ICD 08241

Amateur Radio

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CQ

SATELLITE TV ISSUE

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THE RADIO AMATEUR'S JOURNAL

TS-530S

IF shift, digital display, narrow-wide filter switch

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

TS-530S FEATURES:

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

OPTIONAL ACCESSORIES:

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

TS-660

"Quad Bander"...dual VFOs, memory, scan, IF shift, FM, SSB, CW, AM

The TS-660 is a unique, all-mode transceiver designed for operation on 6, 10, 12, and 15 meters.

TS-660 FEATURES:

- FM, SSB (USB), CW and AM operation.
- 10 Hz step digital VFO. The frequency step is determined by mode of operation.
- F. STEP switch allows alternative step size in each mode.
- Dual VFOs built-in.
- 5 channel memory stores frequency and band information.
- Memory scan scans all bands, skips channels not in use.
- UP/DOWN push-button frequency control on microphone.
- UP/DOWN bandswitch.
- Frequency lock function switch.
- IF SHIFT circuit built-in.
- Fluorescent digital display shows Tx/Rx frequencies.
- Squelch circuit for FM, SSB, CW and AM.
- CW semi break-in circuit, with CW side tone.
- 10 W RF output on SSB, CW, FM. 4 W on AM.
- Two antenna terminals provided.
- RIT control. • Noise blanker.

OPTIONAL ACCESSORIES:

- PS-20 power supply.
- SP-120 external speaker.
- MB-100 mobile mounting bracket.
- YK-88C normal CW, (500 Hz) filter or YK-88CN narrow band CW, (270 Hz) filter.
- YK-88A AM (6 kHz) filter.
- VOX-4 speech processor/VOX unit.

KENWOOD

TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut, Compton, California 90220

Digital world clock with two 24-hour displays, quartz time base

The HC-10 digital world clock with dual 24-hour display shows local time and the time in 10 preprogrammed plus two programmable time zones.

R-600

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

The R-600 is a high performance, general coverage communications receiver covering 150 kHz to 30 MHz in 30 bands, at an affordable price. Use of PLL synthesized circuitry provides high accuracy of frequency with maximum ease of operation.

R-600 FEATURES:

- 150 KHz to 30 MHz continuous coverage, AM, SSB, or CW.
- 30 bands, each 1 MHz wide, for easier tuning.
- Five digit frequency display, with 1 KHz resolution.
- 6 kHz IF filter for AM (wide), and 2.7 kHz filter for SSB, CW and AM (narrow).
- Up-conversion PLL circuit, for improved sensitivity, selectivity, and stability.
- Communications type noise blanker eliminates "pulse-type" noise.
- RF Attenuator allows 20 dB attenuation of strong signals.
- Tone control.
- Front mounted speaker.
- "S" meter, with 1 to 5 SINPO-S scale, plus conventional "S" meter scale.
- Coaxial, and wire antenna terminals for low impedance (50 Ω). Wire terminals for high impedance (500 Ω).
- 100, 120, 220, and 240 VAC, 50/60 Hz. Selector switch on rear panel.
- Optional 13.8 VDC operation, using DCK-1 cable kit.
- Other features: carrying handle, headphone jack, and record jack.

OPTIONAL ACCESSORIES:

- DCK-1 DC Cable kit.
- SP-100 External Speaker.

R-1000

"Hear there and everywhere"... easy tuning, digital display

The R-1000 is an amazingly easy-to-operate, high-performance, communications receiver, covering 200 kHz to 30 MHz in 30 bands. This PLL synthesized receiver features a digital frequency display and analog dial, plus a quartz digital clock and timer.

R-1000 FEATURES:

- Covers 200 kHz to 30 MHz continuously.
- 30 bands, each 1 MHz wide.
- Five-digit frequency display with 1-kHz resolution and analog dial with precise gear dial mechanism.
- Built-in 12-hour quartz digital clock with timer to turn on radio for scheduled listening or control a recorder through remote terminal.
- Step attenuator to prevent overload.
- Three IF filters for optimum AM, SSB, CW. 12-kHz and 6-kHz (adaptable to 6-kHz and 2.7-kHz) for AM wide and narrow, and 2.7-kHz filter for high-quality SSB (USB and LSB) and CW reception.
- Effective noise blanker.
- Terminal for external tape recorder.
- Tone control.
- Built-in 4-inch speaker.
- Dimmer switch to control intensity of S-meter and other panel lights and digital display.
- Wire antenna terminals for 200 kHz to 2 MHz and 2 MHz to 30 MHz. Coax terminal for 2 MHz to 30 MHz.
- Voltage selector for 100, 120, 220, and 240 VAC. Also adaptable to operate on 13.8 VDC with optional DCK-1 kit.

OPTIONAL ACCESSORIES:

- SP-100 matching external speaker.
- HS-6 lightweight, open-air headphone set.
- HS-5 and HS-4 headphones.
- DCK-1 modification kit for 12-VDC operation.

SP-100 R-1000

HS-5

KENWOOD

TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut, Compton, California 90220

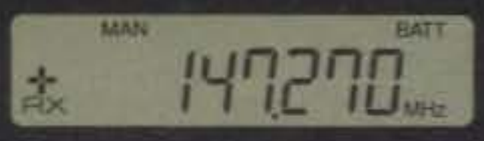
ST-144/μP, 2 Meter FM

It's Time!

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

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

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



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

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

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

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

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

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

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

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

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

SANTEC

2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214) 423-0024 • INTL TLX 203920 ENCOM UR

Encomm, Inc.
2000 Avenue G
Suite 800
Plano TX 75074

Please send me more information about:
☐ The ST-144/μP
☐ Authorized SANTEC Dealers

NAME _____ CALL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____ CQ

YOU MAY SEND A DUPLICATE OF THIS FORM.

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CQ The Radio Amateur's Journal

ON THE COVER: Mike Staal, K6MYC, and Bob Bignami, KD6NH, put some finishing touches on Bob's satellite TV antenna. Here they are seen installing the LNA.

FEBRUARY 1982 **VOL. 38, NO. 2**

FEATURES

DEPARTMENTS

Zero Bias

AN EDITORIAL

Within this issue are several articles devoted to the video aspects of amateur radio and electronics in general. Based on past performance, I can expect to receive a few irate letters from readers who will remind me about "605" and how illegal the whole process is. I really don't know how illegal the whole thing is anymore than does the government, all the members of all the Bar Associations, and all of the "jail-house lawyers" put together. I think we all have opinions, and those opinions hang on that ubiquitous quote "Whose ox is being gored?"

To a lot of people, the actual programming being received is secondary to the consideration of the beauty of the technology involved and the effort and hardware needed to accomplish the task. To others it is all of the above plus "how cheaply can it be done?" Regardless of the intent at the outset, the end result is that programming is being received. The programming is there, out in the open so to speak; it doesn't pass through a modern-day "Enigma Machine" (not yet anyway) to defy interpretation. I don't have to draw a picture or rehash amateur radio history to remind everyone that the very presence of a challenge presents people geared to accept that challenge and solve the problem. There have always been (and I hope always will be) amateurs who drag the rest of us kicking and screaming up to modern times.

I think that the furor over satellite reception has taken and will take a back seat to associated newer problems. By now people in the satellite business and television networking realize that the overwhelming number of potential customers will still be customers for their services. Most of us do not have the room to install a 10- or 12-foot dish inconspicuously in some corner of our yard, let alone in a spare apartment closet. The argument of "theft of services" is still an argument, but not one that can be pursued easily through legal channels.

If you take an arbitrary number of 10,000 TVRO setups spread over the country, it becomes a little impractical at this point to start 10,000 actions. What appears to be the focus then of legal action is video recording. This industry seems to have been hit recently by several suits under the guise of "theft of services." This is not actions against individuals who use the equipment, but is rather action against people who make and distribute the equipment. By extension, if Sony, for example, wanted to advertise their Betamax in *CQ*, we then would be an accessory to any action taken against Sony.

The suits and threats of suits, in case you haven't kept up, have been brought about by corporations who allege a financial loss via "theft of services." These are the people and industries who produce the material that we have called programming. They contend that they are deprived of income for themselves and their clients because of the repeated use (without fee) of this recorded material. This is the avenue of attack that can be expected. After all, why sue John Q. Citizen for receiving a movie? He probably doesn't have anything worth taking if you win. A large corporation, however, is another financial story.

The crux of all of these arguments involving satellites in space, video tape recorders, and every other technological marvel has its basis in something written over 200 years ago. It's called "The Constitution Of The United States." In Article I, Section 8 (Powers of Congress), it states that "The Congress shall have power: To promote the progress of science and useful arts by securing for limited times to authors and inventors the exclusive rights to their respective writings and discoveries." This statement is the basis for the Patent Office and copyright laws. However, this statement presents two distinct tracks, or paths, which are mutually exclusive. The framework of that statement, the very language used, does not even allow for the possibility of these very modalities such as video recording. The progress of science has outdistanced the arts, so to speak, and in this instance one half of this blanket "power" of Congress is being used against the other half.

In order to protect the "useful arts," we then have to deny or "not promote" the progress of science. It's quite a dilemma and not as simple as "605" after all. It boils down to the fact that copyright laws have not now nor ever kept up with either science or the times. Only recently did the copyright laws take into account and make it legal for an individual to make a tape recording from a radio station for his or her own use. Eventually the copyright laws will recognize the existence of video recording and satellite reception. We have not now nor have we ever been talking about secrecy; we have been and are talking about money.

What is explicit and understated is that certain individuals are being entertained or informed for free. The law as it stands now does not seem to be clear cut on whether or not money is owed for this "use of service," and if so to whom. We are probably talking about a "use" that wasn't even considered when some original contracts were drawn. On the other hand, none of us is in a position to say that an actor, for example, has made "enough" money already from any particular endeavor and doesn't deserve any more. Whether or not the fees end at any particular point is not the issue here; the fees are assumed.

The thorn or fly in the ointment is that a subindustry was formed that is making money off of the same product while not sharing in the cost of risk of the endeavor. The fact that you as a consumer spend hundreds or thousands of dollars on this equipment does not increase the profit picture of the entertainment producer by one cent. The laws, however, will catch up to technology and things will once again be great in Hollywood.

What will happen is that there will come a realization to the powers that be. They will realize that all of this questionable equipment in the hands of the great unwashed is creating a demand for product. People by and large will not have libraries of 8,000 movies and every Johnny Carson Show. Unlike music, most of what is on television has a finite interest span. Throw in all of the channels from satellite television, and you still will only watch something a few times before you rerecord something new over it. The powers that be will also realize that they are already getting a share of the market via the prerecorded tapes. (Ever wonder how many of those actors, technicians, etc., are getting a fair and accurate percentage of that money?)

The problems and laws will sort themselves out when everyone realizes that there is still a lot of money to be made out there. After all, television did not ruin radio, and neither satellite nor cable television has ruined commercial television, nor will they. Each has come along in its own time and increased a welcoming market. The things that have changed or dropped by the wayside have been a result of this thing we call technology and the expectancy of improvement in product. After all, the only one who could get away with producing a silent movie these days is Mel Brooks, and then only once.

How does any of the above relate to amateur radio you might ask? Why are you taking up space in *CQ* for nonamateur matters? Well, the principle and the lessons are exactly the same. Amateurs do not live by 20 meters alone! The technological changes in the last 5 to 10 years have been astounding. The changes have not been designed nor developed just to give you a smaller transceiver, just the same as the CK722 was not created to produce a smaller 807. It was the thinking and direction that had to be changed, and once that was done, a whole new realm of possibilities opened up. The computer age opened up, and thousands of amateurs now take that for granted. OSCAR went up, and that's now an almost everyday thing. Microprocessor is the "in" word in our lexicon. Some of us "expect" certain features now, and we are no longer amazed that they are even available.

So what we are looking at is perhaps the next plateau in technology. It certainly presents some new and interesting hardware to play with, some new concepts, and another new realm of possibilities for the future. What has also been introduced recently to amateur radio has been elements of the real world. To some, this has been the most painful of changes. We are being forced to come out of our basement shacks and let the sun shine in. We have learned that some of our heroes are not heroes at all. We are learning to deal with a government that regulates us and yet still come out with some effective change. The Plain Language Rewrite is really a victory for amateur radio. It forced a lot of us to learn the system and learn how to use it. We became political—a dirty word not too long ago.

So, satellite television, video recording, and legal battles by themselves are not much help in getting through a pileup, but they are the way of the future. The computer is already here. Tomorrow's amateur is coming from this world, and he (or she) is different from us. It may be a short or long time before a next generation of amateurs comes along to shake the pedestal, but make no mistake—this pedestal too will be shaken and possibly toppled for the "new" mode at that time. 73, Alan, K2EEK

In the proud tradition of the S/Line and KWM-2: Collins KWM-380.

What is "tradition"? Fifty years of HF communications experience and a high technology base that makes us an industry leader. Plus added value like the KWM-380 12-month warranty and 24-hour factory "burn-in" followed by individual testing and calibration of each transceiver.

The Collins KWM-380 gives you "tradition" in one box. Microprocessor control provides operation from the front panel or optional remote interface connector. Plug-in read-only-memory I.C. allows the addition of WARC band changes. Built-in AC/DC power supply lets you operate almost anywhere.

Rate selectable tuning to 10 Hz with frequency memory and split VFO provide excellent operational flexibility.

The Collins KWM-380. A sound investment that offers excellent resale value. See it at your authorized dealer. Collins Telecommunications Products Division, Rockwell International, Cedar Rapids, Iowa 52498. Phone 319/395-5963. Telex 464-435.

Rockwell International

...where science gets down to business

CIRCLE 29 ON READER SERVICE CARD

New Drake TR5 Transceiver

far above average!

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

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

* Patent pending

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

DYNAMIC RANGE

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

RELIABLE SERVICE

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

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

ACCESSORIES

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

KILOWATT AMPLIFIER

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

ENGINEERING

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

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

See your Drake dealer or write for additional information.

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

R. L. DRAKE COMPANY

DRAKE

540 Richard St., Miamisburg, Ohio 45342, USA
Phone: (513) 866-2421 • Telex: 288-017

CIRCLE 18 ON READER SERVICE CARD

The ultimate team... the new Drake "Twins"

The TR7A and R7A offer performance and versatility for those who demand the ultimate!

TR7A Transceiver

• **CONTINUOUS FREQUENCY COVERAGE** — 1.5 to 30 MHz full receive coverage. The optional AUX7 provides 0 to 1.5 MHz receive plus transmit coverage of 1.8 to 30 MHz, for future Amateur bands, MARS, Embassy, Government or Commercial frequencies (proper authorization required).

• **Full Passband Tuning (PBT)** enhances use of high rejection 8-pole crystal filters.

