READER SERVICE CARD

CQ REVIEWS:

The ICOM IC-02A/T 2 Meter Handheld

BY LEW MCCOY*, W1ICP

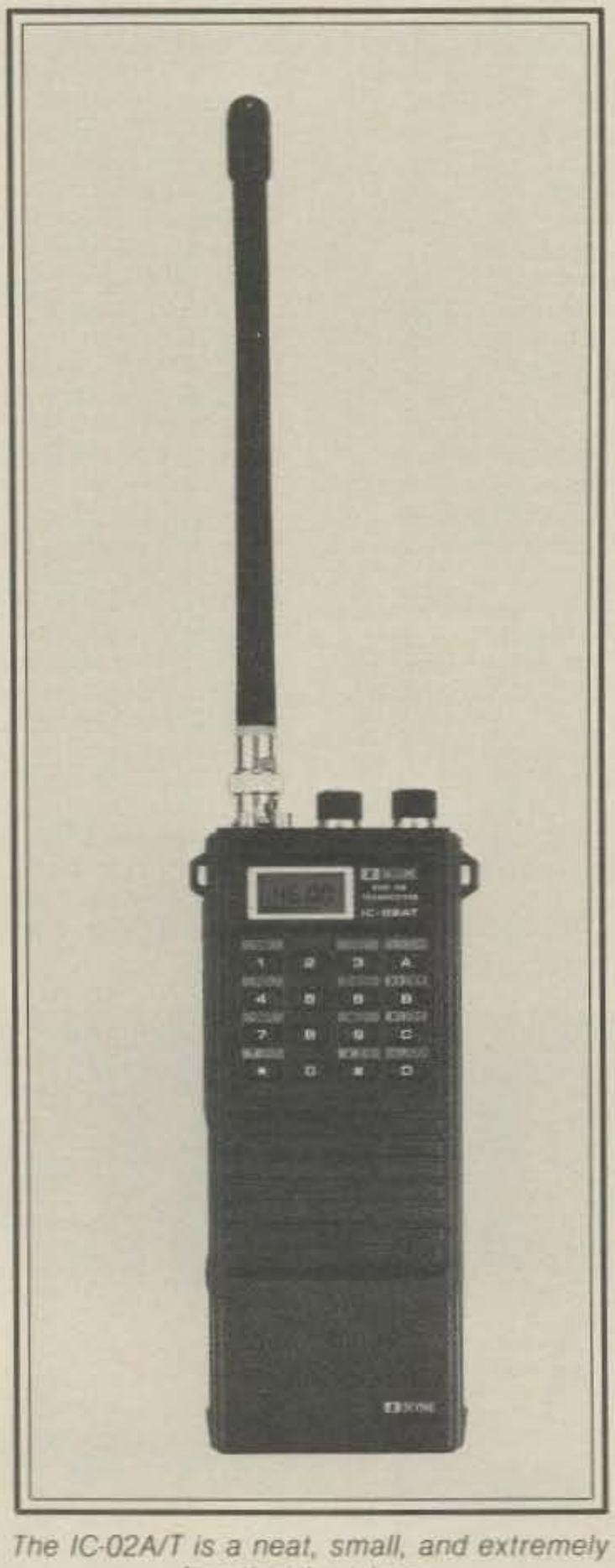
A constant source of amazement to me is the continuing revolution taking place in amateur radio equipment design. In the last ten years I have been heavily involved in two facets of amateur radio: computers and 2 meter repeater work.

At first many amateurs (and engineers for that matter) thought that computers wouldn't amount to much in our hobby. How wrong those people were! Hardly a new piece of radio equipment shows up these days without a microprocessor of some sort being the main part of the gear. I am in the process of preparing reviews for several ICOM pieces of equipment, including the R71A receiver and the IC-745 transceiver. It is amazing how well these units are designed, and I might add that they are extremely complex. They are so complex, in fact, that I know of only a few amateurs who are qualified to service such equipment. It makes one wonder just for what our license exam program is supposed to prepare us!

Two-meter repeater operation has completely changed amateur radio in the last ten years. It is possible to get into your auto, drive just about anywhere in the country, and be in touch with other amateurs through repeaters—and usually with a handheld transceiver. If you have traveled here in the Southwest (western Texas, New Mexico, and Arizona), you are probably aware of the linked repeater system in use. Several dedicated amateurs have linked repeaters together so that it is possible to work distances such as 1000 miles on a regular day-to-day basis! Like I said, the last ten years have seen great advances in our hobby and also in the complexion of 2 meter equipment. The ICOM IC-02A/T 2 meter handheld is an excellent example of these new advances in technology.

At the outset I must say that the IC-02A/T is loaded with "chimes and bongs" (I am sick of hearing "bells and whistles," so forgive me!). This unit is about as far removed from the early crystal-controlled handhelds as it possibly can be. It measures 2½ inches wide, 1½ inches deep, and 6½ inches high. Power output is either ½ watt or up to 5 watts with a 13.2 volt battery. It weighs just about 1 pound.

The radio covers 144.00 to 149.995 MHz, receive and transmit, so it well covers the MARS and CAP frequencies. The offset transmit or receive frequency can be set to any desired frequency within the IC-02A/T range. Table I gives the pertinent specs on the IC-02A/T, and from my own tests the radio met or exceeded all the specifications.



The IC-02A/T is a neat, small, and extremely functional package.

A liquid crystal display is used to show several different functions, including the transmit and receive frequencies. For example, the display would show 46.82 if 146.820 MHz was the receiver frequency. Just above these numerals are several other indicators. A + or – sign is used to show the offset in use. A **T** is shown to indicate transmission. An **S** shows when you are in the scan mode. The letter **L** is displayed when the keyboard is locked, and a triangle indicates battery condition. A musical-note symbol indicates that the tone encoder is turned on. The numeral **25** is displayed when operating in 2.5 kHz increments, **50** is shown for 5 kHz, and **100** is shown for 10 kHz. A letter **M** is displayed as a memory mode indicator and last, a . is shown for a priority function indicator.

On top of the handheld are the power on/volume control, squelch control, light switch for illuminating the liquid crystal display, and a high/low power switch. Also, there is a jack for an external power input (such as a cigar-lighter line) and two more inputs for external mike and speaker (which is available separately from ICOM).

The keypad has 16 keys consisting of 10 numerical keys and 6 code keys. Most of these keys have dual functions. The keypad is lettered with the various key operations, which are numerous. I found it interesting that this was a piece of gear that I could *not* just turn on and make it work! I had to sit down with the instruction manual for at least an hour and study the book first. You know the old saying, "If all else fails, read the instruction manual," and believe me, with this modern-day equipment you *have* to read the book first! I might also add that the instruction manual is very extensive and complete. It goes into step-by-step detail for entering frequencies and for entering repeater frequencies into memory. Also available is a pocket guide which includes simple step-by-step instructions.

I had to make a trip to Las Vegas, Nevada, from Silver City, New Mexico, which took me through Phoenix. To try out the handheld, I entered all the common repeater frequencies, 146.94 down to 146.64, and then put the unit on scan, which scans through each of the ten memories looking for activity. I must say that I found a lot of activity on different channels on that trip. I very highly recommend both the memory and scanning functions. They may appear to be extra "chimes and bongs" but they certainly were worthwhile.

I could detail all the steps involved in setting frequencies, but it would make pointless reading. The instruction manual does a much better job than I can. Briefly, there is one other switch not mentioned earlier. It is called the function switch, and it is mounted on the side of the handheld just above the transmit/receive switch. For operation with just a single repeater pair, the desired frequency is entered via the numeral keys, and then the function key is used to set up the offset frequency and the PL tone if required. If one desires to put this frequency into memory, the function

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

General	
Number of Semiconductors	Transistor: 42 (02AT: 48, 02E: 43) FET: 3 IC: 10 (02AT: 13, 02E: 11) Diode: 40 (02AT: 46)
Frequency Coverage	02A/AT: 144 MHz ~ 148 MHz 02E: 144 MHz – 146 MHz (Some versions cover 140 MHz – 149.995 MHz without specifications guaranteed)
Frequency Readout	6 digit 5 kHz readout, LCD display
Frequency Resolution	02A/AT; 5 kHz steps (other steps such as 10 kHz, 15 kHz, 20 kHz and 25 kHz are programmable and available by pushing the UP/DOWN buttons) 02E; 12.5 kHz steps (25 kHz steps are programmable)
Frequency Control	Digital PLL synthesizer with key input
Frequency Stability	Within 0.002% in range of –10°C ~ +60°C
Memory Channels	10 channels
Scanning	Programmed scan and memory channel scan available
Usable Temperature	–10°C ~ +60°C
Antenna Impedance	50 ohms unbalanced
Power Supply Requirement	D.C. 8.4 V with attendant power pack IC-BP3 D.C. 5.5V – 16 V negative grounded is acceptable.
Current Drain at 8.4V	Transmitting: High (3W) Approx. 1.05A Low (0.5W) Approx. 0.45A Receiving: At max audio output Approx. 140mA Squelched Approx. 35mA
Dimensions	116.5mm(H) X 65mm(W) X 35mm(D) without power pack Attendant power pack, IC-BP3 49mm(H) X 65mm(W) X 35mm(D)
Weight	515g (IC-02A: 495g) including power pack, IC-BP3, and flexible antenna
Transmitter	
Output power	High: 3W at 8.4V (5W at 13.2V) Low: 0.5W at 8.4V – 13.2V
Emission mode	$16F_3$ (F3E 16KO)
Modulation system	Variable reactance frequency modulation
Max. frequency deviation	±5 kHz
Spurious emission	More than 60 dB below carrier
Microphone	Built-in electret condenser microphone Optional speaker-microphone (IC-HM9) and headset (HS-10) can be used
Operating mode	Simplex Duplex (any in-band frequency separation programmable)
Receiver	
Receiving system	Double-conversion superheterodyne
Modulation acceptance	$16F_3$ (F3E 16KO)
Intermediate frequencies	1st: 16.9 MHz; 2nd: 455 kHz
Sensitivity	Less than 0.25 μV for 12 dB SINAD Less than 0.3 μV for 20 dB noise quieting
Squelch sensitivity	Less than 0.1 μV
Spurious response rejection ratio	More than 60 dB
Selectivity	More than ±7.5 kHz at –6 dB point Less than ±15 kHz at –60 dB point
Audio output power	More than 500 mW (at 8 ohms 10% distortion)
Audio output impedance	8 ohms

Table I– Here are all the vital statistics for the IC-02A/T. My own tests showed the unit met or exceeded all the specifications.

key is held down, the memory set key is depressed, and the frequency is entered into any of the desired ten channels simply by pressing the desired numeral key. The same process is used to store nine more frequencies into memory. The **D** key is also the "call key." When the radio is in the **Memory Channel Mode** or **Dial Mode** by pushing the call key, the frequency (and duplex mode and tone number, if any) memorized in memory channel 1 (**M1**) is recalled and displayed on the frequency display.

Another operation feature is the **Priority Function**. This feature allows you to check on your favorite frequency (such as a local repeater or calling frequency) for activity while operating on a different channel. It allows you to check if the frequency is busy or empty. This is accomplished by storing the favorite frequency in channel 1 and then pushing the **Prio** key while holding down the **Function** key. The handheld will now receive on the operating frequency for five seconds and on the priority channel, number one, for one second, and then back to the operating frequency for five seconds, repeating this procedure.

Still another function is the **Lock** feature. This function is provided to prevent accidental operation by pushing undesired buttons. By pushing the **D (Lock)** key while holding down the **Function** key, the displayed frequency and any other data are fixed. At this time all other key functions are disabled.

I already mentioned that the set can be programmed to scan all ten channels. In this mode, when a channel is scanned that has operation, the squelch is opened and that channel is held until the activity ceases. Scanning then is continued. There is still another feature called **Programmed Scan**, which allows you to scan between two desired channels, excluding the others. This would be a useful feature when there are just two repeaters in operation in an area, a frequent occurrence.

An important feature of the IC-02A/T is that is has a built-in tone encoder. This is, of course, extremely useful (and necessary) when the repeater uses tone access. The tones are from No. 1, which is 67.0 Hz, up to No. 55, which is 2125.0 Hz—55 in all.

Something I liked, which I guess is becom-

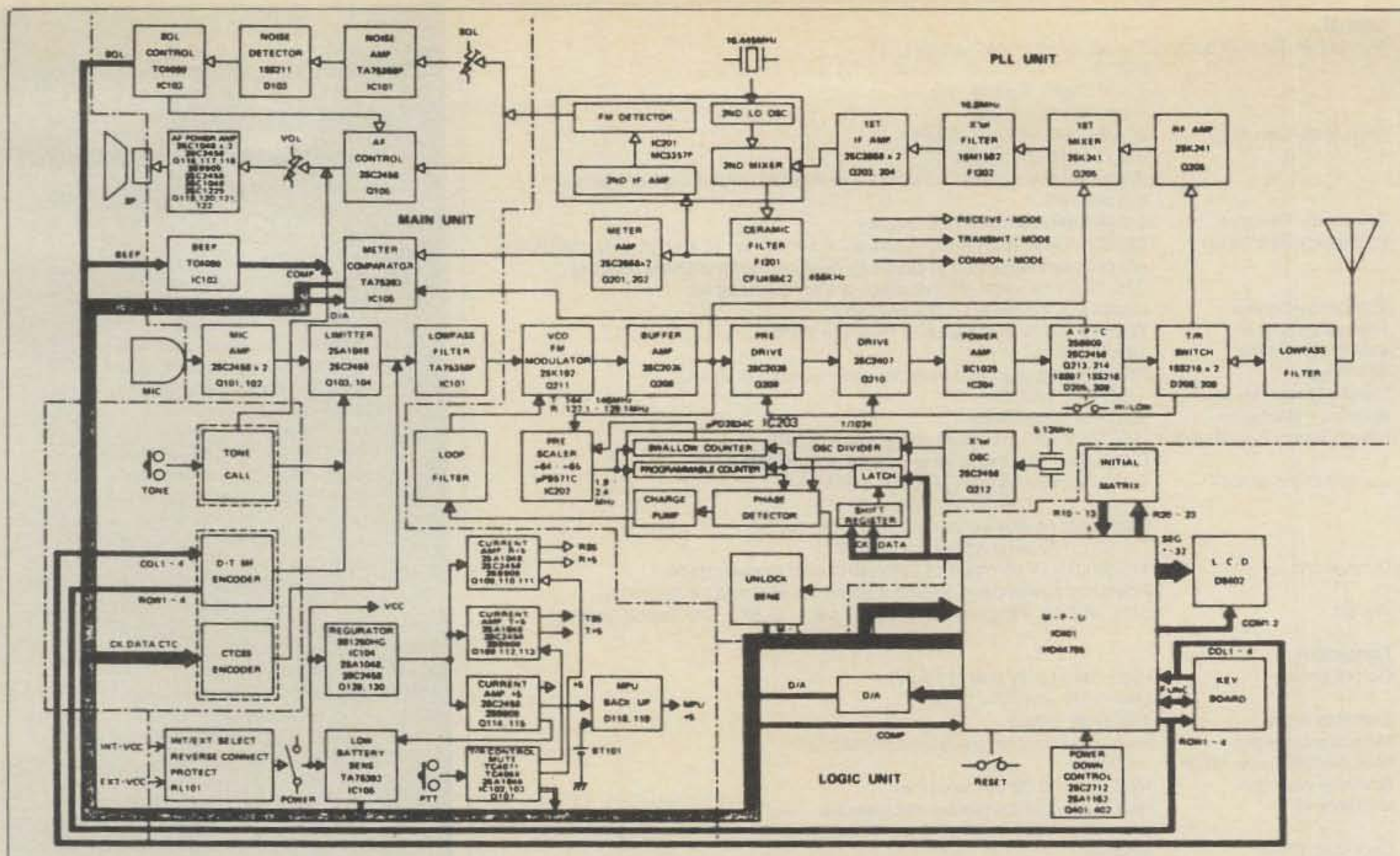


Fig. 1– Block diagram of the IC-02A/T.

ing more popular with 2 meter transmitters, is the audible touch-tones. In this unit, when using the touch-tones, such as when accessing an autopatch, the tone is audible as you hit any of the 16 keys. In other words, in addition to transmitting the tone, the tone is also heard via the speaker.

As to the circuit itself, the instruction manual doesn't provide any details, although a block diagram and circuit schematic are given. The block diagram is shown in fig. 1. The heart of this unit, as it seems to be with most of the latest equipment, is a microprocessor, or CPU (Central Processing Unit). In this case it is an HD44795, which doesn't show up in any of my reference books, so I cannot give you any details about the chip. In any event, it handles the input from the keypad, the liquid crystal display, the memory storage and scan operation, and so on. The ICOM has a lithium-battery memory backup rated to last up to seven years! In other words, the IC-02A/T has the very nice feature of holding the memorized channels when it is turned off.

The unit is also water resistant, so if you go out in a storm you needn't worry about the handheld getting wet! The case is a dark plastic material, high-impact rated. *Most important:* As I said earlier, I think that very few amateurs are qualified to service this new equipment, so we have to look to the manufacturer. ICOM has a service policy of approximately three to five working days to repair any of their units, a service I find hard to beat. Nobody wants to spend the money, have something go wrong with the unit, and then spend months waiting for service.

There are several accessories available for the IC-02A/T, including a new generation of battery packs and charging units. There is a plug-in speaker/microphone, IC-HM9, $34.50 list price. The battery pack supplied with the unit is the IC-BP2 (nickel-cadmium batteries); the 'BP2 will provide 7.2 volts and 3 watts output and is listed at $39.50. Also supplied with the handheld is a wall charger, the IC-BC25U (15-hour recharge time). There are other battery packs available. The IC-BP4 uses 6 AA-type, 450 maH Ni-Cads, providing 7.2 volts and 3 watts output. This same pack can be used with 6 alkaline batteries to provide 9 volts (price is $12.50 list). There is a more heavy-duty pack, the IC-BP5, which uses 9 AA-type, 450 maH B Ni-Cads (providing 10.8 volts and 4 watts output for the IC-02A/T); the IC-BP5 sells for $49.50 list. Also, there is the quick charger, the BC-35, which lists for $69 (charging time 1.5 hours).

The list price for the IC-02A/T is $349. It is manufactured by ICOM Incorporated, and distributed by ICOM America, 2112 116th Ave. NE, Bellevue, WA 98004, telephone (206) 454-8155. CQ

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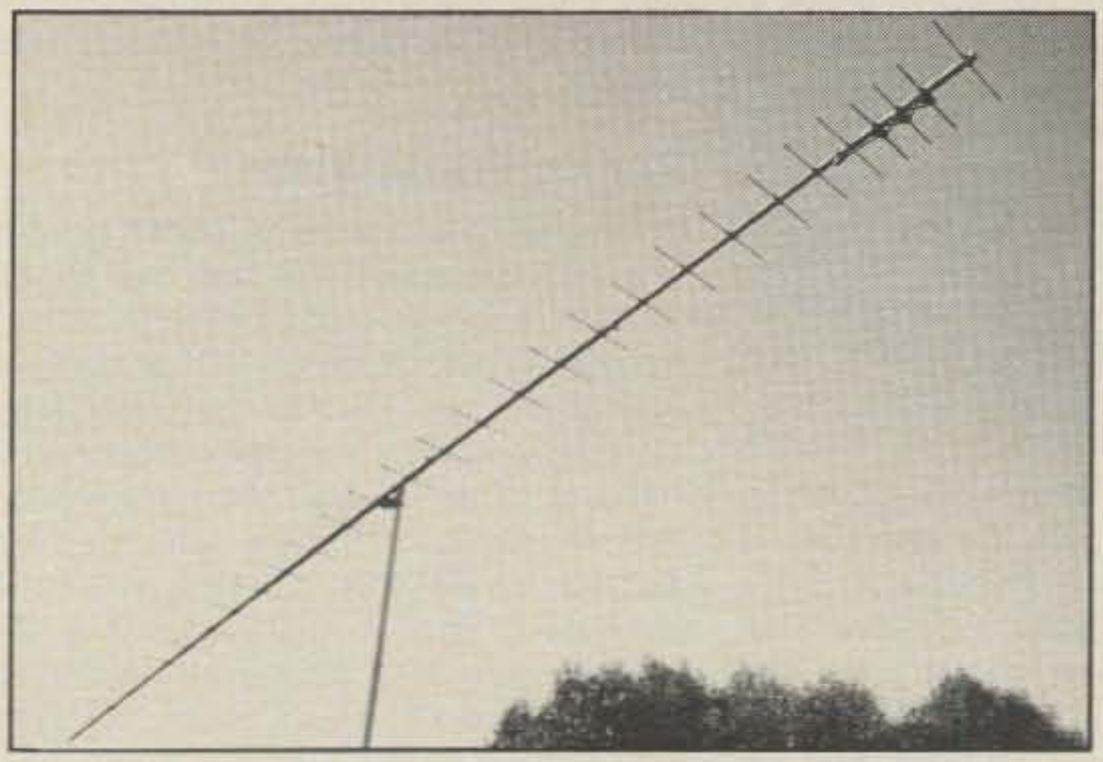
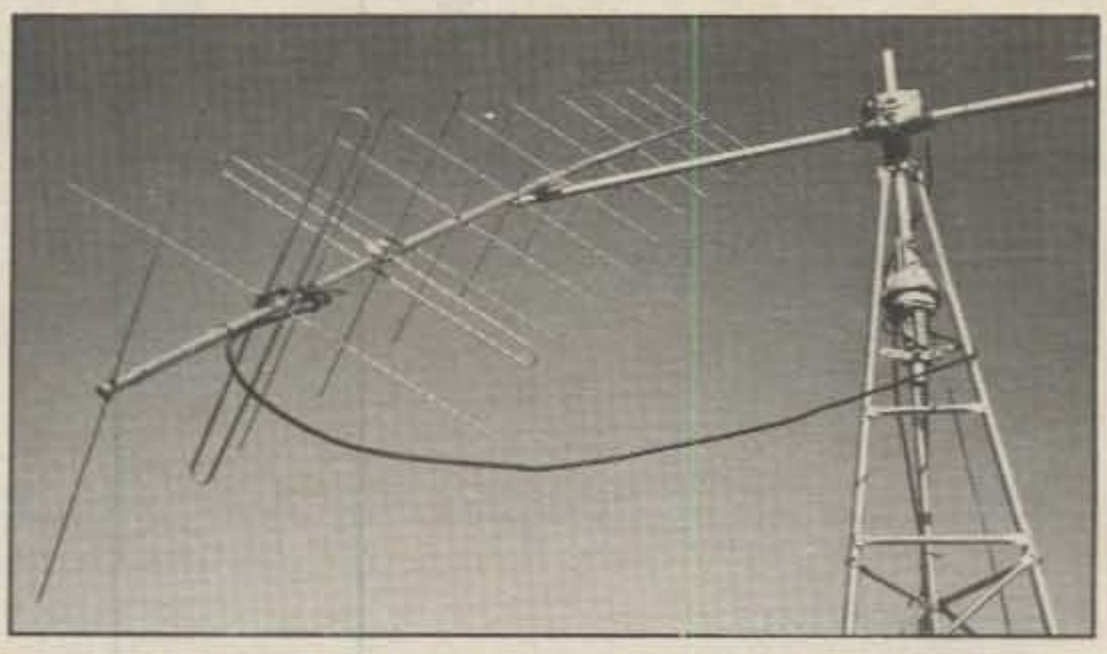


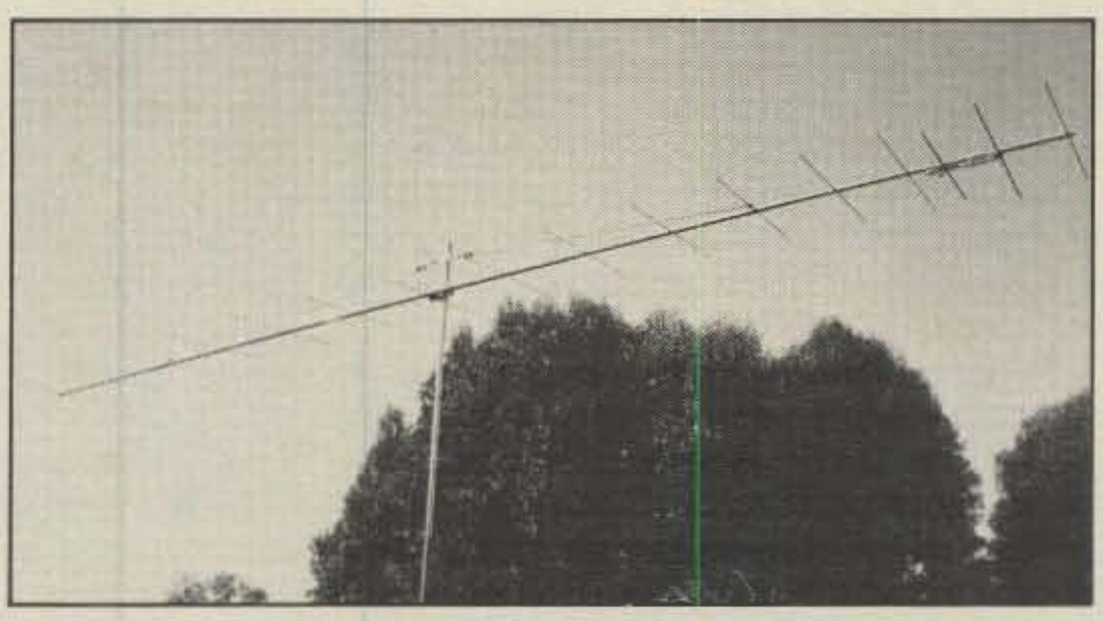
432-30LBX

BANDWIDTH	430–440 MHz
GAIN	17.3 dBd
BEAMWIDTH	20°
FEED IMP	50 ohms unbal.
BALUN	included
BOOM LENGTH	21 ft. 9 in.
F/B 20 dB F/S	35 dB
VSWR	1.5:1
WINDLOAD	1.43 sq. ft. (typical)
TURNING RADIUS	12 ft. 5 in.
WT. (lbs.)	9 lbs.



2M-22C

BANDWIDTH	144–148 MHz
GAIN	13 dBd
BEAMWIDTH	34°
FEED IMP	50 ohms unbal.
BALUN	(2) 4:1 coax
BOOM LENGTH	19 ft. 1 in. (tapered)
VSWR	1.5:1
WINDLOAD	1.85 sq. ft.
ELLIPTICITY	3 dB max.
CIRCULARITY SWITCHER	CS-3 included
WT. (lbs.)	11 lbs.



2M-16LBX

BANDWIDTH	143–146 MHZ
GAIN	(144 MHz) 14.8 dBdc
BEAMWIDTH	(V) 28°, (H) 33°
FEED IMP	50 ohms unbal.
BALUN	4:1 RG303, Teflon
BOOM LENGTH	28 ft. 1 in. (tapered)
VSWR	1.4:1
WINDLOAD	(H) 1.75 sq. ft. (V) 2.44 sq. ft.
WT. (lbs.)	10 lbs.
TURNING RADIUS	15 ft. 6 in.

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W1VV gives us some pointers on how to get through to that rare one when everyone else is trying to get through, too!

How To Work DX In A Pile-Up

BY WILLIAM R. LOWRY*, W1VV

While tuning across an amateur h.f. band, you suddenly find a tremendous pile-up. Hundreds of stations must be calling! The congestion may be pinpointed on one frequency or spread over many kiloHertz—five, ten, or even more. Obviously, they are calling a rare DX station, but who is it and what is his transmitting frequency?

Unfortunately, you usually won't get answers to the who or where questions by listening to the stations in the pile-up. Most operators shout only their own call, or pound it out in c.w., if that's the mode, and it's the unusual operator who identifies the station he is calling in this situation. It is also a waste of time to ask the stations you hear, because in the typical situation all are listening on another frequency—the one occupied by the DX station. (When a station transmits on one frequency and listens for a reply on another, it is called "split-frequency operation" or "operating split.")

Fortunately, there are many typical relationships between the frequency limits of the pile-up and the DX station's transmitting frequency. In many cases, when listening for U.S. amateurs, the DX operator transmits below the pile-up, usually by at least 2 or 3 kHz. Sometimes he will announce where he is listening and sometimes he won't. Some of the typical transmitting and listening frequencies for 20, 15, and 10 meters are listed in Table I.

On 40 meters the most popular c.w. frequency is between 7.000 and 7.010 MHz, with the foreign amateur listening up a few kHz if operating split. To a lesser extent, the frequencies up to around 7.030 MHz are also used with the same operating pattern. Forty meter phone presents greater difficulties because the U.S. phone band begins at 7.150 MHz, but the typical foreign phone operation is below 7.100 MHz. This means that there is often a great separation between listening and transmitting frequencies, and it is not unusual to have a DX station transmitting around 7.075 MHz and listening from 7.200 to 7.210 MHz.

DX Station Transmits On Frequency (MHz)	DX Station Listens On Frequency (MHz)
14.020–14.024	14.025–14.030
14.023–14.028	14.030–14.040
14.192–14.198	14.200–14.210
14.205	14.210–14.220
21.025	21.030–21.035
21.295	21.300–21.310
21.300	21.305–21.320
28.001–28.008	28.010–28.015
28.501–28.505	28.505–28.515
28.595	28.600–28.610

Table I– Typical transmitting and listening frequencies of DX stations using split-frequency operation on the 20, 15, and 10 meter bands. Note that these are just a few of the many possibilities. If the DX station represents a very rare country, the range of the listening frequencies can be 50 kHz or more. Now that U.S. amateurs are allowed to operate s.s.b. between 14.150 and 14.200 MHz, a new pattern may develop. For example, the DX station may operate around 14.145 MHz, and listen from 14.150 to 14.160 MHz, or in some other slot in the new segment. The January 1984 operation of VU7WCY, however, still did considerable transmitting around 14.195 MHz, while listening from 14.200 to 14.215 MHz, and from 14.250 to 14.260 MHz.

On 80 meters c.w. the pattern is comparable to 40 meters c.w. with much of the DX concentrated at the very low end. On 75 meters phone, however, the situation is even more complicated than on 40 meters phone. Some DX stations will transmit just below 3.8 MHz and listen just above it. Some will operate anywhere in the segment from 3.775 to 3.8 MHz and listen just above their transmitting frequency. Some will operate below 3.7 MHz and listen on any one of a wide variety of frequencies from 3.8 to 3.85 MHz or even higher! Unless you know in advance the operating frequency of the DX station, it can be extremely difficult to locate him.

Fortunately, on both 40 and 75 meters phone instead of hunting for the DX station after finding a pile-up, it can be easier to search for a DX station from the outset. Carefully tune the well-known DX operating frequencies and listen for DX stations having QSOs or calling CQ. If they are interested in working U.S. stations, they usually will announce where they are listening. In any case, if you are unfamiliar with this aspect of DXing, it is easier to gain experience on 10, 15, and 20 meters before struggling with 75 and 40 meters phone.

Finding the DX Station

After you have a general idea of where to look, you must still find the specific transmitting frequency of the DX station. An added complication is that some DX operators don't identify themselves very often, giving only a signal report and the callsign of the station they are working. For example, on phone you may hear something like this: "W1VV, you're five by nine." This is followed by a short pause while the DX operator listens for W1VV's report. Then, "QSL. QRZed." This is followed by another pause, which can be lengthy, while the DX operator listens for another caller.

Other complications are the weakness of the DX signal—especially if you have a directional antenna and it is pointed in the wrong direction—and the existence of other DX stations whose interference can bury the station you are hunting.

*Brown's Lane, R.R. #1, Old Lyme, CT 06371

Because of problems like these, the best approach is to tune very slowly across the band of frequencies on which you expect to hear the DX station. Include the lower edge of the pile-up itself, as the DX station may be operating just below it. In practice I usually make a few quick tuning passes over the probable frequency range of the DX station. If that is unsuccessful, I start tuning slowly and carefully using a raking technique. That means I tune back and forth several times over a few kiloHertz, gradually moving across the frequency range. Sometimes, unfortunately, there will be a commotion on the transmitting frequency of the DX station, which makes it easy to find. Self-appointed watchdog stations listen on his frequency to tell any intruders to QSY. Sometimes this is done politely, but other times it is not, and insulting remarks fly back and forth. The resulting commotion can bury the DX station, and in any case it is one of the least attractive aspects of amateur radio. Some operators delight in causing QRM on the DX frequency, and this deliberate and illegal interference takes a wide variety of forms.

If two or three slow tuning passes do not locate the DX station, check to see if the pile-up still exists. The DX station may have gone QRT or shifted to another band. If the pile-up is still there, you may have to widen the scope of your search to cover more frequencies. You may also try tuning frequencies above the pile-up, although in most cases I have encountered, the DX station is below the pile-up. Also try tuning through the pile-up, as the DX station may be in the middle of it. Again, this would not be the typical situation, although it does happen.

How To Work the DX Station

Let's assume that you have found the DX station, you know his callsign, and you have established the boundaries of the pile-up. What next? The basic rule is to find the stations the DX operator is working to determine his operating pattern. Many DX operators will work a pile-up in a consistent pattern, and if you can identify it, you can play the pattern to make contact quickly. Here are just a few of the possible patterns:

- The DX operator works slowly upward to the upper limit of the pile-up, then slowly down to the lower limit.
- The operator works rapidly up to the upper limit, then jumps back to the lower limit and starts up again.
- The operator jumps around in a random manner. This is usually the hardest pattern to work successfully.

Various strategies can be employed in these situations. In the first one you may transmit exactly on the frequency of the last station worked by the DX operator or just slightly higher. As an alternative, you can pick a relatively clear spot a few kHz higher than the last station worked, call each time the DX operator says QRZed, and wait for him to work his way up to you. If he goes by you, again find the frequency on which he is listening, and repeat your strategy.

In the second case above in which the DX operator is moving up rapidly and not listening twice on the same frequency, pick a relatively clear frequency above the frequency of the last station worked. How much higher you want to be depends on the average jump of the DX operator, if that can be determined.

In the third case above in which the shifts in frequency are random, you may have to settle for calling repeatedly on a relatively clear frequency, hoping that one of the random shifts will land on your frequency. Shift frequency occasionally if you are not lucky, because your frequency may be suffering from QRM at the DX end. In any case, the DX operator may shift his operating pattern, so monitor it as much as possible.

How often you repeat your call before listening for a reply depends on the skill of the DX operator. If he is good, just repeat your call once or twice and then listen. If he is having difficulty, repeat your call five or six times before listening. If he is not working anyone, call again. Avoid lengthy calls without listening. If the DX station hears you, he has to wait until you stop calling. If he doesn't hear you, you are just adding to the QRM. Unfortunately, marathon calling is much too prevalent in the pile-ups, greatly reducing the number of stations making successful contact.

Positively respect the instructions of the DX operator. Quite often he will work by call districts. This means he will only accept calls from the district he has designated. Normally he will work in some sequence—1st district, 2nd, 3rd, etc.—but some operators will jump around—1st, 6th, 4th, etc. With either approach the purpose is to reduce the pile-up to manageable proportions. The technique also gives the operator who lacks a bone-crushing signal a chance to be heard; otherwise, he is buried under the QRM. Propagation may also favor a few call areas, so working by districts gives the nonfavored areas a chance to be heard.

If all amateurs in the pile-up would exhibit self-discipline and common courtesy, DX stations could make more contacts. For example, the DX station may hear only part of WD7ZZZ's callsign and say, "Will the WD7Z come again." All other stations should remain silent while WD7ZZZ repeats his full call. Unfortunately, many other stations will call again. This slows things down, as the DX operator usually will keep asking for WD7Z and won't work anyone else until he has successfully completed a QSO with WD7ZZZ.

"Tailending" is a practice that can be effective, but it is also easily abused. In this technique an operator slips in his call near the tail end of another station's QSO. The tail-ending operator hopes that the DX operator will hear his call and work him next. Sometimes he will do that. But this technique is effective only if one or a few operators use it and all the others in the pile-up remain silent. However, as soon as the DX operator works one or two tailenders, many others will try it. Because many of these operators slip in their calls too early, the station that actually is working the DX station is obliterat-

ed. For this reason many DX stations will not work tailenders, as they know the situation can quickly become uncontrollable.

When the DX Station Is Not Operating Split

In this case the DX operator may have only a transceiver and cannot listen very far off his transmitting frequency. If he operates in the straight transceive mode, the pile-up will be concentrated exactly on the operating frequency, which greatly reduces the number of stations worked per hour. The reason is quickly apparent when you listen to one of these pile-ups. After the DX operator picks a station from the crowd and calls it, he is often buried under heavy QRM caused by those who are still transmitting. In this situation, the best technique is to make a short call, and then listen for four or five seconds to see if you are answered. Sometimes it is possible to make contact through the QRM while some of the long-winded operators are still making their first call! If necessary, repeat this procedure for about two minutes. If no one in the pile-up makes contact in that period, all should stop calling. The DX station will have some reaction to the pile-up and may give instructions about how to proceed. Unfortunately, some never stop calling, and the DX operator may go off the air in disgust. Incidentally, timing your call in relation to others in the pile-up is an art. Some delay making their first call for a few seconds, hoping to hit the time when all the other operators are taking their first breath.

Even when the DX station is transmitting and receiving on the same frequency, you may try transmitting slightly off his frequency, because most transceivers have a receiver incremental tuning control that allows the operator to listen a few kHz on either side of his transmitting frequency. As most of the signals are concentrated on the transmitting frequency, a signal that is slightly off that frequency has less competition and a better chance of being heard. Carefully listen for the stations the DX station is working. If some are slightly off frequency, you may try this approach, especially in the c.w. mode.

What Equipment Do You Need?

If the DX station is transmitting and receiving on the same frequency, you can get by with a simple transceiver. When the transmitting and receiving frequencies of the DX operator are separated by more than a few kiloHertz, you need equipment that allows you to match his operation. You can do this with a separate transmitter and receiver, or with a transceiver having an auxiliary v.f.o. Another method is provided by the very latest transceivers having circuits so that you can switch back and forth between transmitting and receiving frequencies. Ideally, you should be able to listen on at least two frequencies simultaneously and transmit on one. This arrangement allows you to monitor the frequencies of the DX station and the pile-up. If you use stereo earphones, they can be wired so that each earpiece covers a different frequency.

Not as perfect a two separate receivers, but still highly effective, is a transmitter/receiver combination that has been designed to permit transceive operation, with either the transmitter or receiver v.f.o. controlling transmitting and receiving frequencies. For example, the Kenwood 599 series of transmitters and receivers permits this. One way to use this combination is to find the DX station's operating frequency with the receiver in either the independent operation mode (non-transceive mode) or in the receiver-control mode (transceive). Next switch to the transmitter-control mode (transceive). Leaving the receiver tuning dial set on the DX station's frequency use the transmitter to tune across the pile-up, listening and hunting for the operating frequency you want. Now switch out of transceive mode, with transmitter and receiver operating independently. Your receiver will now be tuned to the DX station's transmitting frequency, and your transmitter will be tuned to a desired spot in the pile-up.

If you don't make contact quickly, listen to the pile-up by briefly switching back to transceive mode, transmitter control, and tuning across the pile-up with the transmitter v.f.o. After listening, you may decide to change your strategy or your transmitting frequency. Incidentally, one hazard of this type of operating flexibility is the possibility of transmitting on the frequency of the DX station, which may be outside the U.S. portion of the phone band in some cases. This results when the function switch is left accidentally on transceive mode, receiver control, and the receiver is tuned to the DX station's transmitting frequency. Believe me, it's an easy mistake to make!

If you have a separate transmitter and receiver that don't permit this type of flexible transceive control, find the DX station and note his transmitting frequency. Then tune across the pile-up to find the spot you want to use and tune your transmitter to that frequency. Finally, tune your receiver back to the DX station and start operating. If all you have is a transceiver, and the DX station's transmitting and receiving frequencies are widely separated, you will have to resort to lots of frantic dial spinning back and forth between the two frequencies. Lots of luck! Once in a rare while this may work, but usually it isn't worth the effort.

Persistence and Practice

Now for the bad news. Even though your operating technique is flawless, it is very possible that the DX station won't answer your call. Don't be surprised or disappointed. If the DX is rare—a country needed by thousands of amateurs throughout the world—the initial QRM may be insurmountable, and unless you have a very potent signal, you initially won't get through. In addition, propagation may not favor your area, or the DX operator may be taking only a few stations from each district, and you are not lucky. If you have the time, hang in there. It can take many hours before you finally score. I remember a situation that occurred years ago. I must have been the weakest station in the pile-up, because after everyone else was worked, I finally received a five by one report, after which the DX station ceased operating!

If the rare DX represents a DXpedition, operation may be around-the-clock for a week, and if you keep trying whenever you have time to operate, you eventually should get through. If the DX operator is living in the country, he probably has some sort of operating schedule which will be reported in one or more of the DX newsletters. Be persistent. Keep listening when and where he supposedly is operating. Even if he doesn't appear, others on frequency may have more up-to-date information about his habits. Although it may take many weeks of patient listening, eventually you will catch him, and be rewarded with a deep feeling of accomplishment that you will never obtain from working DX by means of a list operation.