New! **Both 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity are standard,** plus provisions for two additional filters. These 8-pole crystal filters in conjunction with careful mechanical/electrical design result in realizable ultimate rejection in excess of 100 dB.

New! **The very effective NB7 Noise Blanker is now standard.**

New! **Built in lightning protection** avoids damage to solid-state components from lightning induced transients.

New! **Mic audio available** on rear panel to facilitate phone patch connection.

• **State-of-the-art design** combining solid-state PA, up-conversion, high-level double balanced 1st mixer and frequency synthesis provided a no tune-up, broadband, high dynamic range transceiver.

R7A Receiver

• **CONTINUOUS NO COMPROMISE 0 to 30 MHz frequency coverage.**

• **Full passband tuning (PBT).**

New! **NB7A Noise Blanker supplied as standard.**

• **State-of-the-Art features** of the TR7A, plus added flexibility with a low noise 10 dB rf amplifier.

New! **Standard ultimate selectivity choices** include the supplied 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity. Capability for three accessory crystal filters plus the two supplied, including 300 Hz, 1.8 kHz, 4 kHz, and 6 kHz. The 4 kHz filter, when used with the R7A's Synchro-Phase a-m detector, provides a-m reception with greater frequency response within a narrower bandwidth than conventional a-m detection, and sideband selection to minimize interference potential.

• **Front panel pushbutton control** of rf preamp, a-m/ssb detector, speaker ON/OFF switch, i-f notch filter, reference-derived calibrator signal, three agc release times (plus AGC OFF), integral 150 MHz frequency counter/digital readout for external use, and Receiver Incremental Tuning (RIT).

The "Twins" System

• **FREQUENCY FLEXIBILITY.** The TR7A/R7A combination offers the operator, particularly the DX'er or Contester, frequency control agility not available in any other system. The "Twins" offer the only system capable of no-compromise DSR (Dual Simultaneous Receive). Most transceivers allow some external receiver control, but the "Twins" provide instant transfer of transmit frequency control to the R7A VFO. The operator can listen to either or both receiver's audio, and instantly determine his transmitting frequency by appropriate use of the TR7A's RCT control (Receiver Controlled Transmit). DSR is implemented by mixing the two audio signals in the R7A

• **ALTERNATE ANTENNA CAPABILITY.** The R7A's Antenna Power Splitter enhances the DSR feature by allowing the use of an additional antenna (ALTERNATE) besides the MAIN antenna connected to the TR7A (the transmitting antenna). All possible splits between the two antennas and the two system receivers are possible.

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

DRAKE

See your Drake dealer or write for additional information.

COMING SOON: **New RV75 Synthesized VFO**
Compatible with TR5 and 7-Line Xcvrs/Rcvrs

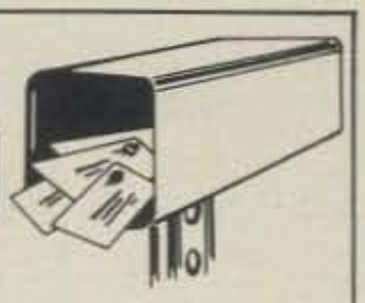
• **Frequency Synthesized** for crystal-controlled stability • **VRTO (Variable Rate Tuning Oscillator*)** adjusts tuning rate as function of tuning speed. • **Resolution to 10 Hz** • **Three programmable fixed frequencies** for MARS, etc. • **Split or Transceive operation** with main transceiver PTO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

R. L. DRAKE COMPANY • 540 Richard Street, Miamisburg, Ohio 45342 • Phone (513) 866-2421 • Telex 288-017

* Patent pending

CIRCLE 19 ON READER SERVICE CARD

Our Readers Say



The Frugal Fifteen

Editor, *CQ:*

Pass on my thanks to Lew McCoy, W1ICP, for his article "The Frugal Fifteen" (*CQ*, August 1981). I just worked my first Japan QRPp on my HW-8 with only the dipole erected. Congrats on your great magazine. Age 30—been a ham 18 months.

Bob Hinshaw, KA7IJY
Roseburg, OR

Turn Down XZ Activity?

Editor, *CQ:*

How can the purist at the ARRL turn thumbs down to the recent XZ activity and accept KA prefix credit for Minami Torishima and Ogasawara? If my understanding is correct, both the JARL and the Japanese government consider KA stations as military, not amateur.

Harold Bolkey, W3KHQ
Fairview, PA

CQ's Second Anniversary

Editor, *CQ:*

My personal congratulations on the second anniversary of the "New CQ." I continue to see a great improvement in the publication, both technically and politically. May you and the staff enjoy many years of success and happiness through your efforts to provide entertainment and information for radio amateurs.

Doug DeMaw, W1FB
Technical Department Manager, ARRL

It's Not Whether You Win . . .

Editor, *CQ:*

I would like to express my ideas on becoming a winner in contests. In reading the results of various contests, one doesn't have to be in the top 10 to be a winner.

The concept of a contest is to increase one's operating proficiency. If your total number of contacts was even a small percentage higher than last year's total, then there is a positive increase in operating proficiency. The very fact that you tried and made QSOs in my opinion makes a winner, rather than a person who complains about its being too difficult and doesn't even try.

Fran Dill, WA3GYW
Kingsville, MD

Thanks From Roanoke Div.

Editor, *CQ:*

I want to thank you for attending our recent Roanoke Division Convention in Virginia Beach. I trust that it was enjoyable.

I also must tell you that your November 1981 issue of *CQ* is about the best you have put out. There is little self-service in the above remarks, because I am interested in RTTY. However, I wish there had been more on the solid state variety. You see, I do not believe, although I may be wrong, that there is a book or pamphlet that can be used as a guide for those just getting into solid state RTTY.

Gay E. Milius, Jr., W4UG
Director, Roanoke Div., ARRL

AM Is Not Dead!

Editor, *CQ:*

I have just read Byron Kretzman's article on A.M. ("In My Opinion," *CQ*, October 1981) and my first and foremost comment is "Bravo!" Thanks to him for having spent time writing and submitting this article.

I, too, enjoy A.M., especially on 40 and 10 meters. It proves very rewarding in many aspects, interpersonally and technically. I operated A.M. before S.S.B. as a General, and still find it as fun now as I did then. I have begun to pick up "new" A.M. equipment to feed a more efficient 40 meter dipole.

K4KYV and WA9OWY are each working on A.M. synchronous detectors which promise to more fully demodulate A.M. signals as well as significantly reduce QRM and QRN, so things are definitely looking good!

Mike Simmons, WB9CWE
Lincoln, IL

Antenna Fan

Editor, *CQ:*

I want to compliment you on your monthly feature "Antennas" by Karl Thurber, W8FX, which I find informative and well written. My thanks to Karl Thurber and T.E. White for their valuable and interesting material. I am a shortwave listener (not a ham) so I find these articles very useful and educational. Please continue the series.

Herbert G. Gardiner
Honolulu, HI

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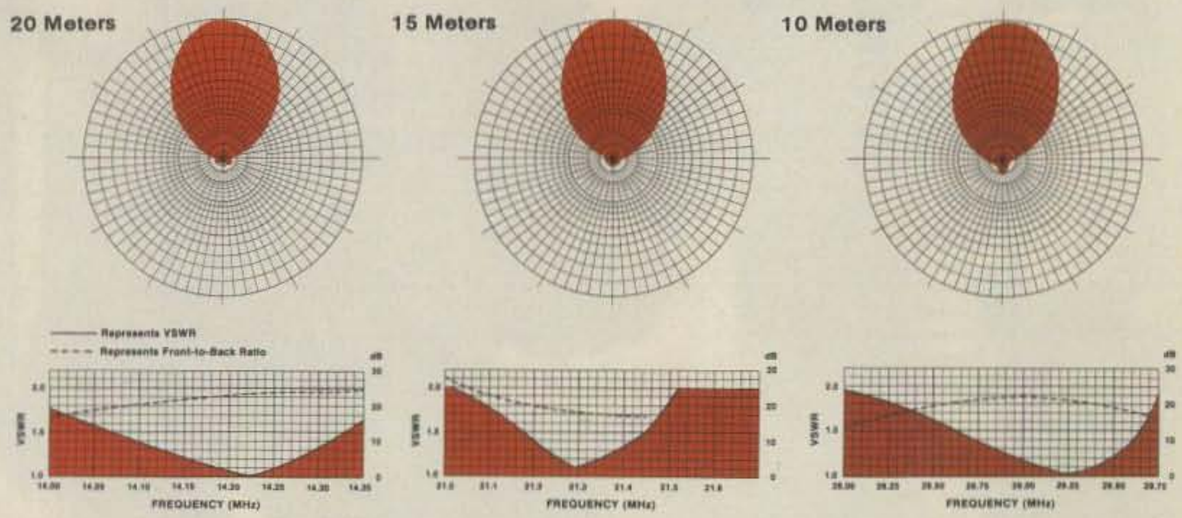

Write for our technical data report and comparative test results.

your neighbor's. However, with its short 20 ft. (6.1 m) turning radius and 31 ft. (9.4 m) longest element, it's no more imposing than a TH6DXX. It's easy to assemble and weighs only 75 lbs. (34 kg). The wind loading is 240 lbs. (109 kg) at 80 mph (129 kph) with only a 9.4 sq. ft. (0.9 sq. m) wind surface area, so the TH7DX is one of the safest and most manageable high performance tribanders you can buy. And, you don't have to spend a fortune on special towers and rotators either.

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a monthly feature by
DAVE INGRAM, K4TWJ

The World of Video

A LOOK AT THE WORLD AROUND US

This month we call on the expertise of Dave Ingram, K4TWJ, to bring to CQ "The World Of Video." Throughout the years, CQ has published the works of famous SSTVers and pioneers in video technology, from the days of Copthorne McDonald, W0ORX, (and even our own Ted Cohen, N4XX) through the works of Don Miller, W9NTP, and Robert Suding, W0MLD. We've had regular columns by Cop McDonald and Bill DeWitt, W2DD, on SSTV. CQ has been into satellite coverage since the mid 1950s, with the original OSCAR program as an idea by Don Stoner, W6TNS, a regular columnist at that time.

With Dave's help we enter a new phase, if you will, or a new generation of video technology. There are more things and more worlds to explore on the "tube" than sitcoms. An amateur's imagination and creative juices can be well nourished by the infinite possibilities that video brings. Your shack can literally abound with all sorts of exotica, tying in TV, computers, satellites, RTTY, etc. Take a "look"; you've got nothing to lose and everything to gain. —K2EEK

As you are surely aware, the unlimited world of video communications is realizing a massive popularity upswing which promises to exceed all previously visualized heights and expectations. Both Slow and Fast Scan amateur television are major interest and pioneering frontiers, while areas of MDS, satellite TV, video recordings, and visual computer linking are also being directly influenced through innovative efforts of radio amateurs. These are, indeed, exciting times which we all can share on a truly enjoyable basis!

Each month this *CQ* column will inform you of the latest happenings and heartily sought information concerning any and all phases of amateur-related video activity. We also plan to highlight single "hot" topics during their prime development, continuing this communications leadership for which radio amateurs have traditionally been known. Nineteen eight-two promises to be a banner year, and, with your support, this column will provide banner coverage of those events.

It is a true pleasure becoming one of the *CQ* "regulars"; indeed, it is a superb and respected pleasure working with all the amateur publications. They are a very special and devoted group of which all amateurs can be justifiably proud. Such devotion and interest are never forgotten, right? Now let's get into this month's happenings in the world of video!

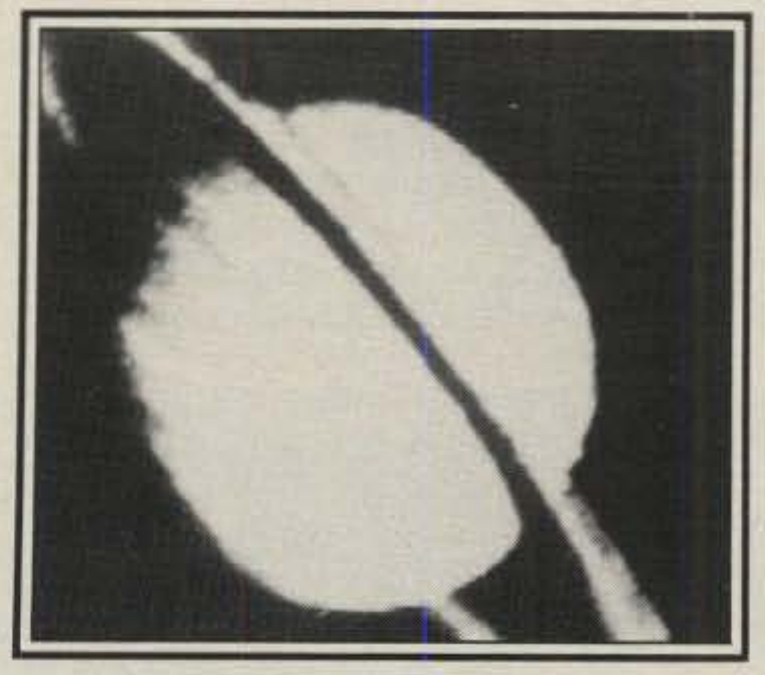
Eastwood Village No. 1201 So., Rt. 11 Box 499, Birmingham, AL 35210

Date	Time	Frequency	Net Control Stations	Approx. Length
Saturday	1800 GMT	14,230 kHz	W1JKF, W9NTP WA7WOD, W0LMD	2½ Hours
Friday	0100 GMT	14,230 kHz	N7AON, WA7WOD	2 Hours

Fig. 1– Slow Scan TV nets and their control stations. The Friday net's second hour involves color operations.

Color SSTV In Vogue

The big news in '82 is color Slow Scan's rising popularity and acceptance on the high-frequency amateur bands. Evolving through recent efforts of several SSTVers, one can now become fully operational on color SSTV for less than the cash outlay of a new transceiver. Approximately 50 percent of each weeknight's SSTV activity on 20 meters involves color video operations, and that figure is rising. The presently popular technique for transmitting color SSTV involves sending separate red, green, and blue frames while briefly stating each color at the beginning of its respective frame. SSTV viewers with black and white monitors see the color pictures with miniscule overall loss of detail (watch the "green frames" for maximum picture reproduction) while color-equipped SSTVers truly enjoy the views in "living color." The most popular equipment used for color SSTV operations are Robot 400 scan converters with expanded memory banks and suitably programmed and interfaced TRS-80C color computers.



This now-classic view of Saturn was obtained during Voyager II's flyby of the ringed planet and relayed on 20 meter Slow Scan by W6VIO at JPL in Pasadena, California.

Old-time Slow Scanners will recall the dual memory concepts pioneered by Dr. Don Miller, W9NTP, several years ago. One memory stores green video, while the additional memory stores red and blue video. In an effort to assist fellow amateurs and advance the state of the art, Don continues to share these boards/kits with interested Slow Scanners on a non-profit basis. The "color board" assembly and installation is a rather complex procedure, requiring patience, accuracy, and approximately 35 hours total conversion time.

Sam Mormino, WA7WOD, in conjunction with Interface Systems of Lindale, Texas, is producing ready-to-install color memory modification kits for Robot 400's, and their units are becoming quite popular. This color conversion, which contains three full-color memories and their associated timing and multiplexing circuits, requires approximately 6 hours

Typical of previous yearly gatherings at the Dayton Convention, this 1981 "Friday night get-together" boasted discussions of numerous new concepts. Notice there are five types of amateur TV being displayed in the dim room.

to install in a Robot 400. The three-color memory board was designed by Howard McAfee, KD6HF, and produces high-quality color pictures. The system can be used with most popular color TV receivers, such as those marketed by K-MART, etc.

Thanks to the ingenuity of Clay Abrams, K6AEP, the Radio Shack TRS-80C color computer is also being applied in the color SSTV game. Clay developed the necessary programming and interface to permit using this inexpensive unit in color Slow Scan with very good compromising results. We say "compromising" because additional memory is required (32K for color receive), and the system operates with red, green, yellow, and blue rather than full color. All aspects considered, however, the TRS-80C is an ideal choice for amateurs seeking a home computer which can also be used in the ham shack for full RTTY and almost-full SSTV applications. If you're considering purchasing a computer, Clay's programs and the TRS-80C truly hold merit.

Additional details on each of the previously overviewed color systems will be presented in future columns, so be patient and stay with us!

Amateur TV Flies!

The recent successful launch of England's first amateur satellite, UOSAT (now known as OSCAR 9), is destined to open some exciting doors for video enthusiasts around the world. In addition to its on-board propagation-study transmitters and microwave beacons, the spacecraft also hosts a CCD (charge coupled device) form of TV camera designed to provide views of earth from its orbital altitude of approximately 540 kilometers. These views are expected to encompass an approximate 500 km by 500 km area, and yield a resolution of approximately 2 km. Camera response is optimized to enhance land features and coast lines. Although conventional SSTV parameters

Frequency	Service
2100–2200 MHz	MDS Band
2300–2450 MHz	Amateur Band
2500–2515 MHz	Educational TV Band

Fig. 2– Frequency allocations in the 2 GHz region.

were considered for camera use, they were necessarily exchanged for digital techniques directly compatible with the craft's on-board microcomputer. This measure also permits storing visual information for later recall, providing graphical displays of telemetry data, etc. The image format of 256 by 256 pixels with 16 shades of gray is to be conveyed at a 1200 baud rate using Audio Frequency Shift Keying (AFSK) tones of 1200 and 2400 Hz. The downlink frequency and mode of these transmissions are 145.825 MHz f.m. and 435.025 MHz f.m.

As this column is being written (early November), OSCAR 9's telemetry is being received on 145.825 MHz with S-7 to S-9 signal strength. Minor fades due to satellite roll are apparent, but that condition should only be temporary. OSCAR 9's orbit path is slightly different from previous OSCAR's, and this has created a cold internal temperature which hampers some electronic circuits. Once past that "shock," however, things should begin operating satisfactorily.

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Height	Orbital Period	Increments Per Orbit	Inclination	Telemetry Beacons	S-Band Frequency	X-Band Frequency
540 km	95.5 Mins.	23.8°	97.5°	145.825 MHz 145.025 MHz	2.401 GHz	10.47 GHz

Fig. 3– Orbital parameters and u.h.f. frequencies for OSCAR 9. Thanks to AMSAT.

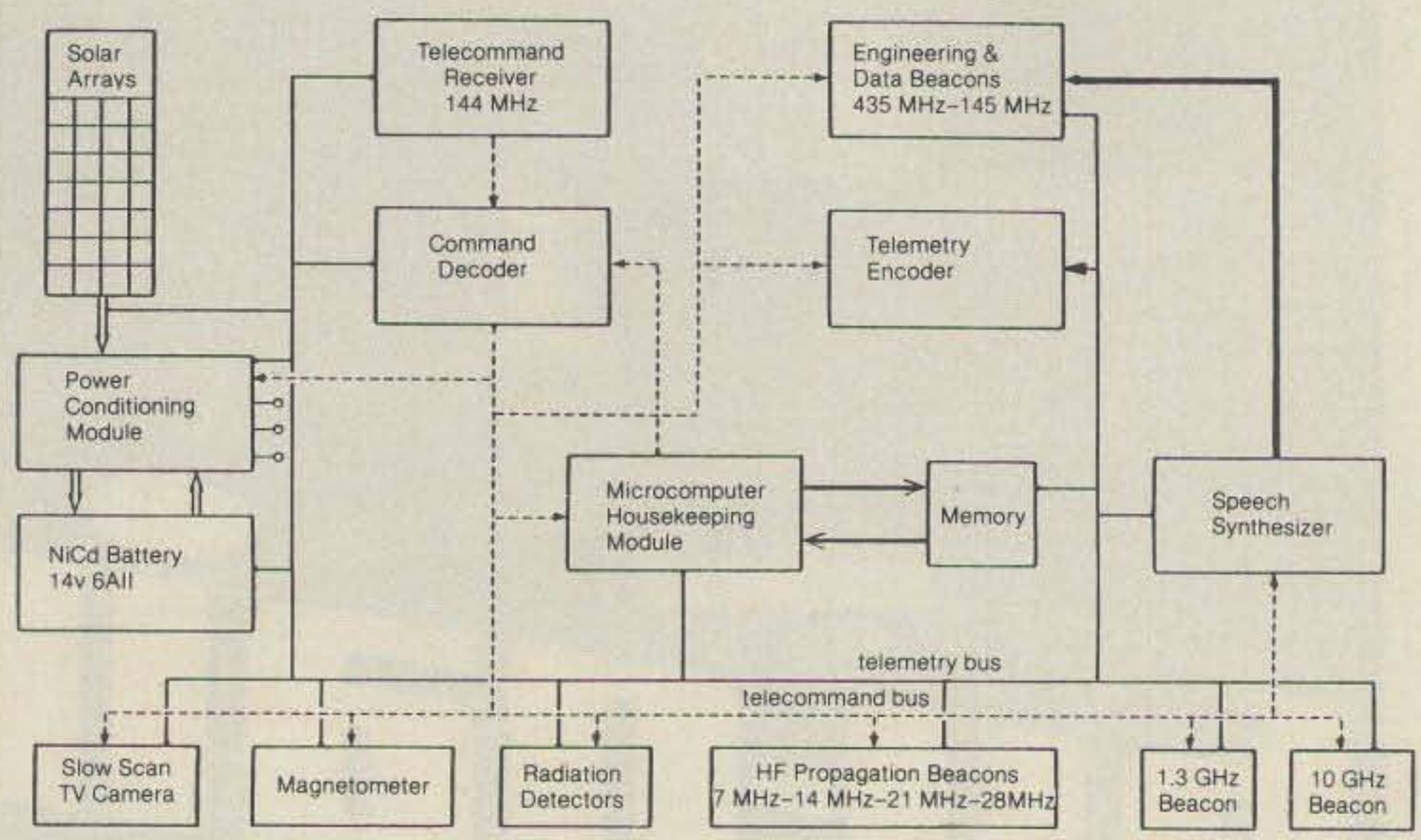


Fig. 4– Block diagram of electronic systems aboard UOSAT/OSCAR 9.

Any of the presently popular frequency-synthesized 2 meter transceivers or hand-held talkies can be used for receiving OSCAR 9's signals. Check orbital predictions in the magazines and set the squelched rig on frequency to await the pass (which usually occurs around 3–5 p.m. or 5 a.m. one's local time).

OSCAR 9 to SSTV or computer input interfaces show promise of being inexpensive. However, specific circuit designs and suggestions are being postponed until the satellite stabilizes and engineering data links operate normally. We will feature such circuits and information in this column as soon as possible—hopefully next month.

2 GHz TV Activity

The low-microwave range of 2 GHz is presently receiving its fair share of TV activity, and that situation will surely escalate during the near future. In addition to amateur TV operations in the 2300 to 2450 MHz range, educational television systems are using the 2500 MHz range for point-to-point video relays, and MDS services are clamoring into the 2100 to 2200 MHz range. OSCAR 9 is even getting in on the action, with its "S" band beacon operating on 2401 MHz! Although originally intended for other purposes, the MDS range has become a low-power private TV band conveying cable-type TV programming to its area subscribers. Since the FCC has been somewhat lax in specific rulings of this range, several areas of the country are experiencing MDS TV operations resembling activities akin to the citizen's band. The resultant demand for inexpensive 2 GHz equipment has resulted in a number of manufacturers producing gear/kits capable of being tuned for operation on 2100, 2300, or 2500 MHz. ATV enthusiasts are taking advantage of this opportunity, using 2300 MHz downconverters and transmitters for super TV operations. Consider, as an example, an area SSTVer connecting the Fast Scan output of his scan

DX views from around the world roll down the screen of SSTV monitors in amateur setups on an almost continuous basis. The "prime action spot" of this activity is 14,230 kHz in the 20 meter band.

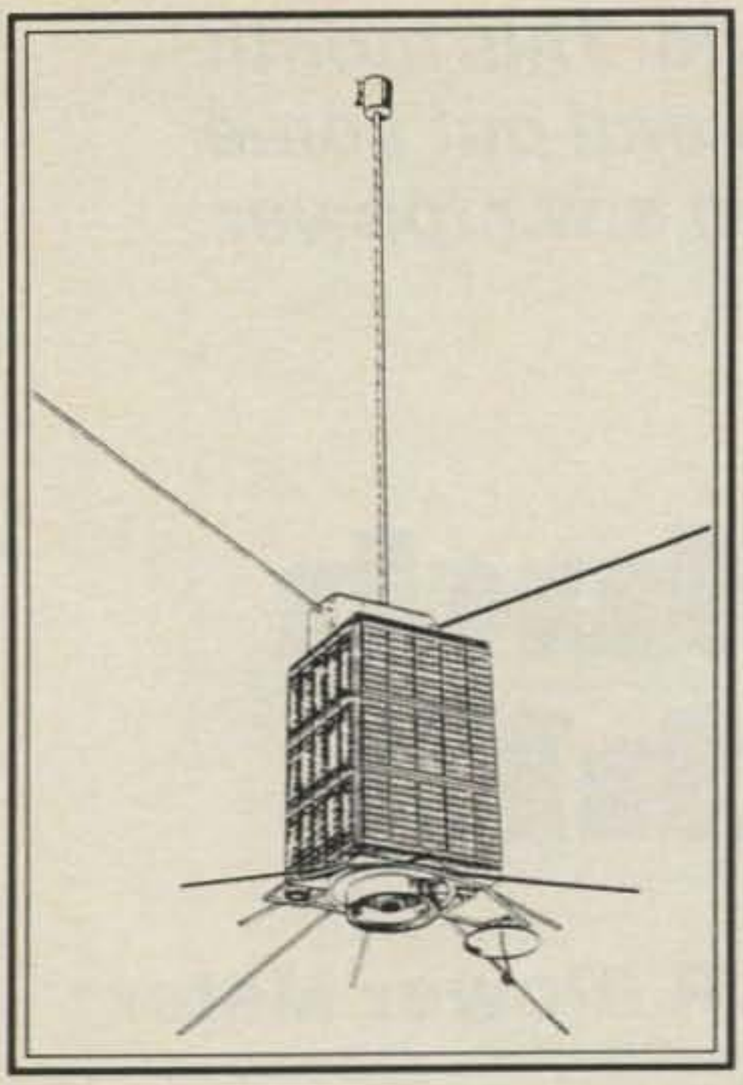


Fig. 5– This sketch of OSCAR 9 illustrates antenna placements and outer perimeters which are covered by solar cells. SSTV camera is located in center bottom of spacecraft, facing earth. Parabolic antennas are for S and X band operations.

converter to a 2300 MHz transmitter for relaying DX views to a remote operation in a nearby shopping mall. Another mall-located 2300 MHz setup would relay Fast Scan camera views back to the Slow Scanner's QTH, and worldwide video communications would be produced. Want more incentive? Consider the simplicity of a 2300 MHz Fast Scan setup similar to commercial TV's "insta cam" arrangement. A Fast Scan camera, 2 GHz transmitter, simple downconverter, and unmodified TV receiver are all that's basically required. If 2 meter communications are beneficial during area emergencies, visualize the additional capabilities which could be provided by amateur TV activities.

Voyager Mission Continues

Voyager II made its now-historical flyby of Saturn during August 1981, and SSTV coverage of the event was once again fantastic. W6VIO, the amateur club station at the Jet Propulsion Labs in California, was on the air almost continuously during the flyby, providing direct-relayed SSTV views and narrations of the mission. The overall effect was like sitting beside a personal interpreter in mission control. Indeed, many amateurs first learned of such items as the "beer can satellite," Saturn's "Ring Spokes," etc., via SSTV rather than local news medias. Color Slow Scan was also included in the action, making W6VIO's greatest operation to date. A full "crew" of amateurs manned the station's many rigs, operating all popular bands and breaking their previous QSO records. During the mission's peak, several scientists joined W6VIO's festivities, talking directly with the many on-frequency amateurs and answering their questions in a personal and effective manner. Special thanks are extended to W6VIO for another truly superb operation.

Dayton '82

The annual Slow/Medium/Fast Scan amateur TV "meeting of minds and comparison of concepts" will soon be headed our way, and right now is the optimum time for making plans to attend this gala event. This gathering is held in conjunction with the Dayton Convention during late April, with Friday evening and Saturday forums hosting discussions which set innovation patterns for following months (and years!). Some of the prime subjects presently slated for presentation include full-color SSTV within an 8-second frame, increased resolution video concepts, unique computer/television interfacing techniques, Medium Scan TV developments, and much more. Many innovators informally discuss their projects during the Friday night "get together," while the Saturday program highlights all items in a more formal manner. A large ATV booth containing numerous homebrew Slow, Medium, and Fast Scan systems is manned by their designers and other Slow Scanners during the convention. If you would like to experience the center of SSTV and FSTV developments, you'll definitely want to attend the Dayton Convention. Don't postpone making reservations, however; the city books solid.

Conclusion

Although bypassing any "heavy" technical discussions in this first *CQ* column, we've presented an overview of several presently popular areas which will be further detailed in future columns. Next time, we'll delve into satellite TV and TVRO's, using home computers in SSTV, Medium Scan TV news, and more. Please remember this is *your* column, and we want to include your thoughts and photos. Mail notes, etc., directly to me, K4TWJ, in order to save time.