Practice and practice; then practice some more so that when you need the skill to catch that rare one, you will have it. There are numerous opportunities. On any of the bands up to 10 meters, s.s.b. or c.w., you often will find small- to medium-size pile-ups on DX stations not representing rare countries. If you don't need the country for DXCC purposes, try working the DX with low operating power. During the major DX contests you will find pile-ups on any DX station that represents a rare country for that particular contest. The contest does not have to be a DX contest. The Sweepstakes run by the ARRL in November involves only Canada and the United States and its related islands. There the pile-ups will be on rare states or sections, but the practice is just as useful none the less. In fact, participating in contests can greatly sharpen your operating skills if you sincerely try to maximize your score for the time you participate.

In conclusion, it's worth emphasizing that the key to success is determining the operating pattern of the DX operator by locating the stations he is working. When the operator is working split, much of the QRM on his transmitting frequency is caused by other operators trying to work him there because they don't know what he is doing. If they spent a few minutes listening before transmitting, they wouldn't make that mistake. See you in the pile-ups! CQ

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a regular feature by
THEODORE J. COHEN, N4XX

THE INS AND OUTS OF THE WASHINGTON SCENE

U.S. and Japan Move To Sign Reciprocal Operating Agreement

By the time this is read, it is possible that a reciprocal operating agreement will have been signed between the United States and Japan. According to Washington insiders, the sticky points which had stalled the agreement for several months have finally been ironed out, and the Department of State has given our embassy in Japan the go-ahead to draft an agreement. It should be noted that the embassy was authorized to send the first note and to make minor changes in the format normally used for such documents, two concessions that are considered unusual in matters such as these. There is some speculation that the concessions are an indication of the importance placed on the agreement by the U.S.

CQ Presents Interview With Chester Martin, W3EIL

Elsewhere in this issue, readers will find an interesting interview with Mr. Chester Martin, W3EIL. Licensed for over 50 years, Mr. Martin now devotes his time to public service activities in the Nation's Capital and to helping minority students enter the world of amateur radio. He is also the secretary of OMIK, a little known—but important—nationwide amateur organization. For a look at one of Washington's more active radio amateurs, don't miss *CQ's* exclusive interview with Chester Martin, W3EIL, in this month's issue.

RSGB Raises Concerns About Satellite TV Receivers

In documents filed with the British Department of Trade & Industry, the Radio Society of Great Britain stated that it is "particularly concerned" that the intermediate frequencies being considered for satellite TV receivers will be close to the 1.3 GHz and 144 MHz amateur bands. "If this is the case," says the Society, "then considerable television interference will almost inevitably occur in normal domestic circumstances."

It was the Society's understanding that the Japanese were about to adopt these bands (specifically, the first i.f. would be established in the range 950–1350 MHz, and the second intermediate frequency would be set to 134 MHz with an associated bandwidth of 27 MHz). Furthermore, Germany and Holland are likely to follow Japan's lead and adopt the same frequency bands.

The RSGB, in technical material prepared for the Department of Trade & Industry, determined that the signal strength associated with short transmitter/receiver paths characteristic of the 144 MHz and 1.3 GHz bands are sufficiently high as to cause serious RFI problems. "Unless the DBS (direct broadcast satellite) receiver system is designed to cope with such high signal levels, either from amateurs or other sources," warned the Society, "then there will be a high risk of breakthrough."

Copies of the RSGB's findings have been forwarded to the ARRL for consideration by the League's technical staff.

CATVI Still A Major Headache, But Some Cable Operators Move To Correct Problems

Complaints regarding cable television interference (CATVI) continue to pour into ARRL headquarters, with problems on the 144 MHz band (cable channel "E") cited most frequently. However, your Washington editor is also receiving reports that some cable operators—specifically Storer Cable in Punta Gorda, FL, and Cox Cable of San Diego, CA—are cooperating with local amateurs who reported interference produced by leaky cables and defective splitters.

If you are experiencing interference from your local CATV system—or have been cited for alleged interference to cable operations, you are encouraged to file a report with the RFI Task Group of the ARRL. Write to the American Radio Relay League, Attn: RFI Task Group, 225 Main Street, Newington, CT 06111. It's just possible that the League, working together with the National Cable TV Association in Washington, DC, may be able to resolve the problem to everyone's satisfaction!

U.S. Invites Third-Party Agreements For Olympics

As part of the preparations for the Los Angeles Olympics this summer, the Department of State asked the International Telecommunications Union (ITU) to indicate this country's willingness to enter into third-party agreements with countries whose athletes will attend the Games. The ITU has complied, with release of the appropriate Notification (#1195) made earlier this year. The purpose of the third-party agreements, of course, would be to permit U.S. amateurs to handle health and welfare messages on behalf of the Olympic athletes whose countries respond to our offer. Credit for moving the third-party offer through State goes to Dexter Anderson, W4KM.

Rumors Abound on Malicious Interference

Contrary to what you may have read or heard elsewhere, there is no evidence to support assertions that the Department of State is bringing pressure on the FCC to "clean up" malicious interference in the 6th call area. Furthermore, Commission representatives deny that the recent spurt of enforcement activities on the west coast is in any way linked to preparations for the Olympics. Instead the FCC's pursuit of rules violators throughout the United States is said to represent a strong and ongoing commitment to the Amateur service and to its continued good standing in the international telecommunications community.

AMSAT To Provide GAS Can Controller For Shuttle Experiment

According to *Amateur Satellite Report (ASR)*, The Radio Amateur Satellite Corporation (AMSAT) has agreed to supply the primary controller for a Space Shuttle "Get-Away-Special" (GAS) experiment developed by El Paso/Ysleta (TX) High School students. While the GAS involves 12 experiments in the biological sciences, AMSAT officials feel that the design and construction of the controller (which will monitor and record experiment temperatures) will give AMSAT en-

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gineers valuable experience in both the Shuttle and GAS programs. Among other things, ASR notes that "the basic requirements of the controller (will) match the requirements of the PACSAT low power portable ground station controller." PACSAT, a satellite employing packet-switching technology, is under development by AMSAT for Volunteers in Technical Assistance (VITA); the satellite is scheduled for deployment from a GAS can in 1986.

The El Paso/Ysleta High School GAS can experiment is to be deployed from STS 41-F, a flight that is now scheduled to lift off on 9 August 1984.

Commission Issues Instructions To Volunteer Examiner Coordinators

With the appointment of the first five VECs (for the Second, Eighth, Ninth, Alaskan, and Caribbean areas), the Commission issued detailed instructions on how amateur examinations are to be administered by volunteer examiners. The instructions spell out in great detail the 16 functions of a VEC:

1. Provide contact person and alternate.
2. Recruit VEs.
3. Issue accreditation documents.
4. Coordinate examination sessions.
5. Notify FCC of examination sessions.
6. Provide application forms.
7. Provide written examination materials.
8. Provide telegraphy examination materials, when requested by VEs.
9. Provide Certificate of Successful Completion of Examination, when requested by VEs.
10. Establish examination session-unique identifier.
11. Collect test materials.
12. Screen applications and resolve defects.
13. Compile examination session Test Report.
14. Forward applications to FCC.
15. Maintain record-keeping system.
16. Provide annual question evaluation reports.

The instructions also suggest that VECs may want to offer some training to its volunteers on how to administer an examination or on how to conduct an examination session.

Satellite Experimenter's Handbook Is A "Sellout"

A newly released book for radio amateurs interested in satellite communications, the *Satellite Experimenter's Handbook*, is selling out as soon as copies become available. The book, written by former AMSAT Director Martin Davidoff, K2UBC, has been hailed by amateurs and professionals alike as a "masterpiece" of technical literature. The book is available from AMSAT, P.O. Box 27, Washington, DC 20044.

Correction to FCC Exam Schedule

According to the Radio Operator Branch, Public Service Division, FOB, the examination schedule published in the February edition of this column (p. 71) contains an error. Specifically, the dates on which field offices will give exams in August should have read "August 6–10." The Branch also notes that the Detroit field office has moved. Its new address is: 24897 Hathaway St., Farmington Hills, MI 48018-1398.

Additional information on the examination program may be found in Bulletin FO-28, which was issued by the Field Operations Bureau in November 1983.

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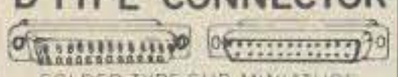

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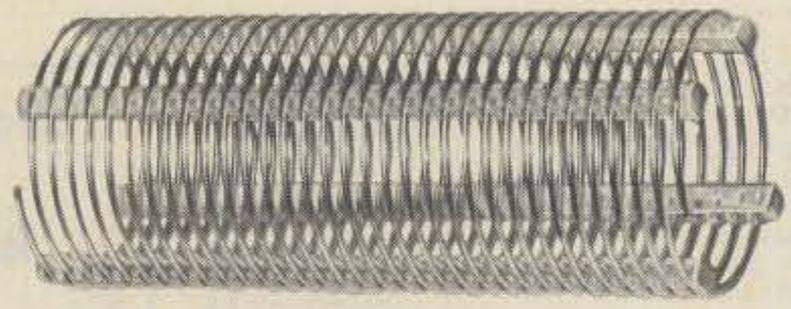

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160 Meters Plus

A No-Sacrifice 160 Meter Conversion for the Heath SB-201 and SB-200 Amplifiers

BY JAMES E. MCQUEEN, JR.*, WB4LJP

Having just recently built the SB-201 linear amplifier, I was stunned to learn that I must also purchase an extra kit to convert it to operate on 10 meters. Unlike some manufacturers, Heath chooses not to include the extra contacts on the switch, but requires you to purchase a new switch and associated parts to make the conversion.

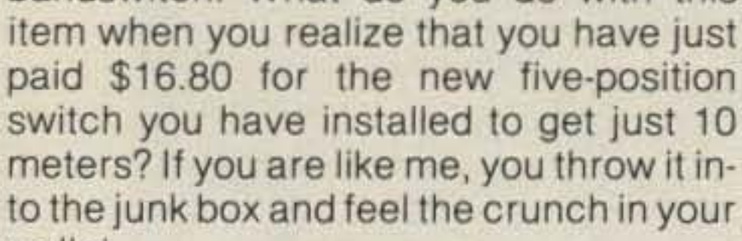
After making the conversion, you are left with the original four-position main bandswitch. What do you do with this item when you realize that you have just paid $16.80 for the new five-position switch you have installed to get just 10 meters? If you are like me, you throw it into the junk box and feel the crunch in your wallet.

Over the next couple of weeks, every time I opened the junk box I saw that expensive switch looking back at me. Finally it hit me! Why not beat Heath at their own game and use parts from that switch to add 160 meters to the SB-201?

By now the wheels were turning. I quickly slid the SB-201 out of the cabinet and removed the top shield to see if my idea would work. Now I had my revenge! After a few quick calculations I determined several essential parameters you must know before modification.[1]

A. Plate impedance equals approximately 2444 ohms.

B. With this plate impedance the tank circuit shown below is required for 160 meter operation.



A quick look at the SB-201 schematic shows a 150 pF for plate tuning and a maximum of 1350 pF for loading capacitance. The total tank circuit is approximately 10 μH. From this you now know what you need to add to the SB-201 to make it operate on 160 meters.

A. You must add fixed capacitance to the plate tuning capacitor to get the required value of 450 pF.

B. You must add 9 μH of inductance to the existing inductor in the SB-201 to get the required 19 μH.

C. You must also add fixed capacitance to the loading capacitor to get the required value of 2500 pF.

D. Most important, all of this must switch in and out of the circuit with a turn of the main bandswitch.

At this point I also looked at several other items of a questionable nature. These included the 10 μH filament choke and the 50 μH plate choke, both of which I decided to replace.

A quick look through the junk box produced the other items needed to make the conversion. They are listed below:

1. A 1000 pF 5 kv ceramic capacitor.

2. Two 200 pF 5 kv ceramic capacitors.

3. A 100 pF 5 kv ceramic capacitor.

4. A 150 μH plate choke.

5. A new filament choke.

6. A six-position, dual-section, single-wafer switch to select the proper tuned input circuit.

7. A 2 inch section of B&W miniductor coil no. 3030/3906-1.

8. An Amidon T-106-2 core.

9. A 2200 pF and a 1800 pF 1000 volt silver mica capacitor.

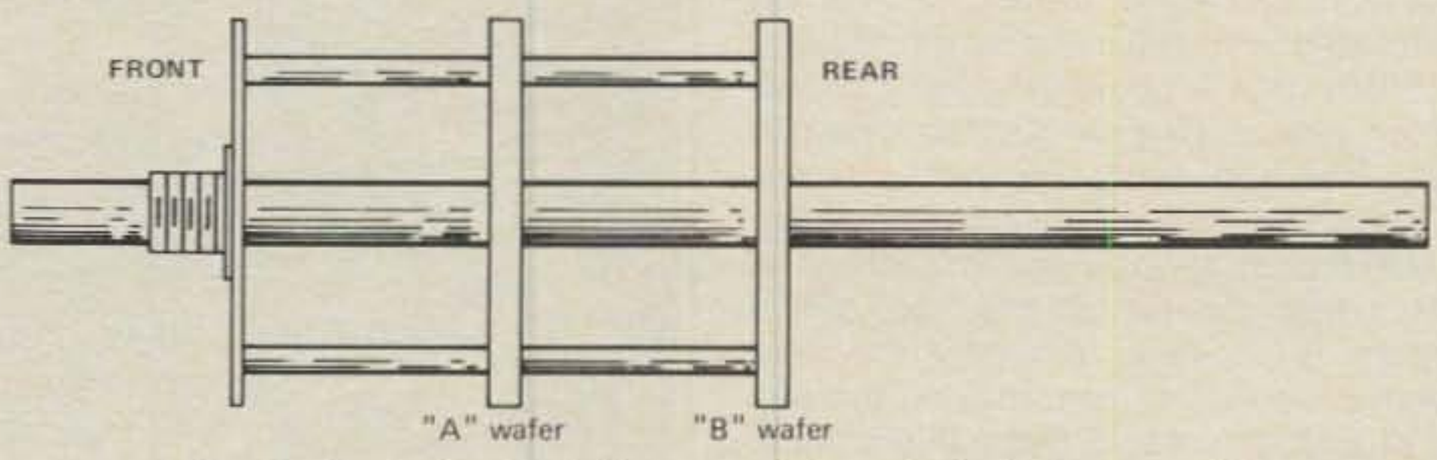


Fig. 1– A mechanical diagram of the switch deck assembly.

Once these items are located you are ready to proceed to the heart of the operation: making the five-position main bandswitch become a six-position switch and perform its switching functions.

First, you should completely disassemble the leftover four-position bandswitch sitting in your junk box. Carefully remove the ceramic wafers and place the rest of the switch into the junk box. Once the ceramic wafers are detached, you must drill out the rivets holding the contacts to the wafers. Use a 3/32 inch drill and be extremely careful to avoid breaking the wafers. Save these contacts, as they will be added to the five-position bandswitch already installed in the SB-201. You should now be holding a handful of switch contacts and you can begin to customize your bandswitch.

Now you must remove the five-position main bandswitch from the SB-201. After this switch is out you are ready to add your new contacts. Remember to *add one contact to each side* of the wafer. Fig. 1 is a diagram to show which wafer you are reworking. For your rebuilding you will view each wafer from the rear.

Not having riveting facilities, I chose to mount the contacts with a 3/8 inch long 2-56 bolt and nut because they were small enough to go through the holes already in the switch wafers. (If you use this method, *do not* over tighten, as you may break

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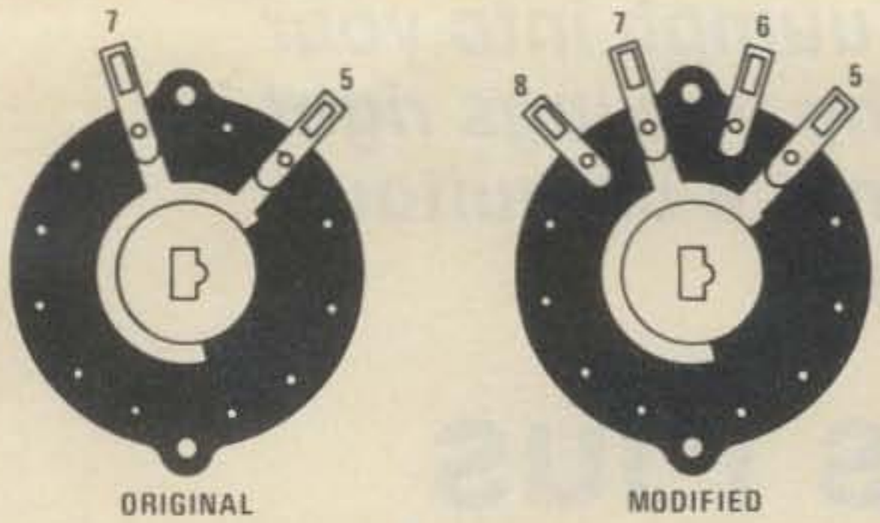


Fig. 2– The original and modified "A" wafer. Note the index and new switch positions.

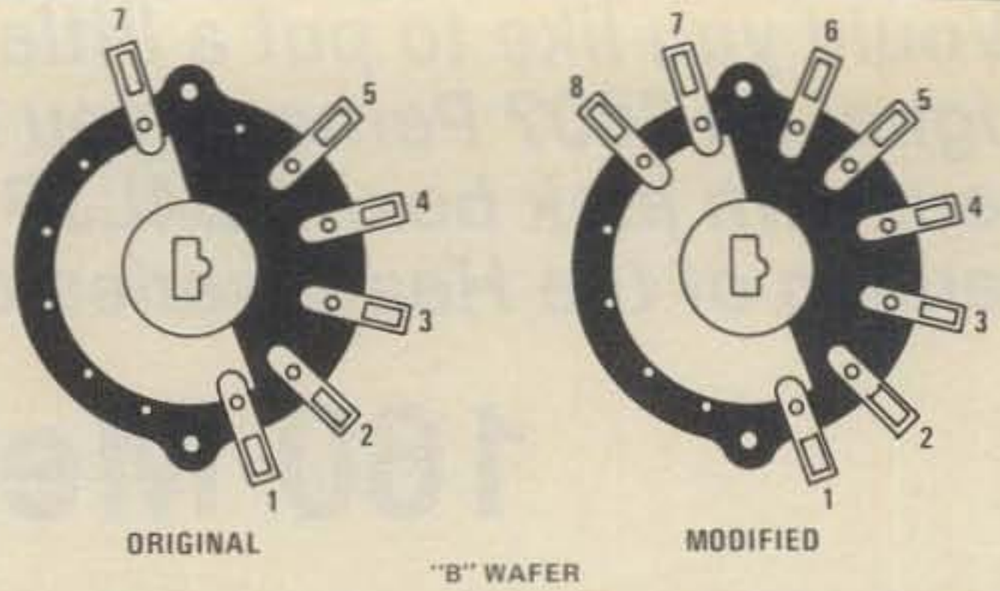


Fig. 3– The original and modified "B" wafer. As with fig. 2, you must add one contact to each side of the wafer.

the ceramic wafers.) You may want to use some enamel paint on these threads to ensure that they will not come undone.

Looking at fig. 1 of the bandswitch, let's work on the "A" wafer. This can be performed with the bandswitch fully intact. *Do not* disassemble the five-position switch. Just add the contacts as shown in fig. 2. Then add contacts to the "B" wafer as shown in fig. 3. This completes the switch modification except for cutting the switch stop located on the front of the switch. Be sure to cut only the stop holding the switch from making the last set of added contacts. Once this is done, you will have a six-position switch.

Now you must remove the small five-position, single-wafer, dual-section switch which selects the tuned input circuit. Next replace the modified six-position bandswitch back into the SB-201 and be sure to position it so that you have it stop one position past the 80 meter mark on the front panel. Then rotate the switch through all of the six bands to make sure it is operating correctly. It should now select 160 through 10 meters.

Install the new six-position, single-wafer, dual-section switch over the shaft protruding through the tuned input coil area. Make sure this switch is in proper sequence with the main bandswitch. You will have to drill new mounting holes to get proper sequence. Once this is mounted, you have the capability to switch everything required. Now reconnect the 80 through 10 meter tuned input circuits.

You must now install the 200 pF and the 100 pF 5 kv ceramic capacitors on a small bracket and mount them on the plate tuning capacitor similar to the one already used by Heath. See fig. 4.

Next connect the lead from these capacitors to contact No. 5 on wafer "A" of the main bandswitch. The original 100 pF 5 kv capacitor must be moved and attached to our added contact No. 6 on wafer "A." Contact No. 7 is already grounded, so you must now also ground your new contact No. 8. In the 160 meter position you now have an extra 300 pF of fixed capacitance in parallel with the plate tuning capacitor. The original 100 pF now switches in parallel only in the 80

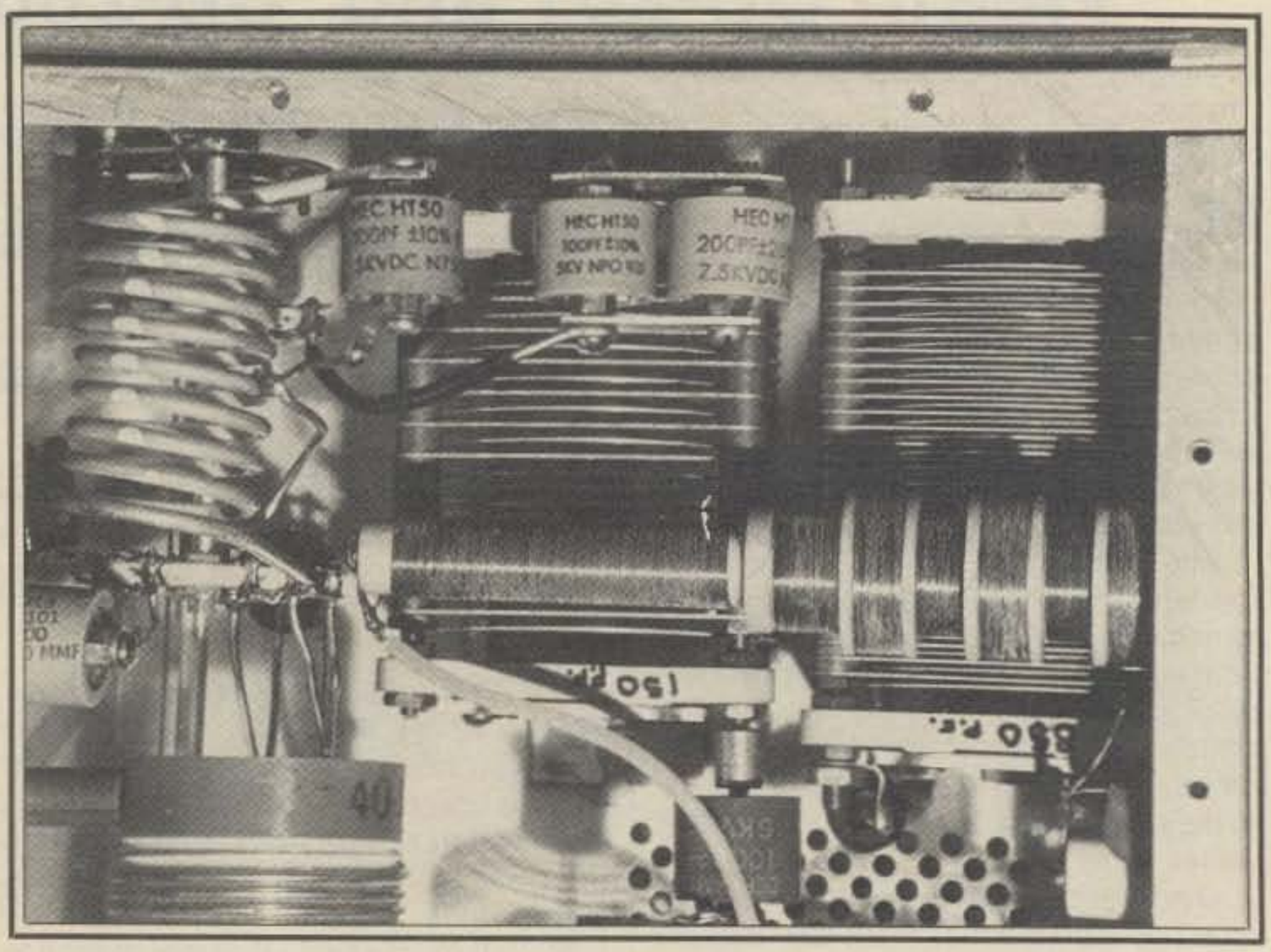


Fig. 4– This view shows the installation of the two new capacitors mounted on a small bracket located at the top center.

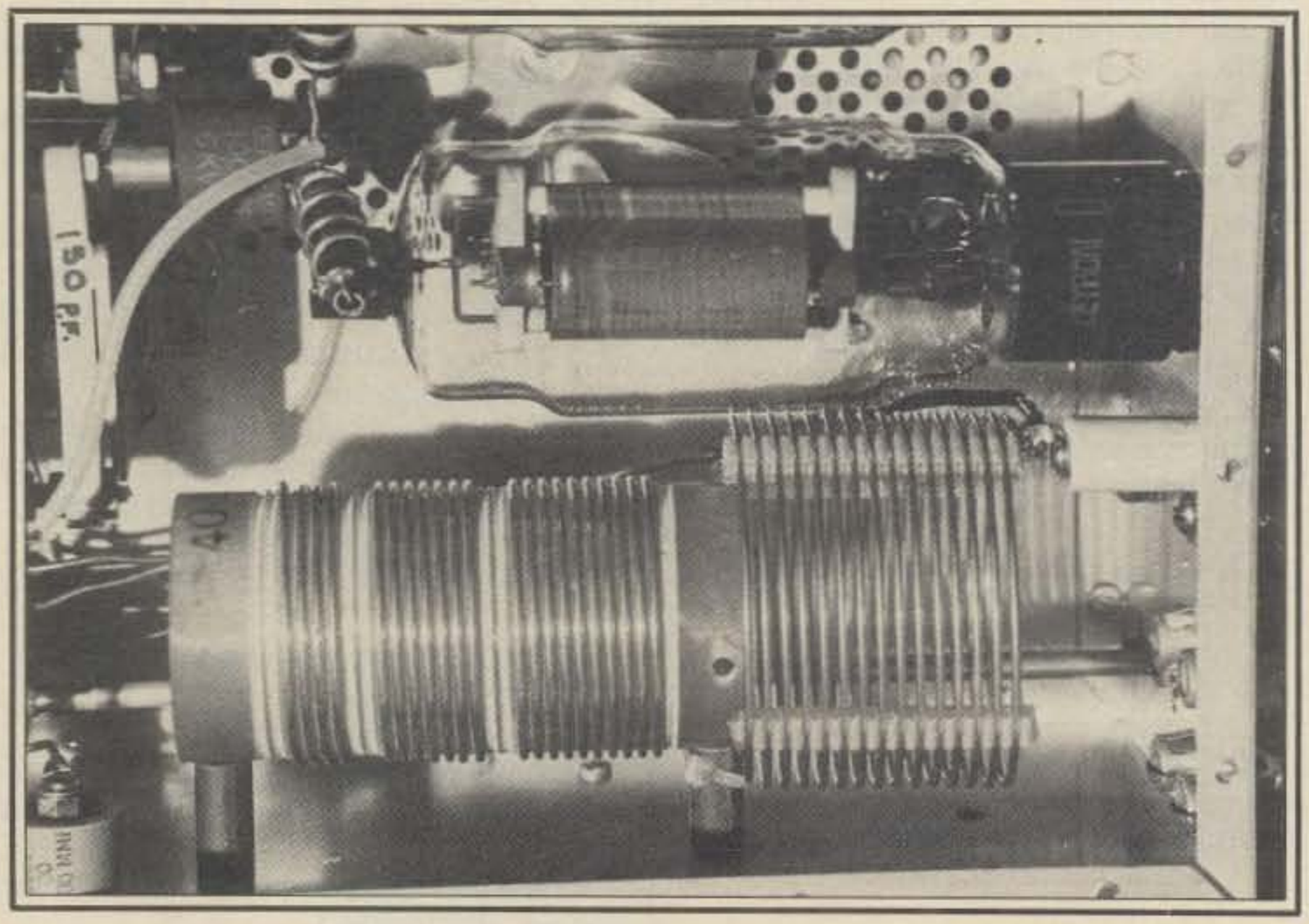


Fig. 5– The new coil can be seen added to the existing coil in the bottom half of this photograph.

meter position. The only function of the "A" wafer is to switch the proper fixed capacitor in parallel to ground with the plate tuning capacitor at the proper time.

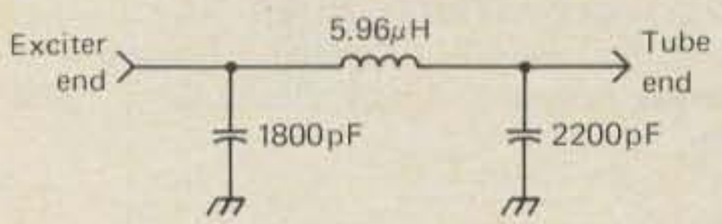
Total inductance of the original final tank cicuit is approximtely 10 μH. The calculations show this to be 9 μH short of the required value, so you must now add a 2 inch length (16 turns) of B&W miniductor No. 3030/3906-1 to get the extra inductance you need. See fig. 5 and locate the added coil in this location.

After mounting, be sure that the coil does not short against the long metal shaft which goes to the tuned input switch.

Now you must position the taps on your coil to the proper contacts on the "B" wafer. See fig. 6. The original 500 pF mica which the "B" wafer places in parallel with the loading capacitor on 80 meters must be moved to our added contact No. 8. A 1000 pF and the 200 pF (if required) 5 kv capacitor must be added in parallel from contact No. 7 of the "B" wafer to ground. The 200 pF 5 kv capacitor was not required in my unit, as the 1000 pF capacitor was about 20% on the high side, which figured out to be 1200 pF.

In the 160 meter position the "B" wafer selects all of the inductor and adds the 1000 pF, 500 pF, and the 200 pF (if required) in parallel with the variable loading capacitor to provide the required 2500 pF needed for the required loading.

Now you must build the tuned input circuit for the 160 meter position. At this frequency the input impedance is approximately 107 ohms for a pair of 572Bs.[2] This calls for the following pi network to match the 50 ohm exciter to the tubes.[3]



The 5.96 μH inductor is made from winding 21 turns of No. 20 wire on an Amidon T-106-2 core. The inductor and the two fixed capacitors accomplish the required impedance transformation. The core is placed near the other input coils. See fig. 7. Hook up the tuned input circuit to the proper contacts on the switch.

Remove the original 10 μH filament choke and replace it with your homemade choke consisting of 22 bifilar turns of No. 12 wire wound on a ½" × 7½" Amidon rod. There are many commercial units which will work satisfactorily. The filament choke should present a minimum of 428 ohms of inductive reactance at 1.8 MHz.[4]

Finally, all that remains is removing the 50 μH plate choke supplied by Heath and replacing it with a choke that has a value in the vicinity of 150 μH. You might pick up an old National choke at a hamfest, or you could purchase a commercially built unit.

This completes the modification. Dou-

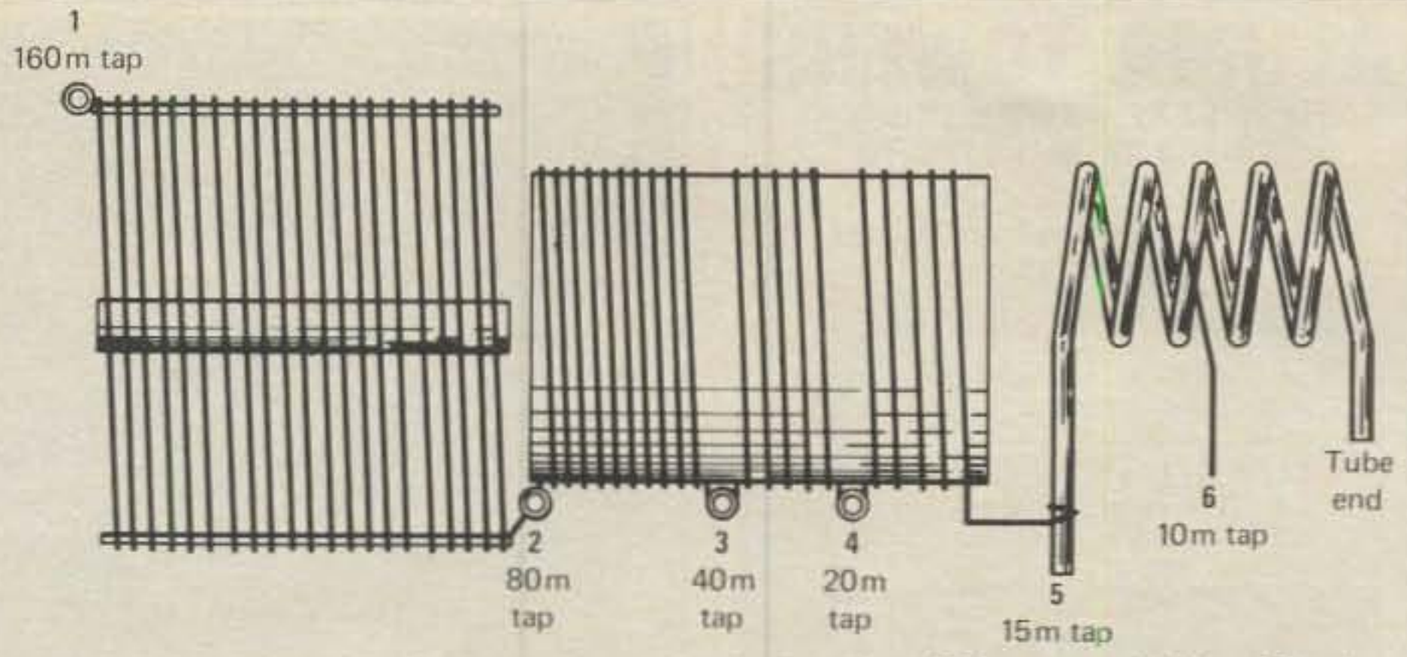


Fig. 6– Diagram of the all-band inductor, including the 160 meter addition. The taps for the various bands are also shown.

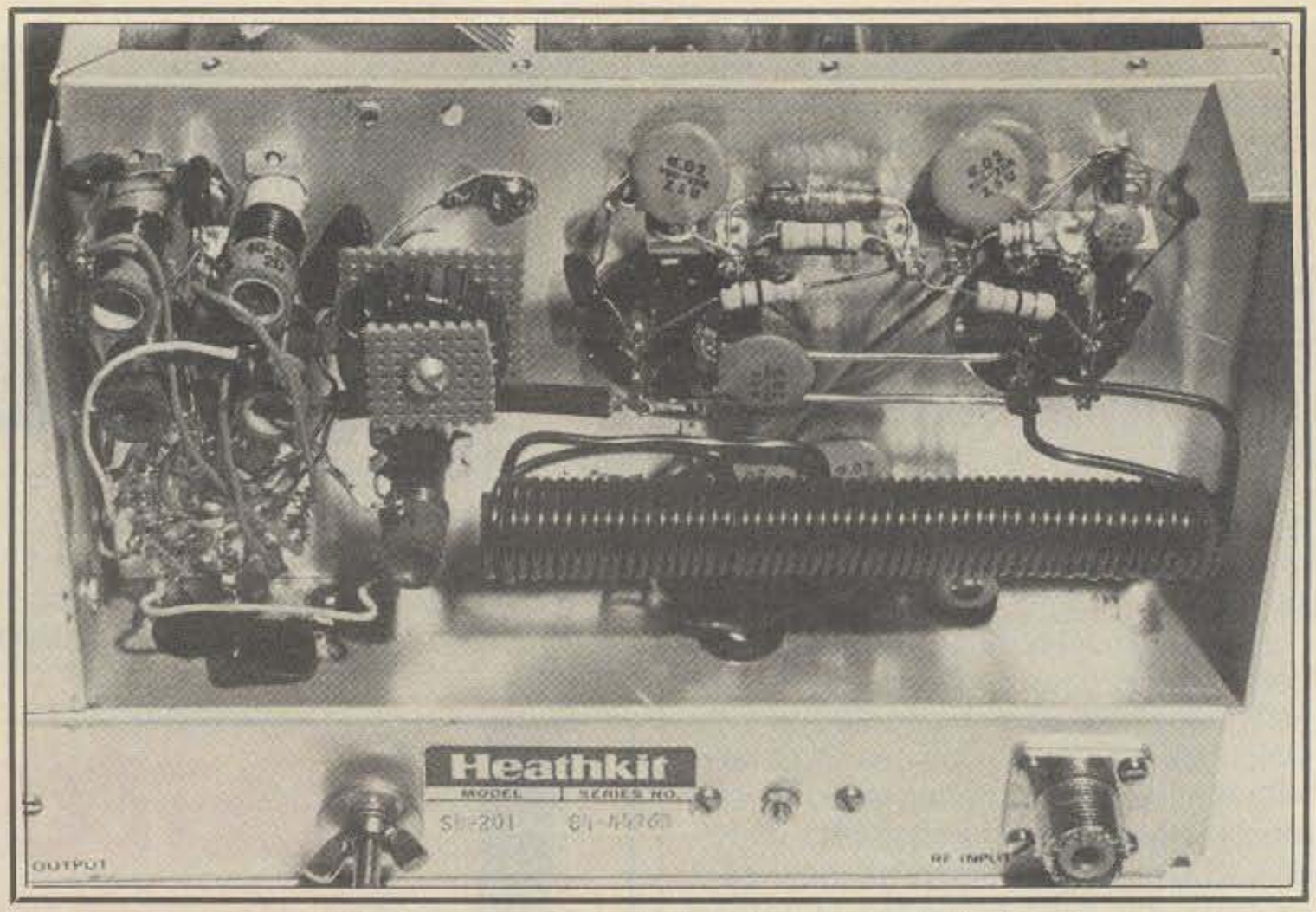


Fig. 7– The two new inductors are shown in this view. To the left of center, sandwiched between two pieces of perf-board, is the 5.96 μH toroid. The bifilar-wound filament choke can be seen along the edge of the chassis.

ble-check your work. Make sure you have the circuit hooked up correctly. Now *without* applying power, place the bandswitch in the 160 meter position and place a grid-dip meter near the final tank coil. As the plate tuning and loading capacitors are rotated, a good null should be noted. Check all the other bands to make sure you have all the tap on the final tank coil located correctly. Double check to see that the proper tuned input circuit is also being selected. When this is completed you are ready to button up the unit and place it back in the cabinet.

You may now apply power and check operation into a dummy load on each band. Eighty through ten meter operation should remain as before modification. One-sixty meter operation may not fall with maximum plate capacitance or maximum loading. This is normal and is caused by the tolerances in the fixed capacitors used in the plate and loading circuits. Watch you wattmeter and load it for maximum output. When properly loaded, the unit should show about 1200 watts PEP on 160 meters. At this point, if you have a scope, hook it up and check your signal. Everything should be operating correctly. If a problem shows up, shut the unit down and check your work thoroughly. (If all goes well, I'll be looking for your big signal around 1840 kHz.)

If you live in the city as I do, a quick word about antennas is in order. My lot is 135 feet long and only 80 feet wide. This is very limited real estate for a good 160 meter antenna. I've tried many antennas and finally found one that delivers a good signal without an elaborate ground system; it is the folded unipole.[5] The 80 foot Rohn 25G tower which supports my triband beam is fed as a folded unipole and gives excellent results.

Footnotes

[1] Irvin M. Hoff, W6FFC, "High Frequency Power Amplifier Pi Network Design," *Ham Radio*, September 1972, pp. 6–22.

[2] William I. Orr, W6SAI, *Radio Handbook*, 22nd ed., p. 7.23.

[3] Irvin M. Hoff, W6FFC, "Networks for Transmitter Matching," *Ham Radio*, January 1973, pp. 6–12.

[4] Doug DeMaw, W1FB, "The Whys and Hows of Bifilar Filament Chokes," *QST*, April 1979, pp. 28–29.

[5] John Haerle, WB5IIR, "Folded Umbrella Antenna," *Ham Radio*, May 1979, pp. 38–43.

Parts Information

Here is a list of the required parts:

1. 1000 pF 5 kv capacitor part No. CC-1000 (one req'd.).
2. 200 pF 5 kv capacitor part No. CC-200 (two req'd.).
3. 100 pF 5 kv capacitor part No. CC-100 (one req'd.).
4. 30 amp filament choke part No. FC-30 (one req'd.).
5. Plate choke part No. PC-1000-2A (one req'd.).

Parts may be purchased from the following sources: Amp Supply Co., P.O. Box 421, 2071 Midway Dr., Twinsburg, Ohio 44087 (phone 216-425-2010). The coil stock B&W No. 3030/3906-1 may be ordered directly from this address: Barker & Williamson, 10 Canal St., Bristol, PA 19007 (phone 215-788-5581). The T-106-2 toroid core and the ferrite rod may be ordered from Amidon Associates, 12033 Otsego St., North Hollywood, CA 91607.