Mike Stone, WB0QCD, recently assumed *A5 Magazine* (Box H, Lowden, Iowa, 52255-0408) from ex-owner/publisher KB9FO. This is ATV's only fully devoted magazine, and it deserves the support of all ATVers. Best of luck, Mike, and keep up the good work! We're behind you all the way.

Remember the annual SSTV contest, gang, which will be taking place on March 13th and 14th. If there are any questions, check with W1JKF, K4TWJ, or any net control stations during the Saturday SSTV net.

73, Dave, K4TWJ

Clear your workbench and get ready to build. This month we take what W1ICP wrote about in Part I and put some components behind it to come up with an s.w.r./power meter.

S.W.R.: How Much Is Too Much?

Part II—Building And Using An S.W.R./Power Meter

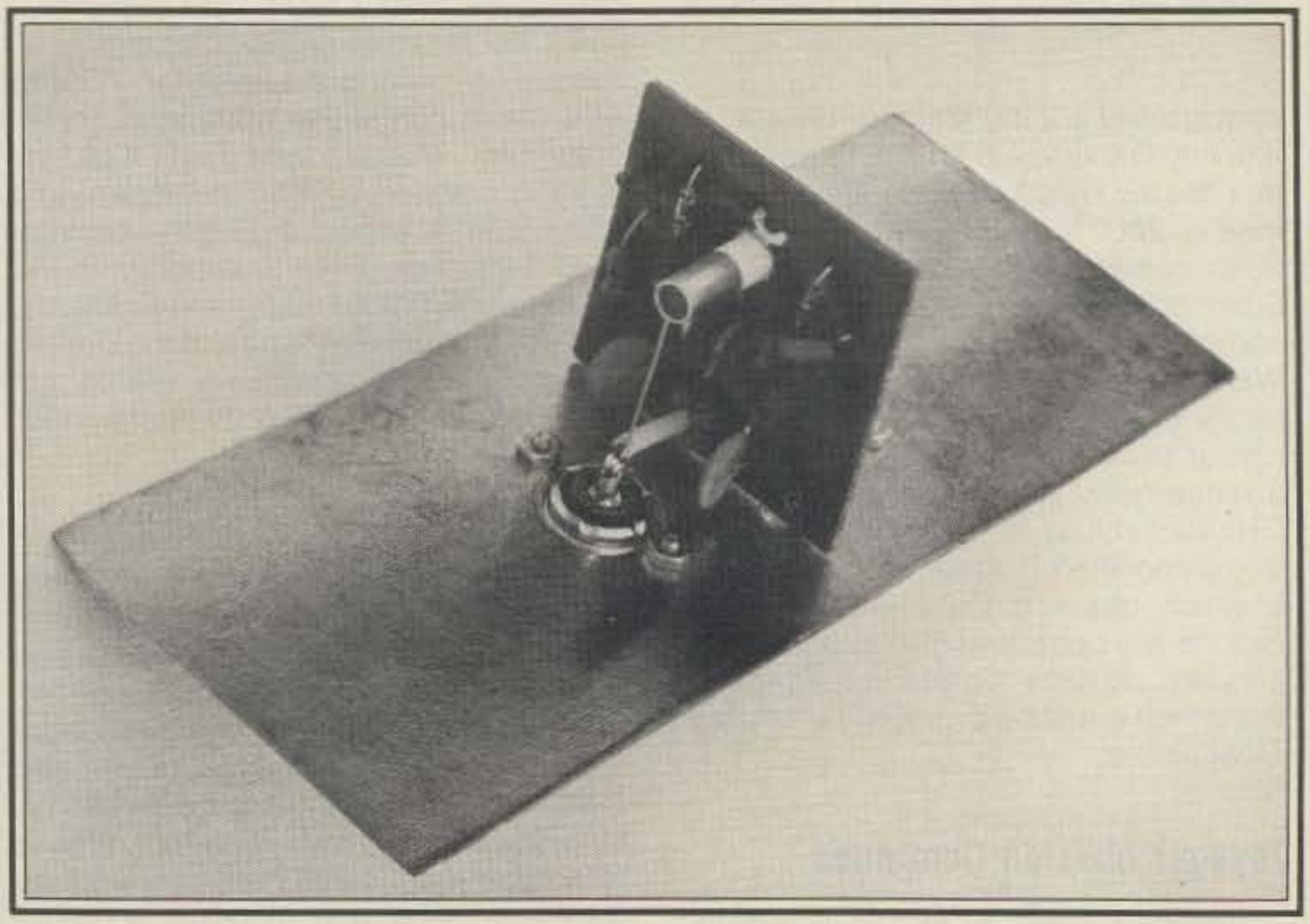
BY LEW MCCOY*, W1ICP

In the last issue, we described the ifs, ands, and buts of s.w.r. and how much one can tolerate. Of course, it is a lot more helpful to an amateur if he can determine how high his s.w.r. happens to be, and at the same time, how efficiently his equipment is operating. An instrument that will accomplish this task is an s.w.r./power indicator. The s.w.r. indicator described in this article is placed in the 50-ohm coaxial line that feeds the antenna system, and it will show you exactly what the s.w.r. is. Note that we say "antenna system" because in many cases the indicator will be placed in the feed line between a Transmatch and the rig, not the line that goes to the antenna.

This brings up a point that should be covered before going further. When an s.w.r. indicator is placed in the line as shown at fig. 1(A), it will show the true s.w.r. that exists on the line feeding the antenna. However, when placed between a Transmatch and rig, it shows *only* the s.w.r. on the length of line between the two units. Another way to look at the problem is to assume that we have an s.w.r. of five to one on the line shown at (A) in fig. 1. Next, assume that we install a Transmatch as shown at (B) and then adjust the Transmatch for a match on the short length of line between the rig and Transmatch. This short section of line will have a match (s.w.r. of 1), but we haven't changed the five to one mismatch on the line from the Transmatch to the antenna. However, and this is very important, we have provided a pure 50-ohm load for the final stage of our rig—exactly what we want to do to get the best efficiency from our transmitter—and that is our ultimate goal! As we said in Part I, the Transmatch takes the unknown antenna system load and converts it to a 50-ohm load.

Our s.w.r. indicator (the circuit is shown in fig. 2) is also a power measuring device fashioned after the circuit of Warren Bruene, first described in April 1959 *QST*. Incidentally, the article by Bruene is truly "must" reading if you are interested in power bridges. We recommend you beg, borrow, or steal a copy of that issue of *QST* and read the article.

Our indicator unit has three power scales—20 watts, 200 watts, and 2000 watts. In addition, we've incorporated a switch to show both forward and reflected power plus s.w.r. To save all the shopping hassles for parts, Alpha Electronics has agreed to provide all the parts (with the exception of the cabinet) for a very reasonable sum. More on that later; your junk box may contain many of the parts.



This photo shows the pickup board mounted on the back wall of the cabinet section. Note the insulated wire that runs between J1 and J2 through T1.

*200 Idaho St., Silver City, NM 88061

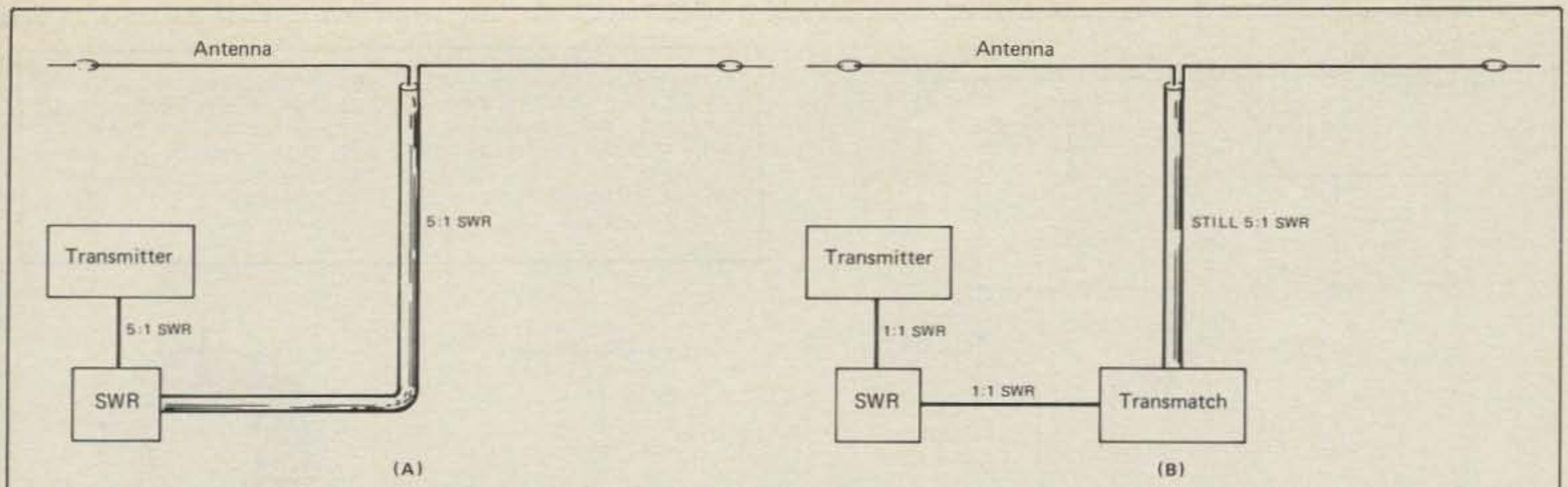


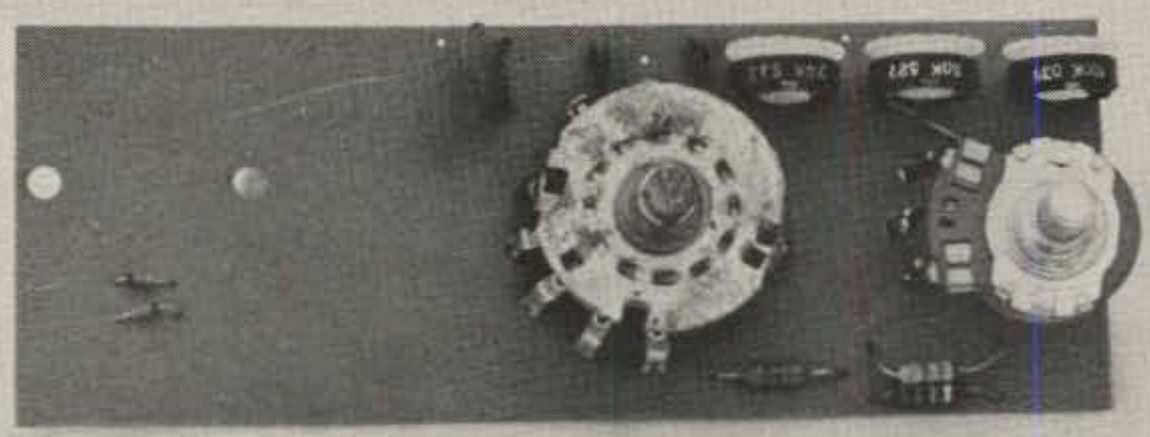
Fig. 1–Two examples of s.w.r. measurement as described in the text.

Circuit Details

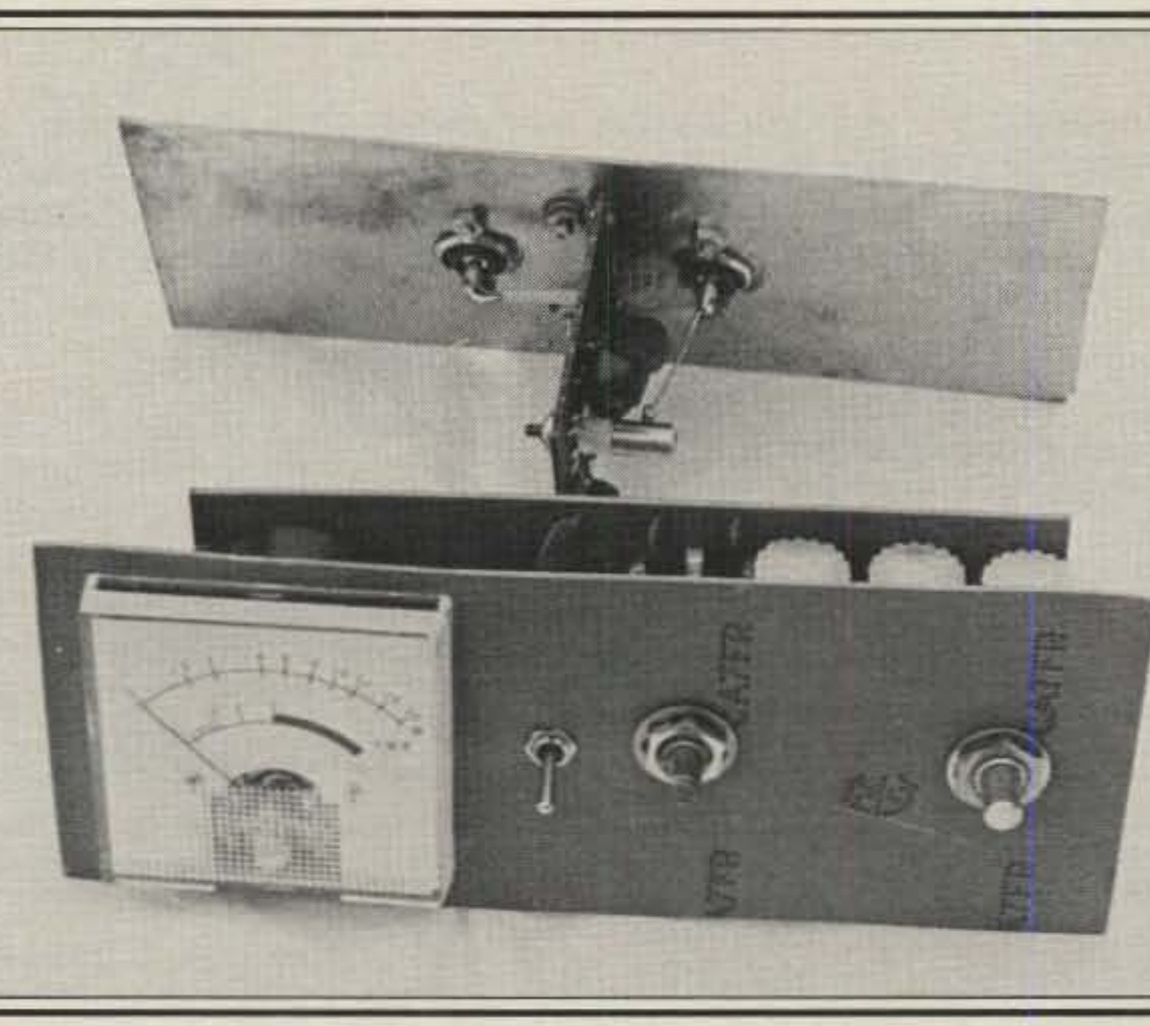
Fig. 2 shows the circuit of the s.w.r./power indicator. The pickup unit, at (A), is shown separately from the indicator at (B). Some amateurs may wish to mount the indicator unit remote from the operating location and run shielded leads for the two required leads to the indicator. As you can see from the photos, we elected to make the unit complete in a single container—made from printed circuit board.

T1 is a bifilar transformer that is used to couple the r.f. voltages from the transmission line. It consists of 19 bifilar turns installed on a Palomar Industries T-37 toroid core. We'll discuss most of the construction details later, but let's cover the toroid construction now, even though it is slightly out of context. Whenever we mentioned "bifilar" turns in constructing, it seemed to bring in more mail asking for more details than anything else we ever wrote about. And as I said in the first part, I don't like to answer mail now that I have retired (!), so let's see if I can be a little clearer on the subject. The circuit drawing for T1 shows a center-tapped coil. Unfortunately, this is about the best way to show the toroid windings in a diagram, but it tends to be confusing simply because it isn't a typical center-tapped coil. At (C) we show this drawing. The actual coil consists of two equal but separate lengths of wire (No. 24 or 26 enamel-covered) wound through and around the toroid as shown at (E). At (D) is the electrical drawing equivalent of (C). The center tap is achieved by connecting points 2 and 3 together. The word "bifilar" can be taken to mean two conductors. Nineteen turns would mean 19 turns of double conductors. We hope that is clearer. In any case, it is important to keep the space between each double-wire turn as even as possible around the toroid.

The forward and reflected voltages on the transmission line are detected and then rectified by the 1N270 diodes to a d.c. voltage that is fed to the indicator unit. The transmission line used for the pickup is a piece of No. 14 Romex house wiring with it's insulation intact. The wire is fed through T1 and connected to J1 and J2.

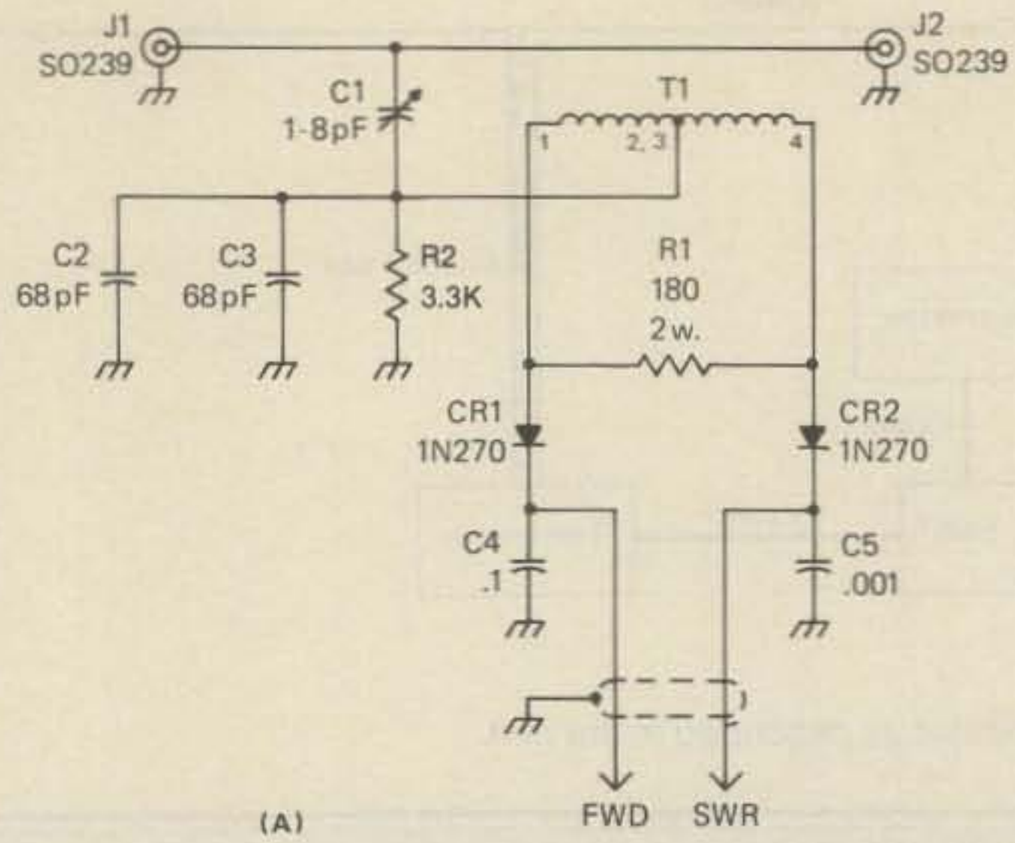


Here is the indicator board all wired and ready for mounting to the panel board.



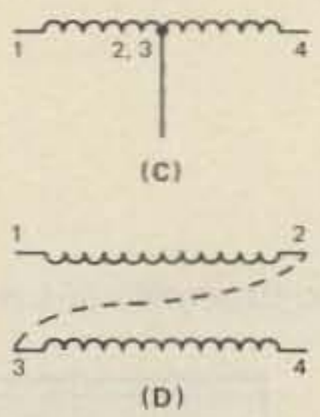
This shows the two boards mounted to the front panel board.

S1 is a double-pole, double-throw toggle switch used to switch the two lines coming from the pickup so that both forward and reflected power can be read. It would normally be left in the forward power reading position. The meter, M1, has a full-scale reading of 100 microamperes. The dial is calibrated from 0 to 20 so that the indicator unit can be set up for 20, 200, or 2 kw full scale by switching in the appropriate resistor networks—R3 through R6. If you happen to be a QRP buff, it would be a simple matter to



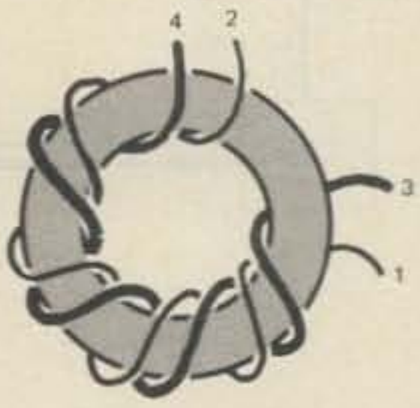
(A)

C1 – 1 to 8 pF trimmer
C2, C3 – 68 pF, NPO 5% disk
CR1, CR2 – 1N270 diodes
M1 – 0-100 uA (see text for other values)
R3 – 20,000 ohms
R4 – 50,000 ohms
R5 – 100,000 ohms
R9 – 25,000-ohm control, linear taper
S1 – D.p.d.t. slide or toggle
S2 – Two-pole, six-position wafer
T1 – See text

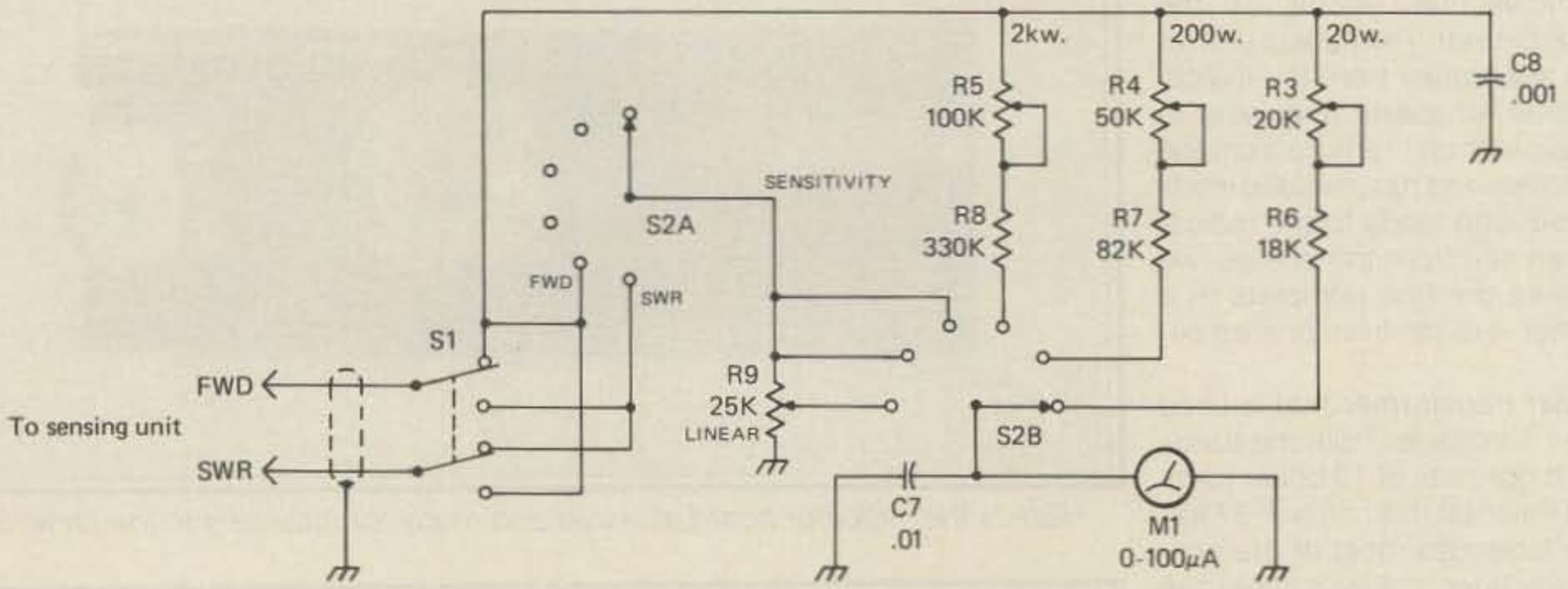


(C)

(D)



(E)



(B)

Fig. 2(A)– The sensing unit for the s.w.r./power meter. (B) is the indicator section with (C), (D), and (E) depicting T1, the bifilar wound transformer. C4 value may be increased to provide a longer "hang" time for more constant power readings when using s.s.b. or c.w. (Note: Alpha Electronics, 2302 Oakland Gravel Road, Columbia, MO 65201, phone 1-800-325-0108, has a complete set of parts including a pre-wound T1 and etched boards for sale at $19.95 plus $2.00 for shipping, handling, and insurance.)

change R3 and R6 to a lower value for a 2-watt full-scale reading. A special type of dial is required for reading power or s.w.r. Any milliameter with a full-scale reading of one milliampere or less can be used. However, either the scale must be recalibrated or a conversion chart used. Table I provides the conversion information for both power and s.w.r. readings. Table I is derived from the following formulas:

$S\sqrt{X/W}$ for a linearly-calibrated scale, where S is the maximum value of the scale, X is the value to be calibrated, and W is the maximum power (full-scale value coinciding with S2). For s.w.r. calibration the formula is:

$$SWR = \frac{1 + \sqrt{\frac{Pr}{Pf}}}{1 - \sqrt{\frac{Pr}{Pf}}}$$

when the Pf (Power forward) and the Pr (Power reflected) are known. However, Table I makes the entire job much simpler than doing all the calculations.

Construction Notes

As we mentioned earlier, Alpha Electronics has all the parts, including two circuit boards, one for the sensing unit and the other for the indicator. One doesn't need to use the etched boards, but it does make the wiring job easier. We made a cabinet from pc board that measures 2⅞ inches high, 7 inches long, and 4 inches deep. However, none of these dimensions are critical, because any cabinet large enough to hold the parts would work.

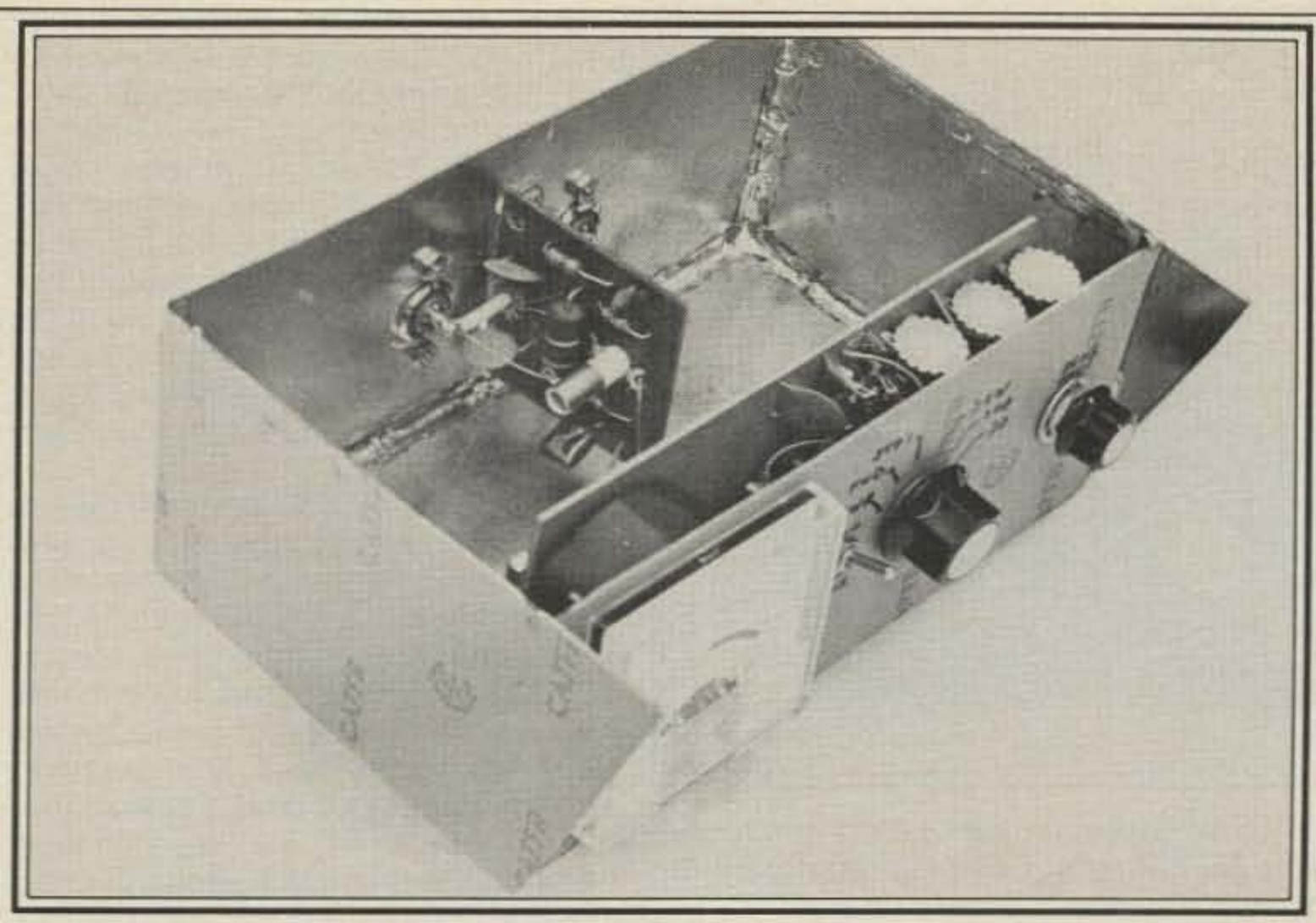
The photographs do a good job of describing the construction. The only critical dimensions are those of the placement of the SO-239s, J1 and J2, for the pickup line. Center pins of the SO-239 fittings are exactly 1.750 inches apart. The No. 14 pickup wire should be mounted ¼ inch from the pc board or metal cabinet wall if a cabinet is used. The pickup transfer toroid is mounted in the center between J1 and J2.