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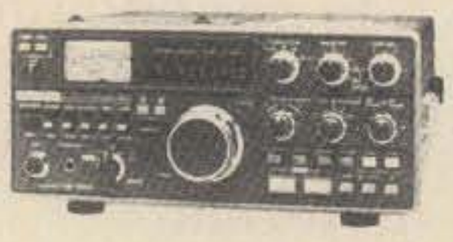

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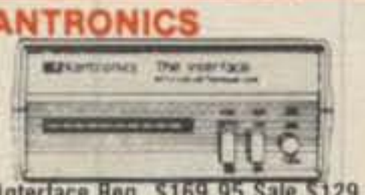

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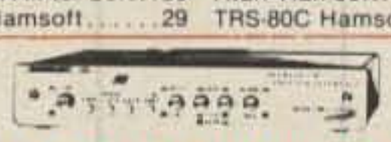

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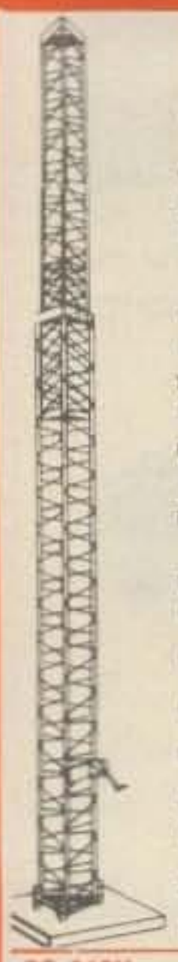

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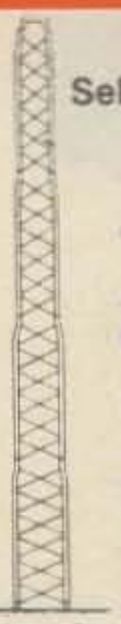

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W36	36.0 ft	20.5 ft	9.0 sq ft	$694	$579
WT51	51.0 ft	20.5 ft	9.0 sq ft	$1154	$999
LM354	54.0 ft	21.0 ft	16 sq ft	$2010	$1599
LM470D (Motorized)	70.0 ft	22.0 ft	16 sq ft	$4195	$2999
DX86 (Motorized)	86.0 ft	23.0 ft	25 sq ft	$7200	Call

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

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

RG-8X

$.19/ft $179/1000 ft

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

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	6.8
RG-58/U	52	1.4	1.9	6.0	12.5
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

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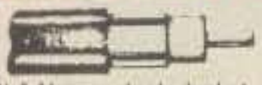

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select connectors below.

HARDLINE & HELIAX™ CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
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½" Heliax ™	$22	$22	$22	$22
⅞" Heliax ™	$49	$49	$49	$49

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Silver PL259	$1.25	UG23D N Female	$2.95
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Van Gorden 1:1 Balun			$11
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6BTV 80-10 mtr Vert $129
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G6-144B 2-mtr Base $89 G7-144 2-mtr Base $119

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15-3CD	$119	15-4CD	$129
20-3CD	$199	20-4CD	$279
40-2CD	$289	D40	$149

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220B	$ 95	424B	$ 79

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A147-20T	$ 63	416TB	$ 59
A14TMB	$ 29	PS4	$ 69

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203BAS 3-el 20-mtr Beam	$149
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103BAS 3-el 10-mtr Beam	$69
DB1015BAS 3-el 10/15 mtr Beam	$179
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18HTS 80-10 mtr Hy-Tower Vertical	$429
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214 14-el 2-mtr Beam	$39
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BN86 80-10 mtr KW Balun W/Coax Seal	$19

MOSLEY

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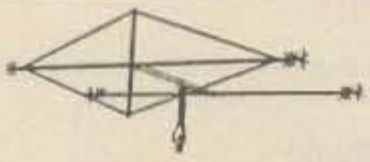
TA40KR 40mtr Kit for TA33	$119



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Model LT/N 200W N Type	$39
Model HT/N 2KW N Type	$44
Model R-T 200W Deluxe	$29
Model HV 2KW Deluxe	$32

KLM

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KT34XA 6-el Broad Band Triband Beam	$489
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40m-1 40-mtr Rotatable Dipole	$179
40m-2 2-el 40-mtr Beam	$309
40m-3 3-el 40-mtr Beam	$439
40m-4 4-el 40-mtr Beam	$649
20m-6 6-el 20-mtr Beam	$689
15m-6 6-el 15-mtr Beam	$439
10m-6 6-el 10-mtr Beam	$259
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10 ft Stack Sections

20G $37.50 25G $46.50
45G $107.50 55G $127.50

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Foldover Towers

Model	Height	Ant Load*	Price
FK2548	48 ft	15.4 sq ft	$ 829
FK2558	58 ft	13.3 sq ft	$ 899
FK2568	68 ft	11.7 sq ft	$ 959
FK4544	44 ft	34.8 sq ft	$1159
FK4554	54 ft	29.1 sq ft	$1259
FK4564	64 ft	28.4 sq ft	$1359
25G Foldover Double Guy Kit			$199
45G Foldover Double Guy Kit			$229

*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.

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3/16" EHS Guywire (3990 lb rating)	$.13/ft
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3/16" CCM Cable Clamp (3/16" or 5/32" Cable)	$.35
1/4" CCM Cable Clamp (1/4" Cable)	$.45
1/4" TH Thimble (fits all sizes)	$.30
3/8EE (3/8" Eye & Eye Turnbuckle)	$5.95
3/8" EJ (3/8" Eye & Jaw Turnbuckle)	$6.95
1/2" EE (1/2" Eye & Eye Turnbuckle)	$8.95
1/2" EJ (1/2" Eye & Jaw Turnbuckle)	$9.95
3/16" Preformed Guy Grip	$1.99
1/4" Preformed Guy Grip	$2.49
6" Diam - 4 ft Long Earth Screw Anchor	$12.95
5000 Guy Insulator (5/32" or 3/16" Cable)	$1.39
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HPTG2100 Guy Cable (2100 lb rating)	$.29/ft
HPTG4000 Guy Cable (4000 lb rating)	$.43/ft
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9901LD Cable End (for 2100/4000 cable)	$6.95
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QRP

a monthly feature by
ADRIAN WEISS, K8EEG

THE ART OF VERY LOW POWER OPERATING

QRP Field Day 1983—Part II

Hopefully, last month's Part I of the QRP Field Day report served as an inspiration for many of you who haven't been out on this annual event. We'll squeeze in the remaining reports and end up with hints about planning and operating in this month's column.

Jim, KK7C, and **Dave, KA7GIP, Stevens** provide some very valuable insight into the strategy involved in antenna selection. They write: "We had a great QRP experience during the past Field Day. As the sun rose over the 8000 ft. mountains a mile to the east, our pickup truck thumped and swayed across the orchard's irrigation ditches. You may wonder what we were doing in such an area on FD. Well, I thought about how most FD groups I knew of were heading for the mountain high ground. Our strategy was different: head for the flat land where we could put up a large antenna. I was already wary of mountains as h.f. portable locations. Three years ago, operating as DJ0DB/portable, we had gotten out much better from the mosquito-infested swampland next to the Rhine than from the Taunus mountains 3000 ft. up. This time we would prove the point!

"When we reached the small clearing at the west side of the orchard, Dave and his buddy Helaman Ferguson jumped out and began the most important project for Field Day, the one we had been planning for three months: stringing the 300 ft. legs of our zipcord rhombic over the tops of the apple trees. Beamed 60° east by 240° west, the rhombic was the keystone of our Field Day strategy. First, we had to have a gain antenna to compensate for QRP power in the heavy FD competition. Second, collinears, Yagis, JF's, and loops had all been studied. None of these designs would have the same directionality on more than one band, nor would any give the rhombic's mixture of low to high angle radiation along a single axis. Third, our single 5 watt transmitter had to be heard in the population centers on the east and west coasts on all bands and under varying conditions, or we would run out of QSO partners in a hurry.

"Our only reservation was would the rhombic do the job when it was only 18 ft. above ground and resting on the upper branches of the apple trees? It did! The moment the generator began its muffled rumble at 1858Z, the signal of WC4M came over the speaker with a silky clear background. One call and we were 599 in Tennessee with only 3 watts out and the antenna tuner not yet peaked! The rhombic performed magnificently on 40, 20, and 15 meters, turning our peanut whistle into an effective competitor on all bands. We were able to average 25 QSOs/hr. on every band! Unfortunately, we could only work the first 12 hours of the test before breaking camp, but we will be back again next year. QRP? You bet!" No way to beat a good wire gain antenna on FD!

Gene Smith, KA5NLY, deserves commendation for squeezing in some QRP operating in the context of a QRO club operation. But it isn't the best way to go, as he writes: "I took you up on your appeal for more milliwatters by frustrating myself and many others with my 750 mw. Must have lost about 10–12 stations that couldn't copy me and gave up. I was part of a short-handed club QRO operation, so I was only able to operate 'bits and pieces' on my QRP rig. Gotta convert someone else in the club to QRP so we can operate our own position in shifts. In between club duties, I only managed to get in one good 2½ hour stretch and averaged about 7 QSOs per hour through the 40 meter phone band QRM in the wee hours. Got some good signal reports during the first half hour and the last 10 minutes that I operated. All in all, I had fun and learned a lot about operating 'milliwatt phone.' It ain't easy, but let's do it again!" Wow, guess I'd never try 40 phone with under a watt, but why not?

Randal Shirbroun, WA0VBW (DXCC ORPp #35), suffered from *CQ's* failure to put the FD report for 1982 into the June issue. He writes: "I was very surprised, and a little upset, to see the results of the 1982 FD listed in *CQ* this year, since there had been no announcement last June, and I assumed that the FD program had been dropped. In fact, due to the infrequent appearance of your QRP column, I wasn't even sure of your status! As it turns out, our score for 1982 was pretty good, but there probably were higher scores. Oh well. This year our FD operation was very similar to that of past years (Argonaut and dipole at 75 ft. fed through open line). This

83 Suburban Estates, Vermillion, SD 57069

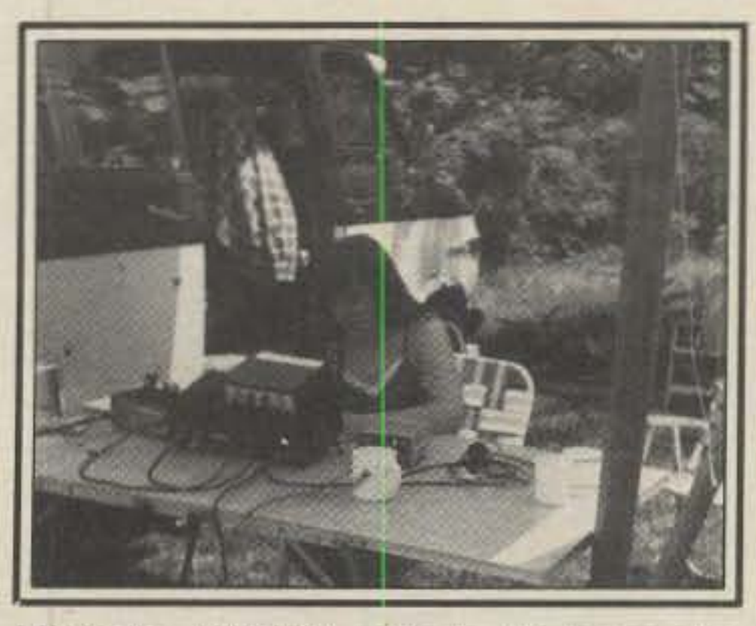
QRP Field Day Trophy Winners
5 Watt Class

Year	Station	QSOs	Score
1970	K4OCE	220	1470
1971	WA6ABP	137	1175
1972	W7DRA	55	562
1973	WA5WYO*	79	1098
1974	W0IYP	439	2748
1975	WB8OSM	220	1470
1976	K6TG	128	918
1977	N2AA	389	2790
1978	WA4IAR	442	2804
1979	WD5BKO	287	1872
1980	K1JX*	741	9042
1981	N4BP	999	6144
1982	N5EM	259	1704
1983	WA0VBW	435	2760

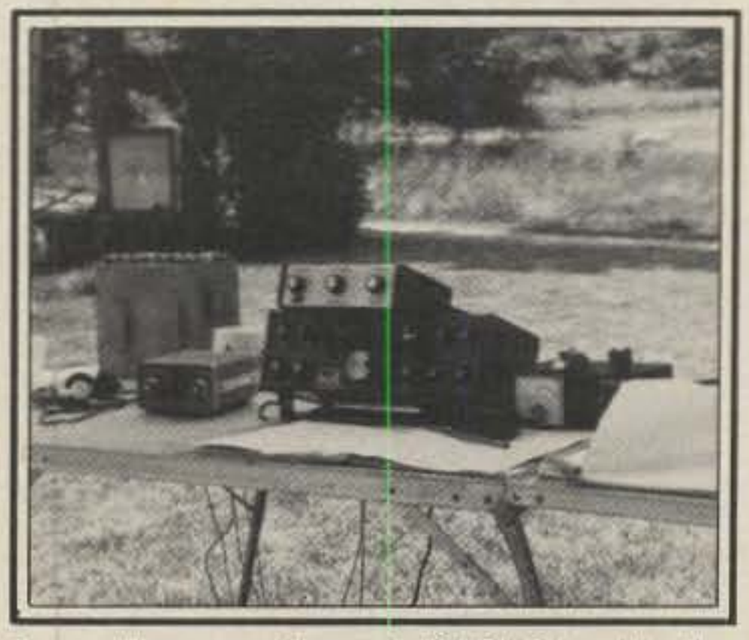
**One watt entries, score adjusted to current X8 PWR MULT.*

One Watt Class

1981	K5WNH/0	239	3018
1982			
1983	N0BYC	241	3042



Michelle, KA8LCJ, who is 15 years old, joins the FD fun at the Woodland Trails Boyscout Camp in Camden, OH. Father, KA8IRP, WA8SOI, and N8ECB helped out with the installation, while Michelle did a fine job with 179 QSOs.



Operating position at KA8LCJ with the Argo 515, mike, and accessories on a collapsible table. I bet that sweet feminine voice helped attract attention in the usual s.s.b. mess for 167 QSOs!

year we also used a 3 element 40 meter Yagi fixed at 90°E, and it worked quite well. I really enjoy operating on 10 meters, so despite last year's bad experience (only 2 QSOs on 10) due to the solar flare, I was determined to check it out frequently for any possible openings. My optimism paid off, as 10 meters made up for last year's bad experience. The second operator was **Dave, KAØHIB**, again. Other than FD, I really haven't been active for several months, but my DXCC QRPp totals are up to 203/185 now." Well, Randal, this year's results ought to make up for last year's mixup!

Next, another in a long series of FD reports from **Ben Saylor, K6TG**, who hasn't missed a year for longer than I can remember. Ben writes: "FD plans were jolted when something was read about Ade's threat to chop off the one watt class because the boys were no longer operating real low power levels. I didn't think Ade would cut off real QRP, but it shook me up. I got to thinking that my first c.w. QSO in 1929 was with less than one watt, but all my QRP FD efforts were with a big signal from 5–10 watts input. So I decided to go from high-power QRP to low-power QRP for the 1983 FD. In getting ready, I tried one watt on my antique Argonaut—only one QSO, and I lost him. Next, I reduced the FT-7 to one watt—no QSOs! Then I used my HW-8 at one watt, and QSOs were easy and lots of fun. That's more like it, I said, but is the little HW-8 best? At any rate, FD power was checked by a B&W 334A dummy-load wattmeter. Twenty-five FD QSOs were made with the HW-8 on four bands, and the rest were made with the FT-7. Conditions here were poor with only two DX signals heard. JA8DA was worked with 0.8 watts output. An 80 meter inverted-Vee with the apex at 40 ft. was used on all bands. Results include 11 QSOs on 80, 60 on 40, 31 on 20, and 51 on 15 meters. It was work, but I have that good QRP feeling!"

Richard Blanchard, WA1VVX, operated for 13½ hours from the home QTH using inverted-Vees on 80/40 meters, and a tribander at 40 ft. on 20, 15, and 10 meters. His comments: "Super band conditions. Ten meters opened at 1030 local time and provided 28 s.s.b. QSOs. Also managed 54 s.s.b. QSOs on 40. Contrary to other advice, I found that standard QRP operating procedures worked best for me. I took a short break each hour to relax a bit, and found this quite helpful in keeping my sanity! Best band for me was 15 meters, with 40 following close behind. This was the first contest I've been in, and I enjoyed the challenge. Many comments were received regarding 'the great signal with just 5 watts.' QRP operation is and can be just as effective as QRO, and it really sharpens your operating skills."

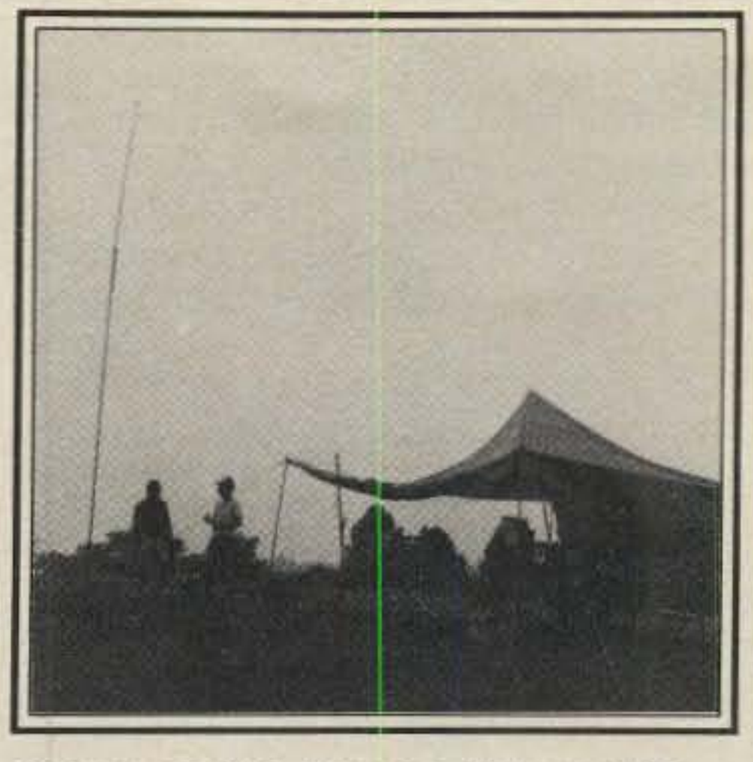
George Zielinski, W9OA, went out for the first time in a decade: "I got interested in QRP about 6 months ago, so I said, 'Self, let's give it a try.' I stayed close to home and set up in an abandoned farm field near my property. Typical weather—blazing hot on Saturday with the temperature at well over 100°. A Ten-Tec 525D powered by an auto battery served as the rig. The antenna consisted of a 16 ft. boom section from an old 20 meter beam as a center-support for the 66 ft. inverted-Vee. The ends were only about 8 ft. above the ground and supported by some old beam elements. I fed it with 450 ohm TV open-wire line through my old Johnson kw matchbox—a bit of overkill, but it worked beautifully on all bands. Thanks for the planning tips in last year's FD column. They were a big help to me and saved a lot of time and effort."

QRP FD Club Standings
Top 25 (1979–83)

	Call (YR)	QSOs	Total
1.	N4BP (82)	1170	7170
2.	K8BX (81)	854	5274
3.	K8IF (79)	732	4488
4.	N2RI (83)	699	4344
5.	N5AF (82)	685	4260
6.	K8IF (82)	684	4254
7.	KN9W (83)	643	4008
8.	W2LZ (83)	637	3972
9.	AC2U (81)	627	3912
10.	N2RI (82)	625	3900
11.	WB9JVX (82)	584	3654
12.	N2RI (81)	555	3480
13.	K8BX (80)	378	2985
14.	KB8GC (79)	437	2772
15.	KM8X (81)	407	2595
16.	WØVM (83)	394	2514
17.	W6SKQ (82)	394	2514
18.	WØMHK (79)	336	2166
19.	K1GAX (79)	342	2052
20.	WAØVBW (81)	312	2022
21.	K9BCM (81)	300	1950
22.	N5AE (83)	279	1824
23.	W6SKQ (83)	259	1704
24.	WA6POC (83)	245	1620
25.	W3FQR (79)	243	1608

The Clubs

Paul Seamon, N2RI, along with **AI2Q** and **KQ2G**, were at it again this year with a modified nautically derived club moniker "Sticky and the QRP Bulkhead Bashers." All three are sailing nuts, and their club names over the years have reflected nautical terminology. Paul notes: "This year the station was set up at Hempstead, Long Island, NY, only about one-quarter mile from our 1982 site, but a bit closer to the Atlantic. This may explain why we made 74 more QSOs this year, as at the site is available a good ground consisting of conduit pipe tossed into the salt water. It seems to make all the difference with our antenna, an Extended Double Zepp cut for 40 meters and fed through open-line and tuner. We also used a collinear beam for 20 meters at a height of 25 ft. However, our weather-balloon vertical turned into an 'almost,' since it burst while we were filling it with helium. Looking forward to seeing the FD article in 1983."



The setup of the Principia College ARC on the college grounds beneath a big top. A battery and solar-panel provided power for the Argosy. The mast to the left supports a center-fed Zepp fed through open-line.

The Principia gang, WØVM, apparently has been doing this FD routine for a while, and they know how to live it up in great style! The centerpiece for the spread of chicken and other goodies is a cake for the occasion—a good job of decorating the cake, too. The top half is blue (sky), the bottom half is off-yellow (ground), and trees at each end of the cake support an antenna!

The "Won Watters" (get it?), consisting of **KQ5U** and **KC5EV**, headed out for competition in the one watt class, but due to confusion regarding the rules, they used two transmitters and ended up in the club competition.

The Principia College Amateur Radio Club with six operators headed by **William R. Stocking, WØVM**, set up on the college grounds with, as Bill humerously describes it, "ye olde tyme center-fed Zepp" cut for 80 meters and fed through open-line and tuner. An Argosy powered by a solar-panel-charged motorcycle battery served as the rig. The good showing included 43 states and 5 provinces. After-

effects of the outing await investigation, as Bill notes: "This was the first year that our group used a loudspeaker instead of phones for the entire 24 hours. One of the men who worked at the FD site following the contest said that the mocking birds were sending Morse code—sounded like 'CQ' to him! Next year I think I'll take a recorder to the FD site following the contest and make a tape recording of these sounds...." What's this, a "bird story"?

Paul Rogers, W2TFL, reports for the Walton Radio Club, **W2LZ**: "We've been operating QRP FD for the past nine years. I thought I had better send our results in to you this year to let you know that there is nothing like a QRP FD. The gang really enjoys it. We used a pair of Argonauts, dipoles up 65 ft. for 80 and 40, a 3 element collinear at 50 ft. for 40, and a tribander up about 30 ft."

Jerome Doerrie, K5IS, led the Top of the Panhandle ARC, with N5AE, WD5FLU, WD5FLV, and WB5ZRC, for the FD outing at Lake Fryer. The outfit operated with a Novice station. "An Argosy at 2 watts performed as the main rig, while an Argo 515 was used by the Novice group. Batteries were charged by a solar panel during sunlight hours. A highlight for us was to operate 32.4 rig-hours with 290 QSOs in 42 states and end the contest with our battery power recharged."

Red Reynolds, K5VOL, and the Harper Air Hawks, including **KN9W, KA9HAO, WD9ISG, KA9KBH, W9ZSJ, K9PNG (DXCC QRPp #63),** were at it again from the same location. Red reports: "Our battery supply came from an electric car that the college was working on. It was nice to *drive* the battery to the site instead of carrying it. Also, all of our 40 meter daytime QSOs were via solar power. We didn't have the spinning-rod expert, so we tried a bow shooting part of a curtain rod for getting antenna lines into the trees. As it turned out, K5VOL's arm and a wrench proved the best method of putting lines into trees! The new 200 ft. vertical held up by a helium balloon worked while the sun was up, but after sunset temperatures cooled and it became more of a semi-vertical. We suspected a small leak. Anyway, we got a few 160 meter QSOs with it—a new band for our FD efforts. Our longwire was a killer to the east and west. It is nice to experiment with different antennas from year to year, but it looks like the Argosy/longwire combo will be the mainstay of our effort. We got the longwire a bit higher this year, and extended the length to 300 ft. A good antenna tuner helps."

Bob Spidell, W6SKQ (DXCC QRPp #59), along with **KF6BC** and **WB6RSM**, were back at 8100 ft. altitude in the San Gabriel mountains with a pair of Argonauts. Bob notes that the altitude seemed to tire the gang out this year—maybe age creeping up on 'em! A late departure for the site pushed preparations beyond sunset, so no one got much sleep. The next morning, sunset revealed Bob thus: "You should have seen me trying to toss rocks with leader lines attached up into the giant 100 footers. These lines were for hoisting and securing the 8JK wire beam between the tall pines. Guess it took about two hours to finally get it up and to adjust everything correctly. But it was really up there. You should have seen the phasing line dropping down from the 8JK and ending about 40 ft. above ground! It loaded quite well on 20 and 40 as well as 15. In essence, it worked out well, but not as much as I had hoped for on 20 c.w. I suspect I'll go back to my trusty homebrew ZL-Special and Vee beam next year, and might settle for 4000 ft. instead of 8100 ft. altitude. Wait till next year ....

Sounds like it was a great FD for those who went out. Now, for some helpful hints.

Planning and Operating QRP FD

1. Don't count on your equipment working after you've hauled it out to the FD site! Check out all gear ahead of time, take it out for a trial run, and correct any problems that arise. Don't leave for the site without all the necessary accessories, tools, and spares. Take a 'bug' or a handkey along in case the keyer malfunctions. An extra rig (if you have one) isn't a bad idea either. Also take pliers, electrical tape, extra hook-up wire, spare coax connecting cables, alligator clips/leads, plugs, #47 buls (current indicators for open-line or single-line feeders), extra accessory batteries, etc. *Important:* Check all solder joints on coax connector cables as well as plugs on the antenna coax runs and redo if corroded. Stress to these items in the temporary FD setup may finish the job begun at the low-stress home QTH. Take along an extra 200–300 ft. of antenna wire in case you need it.

2. *Site selection* is important. If you use a wire antenna, tall trees with sparse branches are ideal, and spacing is important. When too close together, trees serve only as obstacles to erecting an

antenna and have a way of snagging wires and lines. Ideally, a grassy meadow with a pair of 80 ft. trees (few branches) about 140 ft. apart, plus a few scrub trees for shade, fits the bill. Access to sanitary facilities is a definite advantage during FD. Beware of state parks servicing vacationers; TV's generate noise that can cause problems, and usually a lot of snoopy kids are around who are capable of pulling down an antenna.

3. The *antenna* is the key factor in any FD effort. Pick it carefully. If you are located in the populous eastern U.S., the antenna for 80/40 meters should provide coverage close-in and over a wide area; hence a low height (30–50 ft.) will provide high-angle radiation. For those operating from the sparsely populated regions of the midwest and western U.S., a gain antenna on the high bands is the best choice, and strive for maximum height for the low bands. Otherwise, a vertical on 80/40 may help with low-angle radiation, but only when a good ground plane is under it. Otherwise, it is lossy compared to a dipole. Figure out which types of coverage are needed for producing access to the highest activity areas, and go with the antenna type and height that will work. Avoid categorically aiming for a low radiation angle, given summer ionospheric virtual heights and the typical FD antenna heights used, a low radiation angle is often self-defeating. A half-wavelength height is probably optimum in terms of all the factors involved. If you must, be satisfied with a dipole or inverted- Vee on the high bands. But make the effort to come up with a gain antenna. The various handbooks show a large selection of wire arrays which are ideal for FD—bi-directional radiation patterns, either endfire or broadside, with a cheap 4–7 dB tossed into the bargain. Among these are the Extended Double Zepp (single wire), the longwire, and multi-wire arrays such as the *8JK, Lazy-H, ZL-Special, Vee beam, JF Array*, and others. Multiband operation with most of these is possible, since they are fed with open-line through an antenna tuner. Bear in mind that feedline loss on the high bands is considerably less for open-line than for coax, given long run (75 ft. plus).

4. Preparing the antenna *before* FD is imperative! Pick it, cut it, and prune it with the exact components that will be used on FD. Simulate FD conditions—rig outside, battery power, no city-mains ground. Once you have it working, take it out to the site and go through the process of erecting it. Don't figure that just because the guy in the article said it was a 'snap' to spincast a line over a 60 ft. branch, you'll have the same luck! The bow-and-arrow approach sounds like a 'first try, sure winner' approach. Sure, the bow will sling that arrow right over the top branch, but the arrow won't pull the line down the other side without some extra weight, and even then it can get snagged very easily. The simplest approach, if you have a decent throwing arm, is the 6 lb. monofil fishing line with 6 oz. sinker. The sinker must be firmly knotted on, or it will end up in the next county on your first throw. Take extra sinkers.

5. A day in the field requires some attention to creature comforts. FD operating is grueling enough without being worsened by fatigue-inducing operating positions. A chair and a table are bare minimum; picnic tables at parks are fine substitutes. Carry along adequate liquid refreshments because it gets hot out there. Don't even try operating s.s.b. without at least a gallon of liquid! Likewise, it gets cold at night, so a jacket and sweater (long pants assumed) are bare minimums. Rain gear often is useful. Take along a camping lantern or some light source adequate to illuminate the rig and log during night hours of operation.

6. FD is a contest situation and requires special operating techniques. General QRP operating techniques such as calling only strong signals, listening a lot, careful frequency selection, etc., do not apply in such a situation. The basic strategy is to locate and call as many stations as possible *continuously* and *persistently*. Certain conventions apply here.

First, short calls are a must, and timing is crucial. Unless the other guy is loafing along at 10 w.p.m., respond to a 'CQ FD' instantly upon the other guy's "BK" with a quick "DE WØRSP BK." Do not waste time sending his call letters first. Operators skim the readable signals, picking the first one that is available. If two quick calls don't produce a contact, move on to another station.

Working the band edges (away from the thick of the battle) is often most productive. Full break-in is important: while the other guy is sending your report, be listening for the next station to call. If your signal appears to be getting out, don't hesitate to make 3 X 2 calls (*i.e.*, "CQ FD CQ TEST CQ FD DE WØRSP WØRSP BK") frequently as you tune through gaps in the action. End QSOs with a "DE WØRSP QRZ?" sign-off. If an operator chances to hear you, he'll nail you.

If you are using a direct conversion receiver, figure out the transmit-receive offset direction and tune across the band with your transmit frequency out in front of your receive frequency. For example, the HW-8 transmit frequency is about 700 Hz below the receive frequency. Tuning *downward* onto a signal from a higher frequency will place your transmit frequency zerobeat with his. Tuning *upward* from a lower frequency will place your transmit frequency about 2 kHz below him and he'll never even hear you. Pick the area of a band to operate in on the basis of your expected signal strength. If you have a dipole at 15 ft. on 40 meters, stay away from the heart of the action. Rather, head out to the edges of the action where less QRM is encountered. If you have a 40 meter *8JK* up 40 ft. for 15 meter operation, wade right into the thick of the action. Whatever, keep skimming and calling relentlessly. Should fatigue build up to the point where you're becoming "spacy," take a walk and clear your head, and then back to the fray.

Expectations are critical in terms of psychological motivation during the contest. If you think you should be working 35 QSOs/hour, you'll drive yourself crazy with frustration and end up too angry to operate effectively. Again, be realistic about what your power and antenna are likely to produce in terms of a QSO/hr. rate. With a dipole at 30 ft. on 40 meters, daytime operation with 5 watts in populous areas should produce 10–13 QSOs/hr. Don't expect more! A gain antenna on 20/15/10 meters can stretch to 35 QSOs/hr., depending on propagation, location, and operating skills. To prepare for FD, practice zerobeating incoming signals. Work your code speed up to 35 w.p.m. Practice instantly responding to the other guy's "BK" with your "DE" spaced one letter after. Practice "wideband" listening techniques with the selectivity backed off and several signals in the passband at the same time.

I know that FD is supposed to be fun, and that the above comments may seem to turn it into a grueling, high-tension exercise, but believe me, operating FD with the wrong techniques results in more frustration and tension than will result from being prepared to do it the right way!

Just remember: If you are operating at peak efficiency and living up to your realistic expectations, you can take a break from the action to relax, and *really* relax. If you are messing up and not succeeding, taking a walk won't help. At any rate, good luck to all of you who venture forth this year. Let's see if we can't show more effort in the one watt category. Submit results by the end of August with your comments and photos and you'll see them in print come next June.

Entries: Cover sheet indicating category of entry, breakdown of QSOs by band and mode, power output used, power source, and whether full portable away from home QTH. Three categories: (1) one watt, single transmitter/2 operators; (2) 5 watts, single transmitter/2 operators; (3) club, either one or 5 watt, two or more transmitters in operation simultaneously. *Full portable* is defined as the complete FD installation set up specifically for FD, completely independent of permanent structures—such as towers, antennas, and house—and independent of commercial power sources. Only full portable stations are eligible for awards. *Scoring:* Total number of QSOs multiplied by Power Mult. (5 watt = × 4, 1 watt = × 8), multiplied by Battery/Solar Power Mult. (× 1.5), plus 150 Full Portable Bonus = Total Score.

73, Ade, WØRSP

Antennas

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

DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

The First Four: Part Two

Last month in CQ author W8FX began a review of the progress of the Antennas column over the past four years. He scanned 1980 and 1981 then, and will continue with 1982 and 1983 this time. If you missed an article, here's a good way to catch up!

In last month's Antennas column we began a review of the progress the column has made since we came on board as the editor in March 1980. We covered 1980 and 1981 last time, and we will examine columns through December 1983 this month. Following this review we'll also note some reader mail received and touch on some software topics. Finally, we will highlight the Palomar Engineers "DX Penetrator" series of antennas. Let's look at some past articles first.

1982 in Review

The year 1982 in the Antennas column started off strong with one of my favorite articles, a profile of the late Dr. Hidetsugu Yagi of antenna design fame. The column was "Another Time, Another Place: A Look at the Co-Inventor of the Yagi-Uda Antenna." This article went back to the mid-1920s for a look at Japan's *dai ichi* (number one) scientist and father of the parasitic array that bears his name. The article, which also highlighted the contributions of Dr. Shintaro Uda, included excerpts from an early postwar interview of Dr. Yagi which appeared in *CQ* in the October 1948 issue.

The next four months of the column were devoted primarily to the Yagi (naturally!). "The H. F. Yagi" appeared in four parts in the February through May 1982 issues. Topics covered included the basic dipole element, Yagi array design, gain and front-to-back (F/B) ratio, multiband and trap Yagis, construction techniques, feeding, and tuneup. March saw the Cushcraft Ringo Ranger II featured as the "Antenna of the Month."

The April issue also contained a separate article, Part III of "A Primer: The Cubical Quad Antenna," which had been serialized and presented in the August and December 1981 issues. Part II included topics such as feeding, tuning, v.h.f. and u.h.f. quads, and the hybrid Quagi.

Looking to June, we took a "breather" to catch up on some reader mail, with a "We Get Letters" topic for the month. We also presented an update to our review of the Gem-Quad (July 1981) based on some experiments and design changes to improve 15 meter operation. The KLM 10–30–7 Log Periodic was shown as the "Antenna of the Month" feature for June.

Another three-part series was featured in the July through September issues. This was "The Transmatch Revisited," which expanded and updated your columnist's February 1980 transmatch article mentioned in last month's review of 1980. In this Antennas column series we examined transmatch definitions, basic and advanced transmatch circuits, harmonic suppression techniques, matching considerations, receiving benefits, installation, and selection. Tying in with the Transmatch theme, we featured the Palomar Engineers PT-2500A Antenna Tuner in July, and the J. W. Miller AT2500 Automatic Antenna Tuner in September.

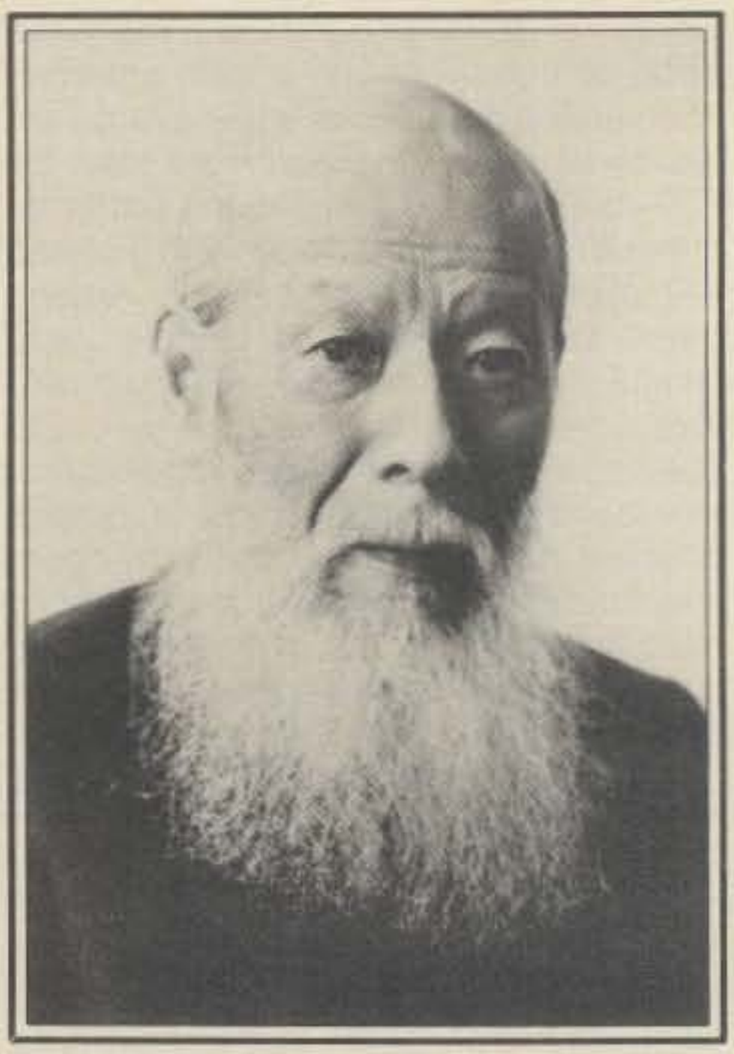
The next seven (yes, seven!) months were devoted to a series of articles on "Antennas Accessories for the Hamshack." Beginning with the October 1982 column and concluding with the April 1983 column, we reviewed a wide range of antenna-related hamshack accessories. In view of the wide range of accessories covered, it is useful to go over them on a month-by-month basis.

In the October 1982 issue we covered several different dummy loads as well as the r.f. ammeter. This was followed by an examination of the wattmeter and s.w.r. bridge in the November issue; in that issue we also featured the Lance Johnson Engineering GP-1 Ground Plane Buss. Closing out the year in December, we highlighted the r.f. transformer and the balun. December also saw us present the Cushcraft R-3 as the "Antenna of the Month" feature.

1983 in Review

The January 1983 column continued the "Accessories" series. In this issue the major topics for discussion were the

Mentioned in the January 1982 Antennas column was the work of Dr. Shintaro Uda, co-inventor and developer of the "Yagi-Uda" antenna array. Dr. Uda described the developmental work on the new array as early as 1926–27 in the Japanese language. The first English-language article was prepared by colleague Dr. Yagi and was published by the IRE in 1928. (Photo courtesy Tadao Kiga, JA1AR, Japan Amateur Radio League)



Shown here is Dr. Hidetsugu Yagi, whose landmark 1928 "Proceeds of the IRE" manuscript made an indelible imprint on shortwave transmission and reception methods. As a result of his antenna work he is widely regarded as the father of the parasitic array. Dr. Yagi's contributions were reviewed in the January 1982 Antennas column. (Photo courtesy Tadao Kiga, JA1AR, JARL)

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r.f. switch and various lightning protection devices and techniques. A sample or "typical" station r.f. wiring layout was presented to show how multiple antennas and a dummy load may be connected to a variety of station equipment. Featured were the Alpha Delta Communications Transi-Trap™ surge protectors.

Continuing the series, in February we discussed various types of in-line r.f.i. filters, with special focus on the lowpass filter; we also covered the field-strength meter. This was followed in March by discussion of two "off-line," or test equipment, accessories, the antenna noise bridge (ANB) and the grid-dip oscillator. In the March issue we also featured the homebrew h.f. interlaced arrays of Chris F. J. Goosen, ZS6LF.

Part VII, in April 1983, wrapped up the "Accessories" series by covering the r.f. signal generator and the frequency counter. The column also described some interesting "accessories of yore"—old-fashioned hamshack accessories such as Lecher wires, frequency meters, and absorption wavemeters, some of which are undoubtedly unfamiliar to current readers.

May 1983 saw the start of another multiple-part Antennas column series. This was the seven-part "Random Headings" series, which ran from April to November 1983 and covered a broad range of topics from reader notes to ham software.