Because we were enclosing the entire unit in a single case, we did not bother with shielded leads between the pickup and indicator board. As mentioned previously, shielded leads must be used if the two units are separated.

Adjustments

It is possible to set up the bridge and s.w.r. indicator with a high-impedance voltmeter, and such methods are described in the various handbooks. However, the only really simple method is to beg or borrow the use of another amateur's wattmeter (and dummy load or Transmatch). Connect your wattmeter in series with his using as short a coaxial lead as feasible, but in no case use coax leads longer than 7 feet. We could go into lengthy discussions of why no longer than 7 feet, but suffice it to say that this unit is designed for 80 through 10 meters (it will probably work well on 50 MHz). Seven feet is just shy of a quarter wave on 10, so stay that short, or shorter.

With your friend's wattmeter connected in the line, turn on your rig without any power output (output control turned all the way down). Use a 50-ohm dummy load, and if you don't have one, use a



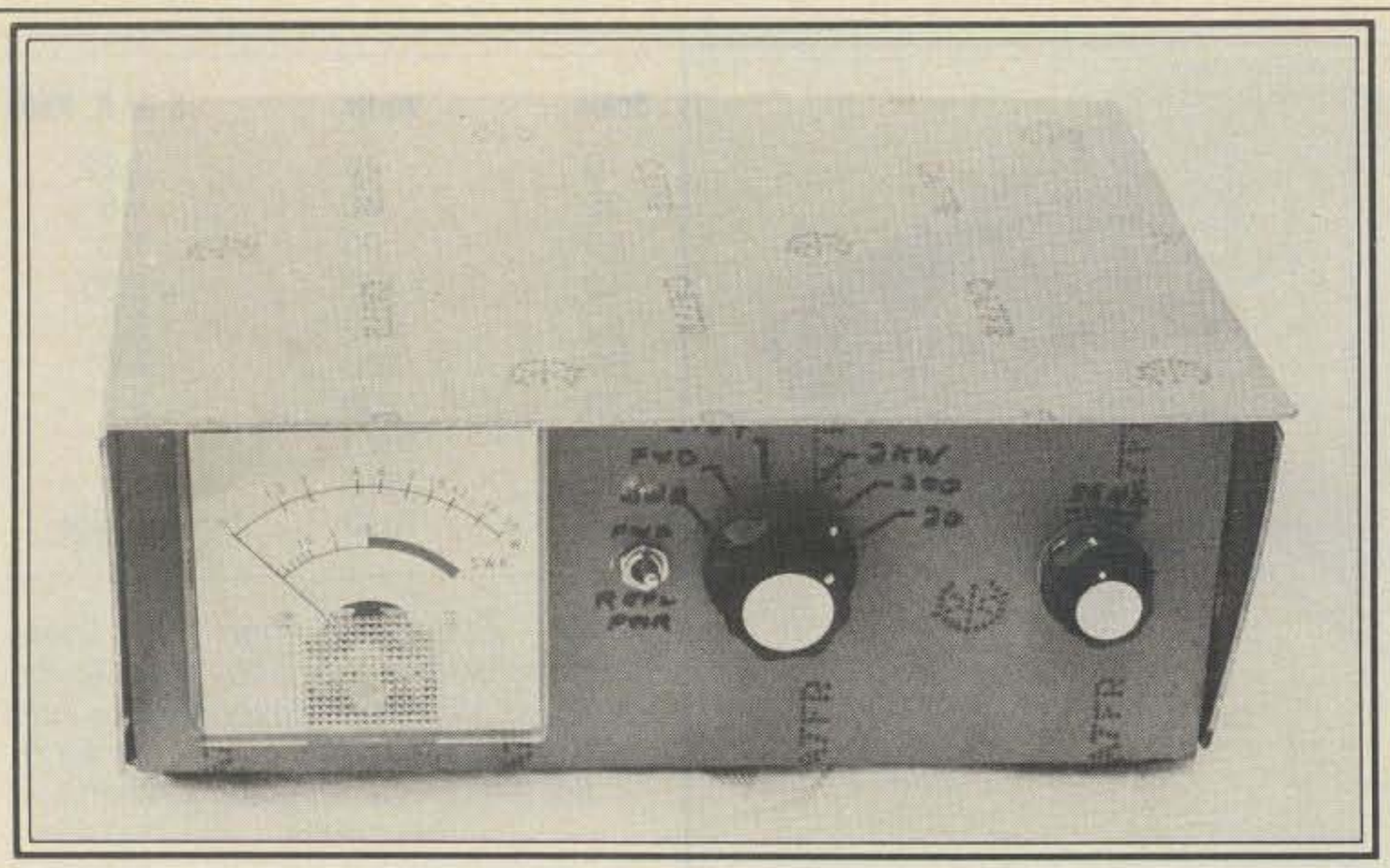
The completed cabinet ready for the lid. Copper circuit board is good material for making small boxes, particularly shielded units.

Scale	Watts	S.W.R. Ratio
10	10	1.22
20	40	1.5
30	90	1.8
40	160	2.33
50	250	3.0
60	360	4.0
70	490	5.7
80	640	9.0
90	810	19
100	1000	Infinite

Table I– Conversion chart for a linear-scale meter, 0 to 1, 0 to 10, 0 to 100, etc. We have included conversion for both watts and s.w.r. (S.w.r. figures are for reflected versus full scale forward.)

Transmatch; tune it up so that you have a one to one antenna system match as indicated by his meter.

We said in Part I that we would tell you how to adjust a Transmatch, and this is as good a place as any. Always use the lowest power possible when making these adjustments. Of course, we assume you are switched to the correct band for your antenna! Set the capacitors in the Transmatch to *maximum* capacitance, *plates fully meshed.* Switch the s.w.r. indicator to **forward** reading and feed enough power through to get a full scale deflection with the s.w.r. meter *sensitivity to maximum.* You should be able to do this with only a few watts. Switch the meter to **reflected** reading, then adjust the capacitors, looking for a dip in the reflected reading. If you are using a roller inductor in the Transmatch, such as the Ultimate circuit, run the inductor through its range looking for a dip. It is also important that the final stage of your rig is constantly "touched up" to keep the final in resonance. *Your goal is to get a zero reading in the Reflected or s.w.r. position, versus a full-scale reading in the Sensitivity position.* It takes a little juggling, but you'll find that 99 percent of the time you'll achieve a perfect match, and the other one percent will be



This is the s.w.r./power bridge ready for use. We didn't get fancy and paint the outside, but that would only take a coat or two of acrylic paint. Also, our lettering was done with marking pen. We didn't have a set of decals to make a professional job.

so close that it won't matter. Last, shoot for the adjustment that gives you the most capacitance in the Transmatch circuit. You'll probably find several matching points, but the one with the most capacitance is always best.

Getting back to our adjustments, your meter should be in the **Off** position. Once you have the one to one match (this is a 50-ohm dummy load condition except that you are on the air, so choose a clear frequency and follow protocol), you are ready to adjust your instrument. Switch to the **FWD** postion, apply power (anything up to 100 watts is adequate), adjust R9 for full-scale deflection, and then switch to **SWR**. The meter should drop to zero. If not, adjust C1 to a zero reading position.

Next, turn off the power and then switch your meter to the 20-watt scale and his to any range that reads 20 watts. Bring up the power to 10 watts on his meter and adjust R3 so that your meter reads 10 watts. You can check the various power readings up to 20 watts to see if they agree; if they don't, assume that his meter is faulty, not yours! Go to the next range, 200 watts, and adjust R4, and so on, up to about 1400 watts output *(good luck!)*. All joking aside, you should be all set.

How accurate is your device in reading power or s.w.r.? I could give you a snow job, but I'll leave that to the experts and manufacturers. Most power reading devices, commercial or homebrew, are plus or minus 10 percent, and you can take that to the bank! A little-known fact in amateur radio is the impedance tolerances on brand-new, good-quality coaxial feed line. For example, the impedance of RG8/U can vary as much as plus or minus 3 percent. Therefore, don't knock yourself out for that perfect one to one match—you may be matching 48 ohms!! All we are trying to say is what we said in Part I. Your main objective in life is to have your final stage tune and load as efficiently as possible and get the power out of it and into the antenna, no more no less! This little device will help you achieve that goal. Good luck, and may all your contacts be 599, or if you are a phone man, 60 dB over! CQ

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Independent Dot & Dash (Full) Weighting	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Calibrated Speed, 1 WPM Resolution	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
Calibrated Beacon Mode	Yes			No		No	No	No	
Repeat Message Mode	Yes			No		Yes	Yes	Yes	
Front Panel Variable Monitor Frequency	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Message Resume After Paddle Interrupt	Yes			Yes		No	No	Yes	
Semi-Automatic (Bug) Mode	Yes	Yes		Yes	Yes	No	No	No	No
Real-Time Memory Loading Mode	Yes			Yes		Yes	Yes	No	
Automatic Word Space Memory Load	Yes			Yes		No	No	Yes	
Instant Start From Memory	Yes			Yes		No	No	Yes	
Message Editing	Yes			Yes		No	No	No	
Automatic Stepped Variable Speed	No	No	No	Yes	No	No	No	No	No
2 Presettable Speeds, Instant Recall	No	No	No	Yes	No	No	No	No	No
Automatic Trainer Speed Increase	Yes	Yes	Yes						No
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In this exclusive interview, Mr. James Treybig, President and Chief Executive Officer of Tandem Computers Incorporated, shares with us some thoughts on higher education and technology . . . and on the role amateur radio has played in his life.

CQ Interviews:

Mr. James G. Treybig, W6JKV

President and Chief Executive Officer
Tandem Computers Incorporated

BY THEODORE J. COHEN*, N4XX

James (Jim) G. Treybig, W6JKV, is the principal founder of Tandem Computers Incorporated, and has been its President and Chief Executive Officer since the Company's formation in 1974. Tandem was founded in the belief that an entirely new system architecture, as related to both hardware and software, was needed to provide for continuous operation, modular growth, and data integrity. The company shipped its first system in 1976, and it reported sales of over $200 million in the fiscal year ending 30 September 1981. Prior to founding Tandem, Jim was a venture capitalist with the San Francisco firm of Kleiner and Perkins, where he continues to be a limited partner. Prior to this affiliation, Jim held various marketing posts at Hewlett-Packard. A graduate of Rice University (with BA and BSEE degrees), Jim also holds an MBA from Stanford University. Recently, he has been honored with Entrepreneur of the Year awards by the Stanford Graduate School of Business and the Harvard Business School. Jim lives in Los Altos Hills, California, with his wife, Linda, and their three children. And when he isn't with his family, at work, or on the air, Jim can usually be found playing a fast game of handball or running on the roads around Los Altos Hills.

Here, then, we present our interview with Mr. James G. Treybig, W6JKV.

CQ: Jim, how old were you when you became interested in amateur radio, and what triggered your interest?

Treybig: When I was in the fifth grade and about 11 years old, I had a friend who was a ham. I heard him talking to people in foreign countries on his radio, and was really excited about doing that myself. Also, my father used to listen to radio broadcasts from other countries. I think it was the ability to communicate with people so far away that triggered my interest.

Amateur radio gave me the practical side of electronics.

CQ: Did your interest in amateur radio influence your educational goals, and if so, how?

Treybig: Yes, it influenced the path my education took. When I was younger, I really didn't know what I wanted to study. Then, in the sixth grade, I began building radios. This seemed to make my classwork in math and science more meaningful.

CQ: Did your interest in amateur radio continue while you were in high school?

**Washington Correspondent, CQ*

Amateur radio . . . led me to explore other high-technology areas, such as computers, communications, and satellites.

Treybig: Oh, yes! In high school, I met a group that participated in contests on weekends. This exposed me to a new set of friends and broadened my social development, which I believe was extremely valuable. It was the experience I had with amateur radio in high school, though, that encouraged me to go into engineering. There was, and still is, something very satisfying to me about designing and building a radio or an antenna with my own hands.

CQ: How about your professional career . . . what part, if any, did amateur radio play here?

Treybig: It really didn't affect my career, *per se*. But it did focus my education, which, I suppose, you could say affected my career decisions. You see, I found that amateur radio gave me the practical side of electronics. And because it is a technical hobby, it naturally led me to explore other high-technology areas, such as computers, communications, and satellites.

Children should learn to appreciate what computers can do because these devices influence so much of what goes on in our lives.

CQ: Today, would you encourage your son or daughter to take up a career in electronic engineering or in computer science?

Treybig: While my children are not interested in careers in the field of electronics, I believe that they and everyone should take an interest in computers. The reason for saying this is that everything which affects us will soon be designed around computers. At the very least, children should learn to appreciate what computers can do because these devices influence so much of what goes on in our lives.

CQ: So, computers and computer technology are important areas of study?

Treybig: No question about it! Computers and communications will dominate our society in the future. Every person, whether he or she is going to make these fields a career or not, should study these topics. Our future will be dominated by the so-called "information revolution."

Ham radio is a good way in which to interest young people in electronics and computers.

CQ: To what other subject areas should today's young people be exposed?

Treybig: That really depends on what is important to each person in fulfilling him- or herself. But, for sure, computers are an important subject. It is important for young people to be exposed to computers and to how they work. And ham radio is a good way in which to interest young people in electronics and computers.

CQ: To sum it all up, then, if you were going to hire an engineer or computer scientist at the BS level, what mix of education and experience would peak your interest?

Treybig: I look for a basic understanding of the fundamentals of technology—math, physics, chemistry, and materials. It is better to have a knowledge of the basic, underlying framework in technology than to have application knowledge.

CQ: Why is that?

Treybig: There is one primary reason. Technology is changing so rapidly that application knowledge is soon out of date. Engineers who understand the fundamentals have the ability to keep learning and growing as professionals.

CQ: Of what advantage today is an advanced degree (MS, PhD) in electronic engineering or computer science?

Treybig: There is an advantage in having an advanced degree, and it comes primarily from the additional time one must devote to developing the fundamental "tools" one needs. I think it has become more and more important to have the MS degree. I don't believe, however, that the PhD has much practical value in the electronics industry because it requires too much specialization.

Engineers should have a basic understanding of the fundamentals of technology—math, physics, chemistry, and materials.

CQ: Engineers who seek to advance within many companies today find that to move up the corporate ladder, they must move into management. Does this work to the electronic/computer industry's advantage?

Treybig: If you're going to make a lot of money, you must, in general, go into management. However, in the computer industry, there are many companies that have a dual career ladder. In such companies, people are paid according to their individual contributions to the company, and not according to their position or job title. I agree with the dual-career-ladder philosophy. A brilliant person who makes a significant, individual contribution can be worth more to a company than a manager.

CQ: What about continuing education for engineers and computer scientists . . . have you found it to be worthwhile for your personnel to participate in such programs?

Treybig: Continuing education is important for people in high-technology fields because things change so rapidly in these fields. If a person works at a company that is at the forefront of technology, the "continuing education" will come on the job . . . in the challenge of discovery and innovation. If a person is working at a company which isn't at the cutting edge of technology, continuing education of a formal nature takes on greater importance.

Continuing education is important for people in high-technology fields because things change so rapidly in these fields.

CQ: Jim, let's talk about amateur radio again. What aspect of the hobby interests you at this time, and why?

Treybig: From a technical point of view, I am interested in propagation and antennas. I love working at 50 MHz and enjoy building with antennas that are small enough to play with. I also enjoy operating from different parts of the world because you can experience different types of propagation. Take, for example, the Cayman Islands. They experience trans-equatorial propagation, something which we don't find in northern California. It's rare that I am able to work TE, and I find it a challenge.

CQ: Are you able to get on the air frequently? What bands do you favor?

Treybig: No, I only really have a chance to get on the air when I take trips especially devoted to ham radio. I try to take about three of these trips each year. When I go, I take as little equipment as possible: a 50 MHz transmitter and receiver, a 50 MHz antenna, and a low-band rig for use in coordinating the 50 MHz DX work.

CQ: What about the expeditions in which you have participated? What calls have you used? Do you have anything in the works right now in the way of a planned expedition?

Treybig: I wouldn't call my trips expeditions; they're really private travel. In the Cayman Islands, I operated as ZF2DN; while in the Cook Islands, I was ZK1XE. In Fiji, I was assigned the call 3D2JT. By the time this is published, I should have completed a trip to Gambia with some friends from my company; we have been assigned C5AEH, and look forward to working as many countries as is possible during our short stay.

CQ: Thank you very much for being with us today!

Treybig: The pleasure was mine!

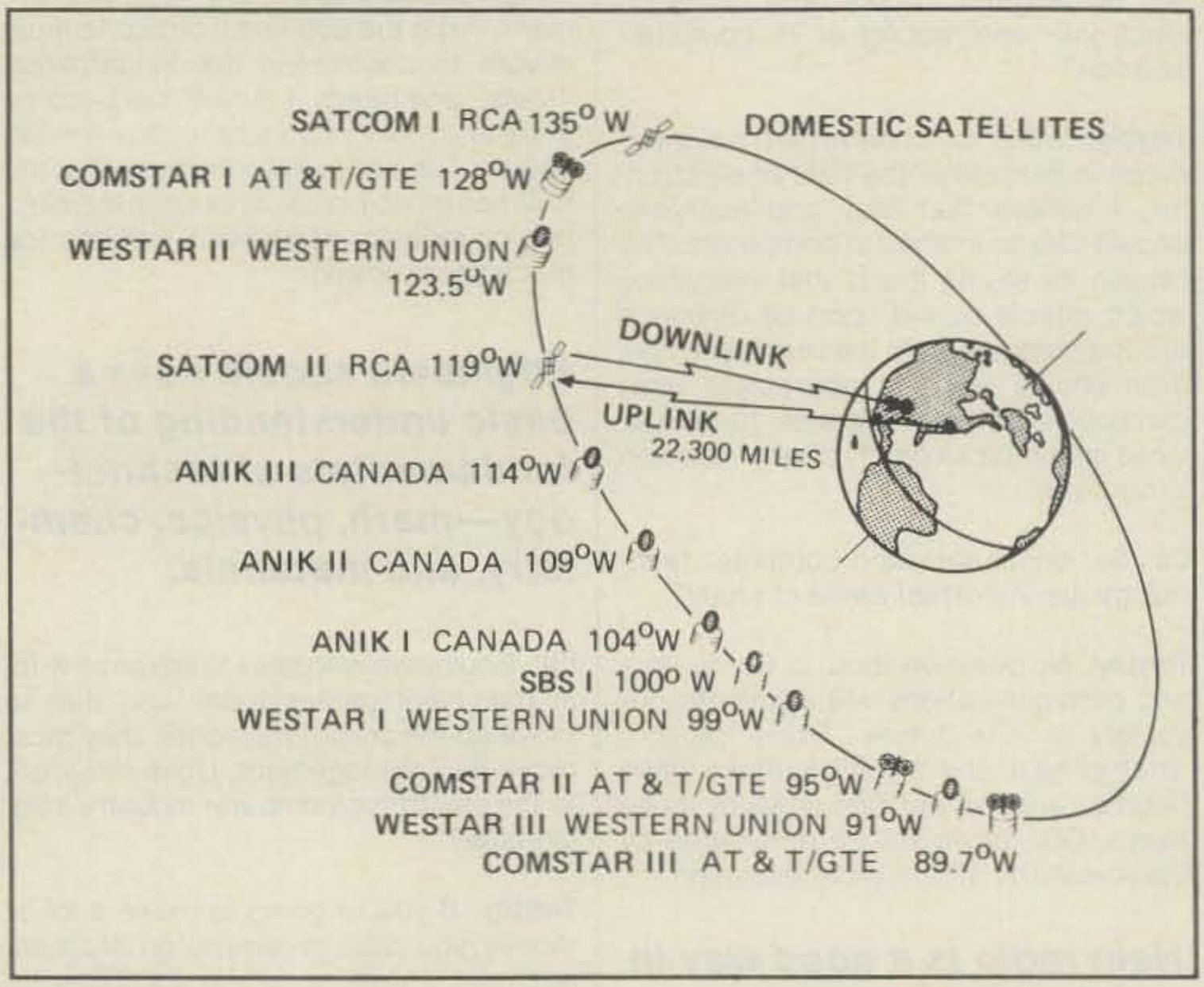
Some might ask "What hath Zworykin wrought?" but it's a far cry from those tiny screens in the large boxes to those satellites whizzing in space literally accessing the whole world via video. We hope you can get a "feel" for the excitement from this two-part introduction to satellite TV.

An Introduction To Satellite Television

Part II

BY DONALD BERG*

This month we conclude our two-part introduction to satellite television reception. Obviously, we have not run the gamut of information on the topic, and as this issue points out, we will be devoting more space in CQ to satellite television. CQ pioneered the concept of satellite communications with the introduction of the OSCAR satellite program over 20 years ago. So in a sense, we will be spending a little time catching up on just where that technology has led and where it's likely to lead. —K2EEK



Where The Birds Are

Since the formation of INTELSAT in 1965, the population of communications satellites has increased dramatically. Western Union and RCA have a total of five birds in operation that provide message and television service to the continental United States and Hawaii. Canada distributes TV services through its three ANIK series satellites, and the Indonesians are using a bird called PALAPA to deliver voice communications and television to their thousands of islands. Europe and the Soviet Union both have highly evolved satellite communications networks.

All of this traffic, of course, requires a certain amount of control, especially since many communications satellites operate on the same frequencies. To avoid collisions and undue interference, an organization called the International Telecommunications Union was formed. The ITU has allotted specific "slots" or "parking spots" for the geosynchronous orbits of all nations' satellites. The C-Band satellites of the United States, Canada and other countries of the Americas have been assigned to an arc (directly over the equator), ranging from 70° West Longitude (due south of New England) to 150° West Longitude (due south and slightly west of the Alaskan peninsula).

The objective for the TVRO owner, therefore, is to figure out which satellite(s) he wants to "see" and to aim his antenna appropriately. (The locations of all communications satellites are easily obtainable through several different sources, such as television, radio and electronics trade magazines.) The aiming of the antenna involves calculating latitude and longitude to determine the correct "look angle" (position angle) for each satellite of interest. The correct "azimuth" (angle in degrees left or right of true north) and "elevation" (degrees up or down) must be computed in order to pinpoint the desired bird(s).

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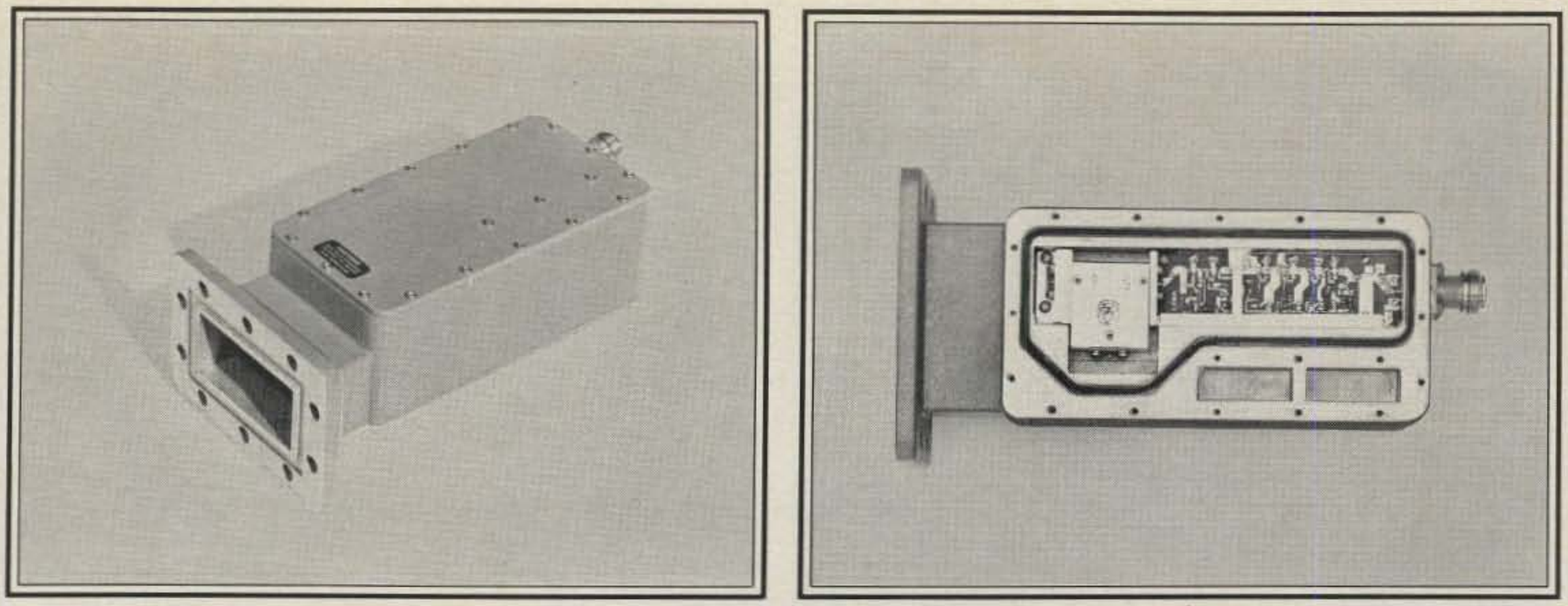


Two views of the LNA produced by Channel Master. The flange on the left is used to mount the prime focus feed assembly. The LNA is housed in a cast-aluminum case which is then sealed for weather protection. The LNA itself is clamped to a plate which is mounted on the center shaft emanating from the dish. The feed point faces the dish. (Photos courtesy of Channel Master)

Satellite Television

The usefulness of satellites has pervaded every level of the television industry. In fact, systems like our prolific cable TV networks would not even exist without satellites. Independent TV stations; Public Broadcasting; small, special interest programmers; and the three major networks and their affiliates all make ample use of satellite relays.

Two major decisions by the FCC have contributed greatly to this growth. In 1972, the FCC evolved an "open skies" policy, which allowed private businesses to build and launch their own satellites, provided that they followed FCC guidelines. This caused a tremendous increase in competition, which, in turn, caused the prices for satellite services to drop. The second important FCC decision occurred on October 18, 1979, when the Commission decided to deregulate TVRO stations. Needless to say, since a license was no longer required, TVRO stations began springing up just about everywhere. This has had a noticeable impact on the television industry as a whole.

With the increasing number of cable TVRO stations, audience share is being fragmented. The major networks are losing viewers to the increasingly competitive cable companies. In addition, new syndications and production companies are being formed almost monthly in an effort to grab a piece of this expanding market.

Today, over 16 million homes (or one out of five Americans) receive cable television. There are over 2,000 cable TVRO stations. But the broadcasters are also buying up transponder time as fast as they can. ABC, NBC and CBS are all using satellites to pick up news and sporting events from the field and to send them back to network centers. They also use satellites to feed programs to regional distribution centers and to relay programs from one coast to the other. In short, video distribution via satellite is covering the continental United States, and at a fraction of the cost of network-affiliate land lines.

There are several organizations distributing specialized programming to a select group of stations via satellite. These include the Independent Television News Association, the Spanish International Network, and the Public Broadcasting Service.

PBS, in fact, is a prime example of a network that has grown up almost entirely around the use of satellites. They have a main transmit/receive earth station near Washington, D.C., six regional transmit/receive earth stations and 142 TVRO stations, connecting a network of 162 public television stations. PBS uses four full-time transponders on WESTAR, launched by Western Union.

Radio programming is also being carried by satellites. The major networks, as well as AP and UPI audio news, are using satellite circuits between the East and West coasts and there is also an all-sports network that uses satellites to relay its programming to regional distribution centers.

Programming

Despite the flurry of activity and the headlong rush into satellite television, video transmitting is only a minor portion of the communication that satellites handle. Of the 180 transponders currently available on American satellites and the 36 available on the Canadian birds, only about 60 offer television programming. Of these, quite a few are "occasional use" channels which do not offer consistent or complete programming. Despite all this, however, there is still a tremendous variety of programming to choose from, which is not available to "regular TV" viewers.