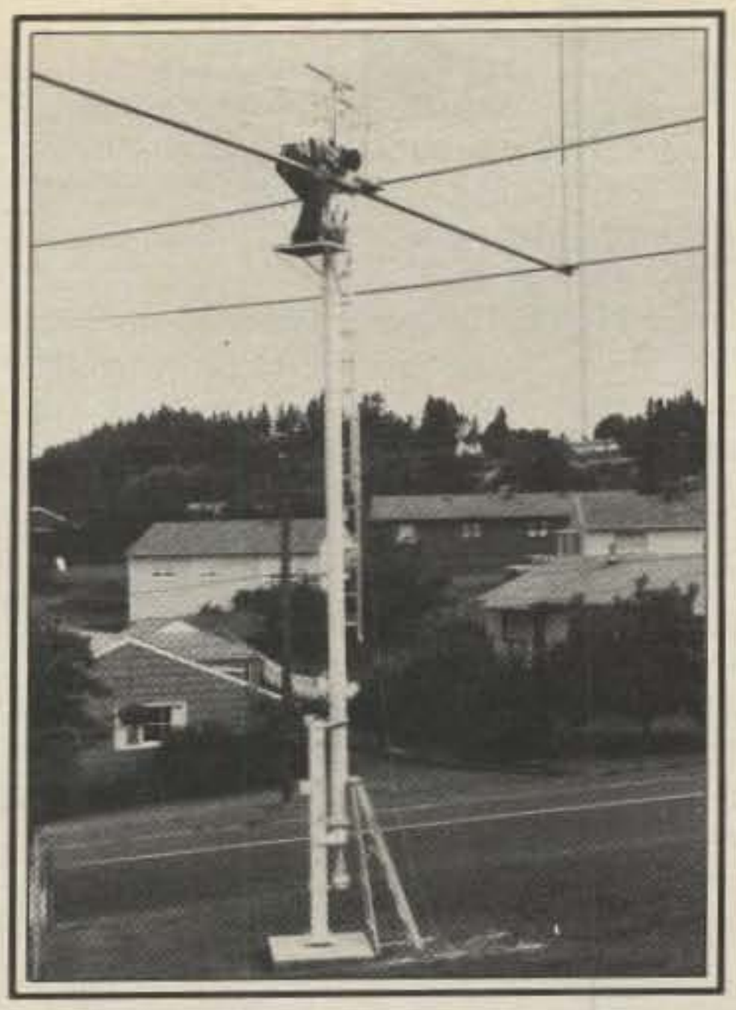
In the May column we started off the series with a catch-up on reader mail received, a sketch of WB9KUV's "they said it wouldn't work" mobile-home antenna system, followup on the "Transmatch" series (which ran last year in the column), and some 10 and 2 meter mobile-antenna installation ideas.

In June we featured the Snyder Broadband Dipole and the so-called "double bazooka" antenna and other homebrew wideband antennas. Also discussed was the Palomar Engineers "loop coupler" receiving accessory. This was followed in July with some of your columnist's observations on the introduction of the personal computer to the hamshack. We also reprinted a still-useful nomograph, which appeared in the magazine back in 1970 and which allows easy conversion of s.w.r. into percentage of reflected power. In this issue we also highlighted the significance of additional transmission losses caused by high line s.w.r.

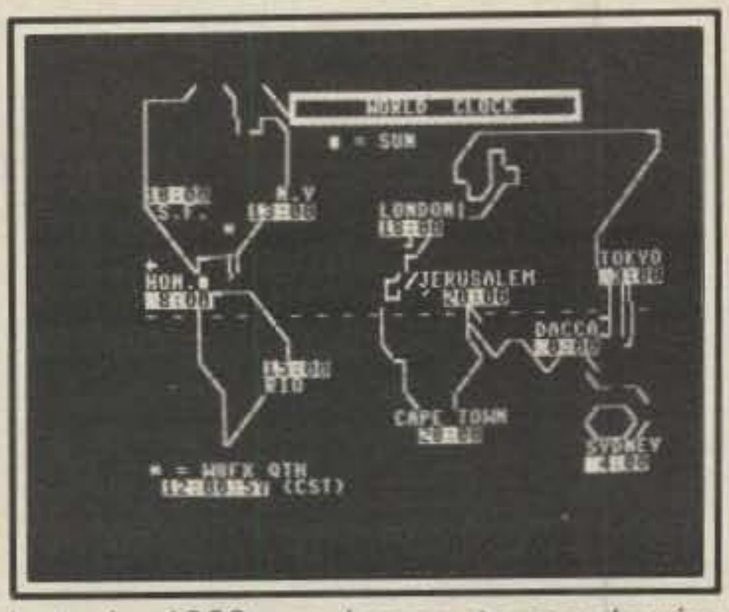
Part IV of the "Accessories" series, appearing in August, covered "between the ham bands" signal monitoring and specialized antennas for cordless telephones. We also featured a pictorial spread on N7AM's big-signal arrays, which consist of a 5-element 80 meter vertical and a 3-element 40 meter quad, to put Bremerton, WA, on the DX map.

In the September issue we suggested some simple antennas for the new 30 meter amateur band, and also presented a computer program listing for determining reflected power level using the Commodore 64 personal computer. Also featured in this month's article was the Ameritron RCS-8 Remote Coax Switch.

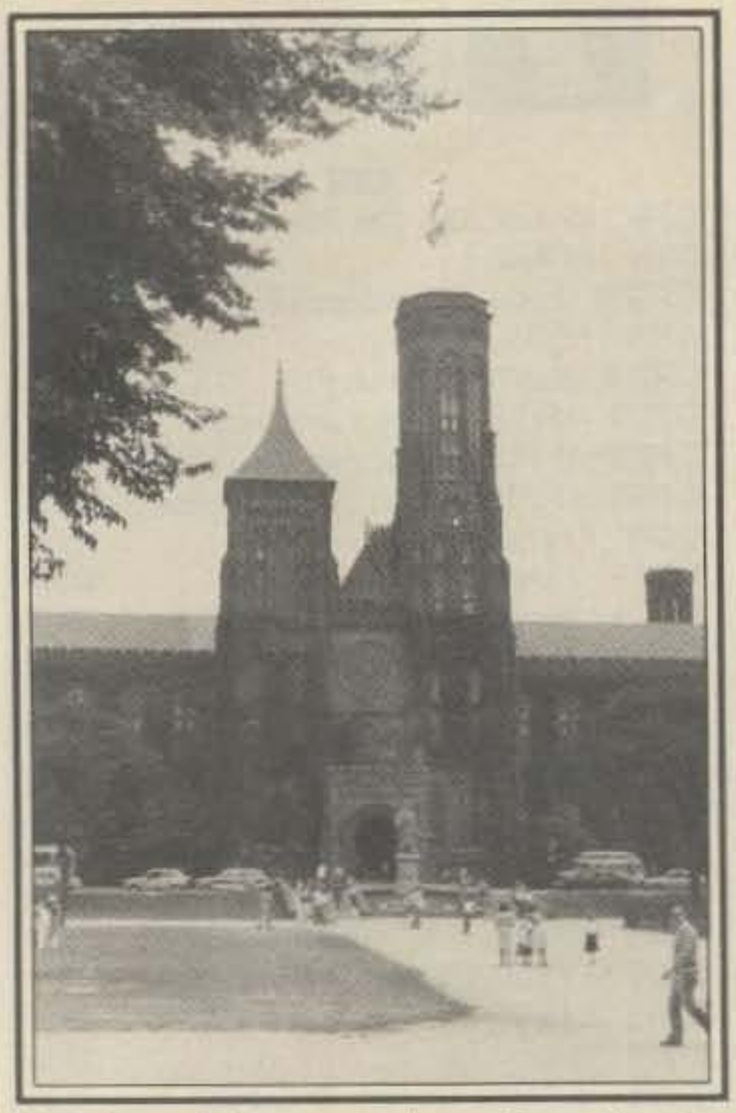
October 1983 saw us open the mailbag again to find a letter from a reader who advised us that our 1947 date for "invention" of the hamshack grid-dip oscillator (stated in the March issue) was off by some 19 years! We ended up running a schematic of an early version of the grid dipper, which, sure enough, appeared in *QST* in July 1928! Also covered in the issue was a tabular listing of a number of sources of personal computer/amateur radio software. The column also featured



The antenna feature for August 1983 was N7AM's set of impressive arrays for 80 and 40 meters. Here N7AM is shown atop his 3-element wide-spaced 40 meter quad. The antenna shown is perched atop a sky-neddle-design tilt-over tower and consists of 3 loops approximately 109 feet around. (Photo courtesy N7AM)



Late in 1983 we began to emphasize hamshack software in the Antennas column. We particularly stressed the amount of free, or nearly-free, public-domain ham software available for some computers. Shown here, for example, is a time-zone clock program for Commodore computers that's available from several public-domain sources.



Not along Antennas column lines, the December 1983 issue also contained an article which we wrote about the Smithsonian ("Communications and Electronics at the Smithsonian"). To an older generation this building is the Smithsonian Institution—the old sandstone "Castle on the Mall." (W8FX photo)

the Butternut 2MCV-5 "Super Trombone" 2 meter vertical and the W2BN "WJCP Cage."

In the November column we concluded the long-running "Accessories" series. We took note of some specific amateur radio and electronics programs for Commodore computers, and we highlighted the Wayne Research B-T-L Antenna Coupler. We also mentioned an unusual TVI problem experienced by PY1APS, and publicly answered some reader mail received following-up our description of WB9KUV's "makeshift" mobile-home antenna in the May issue.

Piggybacking on some mobile-home topics in the previous issue, in the December column we covered KE6CQ's approach to "working out" on h.f. under similarly restrictive mobile-home ope rating conditions. We also described WB3GXV's super-strong roll-over tower used to support a 7 band, 2 through 20 meter boomless Quad. We also presented a public-domain-type Quad antenna design program for the popular Vic-20 computer, and some reader comments regarding the questionable effectiveness of using multiple lowpass filters for TVI suppression.

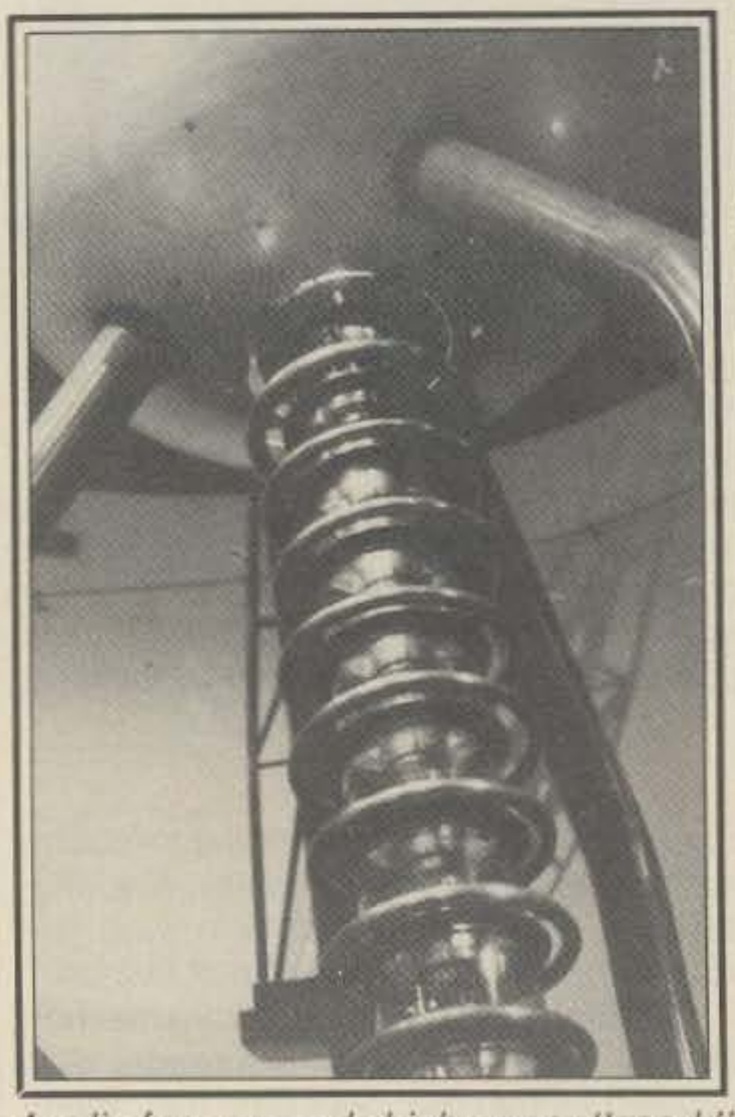
Also in the December issue was our separate Smithsonian Institution article, "Communications and Electronics at the Smithsonian." In this article we took a close look at this unique institution, its history, and its current status. We emphasized the many contemporary and historical technical and electronic exhibits, as well as amateur radio station NN3SI. This article should be of real interest to amateur radio operators and others involved in electronics, communications, and computing.

This wraps up our review of the first four years of the column. As we indicated last month, if you missed some of the topics presented, there are several ways to obtain the needed columns and articles. Many amateur clubs maintain a back issue file, and some public and university libraries save past issues. Failing these free sources, you can obtain back copies of most issues or reprints of the column for $2.00 each directly from the magazine's editorial offices. Address your requests to *CQ* at 76 N. Broadway, Hicksville, NY 11801. If all else fails, we can provide copies of past Antennas columns and other articles that we have authored. Figure about $1.25 per column or article to cover the cost of copying and postage, and write directly to me at 317 Poplar Drive, Millbrook, AL 36054. We'll try to help.

Reader Update

Our first letter this month takes us to task for a slight slip of the tongue which appeared in the November issue in connection with our description of the B-T-L Antenna Coupler on p. 120. Writes Bob Baird, W7CSD:

"...Almost daily I hear some misguided ham say, 'I'm running a TS-83OS with about 100 watts d.c. to the antenna' or my wattmeter says, 'I'm delivering 100 watts d.c. to the antenna.' No transmitter built by Marconi, Kenwood, Rockwell International, or all the builders in between has ever delivered d.c. to any antenna! R.f. energy is a.c. D.C. has a frequency of zero . . . I'm sure you know all of this, but the fact remains that right in the middle of page 120 of the November *CQ* you have a B-T-L Antenna Coupler that 'has a power handling capability of about 1 kw d.c.' It got past you and the *CQ* staff. Now since the error has been made, I think you should admit it and spend a paragraph of exhortation about it. Any ham who says that he is delivering d.c. power to the antenna sounds just as much like a CBer as the guy with the 2X1 call who says 'come back!' "



A relic from an early high-power "spark" transmitter, or even from a science fiction movie? Not quite. It's a portion of a one-million volt Van deGraff accelerator of 1933 vintage. The many exhibits of interest to the radio amateur and the electronics enthusiast were covered in your columnist's December 1983 CQ article, "Communications and Electronics at the Smithsonian." (W8FX photo)

Sharp-eyed W7CSD is correct, of course, and we did let this rather outdated terminology slip into our discussion of that tuner's power-handling capability. We stated that the B-T-L had "power-handling capability of about 1 kw d.c., or 800 watts into a 52 ohm load." Our "1 kw d.c." was, of course, a truncated statement. What was meant was that the B-T-L would handle the output of a transmitter whose measured d.c. input power to the final amplifier was 1 kw, based on an assumed r.f. power output of no greater than 800 watts. The "d.c. input" syndrome is, of course, a holdover from the days when most transmitters used d.c. voltmeters and ammeters to measure the d.c. voltage and current to the final amplifier. The trend today is toward r.f. power output measurement, for a number of reasons—not the least of which is safety of the operator!

A short note commenting on our emphasis on computer topics was received from Mick McDaniel, W6FGE, who writes:

"I read your column in *CQ* with great interest. Notice you are planning to venture into the applications of computers to ham radio. Good! Hope you can take a new approach! There are sufficient authors who can write about the 'bookkeeping' applications. How about some applications for station control? Use of a computer as a frequency memory bank? Measure I/O power, etc.?"

We appreciate Mick's comments, and they reassure us somewhat that we are striking out in the right direction with a look at more than just antennas, *per se*, in the column. Our recent approach has been to "spice" the column with related computer items and other material that has some bearing on antennas and other topics of common interest. The feedback we have received to date has been gratifying, with very few letters being received from readers who would decry covering anything in the column unless it can be raised in the air. Some of the very important topics Mick mentioned are far afield

for the Antennas column, however, so we defer their coverage to other writers who could probably do a better job with them than could we. Also, while *CQ* does not have a dedicated computer column at this writing, you might check Dave, K4TWJ's monthly *CQ* column, which ranges across a broad spectrum of high-technology subjects, including hamshack computer topics.

Postscript: We do appreciate the reader mail. Keep it coming.

Software Topics

Speaking of computers, in several recent columns we have covered a variety of computer topics, including mini-reviews of computer software products of interest to hams. Most of this software has been for the Commodore PET, 64, and Vic-20 computers. The reason for the apparent "preference" shown Commodore computer is, simply, that Commodore is what we have in our hamshack. We've owned an old PET 2001, circa 1978, and currently have and use the Commodore 64 and Vic-20.

Of course, that's not to say that there aren't many other equally capable computers available for the amateur market; there certainly are. The problem is that one individual, for technical and economic reasons is generally limited to one or two computers for personal use. Thus, since we have best access to information about the Commodore line, and also can actually try out amateur software designed to run on Commodore machines, emphasis in the column naturally will be on software for these computers. Please bear with us!

To maintain balance in the column, however, we'll feature software for other computers whenever a good product is brought to our attention. So to you Apple, IBM, Atari, and TRS-80 users, we say, tell us what's good, bad, and indifferent in hamshack software. And identify software producers we may have overlooked in the software directory listings published from time to time in the column.

In the past we have emphasized several low-cost, public-domain-oriented sources of Commodore software. We've come across another such source: John Henry Software, P.O. Box 39021, Cincinnati, OH 45239. This firm, a fairly new distributor, offers a wide selection of Commodore 64 and Vic-20 public-domain software in educational, games, programming, demonstration, business, and home categories. Tapes or disks are available for $7.50 per collection. Included in the offerings are a limited number of electronic calculation and amateur-oriented programs, although separate "ham collections" are not provided. The programs offered are similar in nature to those collected by two other sources we previously have mentioned in the column: The Toronto PET Users Group (Canada) and Public Domain, Inc. (Ohio).

Incidentally, for those who might be interested in our computer setup, it's a very modest one. We produce the monthly Antennas column using a Commodore 64 computer (with its 40-column display), the Easyscript/Easyspell word-processing software, a Star Gemini 10X printer, and a Tymac "Connection" printer interface. We also use two Vic 1541 disk drives, tape datasette, and Commodore 1701 monitor. We use the same 64 computer, as well as a Vic-20, for trying out the various hamshack software which we describe from time to time in the column.

A final note before we depart the software portion of the column: If you're not yet "into" personal computing, one of the major reasons is probably the seeming complexity of the whole subject of "computers," and the resultant confusion regarding their selection and use. The computer business is filled with mystique, and both hardware and software can be intimidating. To be sure, there are literally hundreds of home-computer how-to books which you can buy—some good, some bad, and some just so-so. I'll share with you one of the better books I have found. The book doesn't have an amateur orientation at all, but it constitutes an excellent and comprehensive tutorial on buying and using a personal-computer system. The book is *Everyone's Guide to Personal Computers* by Howard J. Blumenthal, an $8.95 Ballantine oversize

paperback. Written in a straightforward style, you don't need to know anything about math, science, or computer programming to understand it. Despite the simplicity of presentation, when you've finished reading it, you'll know enough about small computers and what they can do to select suitable hardware and software packages to meet your needs.

Blumenthal's book includes a good deal of information on how computers work, how to master simple commands, an evaluation of telephone-line-connected services, shopping for computers, and a review of other books and periodicals on computers. Also included is a computer shopping checklist and information on word-processing programs and printers. Specific reference in the text is made to the most popular systems, including the TRS-80 units, Ataris, Apples, Osbornes, IBM, and Commodores.

DX Penetrator Beams

This month we highlight the DX Penetrator series of h.f. beams manufactured by Western Electronics (UK), Ltd. and imported and distributed in the United States by Palomar Engineers.

According to Jack Althouse, K6NY, of Palomar, the first beams imported are the 3-element and 4-element tribanders for 10–15–20 meters. Jack relates that he was impressed by the ads for the Western antennas and towers in the RSGB magazine and *CQ DL*. Then at the 1982 Friedrichshafen Hamfest Jack saw the antennas on exhibit, and they looked good to him.

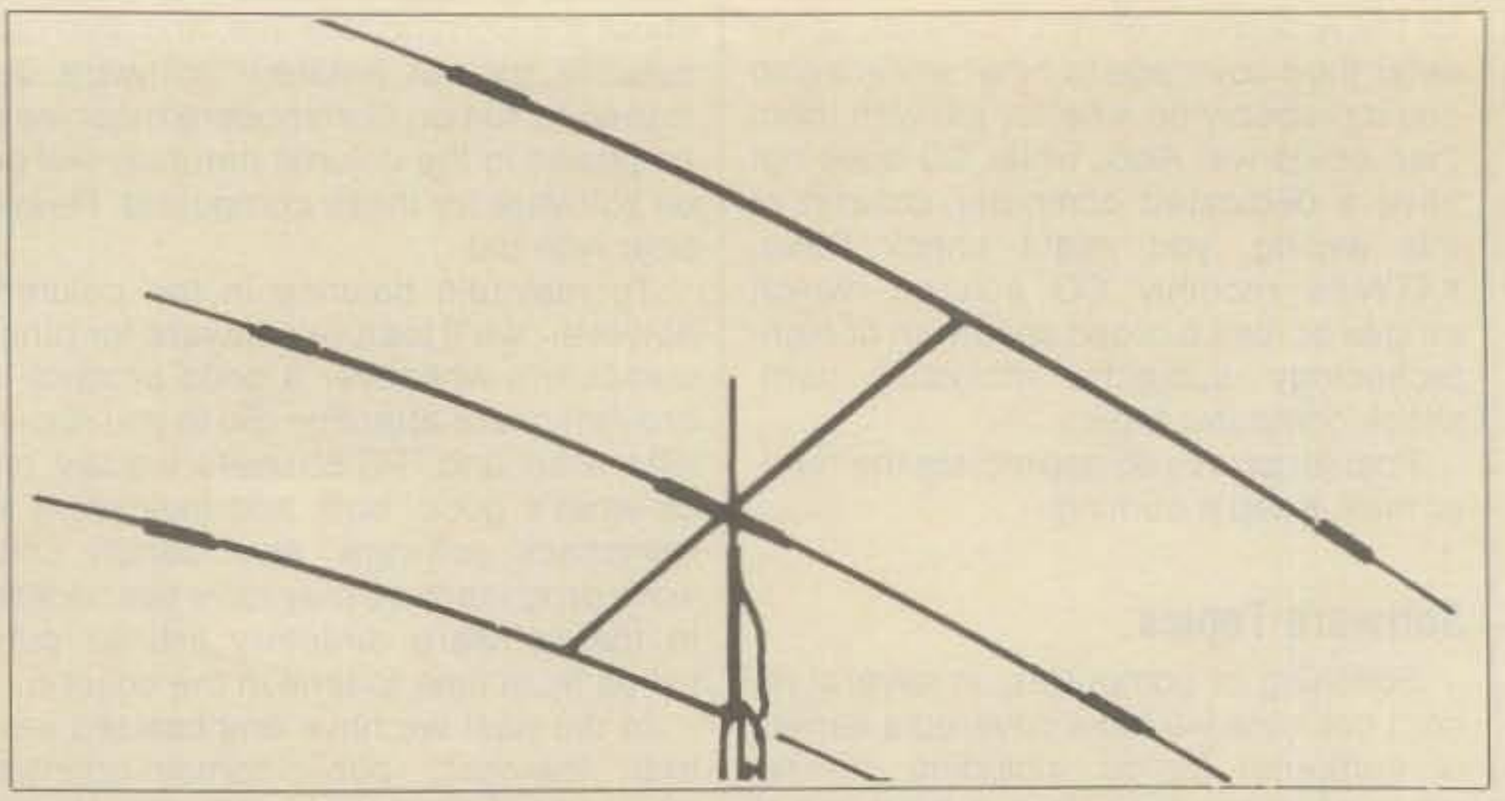


Fig. 1–Sketch showing the three-element DX-33 tribander's profile. The antenna is manufactured by Western Electronics (UK) Ltd. and imported by Palomar Engineers. A similiar four-element tribander, the DX-34, is also available.

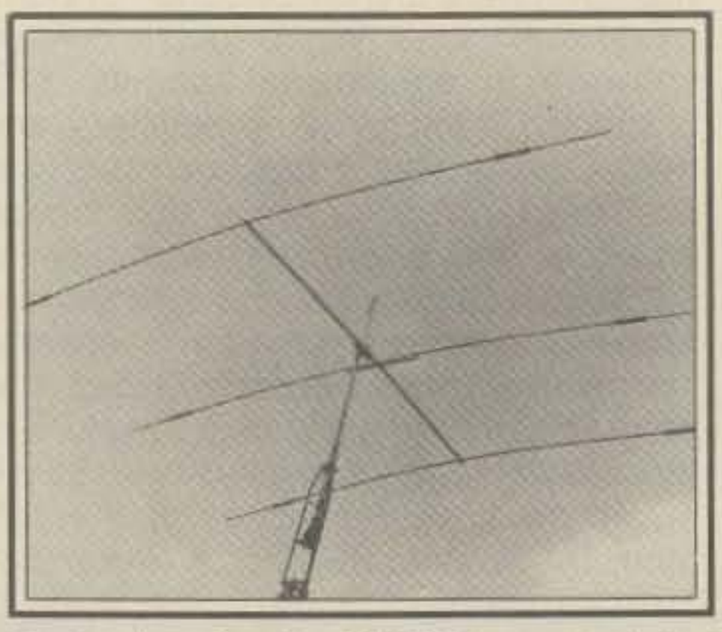


Photo showing the DX-33 beam installed at a height of about 30 feet. Manufactured by a British firm, and imported by Palomar Engineers, the antenna and its four-element twin boast precision, sweep-tested traps that will handle maximum amateur power on a steady-state basis. Though imported, the antennas are price competitive with domestic arrays. (Photo courtesy Palomar Engineers)

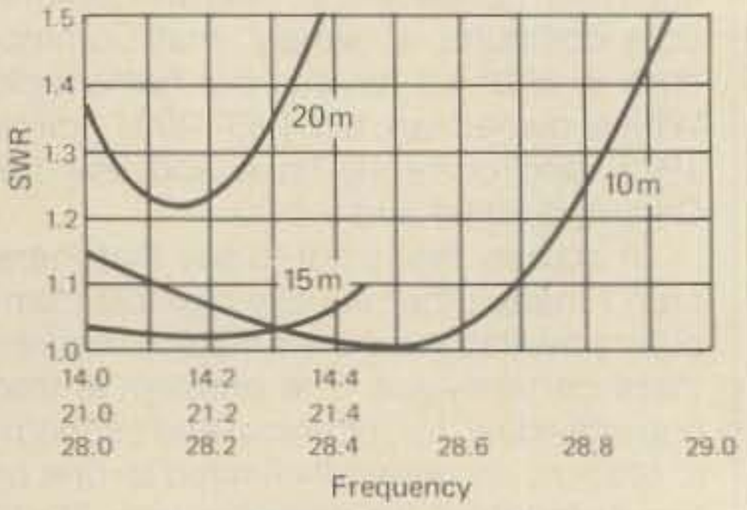


Fig. 2–Manufacturer's representative s.w.r. curves for the triband DX-33 beam. The test antenna used was installed at a height of 9 meters, or 30 feet.

Both of the imported antennas are rugged trap designs able to handle 2 kw PEP, and they offer "whole band" coverage on each band with a correspondingly low s.w.r. plot. The DX-33 has three elements for 10, 15, and 20 meters, while the DX-34 has four elements for the same three bands. A particular feature of the antennas is the intensive quality-control program, which includes the individual sweep testing of each trap at the factory for uniform performance; use of stainless-steel U-bolts throughout; corrosion-resistant high-strength tubing; and high front-to-back ratio (up to 25 dB for each model).

Construction is not too difficult, but since the measurements are in metric and most amateurs don't own metric tape measures, Palomar Engineers provides a special table giving dimensions in inches. The table conversions for all measurements are provided in the instruction manual.

The antennas are sold mail-order direct from Escondido, CA, and are UPS shippable. At this writing the DX-33 is $219, while the DX-34 is $299, both plus shipping. For more information on the imported line, contact Palomar Engineers, 1924-F West Mission Road, Escondido, CA 92025.

Fig. 1 shows a sketch of the DX-33 three-element tribander. Fig. 2 depicts typical s.w.r. curves for the DX-33.

Wrap-Up

In this month's issue we have completed our review of the first four years of the column in *CQ*. Last month we covered the first two years, 1980–81, while in this issue we covered 1982–83. This month we also broke open the reader mailbag, discussed several software topics, and spotlighted the imported "DX Penetrator" h.f. beams.

Next month we plan to devote the column to a closer examination of reader mail on a variety of Antennas column subjects. We think you'll find the reading interesting. See you then.

73, Karl, W8FX

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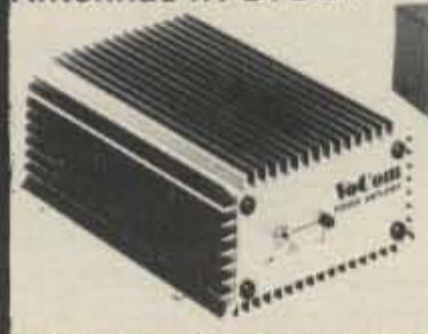

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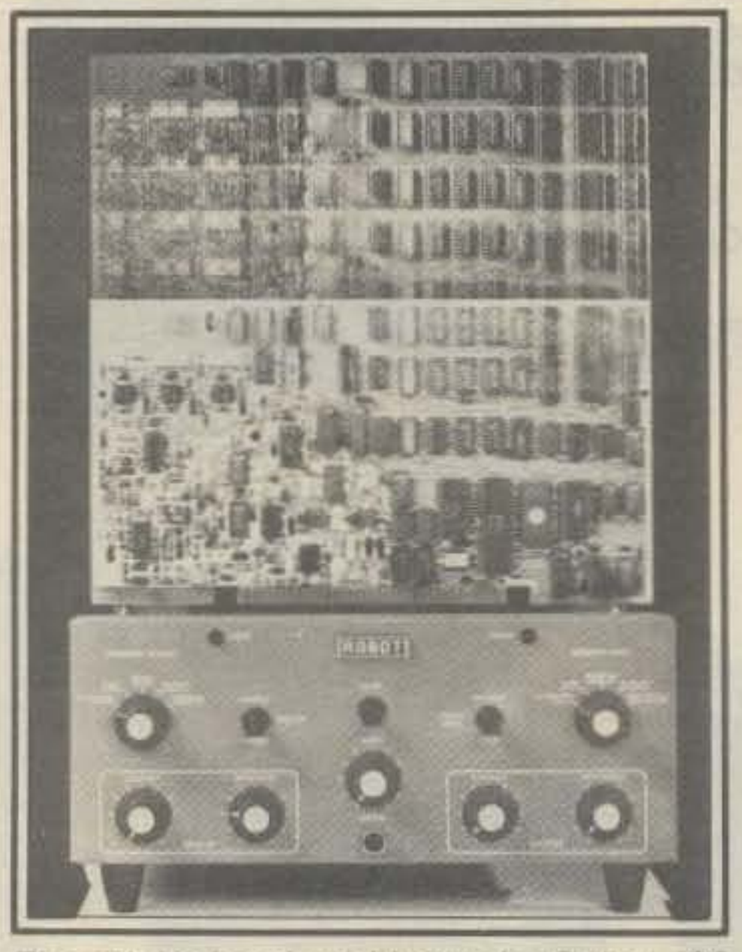
World of Ideas

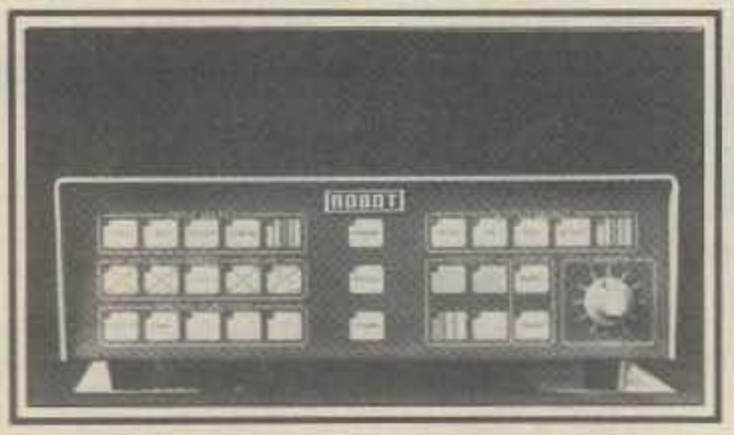
a monthly feature by
DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

SSTV Revisited

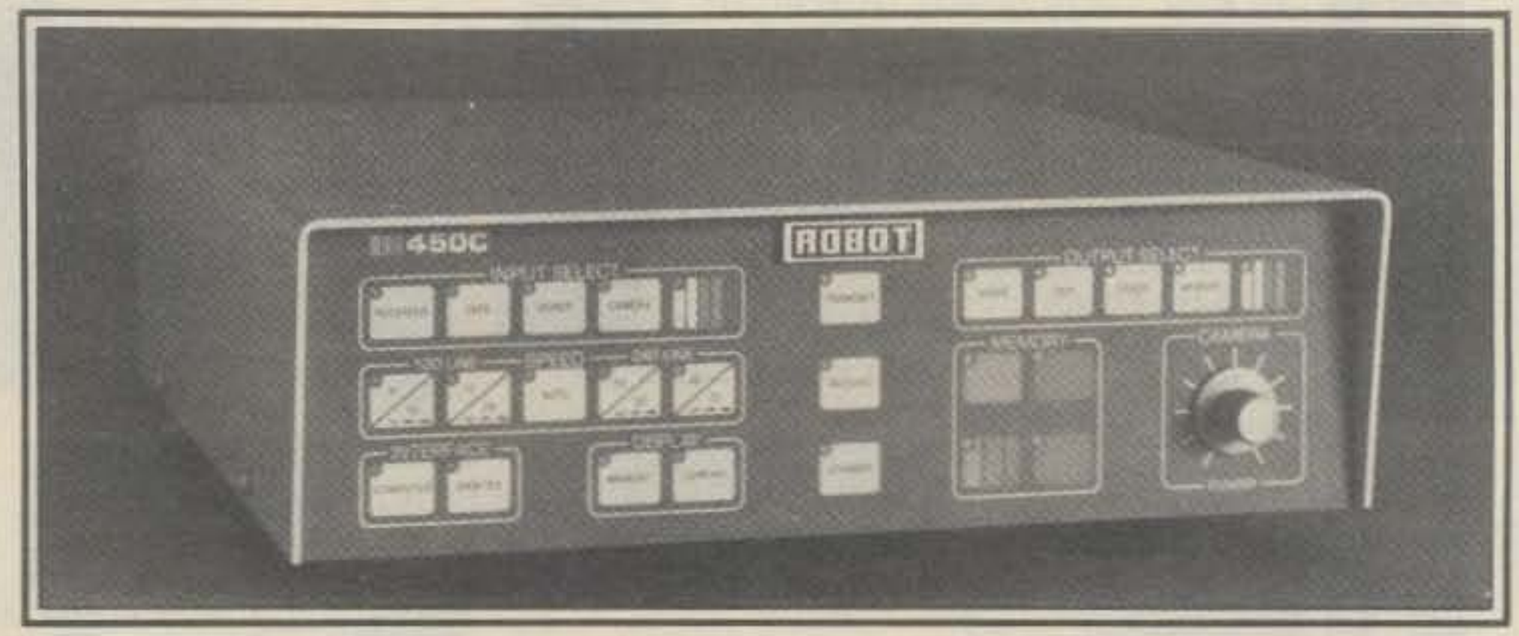


The original and world-popular Robot 400 Digital Scan Converter. A performance masterpiece, it introduced thousands of amateurs to the exciting world of SSTV. Color SSTV modification boards are now available for the 400. (Photo courtesy Robot Research)



The ultimate in color SSTV, Robot's brand-new Model 1200C is capable of operating all popular formats and speeds. Merely add monitor and camera and join the fun! (Photo courtesy Robot Research)

The Microcraft Videoscan 1000 SSTV scan converter. This unit is capable of both 8 second (128 line) and 17 or 34 second (256 line) SSTV operations. (Photo courtesy Microcraft)



The new "all color format" SSTV converter Model 450C from Robot Research. Speed selections can be manual or automatic. Add color monitor and camera and you're ready for unlimited enjoyment. (Photo courtesy Robot Research)

This month's column features a return visit to the world of amateur video and slow-scan TV, a communications area that personally has been quite fascinating and enjoyable for some 14 years. That's a significant compliment to any specialized mode, and that's one of the many reasons why we feel you also would find SSTV an exciting pursuit. Looking back, I remember the original intrigue of actual visual exchanges via h.f. bands and the $20 fleamarket purchase of a used oscilloscope, which we converted to a combination SSTV monitor and Flying Spot Scanner. That was several years before any form of commercial equipment was available. Fortunately, today's amateur video enthusiast is in a more favorable situation. The original excitement of long-distance visual exchanges, however, still continues to be as spellbinding as it was a decade ago. Let's take a closer look at this unique area from a semi-technical and easy-to-understand viewpoint (which is all you really need for enjoying the fun of SSTV operations).

There are some fascinating activities happening behind those somewhat musical tones you hear around 14.230, 3.845, or 28.600 MHz, and you can join that action rather easily by adding a few items to your existing h.f. setup. Each day's views are often more exciting that the last, as new stations take to the airwaves with SSTV. There are original views of foreign lands, pictures of attractive western highlights, video notepads or idea sketches, plus numerous views of operators with their setups. It is, quite simply, adding the dimension of sight to your amateur radio contacts in black and white, in color of various formats, or even in three dimensions. Although it's a sophisticated new mode, it's filled with newcomers such as yourselves—amateurs merely enjoying the ability to see and hear others they contact.

The main differences between slow-scan and amateur fast-scan TV are bandwidth, range, and motion. Fast-scan TV signals necessarily require several megaHertz for transmission, and thus they must be conveyed on frequencies of 432 MHz and higher. If a fast-scanned TV signal is slowed to roughly 1/1000 its normal speed, however, its bandwidth is reduced to that of regular s.s.b. audio. The resulting tones can then be transmitted thousands of miles on h.f. bands via s.s.b. Upon reception, the SSTV signal is decoded and accelerated 1000 times, resulting in a picture which can be viewed on a regular fast-scan display. The SSTV trade-off was transmission time and motion. All SSTV views are conveyed as a series of "still pictures," and each picture's transmission time is at least 8 seconds long. Yet without the capabilities of SSTV, worldwide visual exchanges would only be possible via commercial satellites.

New Parameters, New Gear

Until recent times each SSTV picture was comprised of 128 scanning lines which required 8 seconds to transmit. Ninety percent of this amateur activity was black and white in format. Most early SSTV gear used long-persistence radar tubes for display and plumbicon camera tubes for image pickup. The introduction of digital scan converters changed SSTV significantly, as it permitted using home-video-type cameras for picture pickup and regular televisions for viewing. The scan converter merely acts as an interface between regular TV gear and an am-

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ateur's h.f. setup. A small amount of color SSTV work was accomplished by using time-lapse photography and triple exposures. Red, green, and blue filters were sequentially placed on the front of a 35mm or instant camera as color-keyed black-and-white views were received and displayed. Upon developing, a full-color photograph was produced. This brief background brings us up to roughly three years ago, when color digital scan conversion and real-time color became popular (direct viewing of color pictures on a TV screen).

The first form of real-time color SSTV employed three digital scan converters synced to a common color monitor. This expensive approach was followed by triple memory conversions for a single Robot 400 unit. Interface Systems (Route 4, Box 634K, Lindale, TX 75771) produced hundreds of these memory conversions, and the "red, green, blue" format of three separate 8 second pictures became an accepted new standard (this technique is known as frame sequential color). Before proceeding, let's visualize the forming display of such a real-time color SSTV picture. The distant operator specifies color transmission sequence, and the receiving operator follows memory loading suit. The first displayed frame is red and black, and then green hues are added. The third frame overlays blue tints, producing full-color display in 24 seconds.

Roughly a year and a half ago several additional SSTV formats were introduced by innovators such as W0LMD and WB9LVI. One provided full-color displays by time multiplexing each scanning line with sequenced green, red, and blue video. Computer-based systems were primarily used with this format. Another format provided high-resolution black and white, scanning 240 lines in 24 or 36 seconds. This feature is included in the Videoscan 1000 converter manufactured by Microcraft Corp. (Box 513, Thiensville, WI 53092). (That unit may be color-converted by the time this appears in print; check with them for latest details.) Integrating color SSTV with various formats thus creates numerous possibilities. A summary of those formats is shown in Table I. SSTV was then at an interesting point: several formats were in use, but each required different memory arrangements for reception.

During this time, 20 meter phone expansions opened SSTV opportunities for General class licensees, and "good old black-and-white" SSTV flourished. Next, Robot Research (7591 Convoy Court, San Diego, CA 92111) introduced their "all color format" Models 450C and 1200C scan converters, plus retrofit kits for older Model 400 units. Today's SSTVers thus have everything at their fingertips; merely punch-in the other station's format, sit back, and enjoy the views.

At this point, some of you are probably wondering if your home computer system can be adapted to a few of the new color SSTV formats. Maybe, if you have a TRS-80C or Apple II, but don't jump to conclusions before checking with Clay Abrams, K6AEP (SSTV's computer wizard; he's continually creating new SSTV-related software.)

Format	120 lines		240 lines	
Black-and-white	8	12	24	36
Color	12	24	36	72
	Normal Resolution		High Resolution	

Table I– Summary of various formats presently used in SSTV communications. The majority of worldwide activity uses the "standard" 120 line, 8 second, black-and-white concept. Next popular is frame sequential (24 second, 120 line) color. Other formats are mainly used between separate groups.

SSTV Frequencies by "Gentleman's Agreements": 3.845 MHz, 7.171 MHz, 14.230 MHz, 21.340 MHz, 28.680 MHz.
International SSTV Net: 14.230 MHz Saturdays at 1800 GMT
IVCA SSTV Net: 14.230 MHz Saturdays at 1500 GMT

Table II– Some popular SSTV frequencies and nets.

SSTV Frequencies and Operations

The majority of unscheduled SSTV activity is normally conducted by 20 meter frequencies near 14.230 MHz. However, that situation may be forced to shift with our presently declining sunspots. If you find 20 meters dead during evening hours, check 3.845 and maybe 7.171 MHz for SSTV action. If 10 is open during weekends, check 28.680 MHz for SSTV signals. Only miniscule activity shows on 21.340 MHz, but it's a good spot that needs more utilization.

The International SSTV Net continues operation each Saturday at 1800 GMT on 14.230 MHz, and newcomers are always welcome. If you have any questions about SSTV gear and/or operations (on color formats, computers, etc.), that net is the most direct way to find answers and information. There are some interesting views, and you can also learn how to set up new equipment quite easily. When transmitting, we encourage SSTV newcomers to keep SSTV CQs short and to also identify by voice. In addition to legal stipulations, this consideration lets everyone know who's "behind the tones"; more than a few slow scanners habitually leave their receivers tuned near 14.230 MHz while working on projects in the shack. Finally, there's an encouraging flavor for those of you interested in inexpensively joining SSTV action with conventional 128 line, 8 second, black-and-white systems. The majority of SSTV activity is compatible with that established format, and the various other formats are still in the minority-use class.

SSTV Societies and Magazines

During the early days of SSTV there was precious little video information available to newcomers. That "flying blind" situation was one reason for my original pursuit to develop an International Slow Scan Society during 1971 and 1972. Although the society assisted areas such as Pitcairn and Norfolk Islands in becoming video equipped (for the first time ever—a fantastic experience for all) and established the first world-coordinated SSTV contests, its inception was somewhat ahead of its time. The society dwindled, leaving the International SSTV Net as the newcomer's guiding light. Now ten years later situations have noticeably changed.

There are two SSTV-related magazines available to newcomers and video enthusiasts. *Vision* is the quarterly journal of the International Visual Communications Association (9937 Larchbrook Drive, Dallas, TX 75238) and is a true "guiding light" for slow scanners. The IVCA pursues my originally visualized goals on a more expanded (and professionally managed) scale. In addition to quarterly board meetings, video-formatting coordinations, newcomer/remote assistance, etc. The IVCA also conducts net meetings on 14.230 kHz Saturdays at 1500 GMT. The other helpful magazine, *SSTV Today*, is a privately published work available from P. O. Box 39, Bangor, MI 49013.

With all of these services and information at one's disposal, venturing into today's world of SSTV couldn't be easier.

Summary

That's a general overview of today's exciting world of slow-scan TV in nontechnical form. Old-time slow scanners may wonder why I didn't delve deeper into technical aspects, etc., and the reasoning is quite simply: We're informing curious newcomers and onlookers. Every specialized mode—be it RTTY, Oscar, 10 imeter f.m., or SSTV—needs end users or mode operators for ultimate growth and acceptance. We all know how truly fascinating and exciting visual communications are, and it's only logical to share that information with others.

If you haven't yet checked out the world of SSTV for yourself, consider this an open invitation to do so during the coming weeks. That opportunity may appear at a hamfest, a dealer's showroom, or in a friend's shack. It may appear as a chance to ask an on-the-air SSTVer what he's seeing or transmitting. Whatever the case, we can only say go for it! You'll surely be glad you did, as the views are terrific.

By the way, my new book, *Introduction to SSTV*, is nearing completion and should be rolling off the Universal Electronics press (4555 Groves Road, Suite 3, Columbus, OH 43232) during the middle of this month. 73, Dave K4TWJ

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Time is running out for those of you who have inquired about sponsoring a trophy for our *CQ* World-Wide DX Contest this coming fall. A few additional trophies have been announced in this column during the past few months. These will be listed in the rules announcement in the September issue. However, those of you who did not follow up on your initial inquiry or request have until June 15th to make it definite. You can choose your own category as long as it does not duplicate an existing award, of course. Contact me as soon as possible for cost and other requirements. As I often have suggested, a memorial award for a departed friend or club member is an excellent way to perpetuate his name and call.

As indicated in Al Dorhoffer's editorial in last month's issue, the Contest Trophy Awards program is due for a major overhaul. We will try to incorporate some of these changes in the coming contest. However, this mostly will only affect overseas donors. We have found it difficult to maintain contact with some of the present donors who were required to provide the trophies. With the exception of a very, very few stateside sponsors, the cooperation of our faithful donors has been excellent. Some of these people have been with us for 25 or more years.

A reminder that the mailing deadline for logs for our WPX C.W. Contest is July 10th. They should be sent to our WPX Contest Director, Steve Bolia, N8BJQ, 7659 Stonesboro Drive, Huber Heights, OH 45424.

Once again I emphasize the deadline for material for this column. I must have it no later than June 15th for the September issue and July 15th for the October issue. Send all materials to my home address.

73 for this time, Frank, W1WY

RSGB National Field Day

1600 to 1600Z Sat.–Sun., June 2–3

Activity for this c.w.-only Field Day is concentrated on the British Isles. Operation is from portable locations specifically set up for Field Day operation. (You may also hear some activity from other Europeans.) Although overseas stations are not directly eligible to participate, they are invited to work Field Day stations and submit a report of the stations contacted.

A certificate will be awarded to the overseas station in each continent whose check log shows the most points contributed to competitors.

Send your logs to: RSGB HF Contests Committee, *c/o* M. Harrington, 123 Clensham Lane, Sutton, Surrey SM1 2ND England.

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

*	June	2-3	New York State QSO Party
	June	2-3	RSGB National Field Day
	June	9-10	ARRL VHF QSO Party
	June	9-10	So. American CW Contest
	June	16-17	Six Meter QSO Party
	June	16-17	All Asian Phone Contest
	June	16-17	NINE Land CW Contest
	June	23-24	ARRL Field Day
	July	1	Canada Day Contest
	July	7-8	Venezuelan SSB Contest
	July	14-15	IARU Radio Sport Contest
	July	28-29	Venezuelan CW Contest
	July	28-29	County Hunters CW Contest
	Aug.	6	Illinois QSO Party
	Aug.	11-12	DARC European CW Contest
	Aug.	18-19	SARTG RTTY Contest
	Aug.	25-26	All Asian CW Contest
	Sep.	8-9	DARC European Phone Contest
	Sep.	29-30	Delta QSO Party

** Covered last month.*

ARRL VHF QSO Party

1800–0300Z Sat.–Mon., June 9–11

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.

South America C.W. Contest

1500Z Sat. to 1500Z Sun., June 9–10

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 second 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.

Exchange: RST plus a QSO number starting with 001.

Scoring: Two points per QSO multiplied by the number of different South American 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.

All Asian DX Contest

Phone: June 16–17 C.W.: Aug. 25–26
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

This is the 24th 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/UW9-0; 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).

NINE Land C.W. Contest

1700Z Sat. to 1700Z Sun., June 16–17

This is the second annual contest organized by the Joliet ARS in which there is no limit to whom you can work; however, contact with NINE Land stations (Ill., Ind., and Wisc.) have double QSO point value. Only one contact per band with the same station permitted.

Classes: Single and multi-operator, one transmitter and portable field operation, multi-operator maximum of two transmitters.

Exchange: Consecutive QSO numbers beginning with 001, and state, VE province, or DX country.

Scoring: Contacts with NINE Land stations count 2 points; with all other stations 1 point.

Multiplier: Number of states, VE provinces, and DX countries worked (counted once only). There is a bonus multiplier of 1 for each 20 NINE Land stations worked.

Final Score: Total QSO points from all bands times the number of states, provinces, DX countries, and bonus points worked.

Frequencies: 1805 and 60 kHz up from lower edge of 10 through 80 meters (no 30 meters). Novice: 25 kHz up from low edge of their bands.

Awards: Certificates to high scorers in each class in each state, VE province, and DX country. Plaques to high scorer in NINE Land and outside NINE Land.

Dupe sheets are required for entries with over 200 contacts, and a summary sheet showing the scoring, etc. Include a large s.a.s.e. for a copy of the results.

Mailing deadline is July 21st to: Joliet

CQ Zones

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A2-----38   HK-----09   PZ-----09   UV-UW       YB-YD  28   8Q 22 &39   *1  *1  *
A3-----32   HKØ/MI 09   S2-----22    6-----16   YI-----21   8R-----09   A,K,N,W *
A4-----21   HKØ/SA 07   S7-----39    9-----*9   YJ-----32   9G-----35   KHØ----27
A5-----22   HL-----25   S9-----36   UY-----16   YK,YO  20   9H all 15   KH1----31
A6-----21   HP,HR  07   SJ-SM  14   UZ Ø---*Ø   YS-----07   9I,9J   36   KH2----27
A7-----21   HS-----26   SO-SQ  15   UZ 1---*1   YU-----15   9K-----21   KH3----31
A9-----21   HT-----07   ST,STØ 34   UZ 2---15   YV-----09   9L-----35   KH4----31
AHØ-AL7*3   HV-----15   SU-----34   UZ 3---16   YVØ----08   9M2----28   KH5----31
AP-----21   HZ-----21   SV all 20   UZ 4---16   Z2-----38   9M6,8  28   KH6----31
BV-----24   I-IW    15   T2-----31   UZ 6---16   ZA-----15   9N-----22   KH7----31
BY 23 &24   IA5,IBØ15   T30----31   UZ 9---*9   ZB-----14   9Q-----36   KH8----32
C2-----31   IC,IB9 15   T31----31   V2-----08   ZC4----20   9U-----36   KH9----31
C3-----14   IP9----15   T32----31   V3-----07   ZD7----36   9V-----28   KL7----01
C5-----35   IG9,IH933   T5-----37   VEØ   /MM   ZD8----36   9X-----36   KP1----08
C6-----08   IMØ,IS 15   T7-----15   VE1 all05   ZD9----38   9Y-----09   KP2----08
C8,9   37   IT-----15   TA-TC  20   VE2 02&05   ZF-----08   A/-----37   KP3----
CE1-8  12   J2-----37   TF-----40   VE3-6  04   ZK all 32   *********   KP4----08
CE9all 13   J20/A  37   TG-----07   VE7----03   ZL all 32   *Ø  *Ø  *   KP5----
CEØall 12   J3-----08   TI,TI9 07   VE8 W. 01   ZL5/Ant30   UAØ,UKØ *   KX6----31
CM-----08   J5-----35   TJ-----36   VE8 E  02   ZM7----31   UVØ,UWØ *
CN-----33   J6-----08   TL-----36   VKØGM  29   ZP-----11   UZØ      *   ********
CO-----08   J7,8---08   TN-----36   VKØGW  29   ZR-----38   A-B  18      *6  *6  *
CP-----10   JA-JS--25   TR-----36   VK/ LH 30   ZS1-6  38   C-G  19      UK6      *
CR9----24   JD all 27   TT-----36   VKØ/HI 39   1AØ----15   H----18         A-----16
CT1,2  14   JT-----23   TU-----35   VKØ/MI 30   1S-----26   I-M  19         C,D    21
CT3----33   JW,JX  40   TY-----35   VK1-5  30   3A-----14   O----18         E-----16
CT4----14   JY-----20   TZ-----35   VK6----29   3B6-9  39   Q-R  19         F,G    21
CX-----13   KC4AAA       UAØ    *Ø   VK7----30   3C,3CØ 36   S-W  18         H,I,J  16
D2-----36   KC4AAC 13    UA1----*1   VK8----29   3D2----32   X----19         K-----21
D4-----35   KC4AAD 12    UA2----15   VK9N   32   3D6----38   Y----23         L-----16
D6-----39   KC4AAE 29    UA3----16   VK9X,Y 29   3V-----33   Z----19         O-----21
DA-DL  14   KC4USB 32    UA4----16   VK9Z/DR30   3X-----35   ********        P-----16
DU-----27   KC4USV 30    UA6----16   VK9Z/NI30   3Y-----38   *1  UA1,UK1     Q-----21
EA-EH       KC4USX 30    UA9----*9   VO1----05   3Y/Ant      UV1,UW1 *       U-----16
 1-7   14   KC6/E/N27    UB,UC  16   VO2----02   4K1A   39   UZ1     *       V-----21
 8-9   33   KG4----08    UD,UF  21   VP2 all08   4K1B,C 29   A-O  16         W,X,Y  16
EI,EJ  14   KHØ-KX6*3    UG-----21   VP5----08   4K1D   38   PAA  40         ********
EL-----35   LA-LJ   14    UH,UI  17   VP8/Ant38   4K1E   29   PAL  40         *9  *9  *
EP-----21   LA/Ant        UJ-----17   VP8ME  38   4S-----22   PAM  40         UA9,UK9 *
ET-----37   LU-----13     UKØ----*Ø   VP8MS  13   4U1ITU 14   PGO  40         UV9,UW9 *
F------14   LX-----14     UK1----*1   VP8-        4U1UN  05   Q-2  16         UZ9     *
FB8W,X 39   LZ-----20                  Others13   4W-----21   ********        A,C,E  17
FBBY---30   N6-----03                  VP9----05   4X,4Z  20   *2  *2  *      G-----17
FB8Z---39   NHØ-NP *1    UK2----*2   VQ9----39   5A-----34                   H,I    18
FC-----15   OA-----10     UK3----16   VR6----32   5B-----20   UK2             J,K,L  17
FG all 08   OD-----20     UK4----16   VS5----28   5H-----37    A,B,C 16       M-----17
FH-----39   OE-----15     UK5----16   VS6----24   5N-----35   R,G----15       O,P    18
FK-----32   OH,OHØ 15     UK6----*6   VU,VU7L22   5R-----39   I,L,O  15       Q-----17
FM-----08   OJØ----15     UK7----17   VU7/A  26   5T-5V  35   P------16       S 16& 17
FO/C   07   OX,OL  15     UK8----17   VY1----01   5W-----32   A,B    15       U,V    18
FO 31& 32   ON-----14     UK9----*9   W6-----03   5X,5Z  37   S      16       W 16&  18
FP-----05   OR4/Ant       UL,UN  17   WHØ-NP *3   6T,6U  34   T------15       X-----17
FR all 39   OX-----40     UN,UO  16   XE,XF  06   6W-----35   Z------16       Y,Z    18
FW-----32   OY-----14     UP     15   XP-----40   6Y-----08   ********        ********
FY-----09   OZ-----14     UR-----15   XQ-----12   70-----21
G all  14   P2-----28     US-----16   XT-----35   7J1----27
H4-----28   PA-PI  14     UV,UW        XU-----26   7P-----38
H5-----38   PJ  2-4 09      Ø-----*Ø   XV-----26   7Q-----37   COMPLIMENTS OF
HA-----15       5-8 08      1-----*1   XW-----26   7X-----33   GORDON W6NLG 1/84
HB,HBØ 14       9---09      2-----15   XZ-----26   7Z-----21
HC,HC8 10   PF-PY  11       3-----16   Y2-Y9  14   8J/Ant 39
HH,HI  08   PYØall 11       4-----16   YA-----21   8P-----08   Revision # 3
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ARS, Att.: Paula Franke, WB9TBU, P.O. Box 873, Beecher, IL 60401.

Six Meter QSO Party

0000Z Sat. to 2400Z Sun., June 16–17

This is the 10th 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, or 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 SMIRK certificates 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.

Mailing deadline for entries is July 8th to: Mark S. Anderson, WB5NPK, 8932 Saddle Trail, San Antonio, TX 78255.

ARRL Field Day

1800–2100Z Sat.–Sun., June 23–24

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, ARRL Field Day, 225 Main St., Newington, CT 06111.

ITU Zones

A2-----57
A3-----62
A4-----39
A5-----41
A6,7,9 39
AHØ-AL7*3
AP-----41
BV-----44
BY 33,42-
BY 43& 44
C2-----65
C3-----27
C5-----46
C6-----11
C8,C9 53
CE 1-5 14
CE 6-8 16
CE9----73
CEØA D,E
F 63
CEØX---14
CEØZ B,E
F&Z 14
CM-----11
CN-----37
CO-----11
CP1----12
CP2-7 14
CP8-9 12
CR9----44
CT1----37
CT2,3 36
CT4----37
CX-----14
D2-----52
D4-----46
D6-----53
DA-DL 28
DU-----50
EA-EH
1-6 37
8 36
9 37
EI,EJ 27
EL-----46
EP-----40
ET-----48
F------27
FB8W,X 68
FB8Y 70
FB8Z---68
FC-----28
FG all 11
FH-----53
FK-----56
FM-----11
FO-----67
FO/C 10
FP----- 9
FR all 53
FW-----62
FY-----12
G all 27
H4-----51
H5-----57
HA-----28
HB,HBØ 28
HC,HC8 12
HH,HI 11
HK-----12
HKØ/MI 12
HKØ/SA 11
HL-----44
HP,Hr 11
HS-----49
HT-----11
HV-----28
HZ-----39
I-IF9 28
IG9,IH937
IMØ-IT 28
J2-----48
J2Ø/A 48
J3-----11
J6,7,8 11
JA-JS 45
JD/MT 45?
JD/O 45?
JT 32& 33
JW,JX 18
JY-----39
KC4AAA 74
KC4AAC 73
KC4AAD 72
KC4USX 71
KC6 E. 65?
KC6 W. 64
KG4----11
KHØ-KX6*3
LA-LJ 18
LA/Ant 73
LU A-U 14
LU V-X 16
LU Y 14
LX-----27
LZ-----28
N6 6
NHØ-NP *3
OA-----12
OD-----39
OE-----28
OH-OJØ 18
OK,OL 28
ON-----27
OR4/Ant
OX all 5
OY,OZ 18
P2-----51
PA-PI 27
PJ all 11?
PP-PZ
1-5 15
6-8 13
9 15
PYØ/F 13
PYØ/SP 13
PYØ/T 15
PZ-----12
S2-----41
S7-----53
S8-----57
S9-----47
SJ-SM 18
SO-SQ 28
ST,STØ 48
SU-----38
SV all 28
T2-----65
T3Ø----65
T31----62
T32 N. 61
S. 63
T5-----48
T7-----28
TA-TC 39
TF-----17
TG-----11
TI,TI9 11
TJ,TL 47
TN,TR 52
TT-----47
TU-TZ 46
UAØ *Ø
UA1----*1
UA2,3 29
UA4----*4
UA6----29
UA9----*9
UB,UC 29
UD,UF 29
UG6----29
UH,UI 30
UJ8 30&42
UKØ----*Ø
UK1----*1
UK2,3 29
UK4----*4
UK6----29
UK7----30
UK8----*8
UK9----*9
UL7----30
UM8 31&42
UN1----19
UO,UP 29
UQ,UR 29
UT5----29
UV-UW
Ø-----*Ø
1-----*1
2,3 29
4-----*4
6-----29
9-----*9
UY5----29
UZ Ø---*Ø
1 *1
2,3 29
4---*4
6---29
9---*9
V2,V3 11
VEØ /MM
VE1 all 9
VE2---- 9
VE3---- 4
VE4,5 3
VE6,7 2
VE8 2-4,75
VKØ/HI 68
VKØ/MI 60
VKØ/Ant70
VK/ LH 60
VK 1-3 59
VK 4 55
VK 5 59
VK 6 58
VK 7 59
VK 8 55
VK9N---60
VK9X,Y 54
VK9Z/MR56
VK9Z/MI55
VO1,2 9
VP2 all 11
VP5-----11
VP8/Ant 73
VP8/F 16
VP8--
Others73
VP9----11
VQ9----41
VR6----63
VS5----54
VS6----44
VU,VU7L41
VU7/A 49
VY1---- 2
W6----- 6
WHØ-WP1*3
XE,XF 10
XP----- 5
XT-----46
XU-XZ 49
Y2-Y9 28
YA-----40
YB-YD
East---51
West---54
YI------39
YJ------56
YK------39
YO------28
YS------11
YU------28
YV------12
YVØ-----11
Z2------53
ZA------28
ZB------37
ZC------39
ZD all 66
ZF------11
ZK1 N. 62?
ZK1 S. 62?
ZK2-----62
ZL all 60
ZL5/Ant 71
ZM7-----62
ZP------14
ZR all 57
ZS/Ant 67
ZS all 57
1AØ-----28
1S------50
3A------27
3B all 53
3C------47
3CØ-----52
3D2-----56
3D6-----57
3V------37
3X------46
3Y&/Ant 67
4K1A,B 69
4K1C 70
4K1D 67
4K1E 69
4K1G 70
4K1H----69
4S------41
4U1ITU 28
4U1UN 8
4W------39
4X,4Z 39
5A------38
5B------39
5H------53
5N------46
5R------53
5T-5V 46
5W------62
5X-5Z 48
6T,6U 48
6W------46
6Y------11
70-----39
7J1----45?
7P-----57
7Q-----53
7X-----37
7Z-----39
8J/Ant 67
8P-----11
8Q-----41
8R-----12
9G-----46
9H all 28
9I,9J 53
9K-----39
9L-----46
9M2-8 54
9N-----42
9Q-9U 52
9V-----54
9X-----52
9Y-----11
A/-----48
****
*Ø *Ø
UAØ,UKØ
UVØ,UWØ
UZØ
A-B 22
C,D,F 34
H-----22
I N. 24
I 25
I E. 26
J-----33
K-----26
L-----34
O-----32
Q-----23
S-T 32
U-V 33
W-----32
X-----25
Y-----32
Z-----35
****
*1 *1
UA1,UK1
UV1,UW1
UZ1
A-C,F 29
N,O 19
P 20
PAA 75
PAL 75
PAM 75
Q,T,W 29
Z-----19
****
COMPLIMENTS OF
GORDON W6NLG 1/84

Revision #_____Ø

Canada Day Contest

0000 to 2400 UTC Sun., July 1

Sponsored by the Canadian Amateur Radio Federation, this contest follows the same pattern as the one 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, no multiplier.

Frequencies: 1810, 1840, 3525, 3770, 7025, 7070, 14025, 14150, 21025, 21250, 28025, 28500, 50040, 50110, 144090, 146520.

Awards: Certificates to the top-scoring entries in each class, in each VE prov./terr., U.S. call area, and DX country. Trophies to single operator, single and all band, and multi-operator winners.

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.

Venezuelan Contest

Phone: July 7–8 C.W.: July 28–29
0000Z Saturday to 2400Z Sunday

This is the 22nd yearly contest celebrating Venezuela's independence. It's a world-wide type contest; therefore, do not confine your activity to working YV's only. Use all five bands, 10 through 80 meters. There are four classes: Single operator, single and all band, and multi-operator single and multi-transmitter.

Exchange: RS(T) plus a QSO number starting with 001.

Points: Contacts between stations in different countries, 2 points. Between stations in the same country zero (0), but permitted for multiplier credit.

Multiplier: One for each YV call area, each U.S. call area, and each country (including own) worked on each band.

Final Score: Total QSO points from all bands multiplied by the sum of the multiplier from each band.

Awards: A plaque to the highest scorer in each class. Medals to the highest scoring single operator in each continent and the Bolivarian countries (Bolivia, Colombia, Ecuador, Panama, Peru).

Certificates to stations in the Americas working 15 YV stations and 10 different countries; European and African stations working 10 YV's and 10 countries; and Asia and Oceania stations working 5 YV's and 10 countries.

Use a separate log sheet for each band, and a summary sheet showing the scoring, your name and address in block letters, and the usual signed declaration. It is requested that all award applicants include a remittance of $2.00 or its equivalent in IRC's.

Mailing deadline is August 15th for phone entries and September 15th for c.w. They go to: Radio Club Venezolano, P.O. Box 2285, Caracas 1010-A Venezuela.

Awards

a monthly feature by
DOROTHY H. JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The story of the month as told by Moe, KB5DM, is:

Claude B. "Moe" Dreher, KB5DM
All Counties #458, 1-9-84

"Have you ever heard of Boyd County, Nebraska? I had not heard of it until I became a County Hunter. But one thing is sure, I will never forget that county if I live to be a hundred years old. You may wonder what could be so special about Boyd County. For some reason, known only to fate, this county turned out to be my 3076th—the very last county.

"If you should work a mobile station or a fixed station in a different county every day, it would take you roughly 8½ years to finish working the counties on your own. Now believe me, it is much more fun and certainly more efficient to work the counties on 14.336 MHz with the enthusiastic group of amateurs called 'County Hunters.'

"You may get discouraged, angry, impatient, and feel left out at times, but if you stick it out and stay with it until the end, you will find the rewards far outweigh the letdowns. I know, because every one of these things happened to me.

"I never will forget the first county I put out from the mobile station. I checked into the net as a mobile station in Lafayette County, Arkansas. I got more than enough contacts to fill two log pages. That did it. From then on I became a confirmed County Hunter. My wife, Jane, would have sent me away if she had known what was coming. Do you have any idea how many cups of coffee and how many packs of cigarettes I consumed during this exciting time? I always thought I was pretty good at geography until I went to the atlas a thousand times to find the location of some mobile. I was always afraid the mobile would leave the county before I got a chance to work him or her.

"The thrill of tearing down a lonely Arkansas highway in the middle of the night to try to help out a fellow County Hunter is one memory. Backing into a road sign with my 1977 Courier pickup is another. The timing belt broke once when I was trying to run all the 'Razorback' counties. All these memories and more are still vivid in my memory. When all is said and done, I guess the supreme pleasure of county hunting has to be giving out the counties from a mobile station.

"Now let me tell you about the last days before Boyd County came along. It was a few days before Christmas when I got word that Pete, K4QFK, would be coming through my part of the world again. I was down to five counties by then, two in North Carolina and three in Nebraska. Over the air I suddenly heard KB4XK, Jim, say he was going to go get my last counties in North Carolina, Beaufort and Hyde.

"There seemed to be a light shining way down at the end of the tunnel for me, but to my dismay the weather took a bad turn in Arkansas. We had 10 inches of snow, and ice was everywhere. My electrical power was going off and on like a blinker light. When this happened I would grab the rig and run out in the cold to my truck.

"Jim made it to my counties and finished me east of the Mississippi River, and that left just Logan, Rock, and Boyd in Nebraska.

"Meanwhile, Pete arrived here and told me he would try to finish me up on his way to Idaho to visit Ken, W7LQT. Pete stayed with us for two days, and then he was off to Dallas, and Comanche, Oklahoma. Heading north from there, Pete ran into bad weather in Kansas and was forced to turn west and go to Denver, and then on to visit Chuck, N0BHO.

"Chuck and Pete got into Chuck's auto and took off for Nebraska. I was not aware of what they were doing, so by this time I had decided that it would be spring before any mobile stations would be able to reach my Nebraska counties. I was in despair.

"On the morning of the 22nd of December I plodded to my rig with my head hung low. Out of my speaker I heard K4QFK and N0BHO running counties in Colorado. I had no idea they were headed toward Nebraska until Pete told me. During this time my electrical power lines went dead from ice buildup and once again I took the rig and dashed out to the pickup truck. Jane didn't know whether to bring me coffee in the house or outside in the truck.

"Then suddenly Logan County, Nebraska, was worked and the team moved on east toward Rock County. The weather was very cold in Nebraska, but the team arrived in Rock County and I was down to one to go. I was not to get my last county until the next morning. Never will I forget when Ken, W7LQT, asked Pete if they had reached Boyd County. By the time Pete reached the Keyo Paha and Boyd County line, I had already gone to the truck because my electrical power was off again. Finally Ken, W7LQT, quit talking long

At home in the hills of Arkansas, Moe, KB5DM, All Counties #458.

333 South Lincoln Ave., Mundelein, IL 60060

Moe's Last County

By Jane Dreher

(With apologies to Clement Clark Moore)

'Twas two nights before Christmas, and all through the house,
Not a creature was stirring, not even a mouse.
A miserable winter, so far we have had,
No sunshine or power has been at our pad.
The water is frozen and so is the yard,
If only Pete can make it, my thanks to the Lord.
While Jane in her kerchief and Moe in his cap,
Had just settled down for a long winter's nap,
We'd given up on Pete when we looked at the map.
He'd listen to weather and turned with a zap.
"He's going straight to Chuck's!" I said with a shout.
"My last three counties have just been snowed out."
The very next morning I woke with a drag,
To get all the counties was not in my bag.
But what did my little frozen ears hear?
'Tis ole QFK getting the mobile in gear.
The Net Control said he is heading back east,
With Chuck at the helm and the weather a beast.
If Pete's got on the chains, I'll get one county at least.
On Petey and Chuckie in Buick on chains!
'Tis good of them to do just for my gains.
They are heading for Logan my third from the last.
If they make it today, it'll be a big blast.
They made it to Logan, now Rock's coming next.
If I get this county, I've sure lost my Hex.
They just gave me Rock, I'm beginning to smile.
Boy! Those two hams have gone the last mile.
Boyd, Nebraska, so far from the way,
But they just made it, so I'll say HURRAY!
Three cheers for them both, I owe them a lot,
If only the weather had not gone to pot.
My thanks to you all who've made this day real.
Words just can't express how lucky I feel.
So you've heard me exclaim as I drift out of sight,
"Merry Christmas to all and to all a GOOD NIGHT."

Special Honor Roll
All Counties

#462 Ray Boffa, W1EKZ, 2-2-84
#463 J.V. Staples, KT4U, 2-4-84
#464 Fred Fraley, AA4FF, 2-4-84
#465 Arthur B. Johnson, K2POA, 2-9-84
#466 Florence Reitzel, KU7F, 2-16-84
#467 Daniel G. Hammell, WA9EZT, 2-25-84

enough for me to work Pete, and I finished working all counties.

"While all this was taking place, my wife, Jane, wrote a poem which I am including.

"If you desire a challenge, want to make many friends, and like to help others while receiving help yourself, become a County Hunter. And by the way, if I get a job soon, I'm going to buy me some shoes; it's cold down here in Arkansas. Many thanks to all!"

Awards Issued

Raymond Boffa, W1EKZ, completed them all and sent for All Counties #462 Mixed, 2-2-84.

J. V. Staples, KT4U, finished all his paperwork and qualified for All Counties #463 Mixed.

Fred Fraley, AA4FF, won all Counties #464 Mixed.

Arthur B. Johnson, K2POA, did a lot of paperwork and came up with all Counties #465, All 20 Meters, All Mobile, S.S.B.

Florence Reitzel, KU7F, took time to qualify for All Counties #466 All S.S.B. before she left for a month's holiday in Australia.

Daniel G. Hammell, WA9EZT, worked them all and received All Counties #467 Mixed.

Justino Mateiro (Matt) Santos, CT1TZ, added USA-CA 3000 #492 All S.S.B. to his fine collection.

Joseph "Red" Robert, W5VGF, came up with another 500 counties and added USA-CA 2500 #555 All C.W. to his certificate.

A.G. "Sandy" Anderson, GM3BCL, claimed USA-CA 2000 #608 Mixed, first to a GM station. Sandy is custodian for the Worked All Scottish Districts Award.

Blaha Antonin, OK1APV, qualified for USA-CA 2000 #609 All C.W., #2 to Czechoslovakia.

Hiroyuki Ogawa, JA8DNZ, sent for USA-CA 1500 #678 Mixed.

USA-CA Honor Roll

3000		2000		1000	
CT1TZ	492	W1EKZ	605	W1EKZ	828
W1EKZ	493	KT4U	606	KT4U	829
KT4U	494	K2POA	607	K2POA	830
K2POA	495	GM3BCL	608	JH8NYK	831
KU7F	496	OK1APV	609		
2500		**1500**		**500**	
W1EKZ	552	W1EKZ	675	W1EKZ	1923
KT4U	553	KT4U	676	KT4U	1924
K2POA	554	K2POA	677	K2POA	1925
W5VGF	555	JA8DNZ	678	KA2MUD	1926
				W5OBT	1927

No-79-80

Wataru Hirose, JH8NYK, added the seal for USA-CA 1000 #831 Mixed to his certificate.

USA-CA 500 certificates went to:

Raymond Boffa, W1EKZ, #1923, 2-2-84, Mixed.

J.V. Staples, KT4U, #1924, 2-4-84, Mixed.

Arthur B. Johnson, K2POA, #1925, 2-9-84, All 20 Meter Mobile S.S.B.

William V. Vielhauer, KA2MUD, #1926, All C.W.

Robert D. Lee, W5OBT, #1927, Mixed.

New Awards

Alaska DX Certificate. The Alaska DX Certificate is offered by the Anchorage Amateur Radio Club, KL7AA, P.O. Box 101987, Anchorage, AK 99510-1987 for contacts made since January 1, 1955 with 10 Alaskan amateurs. Of these ten confirmed QSO's there must be at least one from each of the following geographical areas of Alaska:

1. Southeastern (that part east of 141 degrees west latitude).
2. Northern (that part above the Arctic Circle).
3. Aleutian Islands, including Kodiak Island and the Alaska Peninsula South of 58 degrees north longitude.
4. Central Alaska, which includes Anchorage and Fairbanks.

Of these ten QSO's four must be with members of the Anchorage Amateur Radio Club. Phone, c.w., RTTY, SSTV, or any other combination of the aforementioned modes of operation may be used. Except for the WARC bands, any amateur band is acceptable. No special endorsements will be given. Send QSL's or a certified list (certified by either three licensed amateurs or an official of a national-level radio organization or affiliated club), including postage for return, in U.S. money or stamps or appropriate number of IRC's. ADXC is offered to all amateurs of the world with the exception of amateurs within Alaska.

SSTV Master Scanner Award. This award is to recognize the serious SSTV'er. Entry level is 100 two-way SSTV contacts with endorsements for 500, 1000, 1500, and 2000 available. Special endorsements for color SSTV are also available. Copies of logs are required. For further information contact Mike Stone, WB0QCD, P.O. Box H, Lowden, IA 52255.

CANADAWARD. The Canadian Amateur Radio Federation is pleased to announce the following awards available to all radio amateurs worldwide.

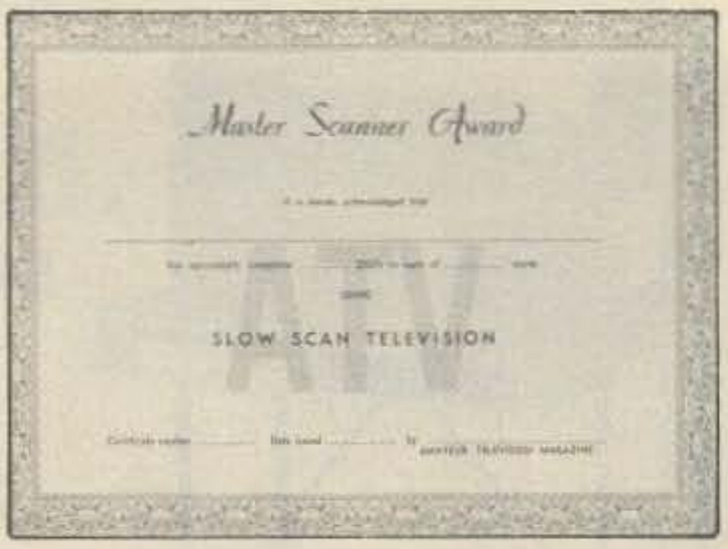
CANADAWARD: A colorful certificate will be issued to any amateur who confirms two-way QSO's with all Canadian provinces and territories. All QSO's must be on one band only. Separate awards are issued for each band on which the applicant qualifies (12 cards per band, see list below). Mode endorsement is available if all QSO's are made on the same mode (c.w., s.s.b., RTTY, SSTV). Contacts made after July 1, 1977 only will count for this award. Submit the 12 cards with two dollars ($2.00) Canadian or U.S. funds or 10 IRC's plus sufficient funds for return postage. CARF members need only send funds for return postage.

5 Band CANADAWARD: A special plaque is available to any amateur who confirms two-way QSO's with all Canadian Provinces and Territories on each of five separate bands (total of 60 cards, 12 cards per band, see list below). Contacts made after July 1, 1977 only will count for this award. Submit the 60 cards and $25 Canadian or U.S. funds plus sufficient funds for return postage.

List of Canadian provinces and territories: VO1/VO2 Newfoundland/Labrador, VE1 Prince Edward Island, VE1 Nova Scotia, VE1 New Brunswick, VE2 Quebec, VE3 Ontario, VE4 Manatoba, VE3 Saskatchewan, VE6 Alberta, VE7 British Columbia, VE8 Northwest Territories, VY1 Yukon Territory. *Note:* VO2, Labrador, is part of the Province of Newfoundland and counts for Newfoundland.

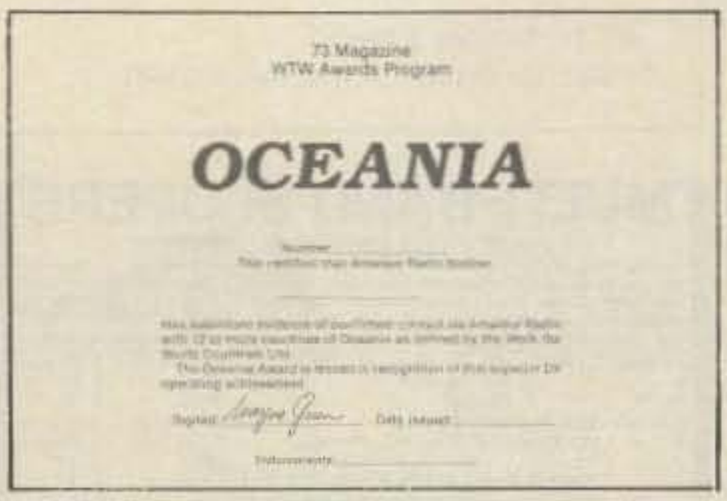
Mail applications to CARF Contests and Awards Committee, P.O. Box 2172, Station "D," Ottawa, Ontario, Canada K1P 5W4.

Oceania Award. Work 12 Oceanic countries. To apply, prepare a list of claimed contacts, listing all contacts in prefix order. Do not send QSL cards! Have your list verified by two amateurs, a radio club secretary, or a notary public. Send the application, along with the award fee of $4.00 U.S. or 12 IRC's, to Bill Gosney, KE7C, 2665 North Busby Road, Oak Harbor, WA 98277.



Master Scanner Award.

CANADAWARD—28 MHz.



Oceania Award.

John, ON4UN, lecturing about 80 meter DXing during the annual h.f. meeting of VERON (Vereniging Voor Experimenteel Radio Onderzoek in Nederland). Photo by PA3ABP, courtesy of PA0VDV. John's story is in the January 1984 column.

Hiro, JA8DNZ, in his fine shack in Sopporo, Japan. Hiro is often heard exchanging reports with the mobile stations on the County Hunters Net.

Notes

We have discovered three printing errors in the new Counties Award Record Book. The correct spelling for the new county in Arizona is La Paz; on page 30, the county following Isanti should be Itasca, and the total number of counties in the United States is 3076.

In this part of the world the school children will soon be dismissed from classes for summer holidays and people are planning ways to spend the lovely summer days. 73, Dorothy, WB9RCY

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Novice

a monthly feature by
BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Terms and Abbreviations

New amateurs are usually confused by the terms and abbreviations heard on the air. This article is intended to clear away some of that mystery, and every reader is urged to pass along this information to prospective and new amateurs.

The November and December 1979 issues of *CQ* included a detailed explanation of the modified Phillips Code used by amateurs. This month's column just lists terms and abbreviations that are common in amateur radio: work signs, message handling abbreviations, and the most commonly used modified Phillips Code abbreviations. Suggested additions are welcome in writing.

This is Larry Bruggensmith, KA4SOZ, who helps keep Louisville, Kentucky, easy to contact. He is a boiler operator working the night shift at the Courier Journal *and* Louisville Times. *Larry is also a motorcycling enthusiast and a Corvette buff. I had an enjoyable contact with him on the 15 meter Novice band.*

A	atto (prefix), ampere (basic unit of electrical current)
AA	all after (retransmission request)
AB	all before (retransmission request)
ABT	about
AC	alternating current
ACC	Affiliated Club Coordinator (ARRL)
ACSB	Amplitude Compandored Single Sideband
AD	analog-to-digital
ADR	address (mailing)
AF	audio frequency
AFC	automatic frequency control
AFSK	audio frequency shift keying
AGC	automatic gain control
AGN	again
AH	ampere hour
AIRS	ARRL Interference Reporting System
ALC	automatic level control
AM	amplitude modulation (voice)
AMSAT	Amateur Satellite Corp.
AMTOR	Amateur Teleprinting Over Radio
ANI	any
ANT	antenna
ARA	Amateur Radio Association
ARC	Amateur Radio Club
ARES	Amateur Radio Emergency Service (ARRL)
ARQ	automatic repeat request
ARRL	American Radio Relay League
ARS	Amateur Radio Society/Station
ASCII	American Standard Code for Information Interchange
ASSC	Amateur Satellite Service Council
ATV	amateur television
AVC	automatic volume control
AWG	American wire gauge
AZ/EL	azimuth-elevation
B	bel
BALUN	balanced-to-unbalanced (r.f. transformer)
BC	broadcast
BCD	binary-coded decimal
BCI	broadcast interference
BCNU	be seeing you
BD	baud (bits per second in single-channel binary data transmission)
BER	bit error rate
BFO	beat frequency oscillator
BIT	binary digit
BIT/S	bits per second
BK	back
BM	Bulletin Manager (ARRL)
BN	been, all between (retransmission request)
BPF	band-pass filter
BPL	Brass Pounders League (ARRL)
BT	battery
BUG	semi-automatic telegraph key
BURO	international QSL forwarding bureau
BW	bandwidth
B4	before
C	centi (prefix), Celsius (temperature), yes (code), capacitor, coulomb (quantity of electric charge)
CAC	Contest Advisory Committee (ARRL)
CANS	headphones
CATVI	Cable TV Interference
CB	Citizens' Band (Citizens' Radio Service)
CBMS	computer-based message system
CCTV	closed-circuit TV
CCW	coherent CW, counterclockwise
CD	Civil Defense, Communications Department (ARRL)
CFM	confirm
CK	check
CL	call, closing station
CLD	called
CLG	calling
CLR	clear
CM	centimeter
CMOS	complementary-symmetry metal-oxide semiconductor
CNFMD	confirmed
COAX	coaxial cable
COR	carrier-operated relay
CP	code proficiency (award)
CPU	central processing unit
CQ	general call to all stations (work sign)
CRT	cathode-ray tube
CS	callsign
CT	center tap
CTCSS	continuous tone-coded squelch system
CUL	see you later
CVTR	converter
CW	clockwise, continuous wave (A0, F0 - not code)
D	deci (prefix), diode
DA	deka (prefix)
D/A	digital-to-analog
DAC	digital-to-analog converter
DAT	that
DB	decibel (0.1 bel)
DBI	decibels above/below isotropic antenna
DBM	decibels above/below one milliwatt, double balanced mixer
DBV	decibels above/below one volt
DBW	decibels above/below one watt
DC	direct current
D-C	direct conversion
DE	the, from (work sign)
DEC	District Emergency Coordinator (ARRL)
DEG	degree(s)
DEM	them
DERE	there
DET	detector
DF	direction finder/finding
DIP	dual in-line package
DIS	this
DLVD	delivered
DLVR	deliver
DOSE	those
DP	dipole (antenna)
DPDT	double-pole, double-throw (switch)
DPSK	differential phase-shift keying
DPST	double-pole, single-throw (switch)
DR	there, dear
DS	direct sequence (spread spectrum)
DSB	double sideband (voice)
DTMF	dual-tone, multifrequency
DVM	digital voltmeter
DX	distant station (usually foreign)
DXAC	DX Advisory Committee (ARRL)
DXCC	DX Century Club (award)
E	voltage
EC	Emergency Coordinator (ARRL)
ECAC	Emergency Communications Advisory Committee (ARRL)
ECL	emitter-coupled logic

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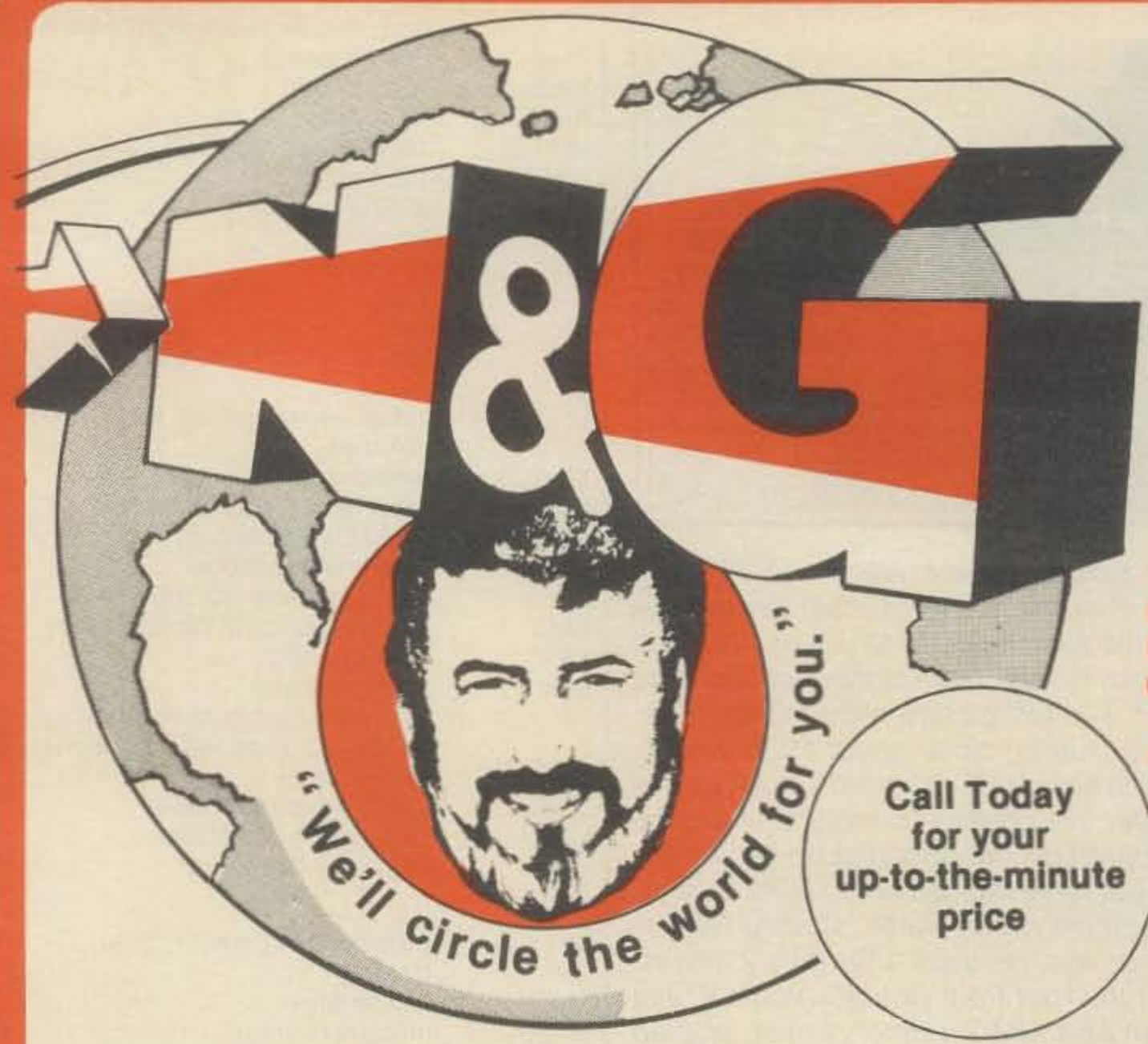
CIRCLE 133 ON READER SERVICE CARD

Here are two Novices who reside at the Good Shepherd Home in Allentown, Pennsylvania. Bruce Humphreys, K0HR, and Maureen Pranghofer, KF0I, help people like Chuck and Jim get licensed and on the air, with the assistance of local volunteers. If you would like to schedule a contact with Jim and/or Chuck, write to them at Sixth and St. John Streets, Allentown, Pennsylvania 18103. The left picture shows Chuck Diebold, KA4JZM. He has been an active shortwave listener since about 1938. He obtained his Novice license about 40 years later, when he was 60 years old. Chuck uses a Century 21 transceiver with a Hal keyboard-reader. He prefers 15 meters, where he has contacted amateurs in several states and countries. The right picture shows Jim Johnson, KA3IYL. Jim is a paraplegic who does not have the use of his arms or legs. Chuck got Jim interested in amateur radio. Jim joined Handi-Hams, studied for a license, and passed the Novice test about one year ago. He uses a Century 21 transceiver with a dipole located on the other side of the roof from Chuck's vertical. Jim uses a pointer strapped to his forehead to key an AEA MM-2 memory keyer, plus an MBA reader to supplement his "wheelchair copy." Friends are designing a motorized tuning system that will allow Jim to shift frequency without assistance. Jim has worked amateurs in ten states and six countries.

EHF	extremely-high frequency (30-300 GHz)
EIRP	effective isotropic radiated power
ELF	extremely-low frequency (audio)
EMC	electromagnetic capability
EME	Earth-Moon-Earth (moonbounce communication)
EMF	electromotive force
EMI	electromagnetic interference
EMP	electromagnetic pulse
EPROM	erasable programmable read-only memory
ES	and
F	frequency, femto (prefix), Fahrenheit, fuse, or farad
FAX	facsimile (A4, F4)
FB	fine business (excellent)
FD	Field Day (contest), folded dipole
FER	for
FET	field-effect transistor
FL	filter
FM	frequency modulation (voice)
FREQ	frequency
FSK	frequency-shift keying
FT	foot (12 inches)
G	giga (prefix), gram (unit of mass)
GA	good afternoon, go ahead (transmit)
GAAS	gallium arsenide
GALLON	full power (usually 1500 watts, PEP output)
GBA	give better address (traffic handling)
GDO	grid/gate dip oscillator
GE	good evening
GG	going
GHZ	gigahertz
GM	good morning
GN	good night
GND	ground
GP	ground plane (antenna)
GUD	good
H	hecto (prefix), henry (unit of inductance)
HANDLE	name
HARMONIC	child (if not frequency)
HERTZ	cycle per second, half-wave antenna
HF	high frequency (3-30 MHz)
HFO	high frequency oscillator
HI	laughter (code)
HPF	highest probable frequency, high-pass filter
HR	here, hear
HV	have
HW	how
HW?	how do you copy my signal?
HX	hydrographic report
HZ	hertz (frequency)
I	current, indicator lamp
IARU	International Amateur Radio Union
IC	integrated circuit
ID	identification, inside diameter
IF	intermediate frequency
IMD	intermodulation distortion
IN	inch/inches (unit of length)
IN/S	inches per second (velocity)
I/O	input/output
IRC	International Reply Coupon
ITF	Interference Task Force (ARRL)
ITU	International Telecommunications Union
IW	Intruder watch
J	joule (energy or work unit), jack, operator for complex notation
JFET	junction field-effect transistor
K	kilo (prefix), Boltzmann's constant, answer (work sign), kelvin (temperature)
KBD	1000 bauds
KBIT	1024 bits
KBIT/S	1000 bits per second
KBYTE	1024 bytes
KG	kilogram
KHZ	kilohertz
KM	kilometer
KNW	know
KV	kilovolt
KW	kilowatt (1000 watts, d.c.)
L	inductance, lambert, liter (liquid volume)
LB	pound
LC	inductance - capacitance
LCD	liquid crystal display
LED	light-emitting diode
LF	low frequency (30-300 kHz)
LHC	left-hand circular (polarization)
LID	poor operator
LO	local oscillator
LP	long path (opposite antenna heading), log periodic (antenna)
LS	loudspeaker
LSB	lower sideband (voice)
LSI	large-scale integration
LW	long wire (antenna)
M	mega (prefix), meter, milli (prefix)
MA	milliampere
MAH	milliamperehour
MARCONI	one-quarter wave antenna
MDS	Multipoint Distribution Service, minimum discernable signal
MF	medium frequency (300-3000 kHz)
MH	millihenry
MHO	(use Siemens)
MHz	megahertz
MI	mile
MIC	microphone
MIKE	microphone
MI/H	miles per hour
MI/S	miles per second
MIN	minute (time)
MIX	mixer
MM	millimeter
MNI	many
MOD	modulator
MODEM	modulator/demodulator
MOS	metal-oxide semiconductor
MOSFET	metal-oxide-semiconductor field-effect transistor
MS	millisecond
M/S	meters per second
MSG	message
MSI	medium-scale integration
MUF	maximum usable frequency
MV	millivolt
MW	milliwatt
N	nano (prefix), no (wrong)
NBFM	narrow band frequency modulation (voice)
NBVM	narrow band voice modulation (voice)
NC	normally closed, no connection
NCS	Net Control Station
ND	nothing doing, no dice
NF	nanofarad
NF	noise figure
NG	no good
NH	nanohenry
NICD	nickel cadmium (battery)
NIL	nothing, I have nothing for you
NM	Net Manager
NMOS	N-channel metal-oxide silicon
NO	normally open
NPN	negative-positive-negative (transistor)



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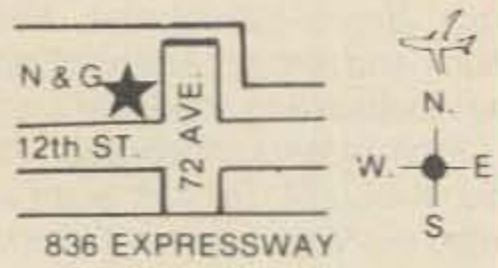

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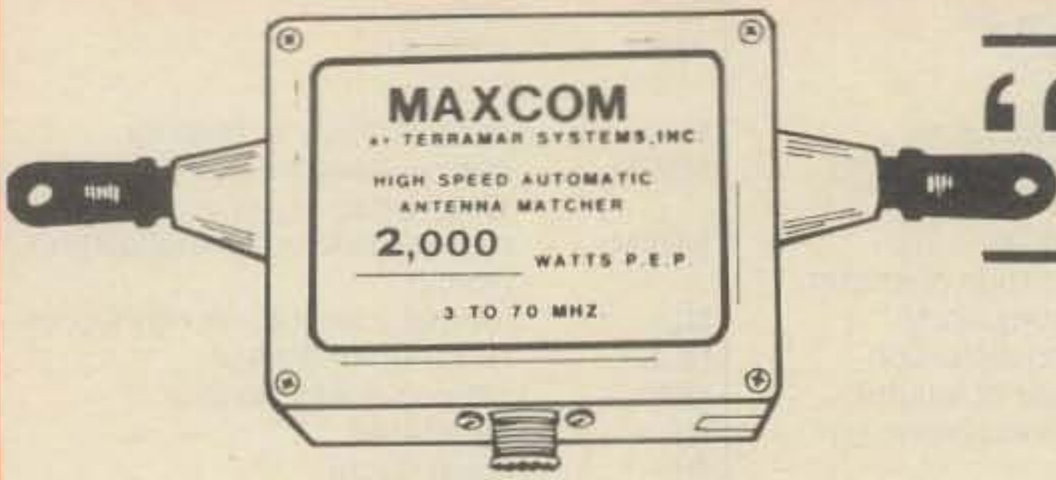

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CIRCLE 33 ON READER SERVICE CARD

NR	number, Novice Roundup (contest)
NS	nanosecond
NTS	National Traffic System (ARRL)
NW	now, resume transmission
OB	old boy (male amateur)
OBS	Official Bulletin Station (ARRL)
OD	outside diameter
OES	Official Emergency Station (ARRL)
OG	old girl (female operator)
OM	old man (male operator)
ONLI	only
OO	Official Observer (ARRL)
OP	operate, operator
OP AMP	operational amplifier
OPR	operator
ORS	Official Relay Station (ARRL)
OSC	oscillator
OSCAR	Orbiting Satellite Carrying Amateur Radio
OT	old timer, old top, offset tuning (receiver)
OTC	Old Timer's Club
OTS	Official Traffic Station (ARRL)
OVS	Official VHF Station (ARRL)
P	pico (prefix), power, plug
PA	power amplifier, public address
PAM	pulse amplitude modulation
PATCH	telephone to amateur station interconnection device
PBL	preamble (message handling)
PC	printed circuit
PEP	peak envelope power
PEV	peak envelope voltage
pF	picoFarad
pH	picoHenry
PIA	Public Information Assistant (ARRL)
PIN	positive-intrinsic-negative (transistor)
PIO	Public Information Officer (ARRL)
PIV	peak inverse voltage
PLL	phase-locked loop
PM	phase modulation
PMOS	p-channel metal-oxide semiconductor
PNP	positive-negative-positive (transistor)
POT	potentiometer
P P	peak-to-peak
PRA	Public Relations Assistant (ARRL)
PRAC	Public Relations Advisory Committee (ARRL)
PROM	programmable read-only memory
PSE	please
PSHR	Public Service Honor Roll (ARRL)
PTO	permeability-tuned oscillator
PTT	push-to-talk
PX	press report
Q	transistor, figure of merit (tuned circuit)
QRP	low power (under 5 watts)
QUAD	four-sided antenna
R	received okay, are, period (punctuation mark), resistor
RACES	Radio Amateur Civil Emergency Service
RAM	random-access memory
RC	resistance-capacitance
R/C	radio control
RCC	Rag Chewer's Club (award)
RCVD	received okay
RCVR	receiver
RF	radio frequency
RFC	radio frequency choke
RFI	radio frequency interference
RHC	right-hand circular (polarization)
RIG	station equipment
RIT	receiver incremental tuning
RLC	resistance-inductance-capacitance
RM	rule making (FCC number for petition)
R/MIN	revolutions per minute
RMS	root mean square
ROM	read-only memory
RPT	repeat, I repeat (message handling)
RPTR	repeater
R/S	revolutions per second
RST	readability-strength-tone (signal report)
RTTY	radioteletype
RX	receiver
S	Siemens, switch, second (time)
SASE	self-addressed, stamped envelope
SEC	Section Emergency Coordinator (ARRL)
SET	Simulated Emergency Test (ARRL)
SGL	State Government Liaison (ARRL)
SHACK	radio room
SHF	super high frequency (3–30 GHz)
SHUD	should
SIG	signal, signature
SKED	schedule
SKYHOOK	antenna
SM	Section Manager (ARRL), silver mica (capacitor)
S/N	signal-to-noise (ratio)
SPDT	single-pole double-throw (switch)
SPST	single-pole single-throw (switch)
SRI	sorry
SS	Sweepstakes (contest), spread spectrum
SSB	Single-sideband (voice)
SSC	Special Service Club (ARRL)
SSI	small-scale integration
SSTV	slow-scan television
STM	Section Traffic Manager (ARRL)
SVC	service, service message prefix
SWL	shortwave listener
SWR	standing wave ratio
SX	simplex
SYNC	synchronous, synchronizing
T	zero (numeral), tera (prefix), transformer (schematic)
TA	Technical Advisor (ARRL)
TAD	Ten American Districts (award)
TC	Technical Coordinator (ARRL)
TCC	Transcontinental Corps (ARRL)
TFC	traffic (messages)
TKS	thanks
TMRW	tomorrow
TNX	thanks
TR	transmit-receive
TT	that
TTL	transistor-transistor logic
TTY	teletype
TU	thank you, terminal unit
TVI	television interference
TX	transmitter, time tick
U	you, intergrated circuit (schematic)
UHF	ultra-high frequency (300-3000 MHz)
UR	your
URS	yours
USB	upper sideband (voice)
UTC	Universal Time Coordinated
UV	ultraviolet
V	volt, vacuum tube (schematic)
VCO	voltage-controlled oscillator
VCR	video cassette recorder
VDT	video display terminal
VERI	very
VFO	variable frequency oscillator
VHF	very-high frequency (30-300 MHz)
VLF	very-low frequency (3-30 kHz)
VLSI	very-large-scale integration
VMOS	vertical metal-oxide semiconductor
VOM	volt-ohm meter
VOX	voice (or sidetone) operated xmit (transmit) control
VR	voltage regulator
VRAC	VHF Repeater Advisory Committee (ARRL)
VSWR	voltage standing wave ratio
VTVM	vacuum tube voltmeter
VUAC	VHF/UHF Advisory Committee (ARRL)
VUCC	VHF/UHF Century Club (ARRL)
VXO	variable crystal control
VY	very
W	watts
WA	word after (retransmission request)
WAC	Worked All Continents (award)
WARC	World Administrative Radio Conference
WAS	Worked All States (award)
WAT	what
WAZ	Worked All Zones (award)
WB	word before (retransmission request)
WBFM	wide-band frequency modulation
WH	watthour
WID	with
WINDOM	unique half-wave antenna
WKD	worked
WKG	working
WL	will
WPM	words per minute (code speed)
WRD	word/words
WVDC	working volts direct current
WX	weather
X	reactance
XCVR	transceiver
XFMR	transformer
XMIT	transmit
XMSN	transmission
XMTR	transmitter
XO	crystal (controlled) oscillator
XTAL	crystal
XVTR	transverter
XYL	wife/married female
Y	crystal (schematic)
YAGI	Yagi-Uda antenna
YF	wife
YIG	yttrium iron garnet (crystaline material)
YL	young lady (female operator)
YRS	years
Z	UTC/Universal Time Coordinated (ex-GMT, Zulu, etc), impedance
ZB	zero beat (frequency)
2	to
5B DXCC	Five Band DXCC (award)
5B WAC	Five Band Worked All Continents (award)
5B WAZ	Five Band Worked All Zones (award)
6B WAC	6 Band Worked All Continents (award)
33	fondest regards (between females)
73	best regards (also an amateur magazine)
88	love and kisses (between male and female)
99	keep out (do not disturb this contact)

DX

This month by
JOHN A. ATTAWAY, K4IIF

NEWS OF COMMUNICATIONS AROUND THE WORLD

Alexander Pope, the great English poet of the early seventeenth century, once wrote:

"Nor fame I slight, nor for her favors call;
She comes unlook'd for, if she comes at all."

Pope's lines apply especially well to the personality of the newly elected member of the DX Hall of Fame, Mr. Rodney H. Newkirk, W9BRD, long-time DX Editor of *QST*.

Rod Newkirk toiled in the vineyards of DX reporting for over 30 years. He wrote his first "How's DX" column for *QST* in November 1947, and finally took his shingle down in March 1978. I once asked Rod how it all started. His reply was "Well, I was making paper airplanes of ARRL memoranda when I worked at W1AW back in '47, and they told me to write a DX column to get me out of their hair. Neither they nor I knew what we had started."

In the early days of DXing there were no weekly DX bulletins and DX nets were largely unknown. Monthly magazine columns played a major role in keeping people informed. To quote Alan Leith, VE3FRA/VE1AL, Editor and Publisher of the *DX Report*: "Rod Newkirk's contributions to DXing have long been overlooked. When life was less complicated and we all received our magazines just a few weeks after they went to press, Rod's column was a bible to all DXers. Without it, many of us would never have known what was going on."

A pre-award interview with Rod revealed many interesting observations and insights. In particular he cited the conviction, formed after 30 years of monthly columns and reader mail, that hams who just like to read about DX far outnumber the ones who really chase after it in a big way. For help and encouragement in many ways, Rod is appreciative to Byron "By" Goodman, W1DX, of East Hartford, CT; K. B. Warner, who was then W1EH; the late Harold McKean, W1CEG, who served as Managing Editor of *QST* for many years; to Elmer, who came along in '71; to the hundreds of contributors who stuck with "How's DX" from their first Novice class DX contacts to the 300 country class; and, of course, don't forget the DX Hoggery and Poetry Depreciation Society. In addition, Rod's particular thanks go to the immortal Phil Gildersleeve, W1CJD, whose cartooning genius animated "How's DX" and all of *QST* for years and years.

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

Rodney H. Newkirk, W9BRD (left), and a very close friend Lynn. Rod was recently elected to the DX Hall of Fame in honor of his over 30 years of dedicated service as DX Editor of QST. *He held this post from 1947 to 1978.*

Silvano "Sil" Rebola, I1XA, of Turin, Italy, is a recent winner in the Single Band WAZ program. Sil grabbed his 40 zones running a Kenwood TS-930S to a Mosley tribander. He is 54 years old and a graduate in physics from Torino University. Zone 19 was his most difficult zone to confirm.

Rod was first licensed in 1937, at the age of 14, with the same callsign, W9BRD. He became a DXer in the early days and earned DXCC number 751 right after World War II. However, deadlines subtracted directly from his operating time, and new growing family responsibilities soon kept him out of the pile-ups. Most of his operating time was, and still is, spent on c.w. using a Collins 32V3, a National NC-100X, and assorted "unaesthetic, homebrew thingies," to some "very nondescript wire antennas." His occupation, incidentally, is in communications for the Illinois State Police.

Rod's family consists of four children, two boys and two girls. His son David is AK7M out west, while son Doug works in electronics in the midwest. Daughter Amanda "did well as WN9PMC until she discovered art and music," and daughter Elizabeth "still puts up with him at home." Wife and mother, Carol, passed away about 10 years ago, and no remarriage so far.

The DX Hall of Fame exists to honor those who have made major contributions to DX, often at great personal sacrifice, contributions above and beyond the call of duty which stand the test of time. Rod Newkirk's 30 years devoted to serving DX and DXers so qualify him for this honor. Congratulations to Rodney H. Newkirk, W9BRD, DX Hall of Fame!

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 and 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

Dr. Sanford E. Hutson, K5YY
Jan. 22, 1983

Rodney H. Newkirk, W9BRD
Feb. 25, 1984

Jack, W2LZX, of CQ magazine's staff, is shown above with Alvin, J6LLI, on Jack's recent visit to St. Lucia, where he operated as J6LJG. QSL's for this operation go to Jack's home call.

De Extra by K5FUV

For a long time I've believed that the biggest threat to amateur radio will come from TVI/RFI and neighbors who don't like antennas. It's happening now to many amateurs around the country, and like it or not, you may be next.

In 1982 a California newspaper reported a major fuss over towers at a DX and contest station in the bay area. The station involved had four towers, and the antenna array included an 80 meter beam. The neighbors complained about the appearance of the towers and alleged radio frequency interference. The article was very biased toward the "neighbors," and would have automatically inspired an uninformed reader to be hostile toward the "bad guy" amateur. Neighbors were writing to the county supervisors complaining that property values were falling and that there was a danger the towers might fall. The county planning director was quoted as looking at the local ordinance to see if it should be amended.

True, this may seem to be an extreme case, but it's becoming more and more frequent and it is happening everywhere. In Lucas, Texas, where K5JA had 5 towers on 4 acres, with no neighbors on 3 sides, an oridinance was passed limiting radio towers to 50 feet in height, no matter how large the lot, and most of them are at least 2 acres. Even Garland, Texas, has recently enacted an ordinance which requires the payment of a $100 fee, *and the signature of approval of everyone within a 200 foot radius of the proposed location before a permit will be given.* Have you ever tried to get everyone within 200 feet of your house to agree on anything?

Frankly, I see the situation as getting worse, not better, and no real solution is in sight. If you own a tower, you may be in for some pressure someday soon. Most of us are city dwellers; very few amateurs can afford a 10 acre rural location just to pursue the hobby. If you want to put up a tower in the future, you may find that local restrictions will make it impossible.

No real solution is in sight. Perhaps the ARRL could find some mechanism to establish a defense fund for RFI/TVI cases, or provide some effective lobbying to re-

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C.W.

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Endorsements

Mixed: 450 EA8ABG, EA1NZ, EA2IA, SM7KIL, JA7XBG, KJ6Z. 500 EA8ABG, EA1NZ, EA2IA, SM7KIL, JA7XBG. 550 JA7MLG, EA2IA, JA7XBG. 600 JA7MLG, EA2IA, JA7XBG. 650 JA7MLG, HB9BYZ, EA2IA. 700 JA7MLG, HB9BYZ, F3AT, EA2IA, DL9TD. 750 F3AT, EA2IA, DL9TD. 800 F3AT, EA2IA, KS0Z. 850 F3AT, EA2IA, IT9KMU. 900 WD9IIC, F3AT, EA2IA, IT9KMU. 950 W2HAZ, WD9IIC, F3AT, EA2IA. 1000 DE0AAA, F3AT, EA2IA. 1050 F3AT, W2HAZ, EA2IA. 1100 F3AT, EA2IA. 1150 F3AT, EA2IA. 1200 F3AT, EA2IA. 1250 F3AT, EA2IA. 1300 UB5-PY83, EA2IA.

S.S.B.: 350 HB9BVV, I5EFO, IS0QDV, K5RP, I8WYD, JA7XBG. 400 W3IJT, HB9BVV, I5EFO, IS0QDV, K5PRC, I8WYD. 450 WB6SRK, HB9BVV, I5EFO, IS0QDV, K5PRC. 500 WB6SRK, I5EFO, IS0QDV, K5PRC. 550 WB6SRK, I5EFO, K5PRC, EA3BOX. 600 WB6SRK, I5EFO, K5PRC, EA3BOX, WA0DCQ. 650 WB6SRK, K5PRC, WA0DCQ. 700 WB6SRK, K5PRC. 750 W0ULU, K5PRC. 800 K5PRC. 850 K5PRC. 900 AC2J. 1350 I3ZKD. 1400 I3ZKD. 1450 I3ZKD. 1500 I3ZKD. 1850 ZL3NS.

C.W.: 350 JR6UDM, W3IMN, KT2C, EA1NZ, EA2IA, PP2WV, JA7XBG. 400 KW9N, EA1NX, EA2IA, PP2WV, JA7XBG. 450 KN7K, EA2IA, JA7XBG. 500 WC4K, EA2IA. 550 WC4K, EA2IA. 600 EA2IA. 650 EA7AAW, EA2IA. 700 W4WJ, EA7AAW, EA2IA. 750 W4WJ, EA2IA. 800 W4WJ, IT9VDQ, EA2IA. 850 W4WJ, I1YRL, EA2IA. 900 W4WJ, I1YRL, EA2IA. 950 W4WJ, I1YRL, EA2IA. 1000 W4WJ, I1YRL, EA2IA. 1050 W4WJ, EA2IA. 1100 W4WJ. 1600 G2GM. 1800 WA2HZR.

VPX Endorsements: 900 . . . . EA2IA.

10 meters:	WB6SRK, W4WJ.
15 meters:	HB9BYZ, W4WJ, JA7XBG.
20 meters:	HB9BYZ, W4WJ, K5RPC.
40 meters:	K2VV, W4WJ.
80 meters:	DL9TD, KZ2P, W0ULU, W4WJ, OK3CFF.
160 meters:	K2VV, W4WJ, K2POF, OK1MP.
Asia:	SM7KIL, JA7XBG, VE2FOU, SM5DAC, JE1TTI, WB6SRK, HB9BVV, W4WJ.
Africa:	W4WJ, VE2FOU.
No. America:	SM7KIL, WB6SRK, W4WJ, K5RPC.
So. America:	W4WJ.
Europe:	SM7KIL, JA7XBG, ZS6BCR, WB6SRK, W4WJ, OK3CFF.
Oceania:	WB6SRK, W4WJ, JA7XBG.

Award of Excellence: YU7DX. 160 meter bar endorsement—OK1MP.

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.

The WAZ Program

10 Meter Phone

273	I7IEH	275	W8VSA
274	DJ9RO		

15 Meter Phone

194	WD5CHW

20 Meter Phone

488	I2MQP	491	VK6AJW
489	WØFF	492	EA3ALD
490	I6NNJ		

10 Meter C.W.

50	JE1QIY	50	JA1BN

15 Meter C.W.

106	JH7AKT	107	JM1BDB

20 Meter C.W.

211	KA2DIV	212	K7ABV

All Band WAZ

S.S.B.

2813	AF3E	2819	JH3KEA
2814	KE4HX	2820	5Z4CI
2815	KA7KIS	2821	ZL4PX
2816	K9LCR	2822	EA3AAH
2817	WA6RLE	2823	KC9CQ
2818	ON6MY	2824	ZP5CY

C.W. and Phone

5710	JH2TPI	5721	OK2PDD
5711	NG8S	5722	F6EXG
5712	W7KWI	5723	DL1TH
5713	JJ1EEA	5724	OH2VD
5714	HB9CCL	5725	K7RDG
5715	HA8CH	5726	JK1EHT
5716	VE7AHA	5727	EA3ALV
5717	W9WAQ	5728	EA1NZ(CW)
5718	YS9RVE	5729	EA1NZ
5719	W2UI		(Phone and CW)
5720	G3BRD		

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.

move these cases from local jurisdictions. However, unless something is started soon, many of us will end up DXing with 100 watts to an indoor antenna at the bottom of this sunspot cycle. That isn't going to be easy!

(De Extra is our slot for editorial comments on matters related to DX. This month's contribution was written by Bill Kennamer, K5FUV, and originally appeared in *QRZ DX*. If you would like to have your say on some matter related to DX, write it up and mail it to K4IIF, P.O. Box 205, Winter Haven, FL 33880.)

Here and There

DX Nets. If DX nets interest you, a booklet by Dieter, OE2DYL, is in order. Dieter's book is entitled *DX Nets Around The World* and is available for six IRC's. Write to Dieter, with s.a.e., at Bessarabierstrasse 39, A-5020 Salzburg, Austria.

Which Zone? WAZ Manager, Leo, W4KA, reports that XZ9A and XZ5A cards are accepted for Zone 26; Abu Ail Island is in Zone 21; Transkei and Bophuthatswana count for Zone 38 as does ZS3, Walvis Bay; Spratley Island is in Zone 26; and KC4AAA can be counted for any of the following zones: 12, 13, 38, 39, 29, 30, and 32. Cards for regular or single band WAZ may be submitted to any authorized *CQ* checkpoint, but cards for 5 Band WAZ must only be checked by Leo himself. His QTH is 1044 Southeast 43rd St., Cape Coral, FL 33904.

Northwest DX Convention. The Willamette Valley DX Club is announcing the 1984 DX convention to be held July 27–29 in Beaverton, Oregon. For further information contact Bob Herndon, W7XN, 607 Andover Place, Portland, OR 97202, telephone (503) 232-2740.

QSL Manager Listing. A listing is available from Fred Smith, WB4KCL, 2265 Sweetbriar Drive, Alexandria, VA 22307. The list goes back to 1979 and has updates. Send Fred a self-addressed, stamped envelope for more information.

International DX Association (INDEXA). This is a new group with the following aims: (1) To promote international goodwill among amateur radio operators of the world on frequencies from 1.8 to 148 MHz; (2) To provide a worldwide network of private radio stations to assist hospitals, medical teams, and the International Red Cross in emergency situations; (3) To provide the same service for city, state, and national organizations when required; (4) To support and abide by all amateur rules and regulations as set forth by the FCC, the IARU, the ARRL, and other national and international governing bodies; (5) INDEXA shall promote amateur operations on all amateur bands and modes without prejudice; (6) INDEXA shall promote DX operations by all amateurs regardless of class of license and on an equal basis; (7) INDEXA is pledged to support good operating practices on all modes and bands; (8) INDEXA will promote limited list and split operations by DX stations and each situation shall be judged on its individual merits; (9) INDEXA shall not promote operations in or on uninhabited lands, reefs, rock, etc., unless so directed by a majority vote of the Board of Directors; (10) INDEXA shall promote DX operations in countries which have limited or no operation—the operation may take the form of a DXpedition for the purpose of operator training or familiarization with the equipment; (11) INDEXA will provide equipment, support of said equipment, training, and training material to DX operations or operators when required; (12) INDEXA shall provide QSLs and act as QSL Manager when required; (13) INDEXA pledges to keep operating expenses below a maximum of 10% p.a.; (14) INDEXA shall promote the transmission of legitimate DX news to all countries on frequencies and times as designated by the Board of Directors.

Membership in INDEXA is $10.00, or 29 IRC's, and their address is 1902 Jamestown Court, Arlington, TX 76013, USA. Officers are as follows: President, K4MQG; 1st Vice-President, K5OS; 2nd Vice-President, W4FRU; 3rd Vice-President, OH2BH; Secretary, NK5K; and Treasurer, W4WMQ. Directors are Chairman, PY2PE, plus K3ZR, F8RU, OA4OS,

Hiro Kojima, JR3GWZ, is the winner of 15 meter c.w. WAZ certificate #98. Hiro has been licensed since October 1972 and operates mostly on c.w. using Kenwood equipment. He is a member of the Shiga Radio Club, which has about 100 members. Off the air he is in agriculture. Pictured above is Hiro with YL Etuko.

5 Band WAZ

Standings as of March 1, 1984

All 200 zones worked:

1. ON4UN	25. K5UR	49. YO3AC
2. K4MQG	26. K9AJ	50. K3TW
3. SM4CAN	27. SM3EVR	51. XE1OX
4. AA6AA	28. LA5YJ	52. VE7IG
5. W8AH	29. DL3RK	53. OK1ADM
6. W6KUT	30. N4WJ	54. CT1FL
7. EA8AK	31. G3MCS	55. WA1AER
8. LA7JO	32. SM5AQD	56. N4RR
9. EA3SF	33. WØMLY	57. UWØMF
10. OH1XX	34. IØRIZ	58. W4DR
11. EA8OZ	35. ON5NT	59. OK1MP
12. WØSD	36. OH6JW	60. W1NW
13. KØZZ	37. OK1AWZ	61. OE1ZJ
14. ON6OS	38. IV3PRK	62. HB9AHL
15. OK3TCA	39. DJ6RX	63. HB9AMO
16. K6SSS	40. OH3YI	64. LA6OT
17. ZL3GQ	41. I4RYC	65. UR2QD
18. OK3CGP	42. ZL1BIL	66. UK2RDX
19. SMØAJU	43. I4EAT	67. ZS5LB
20. OZ3PZ	44. ZL1BQD	68. F6DZU
21. I3MAU	45. TG9NX	69. DL4YAH
22. I2ZGC	46. XE1J	70. LA7ZO
23. 4Z4DX	47. F5VU	71. W9ZR
24. N4KE	48. W3AP	

The top 13 contenders for 5 Band WAZ:

1. VK9NS, 199	8. W8VUZ, 198
2. N4KG, 199	9. LA9GV, 198
3. DK5AD, 199	10. W6GO, 198
4. ZL1BOQ, 199	11. K4CEB, 198
5. JA3EMU, 199	12. OK1MG, 198
6. N4WW, 199	13. K6YRA, 198
7. W1NG, 199	

252 Stations have attained the 150 zone level

CQ DX Awards Program

S.S.B.

1311	EA8ANT	1316	KD4RH
1312	G4MBT	1317	A4XJV
1313	I8WYD	1318	W6MDH
1314	G3BRD	1319	N4HWD
1315	EA5ALW		

C.W.

609	EA3PE	610	EA1NZ

S.S.B. Endorsements

310	W4EEE/315	150	KD4RH/168
310	ZL3NS/314	150	N4HWD/168
310	N6AW/312	150	A4XJV/150
300	KU9I/301	3.5/7 MHz	K4XO
275	KB3OQ/291	28 MHz	KI4DH
200	W6MDH/232	28 MHz	W6MDH
150	NV4O/176		

C.W. Endorsements

300	W0IZ/300	150	SM5DAC/155
250	I8WY/266		

Total number of active countries is 315. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

J37AH, VK6RU, VS6CT, W3DJZ, W4JXM, and Vice-Directors W3ACE, VE3MR, HB9ET, LA8CJ, J28AZ, CE3GN, LU1BR, FK8CK, ZL1AMO, VU2CK, KH6IJ and JA1KSO. *(Tks DX New Sheet.)*

Club Officers

Southern California DX Club. 1984 officers are Joe Locascio, K5KT, President; Fried Heyn, WA6WZO, Vice-President; Esther Wolf, KB6HW, Treasurer; Dan Davitt, N6CGB, Secretary; and Paul Robinson, W6GYM, Membership Chairman. Club Directors are Don Bostrom, N6IC; Chris Williams, KG6AR; and Jim Rafferty, N6RJ. Stan Brokl, N2YQ, and George Morris, W6ABW, edit the *Bulletin*, while Hugh Allen, W6MFC, is in charge of awards.

Western Pennsylvania DX Association. This year's officers include John Getz, AD8J, President; Phil Koch, K3UA, Vice-President; Wayne Albert, KB3KV, Secretary; and Don McDaniel, KJ3Q, Treasurer. The club repeater operates on 145.37 MHz/144.77 MHz with a local DX net Sundays at 9 p.m. local time.

Tri State DX Association. New officers are William E, Rayburn, K4CXY, President; Albert C. Burnham, W4RIM, Vice-President; James B. Alexander, Jr., KA4IKE, Secretary/Treasurer; and Board Members R. O. Blankenship, W4KGH, G. K. Futrell, W4UFH, and W. E. Alward, W4WKB.

Madison DX Club. New officers are Gary A. Turner, KC9LM, President; Joel S. Kupferberg, N9CPW, Vice-President; and Richard G. Burton, N9BAF, Secretary/Treasurer.

North Florida Amateur Radio Society. 1984 officers are Billy Williams, N4UF, President (N4UF is also our *CQ* DX Awards Manager); Pete Nissen, W4PTT, Vice-President; Craig Ferris, NR4E, Secretary; Tom Crompton, WB4STB, Treasurer; and Steve Barber, WA4B, Activities Manager. Directors are Bob Bryner, WD4PFN, and Steve Morgan, WD4NYT.

Kansas City DX Club. Leaders for this year include John Chass, W0LJC, President; Bill Henderson, K0VBU, Vice-President; Tom Bishop, K0TLM, Treasurer; Steve Gecewicz, K0CS, Secretary; and Newsletter Editor Mike Crabtree, AB0X.

Southeast Michigan DX Association. New officers are Ken Schang, W8LU, President; Cornell Varsogeo, KM8Y, Vice-President; Wayne Wiltse, K8BTH, Secretary; Jim Austin, N8AQV, Treasurer; Tom Tozer, WD8KZS, and Paul Lecheler, N8BQI, Activity Managers; Don Patterson, N8AFV, Awards Manager, and Ted Pauck, K8NA, Director. The Southeast Michigan DX Association meets the second Friday of each month at the Red Cedars Restaurant in Southfield, Michigan.

Working AC4, Tibet—Do You Remember?

If you are a DXer with experience back to the 40's, you may remember Reg Fox, who operated with Sir Evan Y. Nepean, G5YN, using the callsign AC4YN. He was

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

2969	YU7DX	1748	N6CW	1388	KF2O	1018	G4FAM	846	WØJIF
2558	YU4HA	1733	N4UU	1379	WØSFU	1017	K2QF	843	AI6Z
2495	F9RM	1715	K5UR	1356	N6FX	1005	NN4Q	837	VE2FOU
2488	YU2DX	1660	YU7AW	1335	SM3EVR	1003	N3ED	827	PY1DFF
2248	W2NC	1648	YU7BPQ	1294	IN3ANE	999	W6OUL	798	WA8TYM
2202	K6JG	1637	N2AC	1240	N6AW	999	G3ZRH	783	K7CU
2191	VE3GCO	1636	YU2RTW	1237	K8LJG	997	KA3A	776	VE2PD
2178	K6XP	1631	W8CNL	1187	JH1VRQ	992	W8ILC	770	WD4RAF
2175	K2VV	1592	I8YRK	1183	N6JM	982	W8ILC	730	K2POF
2024	N4MM	1554	YU1DZ	1174	W8RSW	956	WD9IIC	730	N2AIF
1964	W9DWQ	1496	I6SF	1164	CT1LN	955	N3RL	707	OE1KJW
1951	YU7BCD	1427	K9BG	1154	W7CB	951	KO8T	696	KJ7N
1922	W4BQY	1426	I2PHN	1153	KL7AF	943	YU2CBK	690	K8HF
1902	4Z4DX	1415	WA1JMP	1140	I2MQP	915	N8BJQ	662	K9LJN
1838	N4NO	1401	K6DT	1067	PY4OD	892	W6YMH	658	JH8NYK
1783	N6JV	1397	K6ZDL	1050	WB8ZRL	876	DK2BL	603	ND6U
1755	N9AF								

S.S.B.

2409	F9RM	1465	K5UR	1076	W2CC	939	XE1OX	765	W6LQC
2227	IØZV	1450	W9DWQ	1064	G4CHP	926	KC8CC	759	CT1BY
1936	K6XP	1396	YU7AW	1059	WA4OIB	908	WB6GFJ	748	N3ED
1894	K2POA	1365	N4NO	1057	W2NC	894	AC2J	747	N3RL
1876	K6JG	1341	WA4QMQ	1030	KC4OV	889	W2LZX	744	W3GXK
1867	K2VV	1336	WD8MGQ	1025	N6FX	864	WA2FKF	738	WØULU
1846	ZL3NS	1296	W4BQY	1024	CT1FL	863	CT4NH	707	WB6SRK
1821	N4MM	1271	N2SS	1012	WF4V	857	K8LJG	702	IØSGF
1695	I4ZSQ	1267	N4UU	1005	W6YMH	844	NN4Q	699	EA7AZJ
1600	IØMBX	1217	I2PHN	1002	WB8ZRL	817	I1POR	693	ON6IT
1587	I8YRK	1208	WB2NYM	996	YU7DX	799	KC8YM	667	JH5FQO
1578	YU7BCD	1208	VE1YX	996	TG9GI	798	N4IB	636	KBØC
1568	WØYDB	1203	I6NOA	992	I8KCI	796	W3ARK	615	WN5MBS
1567	I8KDB	1138	I2MQP	975	I1HAG	792	Z21GJ	612	YBØACL
1551	OZ5EV	1136	PY3BXW	944	KL7AF	775	PY4OD	606	KA3A
1542	CT1UA	1081	KF2O	943	N2AC				

C.W.

2023	W2NC	1573	YU7BCD	1304	VO1AW	1032	JE1JKL	752	NN4Q
2010	W8RSW	1561	W9DWQ	1292	YU7AW	1032	I1YRL	747	KA7T
1985	YU7DX	1537	W3ARK	1278	4X4FU	1004	JA1KRU	744	KA3A
1770	W8KPL	1521	W4BQY	1274	W9FD	919	KF2O	734	AG5C
1759	WA2HZR	1481	G2GM	1256	I6SF	900	K9LJG	700	VE2FOU
1746	N6NV	1469	VK4SS	1227	YU3NP	848	W1IHN	694	AI6Z
1729	K2VV	1460	N2AC	1218	LZ1XL	847	KL7AF	687	G4FAM
1722	DL1QT	1425	N4UU	1180	K6ZDL	838	PY4OD	676	JA5SIX
1638	ON4QX	1390	N4MM	1099	N6FX	795	AK9Z	652	OE1KJW
1610	K6JG	1341	K5UR	1092	W4WJ	781	N3ED	603	N2AIF
1607	K6XP	1339	VE7CNE	1087	N4YB	767	DJ1YH	600	N3RL
1605	N4NO	1334	YU7SF						

always good for a QSL and thus became known as the ticket to WAZ. Reg was strictly QRP with a storage battery and 20 watts to a 6L6. He started with the British Embassy in Lhasa, Tibet, in 1936, and before the war worked John, AC4JS, who was a missionary in the Choni area. Unfortunately, AC4JS was not reactivated after the war.

Two other stations with big pile-ups in the post World War II days were AC4NC and AC4RF. AC4NC was operated by Chak, ex-AC3NC, who was stationed at the Indian mission in Lhasa in 1948. Chak fought the pile-ups with a whopping 25 watts to a dipole, while AC4RF was operated daily by Bob Ford using 15 watts. Bob also came to Tibet in 1948 after two years as AC3SS. Bob spent two months in 1949 traveling from Lhasa to Chiamdo in eastern Tibet and was believed to be the first Caucasian to complete this journey. He kept a regular sked with AC4YN.

Many atlases at that time located Chiamdo in China, and Bob was frequently questioned regarding this apparent discrepancy. His explanation was that the Tibetans didn't draw maps—the Chinese did—but that the culture, language, government, and inhabitants of Chiamdo were Tibetan. When China occupied Tibet in October 1950, Bob Ford was detained and later charged with spying. Among the offenses listed was "separatist propaganda" for claiming Chiamdo was in Tibet. After five years he was released and returned to England.

Tibet was then absent from the bands until 1953 when Char, AC4NC, operated from the Indian mission and relayed word that Reg Fox was a silent key and Bob Ford was off the air for "unspecified reasons." Deb Shankar Seal, VU2AC, was in the Indian consulate in Lhasa during most of 1958 and 1959. He signed AC4XX and was very popular on 20 meter phone. When he returned to India, Tibet was again off the air until Gus Browning, W4BPD (DX Hall of Fame #1), operated as AC5A/AC4 and AC4H in 1964–65.

China annexed Tibet in June 1974. This ended Tibet's status as a country. *(Tks DX News Sheet)*

World-Wide Sunrise/Sunset Tables

As the sunspot cycle declines and 40, 80, and 160 meters assume greater importance to DXers, a knowledge of sun-

Giampaolo Nucciotti, I8KDB, of Naples, Italy, has been our faithful CQ DX Awards checkpoint in Italy for many years. He has been on the air since 1947 and most of his activity is in DXing. His awards include WAZ, 14 MHz WAZ, the CQ DX Award, WPX with over 1500 prefixes confirmed, 5 Band DXCC, DXCC Honor Roll, and many others, for a total of 250 certificates. Off the air, Giampaolo is a senior electrical project engineer. He is age 58 and married with 3 sons.

rise and sunset times in needed countries becomes more and more essential. This information is now available in book form from John A. Devoldere, ON4UN. As winner of the first 5 Band WAZ, John's credentials as a DXer are impeccable. He is offering the book, together with a personalized computer printout giving beam headings and distances to 502 locations over the whole world, for $10.00, which includes postage. If you are interested, contact ON4UN directly at 215 Poelstraat, B-89220 Merelbeke, Belgium. Remember, DX propagation on the lower bands is best when the total path is in darkness, or right at sunrise/ sunset. Therefore, you need to know when this occurs in the countries you are chasing.

S8, H5, T4, S4—The Bantu Homelands—What Are They?

In *QRZ DX* Bob Winn, W5KNE, describes the nine Bantu Homelands of South Africa, four of which are of interest to DXers. These are Transkei (S8), Bophuthatswana (H5), Venda (T4 and S9), and Ciskei (S4), recognized as independent nations by South Africa and themselves, but not by the international community.

Transkei was the first of the homelands to become independent in 1976. It consists of three enclaves located on the southeast coast of South Africa. Bophuthatswana became independent in 1977 and is made up of seven enclaves. Venda became independent in 1979. Its two enclaves, T4 and S9, are located in the northeast corner of of the Transvaal near the Zimbabwe border. The fourth homeland to become independent, Ciskei, includes a single enclave located on the southeast coast near Transkei.

The name Bantu is used to describe all Africans who reside in South Africa, but to some extent the homelands resemble "reservations" where members of different tribes can be segregated. The U.S. Department of State in their *Background Notes* for South Africa describes the homeland situation as follows:

"Africans are not considered permanent citizens of South Africa, but rather of one of the homelands to which each tribal group is assigned...When a homeland is granted independence, all the members of the associated ethnic group lose their South Africa citizenship and become citizens of the homeland. When the remaining...homelands have been granted independence, South Africa will no longer have any African citizens."

Amateur radio operations have occurred from all four of the independent homelands, but none of them are accepted as separate countries for the DXCC Award or for the *CQ* DX Awards. For these purposes, contacts with the homelands count only as South Africa because they are not recognized as countries by the rest of the world. However, some argue that Transkei and Bophuthatswana are closer to being real states than some of the countries that are members of the United Nations.

73, John, K4IIF

QSL Information

A4XYS to W4FRU
A6XAS to P.O. Box 6200, Abu Dhabi
A6XYB to W6EYB
A22DP to W7GVC
A92EB to KØLST
AH3AA/KH9 to W1ISD
AZ5ZA (South Orkney Is.) to LU2A
BY8AA to Box 607, Chengdu, Peoples Republic of China
CR9CT to P.O. Box 12727, Hong Kong
CT2CE to AG1K
CY0SAB to VE1CBK, Wayne King, Box 32, Site 35, R.R.# 1, Windsor, Nova Scotia, Canada B0N2V0
D68GA to Don Jones, P.O. Box 9, Fort-de-France, Martinique 97251, French West Indies
EL2AT to OE3NH
EL7W to K4SE
ET3PG to DJ9ZB
FB8WJ to W4FRU
FB8WK to F6EYB
FG0HLI/FS7 to N6DX
FM7WD to W3HNK
G8GRN/5X to G4CTQ
HK0BKX to WB4QFH
J6LJG to W2LZX
J28DM to F6GYU
J37XC to W2BJI
J39BS to WB2LCH
KC6DX to Box 397, Kolonia, Ponape, E.C.I. 96941
KG4DX to WB2CPV
KP2A/KP1 to K8CW
KX6DS to North Alabama DX Club, Box 4563, Huntsville, AL 35815
KX6PO to W4FRU
N2EDQ/KH7 to KH6JEB
N8DCJ/8P6 to KZ8Y
OX3LV to W3HNK
P47LTA to K4LTA
PU8BI to PY8BI
T32AF to KH6UR
TJ1AC to A. David, c/o PTT, Akwa, Douala, Cameroon
TJ1QS to F6DZU
TR8AB to F6AJA
U1AIY to UK1AAU
U1CWW to UK1CAA
VP2KM to WA6ZEF
VP2MGT to KC9LZ
VP2MIU to AB1U
VP2MJI to W2BJI
VP2MKY to KY5R
VP2MM to AB1U
VP2MPB to N3CEX
VP2MSS to K3RMX
VP2MTY to WD4FHN
VP2VEG to WØDVZ
VP8KF, VP8AIB & VP8LF to J. Wright, 5 Warmans Close, Wantage, Oxon OX12 9XS England
VQ9AC to KA3EDN
VS5I, VS5IB & VS5IC to BARTS, Box 222, Bandar Seri Begawan, Brunei
W1BIH/PJ2 to W1KDD
W1CDC/V2A to AB1U
XU1SS to JA1HQG
YV0AA to Radio Club of Venezuela, P.O. Box 2285, Caracas 1010-A, Venezuela
ZD9CS to KA1DE
ZF2HL & ZF2HM to K9QVB
ZK1MA/ZK1XL to ZK1CG
ZK1XO to VE3XJ
ZK1XR to W7XR
ZL7OY to VK3DWJ
ZL8AFH to ZL2HE
ZS3E to K8EFS
ZS3GB to N0AFW
1Z9A to JA8IXM
3D6AK to G3WPF
4M5ARV/6 to Churun-Vena Expedition, P.O. Box 3636, Caracas 1010-A, Venezuela
4O4I to YU4EGZ
5T5RY to F6FNU
5V7NG to WB4LFM
5W1DC to DF1CC
5W1ER to K2FJ
5W1ET to VE3XJ
5W1EU to VE3XJ
7P8OD to G4GEE
9Q5JE to DJ5TY
9U5JB to ON5LT

Long runs of rotator cable can cause a problem. Part of the problem is financial as the longer the run the heavier the wire. W3KHQ offers his solution to the problem.

Twisting The Tailtwister

A Simple Control Modification to the Hy-Gain T²X Rotator, Enabling the Use of Thinner Rotor Cable

BY HAROLD BOLKEY*, W3KHQ

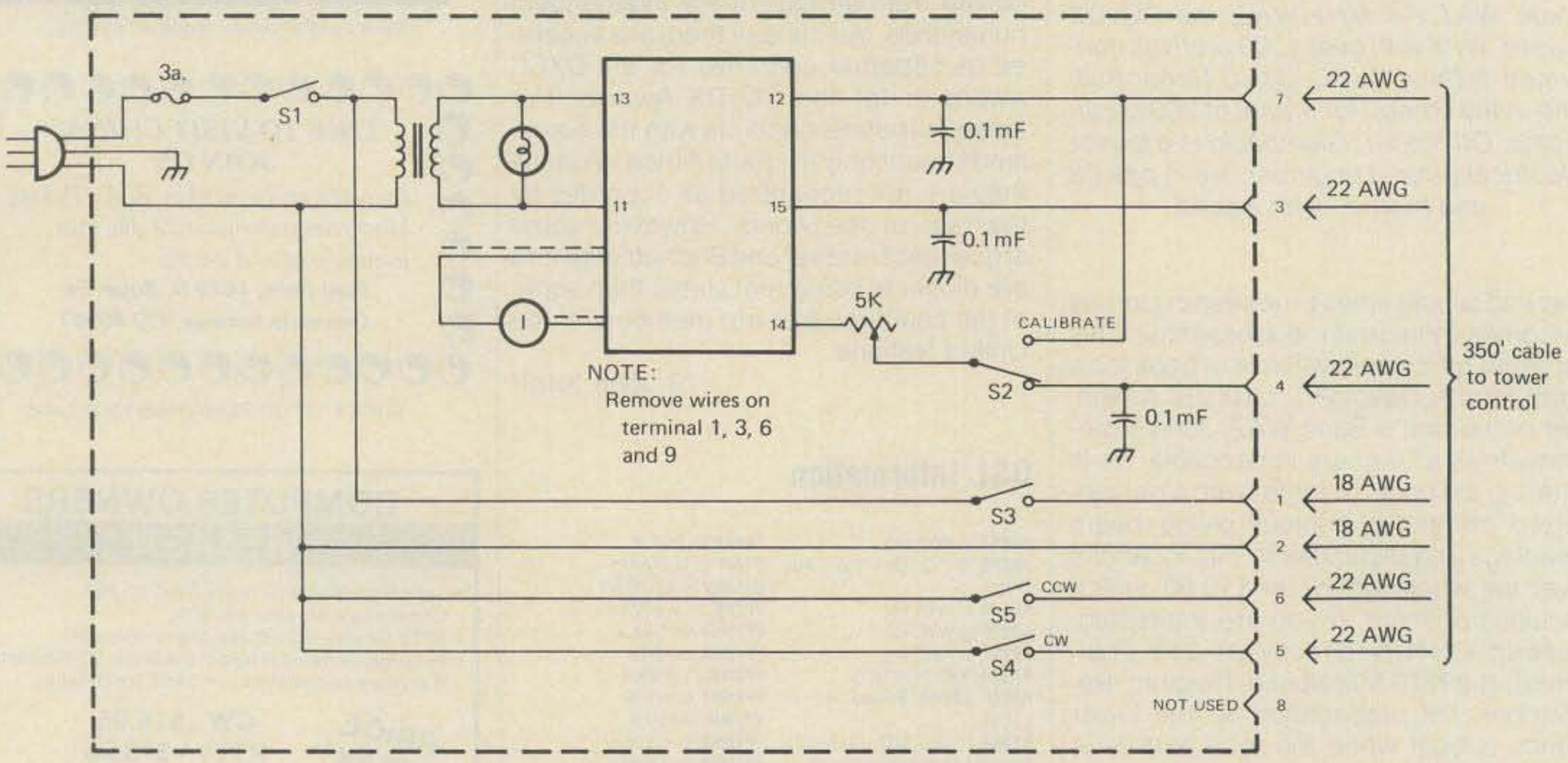

Fig. 1– The modified T²X control unit.

My antenna installation calls for a long run of rotor cable between the control unit in the shack and the rotor itself. The projected 400 foot run, according to the T²X instructions, requires two #12 AWG conductors going to terminals 1 and 2. It's not a question of the current-carrying capability of the wire, but rather the voltage drop of the lengthy conductors.

A simple modification and removal of the power transformer and capacitor from the control unit allows the use of economical standard rotor cable (two #12 AWG and six #22 AWG conductors). The power transformer and phasing capacitor along with two 120 v.a.c. s.p.s.t. relays are placed in a remote location near the rotator. For protection from the elements, these components are cemented to a 1 inch thick pine board and housed in a rural mailbox mounted on the tower near the bottom. It's simple yet effective. CQ

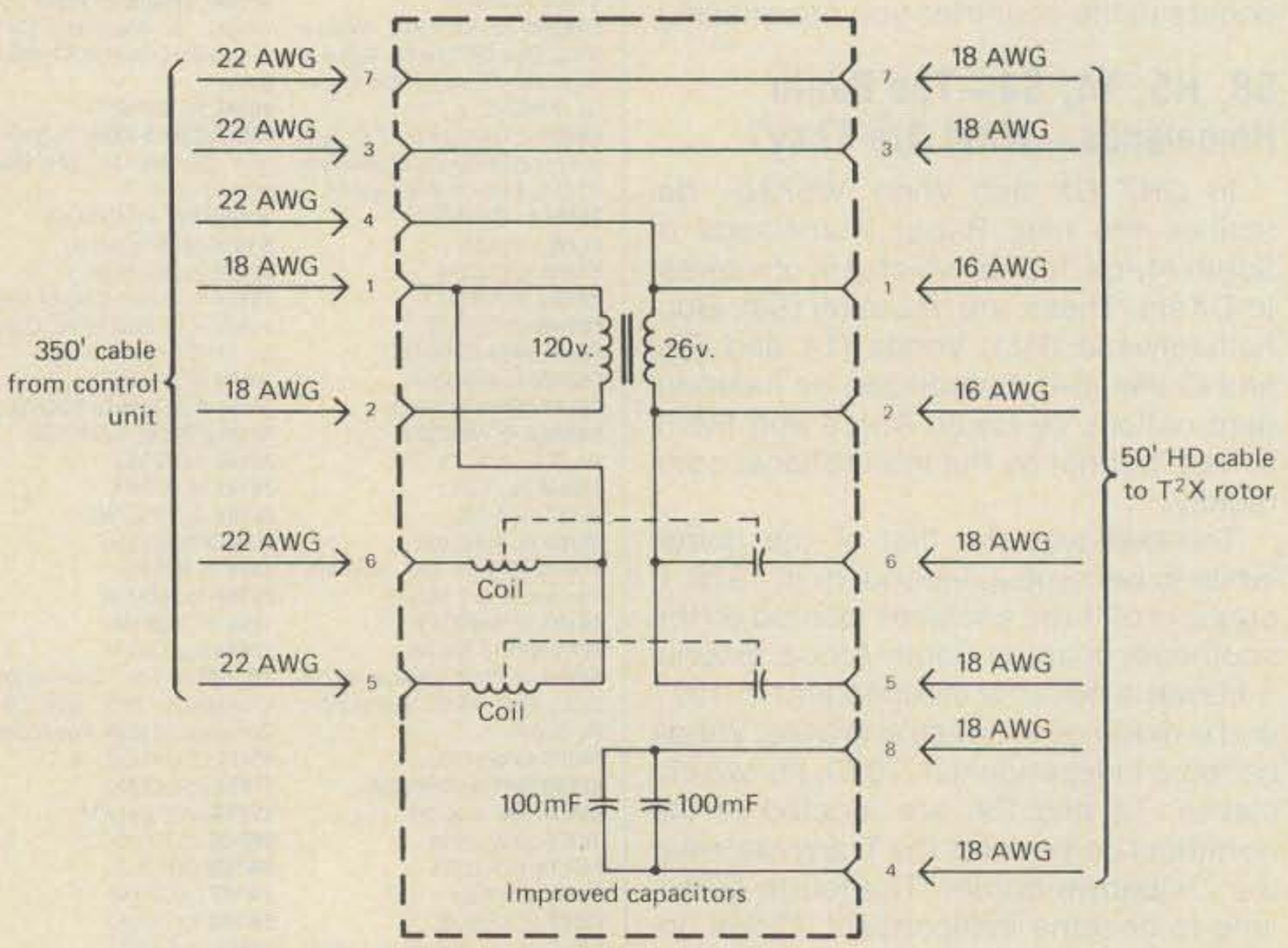

Fig. 2– The remote-control unit in the tower mailbox.

*P.O. Box 472, Fairview, PA 16415

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Ticket Talk

by Dick Bash - KL7IHP

Welcome to the newest column in *CQ*, 'Ticket Talk.' Each month I hope to answer the ever-growing number of questions about the amateur radio licensing structure. Amateur radio is experiencing a great deal of regulatory change right now and there is a great deal of confusion about the meaning of all of this.

At the time of this writing (April 11th), the big word in ham radio is "volunteer licensing." This seems to be the greatest source of confusion. The next problem that creates a lot of questions is the way the new Novice licensing program is to be run. Hopefully I'll be able to answer these questions in this column. If you still have questions, please write me either c/o *CQ* or else at the address shown below. A reply will be sent to those enclosing a self addressed stamped envelope. If you can't wait for an answer, either call me at (415) 278-8275 or else call your local FCC Field Office.

10 Year Tickets

Before we get into a discussion about the volunteer program, let's first clarify the status of the ten (10) year license. The FCC recently changed 97.59 to read as follows:

(a) Amateur operator licenses are normally valid for a period of ten years from the date of issuance of a new, modified or renewed license.

(b) Amateur station licenses are normally valid for a period of ten years from the date of issuance of a new, modified or renewed license. All amateur station licenses, regardless of when issued, will expire on the same date as the licensee's amateur operator license.

(c) A duplicate license shall bear the same expiration date as the license for which it is a duplicate.

Not Getting Junk Mail?

That information should be self-explanatory. If your license is about to expire, renew it! It will then be valid for 10 years. If you're upgrading, your new ticket will be valid for 10 years. Period. The drawback is that many companies who manufacture or sell amateur radio products buy a mailing list of ham operators. If you don't advise the FCC of your change of address (which, by law, you are required to do), then you won't be getting the literature from those companies. Also, I suggest that you advise *The Radio Amateur Callbook* of any address change.

The V.E.C.

The FCC has one major problem right now: money and the lack of it. Because of this, they are forced to make budgetary cuts. According to Washington sources, the FCC was approached awhile back and asked to turn over amateur testing to the hams. Naturally the FCC went for this in a big way because of financial considerations. A program was developed whereby selected organizations would be permitted to become *V*olunteer *E*xaminer *C*oordinators (VEC's). A new subpart to Part 97 was written to accomodate these new rules (97.501 - 97.523). As of right now there are about 8 VEC's approved by Washington.

These VEC's are to solicit hams with Advanced or Extra Class licenses to become unpaid volunteer examiners. The VEC's are to put together exams, print them, distribute them to the volunteer examiners, advise the local FCC Field Office of the exam date at least 30 days prior to the registration deadline, somehow let the ham community know that exams will be given (I haven't seen how this is to be accomplished yet), collect the 610 Forms of those that passed the tests from the volunteer examiners, verify that the forms are correct, send the forms to Gettysburg, and (when they have nothing else to do) the VEC's are responsible for "evaluating the clarity and accuracy of examination questions..." Can you see why I think the VEC will need at least one secretary, a room full of filing cabinets, a hard disk based computer, and an office?

No Free Lunches!

All of this is free, right? Ha! Well, some people suddenly realized that it was going to cost a considerable amount of money to run the volunteer licensing program so they went to a U.S. Senator and asked him to sponsor a bill permitting the VEC to assess a fee to hams taking exams. This bill has been approved by Congress and signed by the President but there is no change to Part 97 at this time permitting the collection of fees. So, any VEC who runs an exam is doing it gratis. Additionally, the VEC and the individual hams serving as volunteer examiners may not receive any compensation (lodging, meals, airline tickets, gasoline, etc.). When the FCC writes the changes to Part 97 permitting the collection of a fee from the hams, it is my understanding that the fee may not exceed $4.00 initially (and it can be lower but I seriously doubt if that will ever happen). This fee may be increased as the consumer price index is increased. You see, in the past your hard earned tax dollars were paying for everything. However, of the thousands of hams I've spoken with, the vast majority go along with a fee for taking tests. Those readers with a background in finance may share the doubt that $4.00 is enough to cover the expenses of all of this.

Written Tests

The FCC published a list of 500 questions for the General/Technician written exams. They also published a list of 200 questions for the Novice Class exams. The VEC's are to use these questions when composing a General or Technician written test or Novice exam or combined Novice/Technician written test. The FCC has *not* published questions for the Advanced or the Extra Class exams yet. Therefore, as of right now, the VEC and his volunteer examiners can only come up with the Novice written test, the combined Novice and Technician written tests, a General Class written test (same as Technician), or the 5, 13, or 20 w.p.m. International Morse code tests. If you want to take an Extra or Advanced Class written test you *must* take it before the FCC. Accordingly, as we all prepare to go to the Dayton Hamvention later this month, we will see a lot of unhappy hams who thought they would be able to take the Advanced or Extra written exams. Life is not fair!

During the time between now and the middle of November, the FCC will be giving exams in their offices during the first week or so of May, the first week or so of August and the first week or so of November. After that time, the FCC is scheduled to be out of the exam business and all examining is to be done by VEC's and their examiners. This asssumes that the VEC program will be organized by then. Like all government programs that I have seen, they have the best of intentions and are usually a bear to implement.

The Examining Team

An additional problem regarding the volunteer examining program that you absolutely must be aware of is that the examining team must be made up of three (3) Advanced or Extra Class licensed hams. If one or more of the examiners has an Advanced Class license, the team may *only* administer the 5 w.p.m. code test, the Novice Class written test, the Technician or General Class written test, or the combined Novice/Technician written exam. In order for the examining team to give the 13 or 20 w.p.m. code tests, the Advanced, or Extra Class written tests, *all three members of the examining team must hold Extra Class licenses.*

Now the problem arises of getting three Extra Class licensees to agree to meet at one place at one time *without any compensation whatsoever* and sit there for

*P.O. Box 2115, San Leandro, CA 94577

several hours giving and grading tests and doing the associated paperwork. If you think there is nothing to this, just ask the folks at the FCC Field Offices what problems are found during exam administration. This team must be prepared to deal with the public and ready to serve the needs of individual hams having unique problems. Giving exams under these conditions requires patience, patience, and more patience. This real-world qualification will undoubtedly eliminate many potential examiners. Others will simply not have the time to devote to the project. Once again, private conversations with Washington sources have shown that they are pessimistic about the chances of this program's success. During this period of change we as hams must be patient with the VEC's and the volunteer examiners.

Handicapped Hams

Under the present scheme of things, when a handicapped individual wishes to take an amateur radio exam, the local FCC Field Office has a ham who was approved by them test the applicant in the applicant's home. Several hams who are visually impaired or non-ambulatory have expressed the concern that under the volunteer program this seems to imply that 3 duly appointed examiners must be present to give them exams and these hams are justifiably concerned that they might not get to take exams with the ease they do now. In the next column I will have an answer to this particular problem. The rules seem to affirm the fact that not less than three approved examiners must be present during exam administration. No mention is made of those with impairments. As hams we must be concerned for those of us who are not blessed with perfect health and/or abilities.

The Novice Program

The Novice Class program was changed completely. In the past, an applicant wishing to take the Novice test merely found a ham with a General Class or higher license. The ham would give them a 5 w.p.m. code test and mail a completed FCC 610 Form to Gettysburg informing them the applicant had passed the code test and to have the FCC send the ham examiner a written test. When the 20 question written test was received, he/she would give the Novice applicant the exam and mail it back to Gettysburg. If the applicant passed the exam, the FCC would issue them a license. If they failed, the FCC would advise them accordingly. Ah, those *were* the good old days, because it's no longer that simple.

Now the applicant for the Novice license still has to ferret out an examiner with a General or higher ticket. The ham still gives the applicant the 5 w.p.m. code test. This code test, by the way, may be a receiving test only. If you doubt this (and I realize the regs say both a sending *and* receiving test), please call the Washington office of the FCC. The FCC hasn't given sending tests in years because they interpret the law to permit them to give just a receiving test and what's good enough for them is o.k. for you too. You can still give a sending test if you wish, though. The applicant didn't pass the code test? No problem. Just return the 610 Form and tell him or her to try again in 30 days.

If the applicant passes the code test the the fun begins. You are required to now *create* a written test for the applicant instead of writing away and having the FCC prepare it. The questions *must* come from the FCC published list of 200 questions. You may give the applicant a multiple choice test (in which case you have to figure out the choices), an essay test, or a single answer type of exam. Most hams I have spoken with agree that anyone who gives a Novice applicant an essay or single answer type of exam should be shot at dawn. You are to also provide the answer sheet. Because the examiner is expected to prepare all of this, some of the publishers of amateur radio publications have prepared examination packages which contain multiple choice exam(s) and answer sheet(s). Then you just pull an exam out of the package, give the applicant the supplied answer sheet, and monitor the test. After the applicant takes the test, you are to grade it (you did figure out the correct answers, didn't you?). The companies providing Novice exams have supplied answers, naturally. If he/she passes, complete the 610 Form and send it to Gettysburg. The FCC will send the new license to the applicant in about a month. If the applicant fails, you are to return the 610 Form to him/her and tell them they may re-take the exam in not less than 30 days, *at which time they have to re-take the code test as well.*

Records, Records, Records!

FCC Rule 97.28(d) presently states:

...For Novice Class examinations, the test papers, including answer sheets, must be retained as part of the volunteer examiner's station records for one year from the date the examination is administered. Thus, you must keep both the answer sheet and a file copy of the exam around for not less than a year. Those of you thinking of doing this on a computer should keep this in mind and make hard copies and plenty of backups. You should read the applicable rules in 97.19 through 97.33. Make sure you are reading a *current* set of rules!

That's it for this introductory column for this month. As you can see, the licensing program is not at all simple and the confusion is every bit understandable. In cooperation with the publisher and editor of *CQ*, we will keep you up-to-date with the latest changes. If you have questions (how can you *not* have questions?), don't hesitate to ask. 73!

Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

The present solar cycle appears to have reached a plateau. The Royal Observatory of Belgium reports monthly mean sunspot numbers of 84.5 and 83.6 for February and March 1984, respectively. This results in 12-month smoothed sunspot numbers, upon which the solar cycle is based, of 66 and 68 centered on August and September 1983.

Plateaus are not uncommon during the declining years of a solar cycle, when the solar count may remain relatively constant, or may even *increase* slightly. In the previous sunspot cycle, Cycle 20, for example, the cycle remained relatively constant for approximately a year and a half, between March 1971 and August 1972. Later in the same cycle, the sunspot count again stalled between August 1973 and October 1974.

A smoothed sunspot count in the upper 50's is forecast for June 1984, but it could be somewhat higher if the present plateau should continue.

Summertime propagation conditions are expected on the h.f. amateur bands during June. These should be typified by somewhat *lower* optimum DX frequencies during most of the daylight hours, and somewhat *higher* usable frequencies during the late afternoon, early evening, and nighttime hours, compared to conditions experienced earlier this spring.

Daytime signal absorption is expected to increase considerably during June and the summer months, resulting in generally weaker DX openings. Static levels generated by a seasonal increase in thunderstorm activity are expected to make DX reception difficult during the summer months, particularly on the *160, 80,* and *40* meter bands.

Sporadic-E ionization is expected to increase considerably during June, and is likely to reach a seasonal peak. This should result in improved short-skip conditions for distances up to at least 1300 miles.

This month's *CQ* Propagation Charts contain DX predictions for the period June 15 through August 15, 1984. Short-skip Charts for June, for openings between 50 and 2300 miles, and from Hawaii and Alaska to the mainland, appeared in last month's column. Instructions for the use of this month's DX Charts appear elsewhere in this column.

The following is a brief band-by-band description of propagation conditions expected during June 1984. For specific times of DX openings, refer to the Propagation Charts on the following pages. See the Last Minute Forecast at the beginning of this column for a forecast of general day-to-day propagation conditions expected during June.

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for June 1984

	Expected Signal Quality			
Propagation Index	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 2, 10, 24, 29	A	A	B	C
High Normal: 3-4, 9, 11-12, 21-22, 25-26, 30	A	B	C	C-D
Low Normal: 1, 7-8, 13-14, 18-20, 23, 27-28	A-B	B-C	C-D	D-E
Below Normal: 5-6, 15, 17	B-C	C-D	D-E	E
Disturbed: 16	C-E	D-E	E	E

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

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

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

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

E—No opening expected.

HOW TO USE THIS FORECAST

1. **Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.**
2. **With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good-to-fair (B-C) on June 1st, excellent (A) on the 2nd, good (B) on the 3rd and 4th, fair-to-poor (C-D) on the 5th, etc.**

June H.F. Propagation

10 Meters: A sharp seasonal decrease is expected in DX propagation conditions on this band during June and the summer months. While considerably fewer openings are expected, some fairly good ones still should be possible to southern and tropical areas during most of the daylight hours. Frequent short-skip openings, between distances of approximately 750 and 1400 miles, are expected during June.

15 Meters: This should be the optimum band for DX openings during much of the late afternoon and early evening hours. Fairly good DX openings are forecast to many areas of the world during the daylight hours, with excellent openings expected to tropical and southern regions well into the evening hours as well. Numerous and widespread short-skip openings, over distances between approximately 600 and 2300 miles are forecast from shortly after sunrise, through the hours of daylight, and into the early evening hours.

20 Meters: The band is expected to remain open to one DX area or another, and at times around-the-clock, during June. It should be the best band for DX openings during the early evening hours, and through the hours of darkness and the sunrise period. Exceptionally high signal levels are expected during periods of optimum conditions. Numerous and widespread short-skip openings are expected over distances ranging between 350 and 2300 miles. During the late afternoon and early evening hours propagation conditions should be optimum for both short-skip and DX openings, resulting in an exceptionally high level of interference.

40 Meters: DX conditions on this band are expected to decline during June because of a seasonally high noise level, and the fewer hours of darkness in the northern hemisphere. Some fairly good openings, however, should be possible to many areas of the world during the hours of darkness and the sunset and sunrise periods. Excellent daytime short-skip openings are forecast for distances between 150 and 750 miles, with nighttime openings extending out to the short-skip limit of approximately 2300 miles.

80 Meters: High static levels and few hours of darkness are also expected to restrict DX openings on this band during June, but some fairly good ones should be possible to some areas of the world during the hours of darkness and the sunrise period. Excellent short-skip openings are forecast during the daylight hours over distances ranging between 50 and 250 miles. During the hours of darkness, the short-skip range should extend out to approximately 2300 miles.

160 Meters: Intense solar absorption during June will prevent ionospheric reflection during most of the daylight hours, with openings limited to a groundwave range of generally less than 50 miles. After sunset, short-skip openings should be possible up to approximately 1200 miles. Occasional openings beyond this range may be possible on some nights, during periods of lower than usual static levels. What little chance there is for a DX opening during June should take place during darkness and the sunrise period.

V.H.F. Ionospheric Openings

Sporadic-E propagation increases considerably during June and the summer months, and this is expected to result

HOW TO USE THE DX PROPAGATION CHARTS

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

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

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

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

5. The charts are based upon a transmitted power of 250 watts 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 10 dB loss, it will lower by one level.

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

June 15-August 15, 1984
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	*Nil*	11-16 (1) 16-18 (2) 18-19 (1)	06-09 (2) 09-13 (1) 13-15 (2) 15-17 (3) 17-22 (4) 22-00 (3) 00-03 (2) 03-06 (1)	20-22 (1) 22-23 (2) 23-01 (3) 01-02 (2) 02-03 (1) 22-00 (1)* 00-01 (2)* 01-02 (1)*
Northern Europe & European USSR	*Nl*	14-18 (1)	09-15 (1) 15-18 (2) 18-19 (3) 19-21 (4) 21-23 (3) 23-02 (2) 02-07 (1) 07-09 (2)	21-22 (1) 22-00 (2) 00-02 (1) 21-00 (1)*
Eastern Mediter-ranean & Middle East	*Nil*	11-16 (1) 16-18 (2) 18-19 (1)	12-14 (1) 14-17 (2) 17-19 (3) 19-23 (4) 23-01 (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	16-18 (1)	10-12 (1) 12-14 (2) 14-15 (3) 15-17 (4) 17-19 (3) 19-20 (2) 20-22 (1)	03-07 (1) 07-09 (2) 09-15 (1) 15-16 (2) 16-17 (3) 17-23 (4) 23-01 (3) 01-03 (2)	20-22 (1) 22-00 (2) 00-02 (1) 22-00 (1)*
Eastern & Central Africa	16-17 (1)	11-14 (1) 14-15 (2) 15-16 (3) 16-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	14-16 (1) 16-17 (2) 17-18 (3) 18-21 (4) 21-23 (3) 23-02 (2) 02-06 (1)	21-00 (1)
Southern Africa	10-13 (1)	09-11 (1) 11-12 (2) 12-13 (3) 13-14 (2) 14-15 (1)	00-01 (1) 01-05 (2) 05-07 (1) 15-16 (1) 16-18 (2) 18-19 (1)	21-22 (1) 22-00 (2) 00-02 (1) 23-01 (1)*
Central & South Asia	*Nil*	10-12 (1) 19-22 (1)	17-20 (1) 20-23 (2) 23-03 (1) 06-09 (1)	19-21 (1)
Southeast Asia	*Nil*	10-12 (1) 19-21 (1)	19-21 (2) 21-23 (1) 23-01 (2) 01-02 (1) 06-07 (1) 07-09 (2) 09-11 (1)	*Nil*
Far East	*Nil*	10-12 (1) 17-18 (1) 18-20 (2) 20-21 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-12 (1) 19-20 (1) 20-23 (2) 23-00 (1)	*Nil*
South Pacific & New Zealand	18-21 (1)	15-17 (1) 17-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	18-21 (1) 21-23 (2) 23-01 (3) 01-03 (4) 03-04 (3) 04-07 (2) 07-09 (3) 09-10 (2) 10-12 (1)	01-03 (1) 03-06 (2) 06-08 (1) 04-06 (1)*
Austral-asia	18-20 (1)	10-12 (1) 18-19 (1) 19-20 (2) 20-21 (3) 21-22 (2) 22-23 (1)	23-01 (1) 01-02 (2) 02-04 (3) 04-05 (2) 05-07 (1) 07-09 (2) 09-10 (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) 15-17 (3) 17-18 (2) 18-19 (1)	08-09 (1) 09-11 (2) 11-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	07-10 (4) 10-16 (3) 16-00 (4) 00-03 (3) 03-06 (2) 06-07 (3)	19-21 (1) 21-23 (2) 23-03 (3) 03-05 (2) 05-06 (1) 22-23 (1)* 23-04 (2)* 04-05 (1)*

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

	20-21 (1)	18-19 (3) 19-21 (4) 21-22 (3) 22-23 (2) 23-00 (1)	23-00 (3) 00-03 (4) 03-05 (3) 05-06 (2) 06-08 (3) 08-09 (2) 09-13 (1) 13-15 (2) 15-17 (1)	01-05 (3) 05-06 (2) 06-08 (1) 01-04 (1)*
Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-13 (2) 13-15 (1) 15-17 (2) 17-18 (1)	09-11 (1) 11-14 (2) 14-16 (3) 16-19 (4) 19-20 (2) 20-21 (1)	18-01 (4) 01-03 (3) 03-05 (2) 05-08 (3) 08-11 (2) 11-14 (1) 14-16 (2) 16-18 (3)	19-21 (1) 21-23 (3) 23-04 (2) 04-05 (1) 20-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	13-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	08-11 (1) 11-16 (2) 16-17 (3) 17-19 (4) 19-20 (2) 20-21 (1)	14-16 (1) 16-18 (2) 18-19 (3) 19-23 (4) 23-01 (3) 01-02 (2) 02-05 (1) 05-07 (2) 07-10 (1)	20-21 (1) 21-00 (2) 00-02 (1) 02-03 (3) 03-04 (2) 04-05 (1) 02-04 (1)*
McMurdo Sound, Antarctica	*Nil*	17-21 (1)	16-18 (1) 18-19 (2) 19-24 (3) 24-03 (2) 03-07 (1)	00-06 (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.

in fairly frequent 6 meter short-skip openings over a range of 1,000 to 1,400 miles. During periods of wide-spread and intense sporadic-E ionization, two-hop 6 meter openings may occasionally be possible up to distances of approximately 2,500 miles.

An occasional sporadic-E opening on 2 meters can occur, particularly when ionization is very intense, over distances between approximately 1,200 and 1,400 miles.

While sporadic-E propagation can occur at any time, and hence its name, it is most likely to take place between 10 a.m. and 2 p.m. and again between 6 and 10 p.m., local daylight time.

Meteors from the *Herculids* and *Scorpiids* showers are likely to enter the earth's atmosphere during the first half of June. Although classified as minor showers, some meteor-type propagation should be possible on the v.h.f. bands between June 3 and 5, when both showers are expected to peak in intensity.

Trans-equatorial (TE) scatter openings are expected to fall off considerably during June, but a rare opening on 6 meters may be possible between 8 and 11 p.m., local daylight time, on long north-south paths which cross the geomagnetic equator at an approximate right angle. TE openings, if they are to occur at all, will favor locations in the southern tier states.

While very little auroral activity is expected during June, some may occur during periods of radio storminess. Check the Last Minute Forecast at the beginning of this column for those days in June which are expected to be Below Normal or Disturbed. These are the most likely days on which auroral activity may occur.

73, George, W3ASK

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LOGGING REQUIREMENTS
POWER LIMITATION
CONTROL OP REQUIREMENTS
R-S-T REPORTING SYSTEM
TELEGRAPHY SPEED
ZERO-BEATING SIGNAL
TRANSMITTER TUNE-UP
TELEGRAPHY ABBREVIATIONS
RADIO WAVE PROPAGATION
SKY WAVE AND SKIP
GROUND WAVE
HARMONIC INTERFERENCE
SWR READINGS
SIGNALS AND EMISSIONS
BACKWAVE
KEY CLICKS-CHIRPS
SUPERIMPOSED HUM
SPURIOUS EMISSIONS
COMPUTERS
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KNOW FIRST! Ham radio fanatics—you need THE W5YI REPORT, a twice-monthly award-winning Hot Insider Newsletter. Acclaimed best! Confidential facts, ideas, insights, nationwide news, technology, predictions, alerts. Quoted coast-to-coast! We print what you don't get elsewhere! $18.00 annually w/money-back guarantee! FREE SAMPLE for S.A.S.E. (two stamps). W5YI, Box 10101-C, Dallas, Texas 75207.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specifiy Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. C, Berwyn, IL 60402.

QSL's by W4TG. Prices from $16 per 1000. Send SASE to P.O. Drawer F, Gray, GA 31032.

NEW JERSEY: The Jersey Shore Chaverim are sponsoring the third annual Ham & Computer Fest on June 10, 1984, 9 A.M. to 4 P.M., at the Jewish Community Center, 100 Grant Avenue, Deal, NJ. We have indoor space, 7300 sq. ft. Admission is $3 per person (children under 12 and XYL's free). Refreshments available. Door prizes. Indoor table $8 and tailgating $3.50 per space. Spaces may be reserved by SASE and advance payment to "Jersey Shore Hamfest," P.O. Box 192, West Long Branch, NJ 07764 by June 1. For information call Arnold, W2GDS, 201-222-3009. Talk-in on 147.045 + .6; 145.110 - .6; 146.52 simplex. Deal N.J. is less than 50 miles from NYC and 70 miles from Philadelphia.

RUBBER STAMPS custom made to your satisfaction. QSL card brings free color brochure. J. Glass, WB6ZTI, 14316 Cerecita Drive, East Whittier, CA 90604.

ANTENNA AND CABLE CONNECTORS FOR HAM RADIO AND CABLE TV. Great prices. SASE for price list. Ojai Valley Electronics, 307B East Matilija St., Ojai, CA 93023.

ROHN AND HY-GAIN TOWERS: Self-supporting, fold-over, guyed, and crank-ups. Get our bid! Cushcraft, Hy-Gain, Butternut antennas and accessories. RF ENTERPRISES, RR7, St. Cloud, MN 56301. Phone (612) 255-0855.

HATS WITH CALL $4.00, with name and call $4.50, plus $1.50 shipping. Eighteen colors. SASE for information. KWICKSET, 2272 Kellogg Pk. Dr., Pomona, CA 91768.

WANTED: Unused and good used #45 and large globe #50 tubes. Write Tom Wright, 4933 Yakima, Pocatello, Idaho 83204. State quantity and asking price.

REPAIR, Alignment, Calibration. COLLINS written estimates, $25; NON-COLLINS, $50. K1MAN (207) 495-2215.

PHOTOVOLTAIC POWER SYSTEMS (Solar Electricity). Stand alone or stand by power for your communications systems. Lightweight, rugged construction for decades of reliable power when and where you need it! Catalog $2.00 (refundable). Contact CURRENT ALTERNATIVES, P.O. Box 166P, Northfield, Vermont 05663.

24 HOUR CLOCKS: Analog quartz movement, 6½" dial, 2 year guarantee. $14.00 or 2 for $25.00 postpaid. SASE for details. NE8V, 9307 Worley Mill, Hillsboro, Ohio 45133.

AAA WANTED: Old Western Electric Equipment (Tubes, Amps, Mixers, Consoles, Recervers, Drivers, Tweeters, Horns, Speakers, Parts, Others), RCA Tubes (45, 50, 245, 250, 211, 845), McIntosh or Marantz Tube-Type Components. Tel.: 213/576-2642. David Yo, POB 832, Monterey Pk., CA 91754.

TELETYPEWRITER parts, gears, supplies, manuals. SASE list. TYPETRONICS, Box 8873, Ft. Lauderdale, FL 33310. N4TT. Buy unused Teletype repair parts.

CERTIFICATE for proven contacts with all ten American districts. SASE to W6LS, 2814 Empire, Burbank, CA 91504 brings data sheet.

RTTY HEADQUARTERS: All your RTTY needs. Dealers for "HAL" and "INFO-TECH" products. You can't beat our prices! Call or write Dick, DIALTA Amateur Radio Supply, 212 48th Street, Rapid City, SD 57701. Phone (605) 343-6127.

FT-102 OWNERS: You're invited to write or call me. Will share my FT-102 experiences with you in exchange for yours. KA2PSQ (212) 729-0714.

YAESU FT-301 Transceiver, 200/50 Watts, all mode, 160–10M, with CW Filter and mobile bracket, low mileage, $550. WA2EXF, Basking Ridge, NJ, 201-766-9644.

OLD TUBES WANTED: 2A3, 45, 245, 345, 445, 50, 250, 350, 450, 101, 102, 104, 203, 205, 211, 212, 242, 244, 252, 253, 258, 262, 271, 274, 275, 277, 284, 285, 300, 339, 347, 348, 349, 422, VT-1, VT-2, VT-25, VT-52, etc. Also Western Electric Amps, Mixers, Consoles, Tweeters, Drivers, Horns, Speakers, Others. Tel.: 818-576-2642. David, POB 832, Monterey Park, CA 91754.

"THE SWAP LIST" has bargains galore. Subscribe now! Six months for $4.00; one year only $6.50. "THE SWAP LIST," Box 988-C, Evergreen, CO 80439.

C-64 and VIC-20 HAM SOFTWARE: New Contest-II program, call-name-QTH log program, ham formulas program. L.S.A.S.E. appreciated. Specify computer. Walt, KA9GLB, 4880 N. 49th St., Milwaukee, WI 53218.

WANTED: Old RCA, Cunningham, Western Electric, etc., tubes. Also old Thorens, Western Electric speakers, amplifiers, McIntosh, Marantz, Dynaco, tube amps. Phone 713-728-4343. Corb, 11122 Atwell, Houston, TX 77096.

FOX-TANGO NEWSLETTERS: Since 1972, the prime source of modifications, improvements, and repair of Yaesu gear, free to Club members. Calendar-year dues still only $8 US, $9 Canada, $12 elsewhere. Includes five year cumulative index by model numbers, or send $1 for index and sample Newsletter. Fox Tango Club, Box 15944, W. Palm Beach, FL 33416.

CASA MARCONI, INC.: First Pre-owned Radio Communication Equipment in Miami. Used and new gear, Bought, Sold, and in Consignments, anything in HF, SSB, VHF, CB Commercial, Marine, Amateur, Mobile, and Base Stations. Casa Marconi, Inc., 2290 NW 28 St., Miami, FL 33142, phone (305) 634-9059.

THE ATLANTA HAMFESTIVAL 1984, sponsored by the Atlanta Radio Club, June 16th and 17th, will be held at the Atlanta Civic Center. 70,000 square feet of air-conditioned exhibitor space and over 800 outdoor flearmarket spaces will be available. Flearmarket $12.50/space in advance. $15.00 at the gate for both days. Hamfest registration $5.00 in advance, $6.00 at the door. To be preregistered for the flearmarket or hamfest, we must receive your application and check by June 8th. Preregistration applications received after June 8th will be returned. Hours 8:00 AM to 5:00 PM on Saturday, 8:00 AM to 2:30 PM on Sunday. Talk-in on 3.975 MHz, 146.22/82 and 146.94 simplex. For preregistration or other information, write Atlanta Radio Club, P.O. Box 77171, Atlanta, GA 30357.

QUADS, * db QUADS * 2, 3 & 4 elements, complete kits, fiberglass spreaders, components, wire. 3 first class stamps for complete brochure. db + Enterprises, Box 24, Pine Valley, NY 14872.

$$$$$ super savings on electronics parts, components, supplies. Free 40-page catalog for SASE. Get on our mailing list. **BCD ELECTRO**, PO Box 830119, Richardson, TX 75083. Or call (214) 690-1102.

MUSEUM for radio historians and collectors now open. Free admission. Old-time amateur (W2AN) and commercial station exhibits. 1925 store and telegraph displays. 15,000 items. Write for details. Bruce Kelley, AWA, Holcomb, NY 14469.

The Livonia Amateur Radio Club Presents

1984 ARRL MICHIGAN CONVENTION

JUNE 29, 30, 1984

New Location — Livonia, Michigan

On the Campus of

SCHOOLCRAFT COLLEGE

SEVEN MILE AT HAGGERTY ROAD

Near I-275 and 7 Mile Road

Registration — $2.50 Advance — $3.00 at Door

200 Table Indoor Swap — 650 Car Trunk Sales Area

For Swap Tables, Commercial Booths, Advance Registration, or Information, Please Send SASE to:

Convention Chairman
P.O. Box 2111
Livonia, MI 48151

HALLICRAFTERS HT37 Transmitter $100. Heathkit SB-300 Receiver $90. Drake TR4, receives well, doesn't transmit, otherwise mint $140. WB2CUZ (212) 347-5988.

WANTED: FC-102 Antenna Tuner, as soon as possible, any condition, with or without FAS-1-4R Antenna Selector. Will consider trade. KA2PSQ (212) 729-0714 collect.

ENJOY SATELLITE TELEVISION. Save money with easy, guaranteed, do-it-yourself antenna plans/kits. Electronic knowledge not necessary. Send for free catalog. GFI-29, Box 9108, Missoula, MT 59807.

WANTED: Model 8010 Remote VFO for Tempo 2020 Xcvr. Call collect 913-267-1575 or Compuserve E-Mail User No. 71336,1270. Will pay all shipping charges. Tim Gorman, WAØLYJ.

STERLING SILVER Callsign jewelry: Pin or tack $11.95. Alligator tie clip $19.95. All ppd. Info. SASE. Tom's Silver, Post Office Box 3758, Manchester, NH 03105.

ALARM EQUIPMENT WHOLESALE. Burglary, Hold-up, Fire, Medical. Easy installation. Fast police response using our Nationwide Alarm Reporting Network! Catalog $1.00. U.S. Detection, Dept. CQ, 109 21st South, Birmingham, Alabama 35233.

DIGITAL DISPLAYS for FT-101's, TS-520's, Collins, Drake, Swan, Heath, and others. Write for information. GRAND SYSTEMS, Dept. D, P.O. Box 3377, Blaine, Washington 98230. Phone (604) 530-4551.

"STOP!! SUPER SAVINGS!" Kenwood R-2000 $499.50, R-1000 $409.50, FRG-7700 $429.50. Sony 2002 $219.50. Panasonic RF-B300, RF-B600, CALL!! Uniden CR-2021 $205.50. Regency HX-1000, HX-3000, MX-5000, MX-7000, IN STOCK, CALL!! BEARCAT BC-100 $288.50, BC-250 $259.50, BC-300 $359.50. Frequency Directories, Cordless Phones, Rotors, Coax, Antennas, Much, More!! FREE UPS SHIPPING & INSURANCE TO 48 STATES. 25-page Picture Catalog $1.00 (REFUNDABLE). GALAXY ELECTRONICS, Box 1202, 67 Eber Ave., Akron, Ohio 44309. Phone 216-376-2402 9–5 pm EST.

REPLACE RUSTED ANTENNA BOLTS WITH STAINLESS STEEL BOLTS. Small quantities, free catalog. ELWICK, Dept. 511, 230 Wood Lane, Somerdale, NJ 08083.

C.W. INTO FOREIGN LANGUAGES provides instant C.W. QSO's in French, German, Spanish, Russian, Dutch, Yugoslavian, Swedish, Norwegian, Hungarian, and Polish. No pronunciation to worry about . . . our book does it for you like a native. Send $5.00 (includes postage) for your copy to C.W. Publications, P.O. Box 2571 Stn. A, London, Ontario, Canada, N6A 4G9.

I NEED HELP in jamming my implanted thought projection, image projection, sound simulation device. Harry Haupt, 815 'D' Ave. West, Oskaloosa, Iowa 52577.

WANTED: 72' E-Z-Way; power supply, manual (can copy) for RCA CC-002 video camera; P.C. Electronics TC-1 + ATV station, J antenna. W4EOB, 1412 Winkler Ave., Fort Myers, FL 33901.

WHEELING WV HAMFEST, Wheeling Park, Sunday, July 22. Major cash awards. Dealers most welcome, tables available, all under roof, flea market, auction, only $3 admission fee required but reserve space. CONTACT: TSRAC, Box 240, RD1, Adena, OH 43901. Phone 614-546-3930.

COLLINS R-390, excel. bud and manuals $220 + ship. WANTED: Yaesu FRDX-400 mech. filters, MF455-03AZ (600 Hz) and input/output trans. # P278/G27, #MF455-AO-50F (5 kHz). Hitachi #V-104 storage scope. Write: APEX, 6300 Lapeer Rd., Goodells, MI 48027.

WANTED: SONY. ICB-2500 Citizens Band AM/SSB transceiver or literature pertaining to this radio. Rickey Jones, Rt. 1, Box 425, Trinity, NC 27370.

ATTENTION COLLINS OWNERS! Bargain 62S-1 transverter, mint with manual, good condition, $500. Also TS-820 in excellent condition, with 4 xtals, ideal for DXpeditions, $490. Call Tom Gabbert, K3TG, (202) 966-1949.

FOR SALE: Old German hand Morse keys as used during WW II by the German army. Screws for adjustments in brass, and silver contacts. Price including sea post is $30 U.S. Payment via bank check. If interested, please write and I will send a color photo and information. WANTED: I'm looking for old keys (no bugs). Please write to me if you have one for sale and tell me the price (send photo if possible). Klaus Gramowski, DL7NS, Kaiserin-Augusta-Allee 91, D-1000 Berlin 10, West Germany.

FACTORY FRESH FINAL/DRIVER TUBE PACKS: Matched 6146B's and 12BY7A $34 ppd USA. Spencer Tube Co., Box 24, Spencer Hill Rd., Corning, NY 14830.

HAMMARLUND OWNERS AND COLLECTORS: Factory original parts, manuals, literature, etc. Send $2.00 plus SASE for lists. Hammarlund receiver service by former factory service manager. Wayne Cordell, K4HCS, Blue Ridge Communications, 770C New Stock Rd., Weaverville, NC 28787, phone (704) 645-7070.

HY-GAIN HG525S TOWER, TH5XDK TB antenna, HD300 rotor and control, 5BDQ 80/40 dipole, 2 baluns, 2 lightning arrestors, thrust bearing, Heath weather station, and approximately 200' cable, $650. Bill Bather, KVØD, (714) 992-6921.

SHAKEOUT . . . SUDDEN UNEMPLOYMENT? RETIREMENT? Have an ACE IN THE HOLE. You can easily learn SECURITY ALARM SYSTEMS. Employment, Business terrific in this BOOMING FIELD. WAKE UP AND SMELL THE COFFEE. Acute shortage of persons with any knowledge in this fascinating business. INFORMATION PACKAGE that can change, improve your future $2.00 (Redeemable). SECURITY ELECTRONICS INTERNATIONAL, P.O.B. 1456-RQ, Grand Rapids, Michigan 49501.

TIMEX/SINCLAIR/TI99/4A owners: Programs for HAM, SWL, and Scanner Operators. CW/RTTY software and hardware, MUF, Satellite Tracker, Logbook, and more new programs. SASE for information. Kentronics, P.O. Box 586, Vernon, AL 35592.

SELL: QST collection 1930–1983, $450. Handbook collection 1956–1983, $225. Pickup only. Stan, W8QKU, 2748 Meade, Detroit, MI 48212.

USED TECHNICAL BOOKS: Radio, electronics, mechanical, data manuals, military equipment, computing, old magazines. SASE for short list, or $1.00 (refundable) for long list. Softwave Communications, 1515 Sashabaw, Ortonville, MI 48462.

FOR SALE: Complete Ham station—Hallicrafters FPM-300 with new final, professionally refurbished to meet specs, 5-band vertical, SWR meter, low-pass filter, mic, key, coax, dummy load, and much more, $400. F. Redburn, 5518 16th Place, Lubbock, TX 79416, phone 806-797-7024.

WANTED: Elmec 400 Amplifier in best condx (the one that uses single 813). Software: Available for Commodore VIC-20. Prog. for contesting and DX'ing $9.95 on cassette. Prog. for balancing the monthly budget, "Checkbook Manager," $12.95 on cassette. KF6CQ, 7438 Kester Ave. #8, Van Nuys, CA 91405, phone (213) 781-2077.

NAVY TCS-14 TX, RX & A.C. Pwr. Sup. 1.5–12 MHz. AM/CW wts. (pickup only), $35 or trade. Clem Duval, W8VO, 33727 Brownlea, Sterling Hts., MI 48077.

GOOD HOME is available for any old telegraph or wireless key. Advise on ID, condx, and price. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

H*A*R*K: Hear Amateur Radio (Over) DX Crystal detectors. SASE. TIMM, 2308 Garfield #304, Minneapolis, MN 55405.

CANADIAN Hams: Heath HR-1680 rcvr, HS-1661 spkr, HW-8 xcvr, HD-1250 dipper. R.W. Boyd, Box 793 Stn "A," Montreal, P.Q. H3C 2V5.

SELL: Drake, Heath, etc., reasonable. S.A.S.E. for price list. Joe Bedlovies, 241 Dover St., Bridgeport, CT 06610.

SB-220 w/10 meters, $500, prefer pickup. Yaesu FT-107M/DMS/WARC, FP-107P external power supply, $675. U-ship. All items in immaculate condition. Call Garry, WR4R. 804-331-1689, if no answer 804-665-5638.

WANTED: Schematic and operating manual for Heathkit HX 11, CW transmitter. Will pay copying and mailing costs. Carl Walczewski, KB1EH, 141 Booth St., New Britain, CT 06053.

NATIONAL NC300/matching speaker, $100. Mid/Super-band Cable TV Block Converter, $35. Heath HD15 phone patch, $25. Hallicrafters SR150/SR160 Mobile PS, $25. FOB P.O. Box 874, Kankakee, IL 60901.

KENWOOD Twins: T599 xmtr: 80–10m, 200w, ssb, am, cw. R599 rcvr: 160–10 & 30m, solid state. $400 for pair or swap for all-mode 2mtr trcvr. W1FO, 401-783-7314.

WANTED: Good used Rohn 25G tower to 100 feet. Also need ceramic wafer switch, 3P6T, standard size or larger. Switch is for Ant. Tuner. Con Helber, KØRAX, Star Route 1 Box 96, Middle Brook, MO 63656.

WANTED: Basketcases. SR-150 xcvr w/wrking rcvr section; Viking II, any condx if complete, unmodified. W3BRX, 247 W Maple, York, PA 17403.

SALE: American Radio Corp. Model 324 power amplifier for TR2400 with Kenwood MC30S mike. First $175 obo. W3CJI, 2705 Andrea Drive, Allentown, PA 18103, Ph. 215-433-4485.

WANT: Any national equipment, working or not. SELL: 120' heavy duty antenna tower. HDR-300 rotor like new. 4KW 120-240V gas generator. T.N. Colbert, 13609 Colony, Burton, Ohio 44021.

WANTED: Manual for Galaxy III transceiver. Also need base or mobile power supply. James E. Crawford, KD5YD, P.O. Box 643, Lovington, NM 88260.

SELL: TS520SE NB CW filter, manual, original box, $425. Hy-Gain 18HT $200. Sever, 1701 Harcourt Drive, Leesburg, FL 32748.

WANTED: Eico VTVM Mod. 232 construction and use manuals. I would like a copy. Very willing to pay for copy costs, etc. V.B. Thompson, KA7NIB, 22413 93 Pl. W., Seattle, WA 98020.

WANTED: Johnson KW Matchbox, Heath IM-103 Live Voltage Monitor and GH-17 Soldering Iron, Ten-Tec Model 200 VFO, Solar Panel or Cells. Tom Coddington, WB6AWC, 7825 Scotts Valley Rd., Lakeport, CA 95453.

WANTED: ALPHA 374, will consider 374-A or 78. Send condx, price, and S.N. to William Fulcher, N4WF, 217 Bluegrass Drive, Hendersonville, TN 37075, phone 615-824-7810.

NOVICE ALL-AMERICAN Certificate: Work a Novice in all 10 call areas. Send list and $1. K6ASI, 25 Rudnick Ave., Novato, CA 94947.

WANTED: AN/URA-17 comparator-converter w/mounting brackets. C.T. Huth, 146 Schonhardt St., Tiffin, OH 44883.

SELL: Call Books, U.S. 1982 and DX 1982 both hard cover, $8.00 plus UPS. Dynakit Stereo 70 & PAS-3 preamplifier with manuals, $100.00 plus UPS. Joseph Schwartz, K2VGV, 2701 Sunrise Lakes Drive E., Sunrise, FL 33322, phone (305) 748-5138.

WANTED: US Callbook Volume 41 Issue 4, Winter 63–64, $25.00. K7MF, Rt. 1, Box 114, Vaughn, WA 98394.

SELL: Swan 270B, xcvr, 80–10 w/mike, mint, $200.00. Hy-Gain vert. ant. 18 AVT/WB 80–10, mint, $50.00. Will ship. R. Eubanks, KC8DS, 614-837-2209. No collect calls.

ATLAS 210X, MFJ CW Filter, Astron RS20A, Drake W-4, Homebrew Tuner; all for $425. Will sell individually—make offer. N8EPX (304) 776-6553.

FOR SALE: 120 ft. super heavy-duty steel microwave tower, 20 ft. sections, $150, whole thing $700. You pick up. WANTED: Any National equipment, dead or alive, SP-120 speaker. T.N. Colbert, 13609 Colony, Burton, OH 44021.

YAESU FT-221, all-mode 2M rig, with mic & tone pad, $250 & I ship. RR #2, Box 338AA, Jamestown, TN 38556.

TR-4 with N/B, AC-4 P/S, DC-4 P/S, remote VFO, Spkr., mobile console, mike & all spare tubes, excellent cond., $475. Phone: 516-221-2404. WA2EBS, Ralph Formica, 1300 Greenbriar Lane, N. Bellmore, NY 11710.

KLM ECHO II two meter SSB & CW Transceiver, 10W PEP output with mike and manual, excellent condition, $175 or offer. Will ship U.P.S. H.C. Reich, KØUBK, phone 1-612-455-7898. No collect calls.

WANTED: Manual for RT616/VRC-51 military FM mobile transceiver. Mike Stasiak, 3819 White Ave., Baltimore, MD 21206.

Authentic MARCONI WIRELESS CO. Stock Certificates, dated 1913 (cancelled March 1920), suitable for framing: $25. (M.O.). D. Sheehan, Box 48, Ballardvale, MA 01810.

KENWOOD TS-700A all-mode 2 meter rig with crystals for .36 and .46, great for RS and Oscar 10, $300. Two each 7.5 VAC @ 12 amp filament transformers for 3-1000 or 4-1000 tube, $25 pair. David G. Ornee, 4615 Howard Ave., Western Springs, IL 60558.

FIFTY PERFORATED steel enclosures with feet less front panel. 8¾" high × 17" wide × 7 5/8" deep, gray, $10 ea. 8 5/8" high × 17" wide × 11 5/8" deep irridite, $15 ea. Plus p & h. Phone (816) 737-2942.

YAESU FT-101EX with accessory fan and desk mike $375. Clegg 2 meter handheld (x-tal) with drop-in charger $100. Shipping included. Phone 218-226-4816.

NATIONAL RADIO CO. SASE for price list of manuals, NCL-2000 parts, and service information. Pair of Dust Covers for NCX-3 or 5 plus NCX-A, $8.95 p.p. Max Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

DX & CONTEST RIG: FT-107M w DMS, $595. Speaker/Patch: SP-107P, $40. FP-107E ext. AC Supply $95. MFJ-984 3KW Tuner $195. 817-281-9447 W5UFI.

WANTED: Good used transceiver not more than five years old. For sale: Radio Shack DX-160. Best offer takes it. Contact: G.W. Shand, Box 86, SWAN HILLS, AB, TOG-2CO, CANADA.

SELL: Autek Research MK-1 Memory Keyer and Vibroplex Keyer (standard). First $100.00 takes it. WA4TKG (904) 462-3900 after 23:00Z.

FOR SALE: LINEAR, excellent, make offer. You pay shipping. W3GVR.

SACRIFICE: YAESU FL-101, FR-101 digital, fully loaded, all SW xtals, all filters, 6 & 2 M converters plus FM module, YP 150, D104, EXCELLENT CONDITION, LOW HOURS, $700. T.A. Coggins, 8734 Marty, Overland Park, KS 66212, phone (913) 341-4303.

SB-220 LINEAR $440 firm. Shipped prepaid 48 states. W9OEV, P.O. Box 2596, Wickenburg, AZ 85358, phone (602) 684-7462.

WANTED: Clean older AM/CW Tx and Rcvrs by collector. Johnson, Heath, National, Hallicrafters, etc. Will pay shipping. Clean out your basement or attic. Dave, K8MN, 3768 Frances Ave., Cincinnati, OH 45211.

COLLINS 30S-1, $1,650. ICOM 211, $350. Both excellent condition. W5KX, 1732 Willow Point, Shreveport, LA 71119.

Please send all reader inquiries directly.

WANTED: Ten-Tec PM-2B QRP rig, AC-4 SWR, 200 VFO, other. Winston, K4CWQ, Box 1143, Carrollton, GA 30117.

WANTED: Tube socket for a 4CX1000A. SELL: Yaesu FTV-250 2 meter transverter, Heath SB-650 freq. display, PMC 0–24 volt DC 0–10 amps power supply, DMG Electronics MVD-1000 Morse video display. KA5EBL.

DX-60B, HR-10B, with matching VFO Excellent $135. HW-12 w/Calibrator and AC-DC Supplies $75. Charles Nydegger, WA9HCU, 317-324-2279.

FIFTY PERFORATED steel enclosures with feet less front panel. 8¾" high × 17" wide × 7⅝" deep. Gray $10.00 ea. 8⅝" high × 17" wide × 11⅝" deep irridate $15.00 ea. plus p & h. Phone (816) 737-2942.

SWAN 500CX-SS16, AC PS and MARS Xtal Osc., Dentron GLA-1000. Super Tuner Plus. Estate of WA2CMO. Bob Kulow, WA2UEH, 17 Elmer Ave., Bernardsville, NJ 07924. Phone 201-766-6181 (eve.).

SELL: "ALL NEW" TS-930S W/AT $1,280; TR-8400 $380; MC-46 MIC $30; PS-30 $100; HC-2000 $260. KV9S, 1624 Columbine, Schaumburg, IL 60194.

FOR SALE: Heathkit HW-16 and HG10B VFO, $140. Doug Kiessling, KB4BKO, 7414 Colshire, McLean, VA 22102, phone 703-821-0509.

FOR SALE: New Heath Equip. EIA416 Freq Counter, SA 2040 Ant tuner, 2140 Dual Watt Meter, Used HRI680 Rec. Works well. Roy Conibear, N9EEX, Box 12, Lee Center, IL 61331.

H*A*R*K Crystal set circuits SASE. TIMM, 2308 Garfield #304, Minneapolis, MN 55405.

COMPLETE RADIO SHACK, including Heath HW104 series and army surplus equip. Large amount of spare parts. Moving, must sell all. Call evenings (401) 295-5607.

FOR SALE: TS-120S w/500 Hz CW filter, MB-100 mobile brkt., MC-35S mic. Absolutely mint cond, in orig. boxes, $425. Don, N4ECM (214) 291-1613.

DRAKE TR4C, MS4, AC4, noise blanker, $459. D-104 amplified mike, $35. Kenwood TS130V, $425. Kenwood TR7625, $135. KAØMOE, Box 955, Joplin, MO 64802-0955.

SELL: Collection of 40 years receiving tubes $1.00 each. Antique molded mica capacitors, all sizes and voltages, write. Trade test equipment for set of machinist tools from retired machinist. W5QJT, P.O. Box 13151, El Paso, TX 79913, phone (915) 581-2017.

SALE: Weston Model 45 DC Voltmeter, Weston Model 45 DC Ammeter, Weston Model 433 AC Voltmeter, Weston Model 433 AC Ammeter, Weston Model 695 AC Voltmeter, Westinghouse Model PX4 DC Voltmeter. Dan Kraft, 18 Laird St., P.O. Box 37, Ramsay, MT 59748, tel. (406) 782-3347.

SE OFRECE, QSL MANAGER, LU1DZ, Alberto U. Silva, Obligado 1175, 1846 Adrogue, Buenos Aires, Rep. Argentina.

SELL: DRAKE L4-B, 10 meters added, mint, low hours. Lakritz, KB9DD, 1914 Eastwood Ave., Janesville, WI 53545, Phone 608-752-8611.

DESPERATE: Need gear belt for HALLICRAFTER FPM 300. It drives the second band-change wafer switch. Where obtainable? Will appreciate advice. Ray Gulland, K4IKO, 11222 Winn Road, Riverview, FL 33569. Tel: 813-677-5219.

WANTED: Swan 14A DC Converter for Swan 350A transcvr. As new, best price. H. Erhart, PSC Box 627, APO Miami 34007.

2KVA POWER XFORMER: 120/240V input, two 16V/63A outputs. Unused, $50 ea. Add shipping, 39 lbs. W. Worley, 305 Hickory Bend, Enterprise, AL 36330, phone (205) 347-5281.

PLEASE SEND me a copy of your HAM CLUB NEWSLETTER for my collection. Don Bishop, NØEA, 5625 S. Sycamore 102, Littleton, CO 80120.

SWAN 103BX $500, mint. Argonaut 515 like new, $290. W2EOE, 81–82 CB.

WANTED: For use in Civil Air Patrol, SSB around 4500 or 4600 kHz, HW-18 or similar transceiver. Robert Hammack, 4305 Cambridge, El Paso, TX 79903.

NEEDED: AN/URA-17 mounting brackets and undulator tape recorder. C.T. Huth, 146 Schonhardt St., Tiffin, OH 44883.

SELL: Heathkit AW-101, PS-23, HR-1681, $200. Kenwood TR-7850, $225. Robot-400, $300. Robot-800, $300. WA3NGU, 178 Newport St., Nanticoke, PA 18634, phone 717-735-5416.

WANTED DUPLEXERS: 144 MHz and 450 MHz. Bill, NJ6T, 1810 Fair Oaks #202, So. Pasadena, CA 91030, phone (213) 682-3881 days, (213) 446-0732 eves.

TELEGRAPH KEY by KA9ACS, Charles Wertz, wanted. Advise on condition and prepaid price. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

SELL OR TRADE for 2M equipment: Astro Communications 30–1000 MHz receiver with scope, $150. Hallicrafters HT-40 CW transmitter, $30. D. Hubecky, WA2CGF, Tower Road, Hopewell Junction, NY 12533, phone 914-223-5523.

WANTED: Volumes 1 & 7, *Hints & Kinks for the Radio Amateur*, published by the ARRL. K4LVZ, POB 562144, Miami, FL 33256.

DRAKE T4XC/R4C Sherwood CW, PS/SPKR, xtls, spare parts, Century 21, Yaesu 221R, Janel preamp. No reasonable offers refused. Gone computer. K2FS 212-353-8485.

FOR SALE: IC-720A Brand New. Box never opened. Including PS-15, EX-144, CF-1, FL-32, and FL-34. I will ship insured to anywhere in U.S. Best offer over $990. P.O. Box 513, Saipan, CM 96950.

WANTED: TS-520 CW Filter YG-3395C. KO8S, Karl T. Schwab, 30752 Ridgefield, Warren, MI 48093.

SELL US AND DX CALLBOOKS: $21.00 for both. I pay shipping. Lowry, 3 Darlin Dr., Reading, PA 19609.

WANTED: Foldover or crankup tower. Prefer above 50 ft. HD models. KV5I, Eddie Hatcher, 840 Wixom, Dallas, TX 75217.

TRI-EX Super Mast SM40 accessory: concrete-type base with accessories. Brand New. $100.00. KH6CDO 808-988-7474.

OSCAR-10 Azimuth and Elevation listings for your QTH. $5.00 per month for subscription. For more details SASE to WB6GFJ, Box 1, Los Altos, CA 94022.

ICOM EXTENSION TERMINAL, IC-EX1, new in original box, never used, $20. W9BM, 888 E. Schirra Drive, Palatine, IL 60067.

TEN-TEC QRP/Hi-power station: Argonaut 515, 405 linear, 251M power supply, 670 keyer, 208A cw/notch filter, 215P mike. $550, you ship. Ron, KA4LYT (904) 384-4177.

WANTED: Knight R55 rcvr. manuals and/or schematics. Zerox O.K., will pay for copies. Send postcard ahead with cost. Bob Glazer, KA3KKP, 121 Wading Spring Lane, Harrisburg, PA 17110.

TEN-TEC 544, 262-G, $550; Yaesu FT-207-R $179; Gonset GSB-201 Linear $200.00; Heathkit HW-2036-A two meter rig $150; Regency HR2-A W/GLB-400 Synthesizer $135. WANTED: Alpha 374. William Fulcher, N4WF, 217 Bluegrass Dr., Hendersonville, TN 37075, phone 615-824-7810.

FOR SALE: YAESU FT-101E, w/manuals, fan, exra finals, excellent condx, $500. Quinton, N7BDH (307) 682-5381.

COLLINS: KWS1, 75A4 $1000. 75S3B, 32S3, 516F2, 312B4 (W/E) $995. 312B4 (R/E) $275. 312B5 (W/E) $395. F455FA-31 (new) $45. James Craig, 32 Birchwood Drive, Rye, NH 03801. Phone 1-603-964-6658.

SELL: YAESU FT-707 with CW Filter, Scanning Mike, Digital VFO FV-707 DM. Manuals, cartons, mint. $700, will ship. Dave KC7AA, 215 3rd St. H.P., Glendive, MT 59330.

WANTED: Hammarlund HQ-180A service manual. SAVOY ELECTRONICS Inc., P.O. Box 5727, Ft. Lauderdale, FL 33310.

WANTED: Dentron MLX 15 or MLX 40 transceiver or similar small HF mobile transceiver. K8HCZ, Griebe, R1, Parksville, KY 40464.

KENWOOD TS130S. SSB Filter, Mobile Mic, Service Manual $500. Bob, KC2DE, 201-347-3040.

SALE: Heath SB-104A with Fox Tango improvements, SB-604, PS-1144, and HD-1410 keyer with all manuals. Mint condition. An $800.00 value, $500.00 or make offer. KB7YY 206-675-5790.

TRS-80 Model 3 CW interface send and receive with MFJ 1212. No additional software needed! Must sell $80. Ron, WB1EAZ, 203-742-7212.

WANTED: Ten-Tec 229 or 4229 Tuner, Kenwood 7950. SELL: Robot 70 $145, IC-211 $275, RM-2 $95.00. Kenwood 7400A $195.00. KØMK 218-865-6541.

FOR SALE: Atronix CR-101 code reader, mint cond., $100. I ship. Call George, KR1X, at 207-797-2265.

UPDATING my station, everything must go! Send S.A.S.E. for list. W. Nero, P.O. Box 232, Fiskdale, MA 01518.

FOR SALE: Drake R-4C, T4XC, MS-4, AC-4, $650. Drake TR-6/RV-6, MS-4, AC-4 $600. Yaesu FT-625RD, all mode, $600. WD8QDA (304) 387-3344.

SELL: Robot 70 Slow-Scan TV, excellent, $145. Wanted: Ten-Tec 229 tuner, Kenwood 7950, Johnson 6 & 2 Thunderbolt amp, Drake MN-2700. KØMK, 690 Vermilion Trail, Gilbert, MN 55741.

SELL: Yaesu 24-hour GMT clock $15, 200 watt end-fed ant tuner $20. David Schwartz, 1183 Southeast St., Amherst, MA 01002.

FOR SALE: Yaesu FL110 amplifier $185; Pace CB converted to 10M SSB $65; Swan MB40A $160; B&W travel ant $30. C. Bright, 4115 Buckley Ridge, St. Louis, MO 63125.

FOR SALE: Carbon resistors; W.W. resistors; pots; audio-power-filament transformers, coils. T. Wojciechowski, 101-45 94th St., Ozone Park, NY 11416, phone 212-845-4756.

WANTED: Quality Commodore 64 code instruction/practice-disk software. Steve Crane, 143 Winthrop Ave., Albany, NY 12203.

FOR SALE: National RAS-2, Tennelec MS-2. Make offer, one or both. KA1KSN, 20 Proteus Ave., Groton, CT 06340.

FOR SALE: Ten-Tec Century 21, excellent condition, $195. Charles Bright, 4115 Buckley Ridge Ct., St. Louis, MO 63125.

NATIONAL RADIO COMPANY equipment manuals. SASE. Maximilian Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

TRS-80 CC, 32K, excellent condition, $255 shipped prepaid U.S. except AK and HI. Lonnie Daniel, 1324 Al Seier Ln., Birmingham, AL 35226.

HEATHKIT HW101, AC power supply, 400 Hz CW filter, New 6146 finals, $250. Tim Fiebig, N2BCF, 616 Canterbury, Pitman, NJ 08071. Phone 609-589-0997.

WANTED: Schematic for National NC 109 receiver. Will pay for copying or whatever. Walter Nichols, 40 Lake Road, East Hampton, CT 06424.

WANTED: Manual Swan 120, purchase or copy & return. W2EOE, 7 Vernon Crossing Rd., Vernon, NJ 07462.

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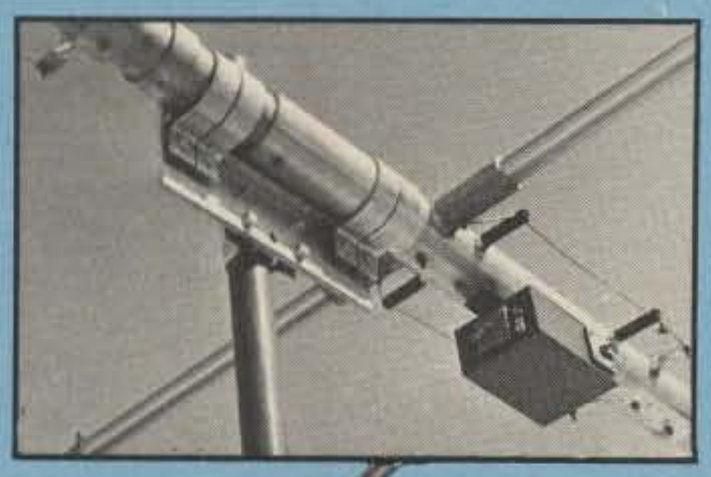

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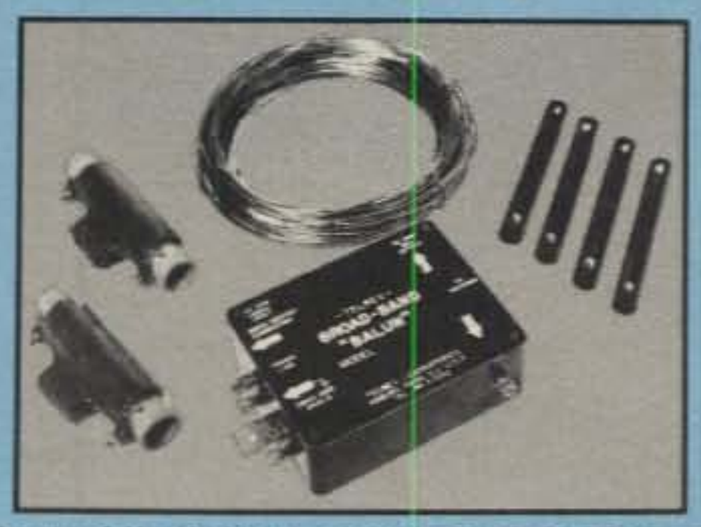

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15M845	15 Meter 8 element	(15 DBD)	1120.00	**925.00**
20M536	20 Meter 5 element	(12 DBD)	660.00	**550.00**
20M646	20 Meter 6 element	(14 DBD)	1130.00	**945.00**
40M214	40 Meter 2 element	(5.6 DBD)	750.00	**625.00**
40M329	40 Meter 3 element	(8.3 DBD)	1145.00	**965.00**
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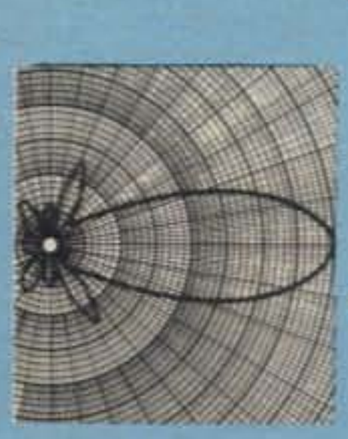

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