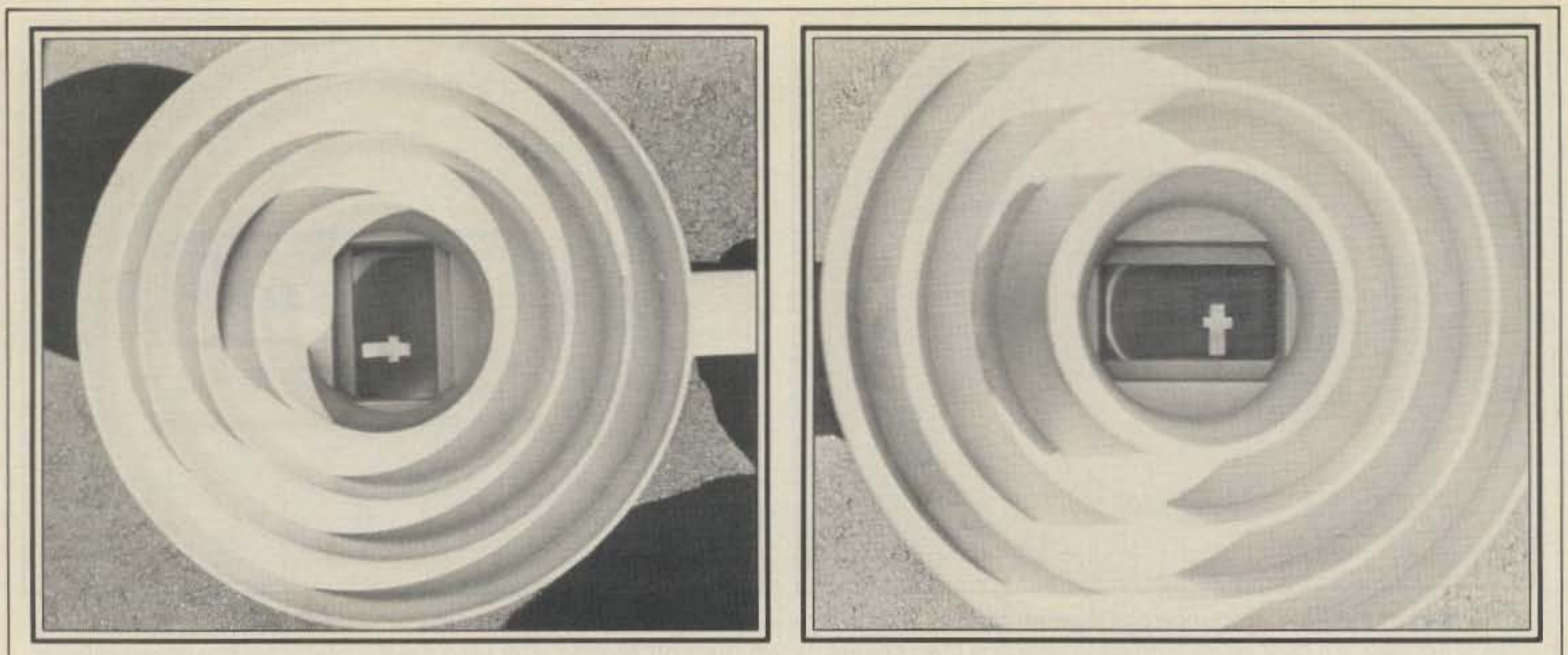
At the present time there are twelve communications satellites in orbit which can be received in the continental United States. Of these, only about six carry any kind of consistent television programming. They are SATCOM I, COMSTAR D-2 and WESTAR III.

SATCOM I was built by RCA and launched in 1975. Referred to as "the cable bird," SATCOM I began relaying Home Box Office programming the same year it was launched. It has 24 channels and carries most of the cable programming available. COMSTAR D-2 is also a 24 channel satellite. Built and launched by AT & T, COMSTAR D-2 also carries quite a bit of cable programming, including duplicates of some of SATCOM I's programs. This deliberately redundant use of transponders acts as an emergency backup system. WESTAR III, by Western Union, carries most of the broadcast programming. All of WESTAR III's programming will eventually be taken over by WESTAR IV, scheduled for operation in 1982.

The following is a brief sampling, by channel number, of the programming available on the three major television satellites.

SATCOM I

Channel	Program/Description
1	**Nickelodeon** Programming for youngsters and adolescents
2	**PTL (People That Love)** 24-hour Christian entertainment



By rotating the LNA and feed assembly, dual polarity reception is possible with one dish. The two views "into" a die-cast aluminum feed assembly show the polyglass protected "window" in both the vertical and horizontal positions. (Photos courtesy of Channel Master)

3 WGN-TV Chicago
Well rounded programming featuring movies, sports, specials and syndicated programs.

4 Inoperative Transponder
No programming

5 The Movie Channel
24 hours of premium movies

6 WTBS-TV Atlanta
Family-directed programming

7 ESPN (Entertainment and Sports Network)
24-hour sports

8 CBN (Christian Broadcasting Network)
Non-stop spiritual programming

9 C-Span
Live coverage of the House of Representatives

9 USA Network
Sports events

9 BET (Black Entertainment Television)
Black culture and life styles

10 Showtime (West)
First-run films, nightclub acts and specials

11 MTV (Music Television)
24-hour, all stereo music channel featuring best selling recording artist. Current hits and Golden Oldies.

12 AETN Showtime (East)

13 Inoperative Transponder
No programming

14 CNN (Cable News Network)
24-hour news broadcast live

15 RCA Message Traffic

16 ACSN (Appalachian Community Service Network)
College level and continuing education channel

16 CMN (Christian Media Network)
Christian movies, family entertainment, visits to the great churches of America

17 WOR-TV New York
Sports, movies and syndicated shows

18 Galavision
Movies, sports and specials in Spanish

19 RCA Message Traffic

20 Cinemax (East)
All-movie channel

21 HTN (Home Theater Network)
Good, clean family entertainment featuring G and PG movies

22 MSN (Modern Satellite Network)
Information, opinion and entertainment for the general consumer

22 HBO (West)
First run movies, sports and specials

23 Cinemax (West)
Same as channel 20

24 HBO (East)
Same as channel 22

COMSTAR D-2

Channel	Program/Description
6	**BRAVO** Cultural entertainment
7	**NCN (National Christian Network)** Multi-denominational religious programs
7	**Escapade** R-rated films and specials for adults
13	**Cinemax (East)** Same as Satcom channel 20
17	**TBN (Trinity Broadcasting Network)** 24-hour religious programming
18	**HBO (East)** Same as Satcom channel 24

WESTAR III

Channel	Program/Description
5	**P.S. (Private Screenings)** Late night adult entertainment
13	**HTN (Home Theatre Network)** Good clean family entertainment featuring a solid GP/G movie package
15	**SIN (Spanish Television Network)** Variety shows, sports, specials, news and novelas, all in Spanish
17	**SPN-2 (Satellite Program Network)** Talk shows, musical specials, public affairs and news.

The Future Of Satellite TV

Satellite television is truly a boom industry. Transponder usage and program selection have experienced a tremendous expansion over the span of a few short years. The birds have become better, and the costs of the reception equipment have dropped off sharply. Satellites have become more reliable, more complex, and more powerful. The next generation of satellites manufactured by TRW, for example, will make earth stations even more cost-effective. Scheduled for launch by the space shuttle in the mid 1980's, the TRW birds will send back a much stronger impulse. This will effectively reduce the costs of the hardware used to receive it.

Nowhere is the bright and shining future of satellite TV more apparent than in the category of home earth TVRO stations. This is especially true, since the costs of the equipment keep coming down, despite inflation. While larger commercial earth stations are limited (by design) in their use of the available transponders, the homeowner with his own

dish can watch his choices improve and multiply before his very eyes. And quite a number of households seem to be doing just that. It is estimated that there are over 4,000 home TVRO stations currently in existence, with more being added all the time. The most recent growth spurt in home earth stations occurred after the FCC's deregulation of TVRO, back in 1979. Now, anyone who wants to can put up a satellite antenna without registration or regulation, just as long as he doesn't try to sell the programming.

And the choices will only get better. The FCC has authorized the launching of twenty new satellites by 1986, which will increase the number of available transponders to over 600. Not all of these will be for television, of course, but one projection insists that there will be a total of 188 video channels by 1990. These figures will vary depending upon who is doing the forecasting, but one thing is for certain—the owners of home satellite TV stations stand very little chance of having to watch reruns.

Satellite Television: A Chronology Of Events

1957	—	SPUTNIK, first manmade satellite launched by the Soviet Union
1958	—	SCORE, first American satellite, built and launched by the U.S. Air Force
1962	—	AT & T satellite TELSTAR is first bird to relay a television picture
1963	—	Hughes Aircraft Corporation launches world's first geosynchronous satellite, SYNCOM
1965	—	INTELSAT network formed to provide intercontinental data, voice and television linkage
1972	—	Canadian satellite ANIK I is first to be launched into a slot assigned by the International Telecommunications Union
1972	—	RCA's SATCOM I is launched and begins relaying cable TV programming to the Home Box Office Network
Oct. 18, 1979	—	FCC deregulates TVRO stations

Glossary

Analog—a physical representation of information which bears an exact relationship to the original information such as physical variables like voltage or current.

Antenna—A device for collecting and focusing electromagnetic energy, resulting in an energy gain generally proportional to the antenna's dimensions.

Aperture—Same as "diameter" of a para-

bolic dish antenna. Also used to refer to the port (hole) in the antenna through which the signal is fed.

Azimuth—Angle in degrees left or right of true north.

Baseband—An information or message signal with a content that extends from a frequency near "dc" to a finite value. Video baseband is from 50 Hz to 4.2 MHz, according to NTSC standards.

BER—Bit Error Rate

Boresight Point—The area of highest gain in the center of the pattern of a directional antenna.

Carrier—A high-frequency radio signal which is modulated to carry information over long distances.

Cassegrain Feed—A system that uses a secondary reflector to focus a signal on the feed. One major type of parabolic dish antenna.

Channel—A segment of bandwidth used to establish a communications link. In satellite TV, sometimes synonymous with "transponder."

C/N—Carrier to noise ratio. The ratio of signal power to noise power in a system, usually expressed as a power ratio in dB.

C/No—Carrier to noise power density ratio.

Decibel (dB)—The ratio of two power levels, used as a measurement of gains or losses in a system. Also used to express absolute power levels, such as dBW.

dBW—Decibels above one watt.

Demodulate—The process whereby information is recovered from a carrier.

Digital—Using numbers expressed in digits; a digital circuit is one which operates as a switch, either on or off, high or low.

Downconvert—To reduce the frequency of a signal, typically from RF to IF.

Downlink—The signal that comes down from a satellite to an earth station.

Duplex—A term meaning two-way communications: simultaneous reception and transmission using different frequencies.

Earth Station—The terrestrial portion of a satellite link consisting of an antenna, amplifiers, and equipment for transmitting and/or receiving a satellite signal.

Eb/No—Emergy per bit to noise power density ratio.

EIRP—Effective Isotropic Radiated Power. Signal strength emitted by a transmitting antenna, expressed in dBW.

Elevation—Direction upward from the horizon, usually measured in degrees.

Feed—The device on a satellite antenna that transfers signals from the antenna to the rest of the equipment in the reception system.

Footprint—The pattern of signal strength of a satellite's transmission as it strikes the earth. The pattern is indicated on a map with concentric lines connecting equal levels of EIRP.

Frequency Co-ordination—A procedure used to determine the level of interference from or with other microwave sources that will be experienced at a particular location.

Frequency Modulation—A system where the instantaneous radio frequency varies in proportion to the instantaneous amplitude of the modulating signal.

Frequency Re-Use—A technique that allows two separate TV channels to be broadcast simultaneously on the same transponder by alternating their polarizations (i.e., one channel is horizontally polarized and the other vertically polarized).

Gain—The amplification ability of a device, expressed in the ratio of output power to input power, measured in dB.

GCE—Ground Communications Equipment. This refers to the earth station electronics equipment.

G/T—The ratio of Gain to Noise Temperature. The primary means of expressing the performance of a satellite reception system, expressed in dB.

Geostationary (Geosynchronous)—The orbit of a satellite 22,300 miles above the equator. In such an orbit, a satellite will circle the earth at the same relative speed as the earth's rotation, causing the satellite to remain fixed in relation to a specific point on earth.

HPA—High Power Amplifier. The final RF amplifier between the modulator and the transmitting antenna.

IF—Intermediate Frequency. This refers to the low frequency RF level to which the satellite signal is converted before processing inside a receiver, typically 70 MHz.

°K—Degrees Kelvin. A measurement used to express the amount of thermal "noise" generated by an LNA. The lower the Noise Temperature (in °K), the better the performance of the amp.

LNA—Low Noise Amplifier. A preamplifier designed to contribute the least amount of thermal noise to a received signal. There are three basic types: the GaAs FET transistor-type amp, the Uncooled Parametric Amplifier, and the Cryogenically Cooled Parametric Amplifier.

Local Oscillator—An oscillator inside a receiver that generates a frequency that when mixed with the received signal, produces the Intermediate Frequency.

Look-Angle—The angle at which an antenna must be aimed in order to "see" (receive the signal from) a particular satellite. Also called Position Angle.

MATV—Master Antenna Television. A system used to distribute signals from a single antenna to a hotel, motel, apartment complex, etc.

Modulate—A process which imposes message information on a carrier by varying the amplitude, frequency or phase of a wave.

Noise Temperature—The amount of thermal noise present in a device or system, expressed in °K. The lower the noise temperature, the better.

Opposite-Sense Polarization—See "Frequency Re-Use"

Orthomode Coupler—Also called an Orthomode Transducer, it is a device which allows the simultaneous reception of signals with opposite polarizations. It feeds signals with horizontal polarization to one LNA and signals with vertical polarization to another LNA, thus enabling a satellite reception station to take advantage of frequency re-use without having to rotate the feed portion of the antenna.

Path Loss—The loss of signal strength incurred between the point of transmission and the point of reception.

Parabolic Dish—A satellite antenna characterized by a round, bowl-like shape that concentrates signals to a single focal point. There are two basic types of parabolic dish antennas: The prime focus feed and the Cassegrain feed.

Polarization—A characteristic of the electric field of an electromagnetic wave in space. Four types of polarization are used with satellites: horizontal, vertical, right-hand circular, and left-hand circular.

Position Angle—See "Look Angle."

Prime Focus—The type of feed in a parabolic dish antenna which is positioned above the dish as the antenna's focal point. As differentiated from a Cassegrain feed.

Redundant—A duplication of equipment in order to provide a back-up, in case the primary equipment fails.

Reflector—The antenna's main curved "dish," which collects and focuses signals onto either the secondary reflector or the feed.

Sidelobe—The response of an antenna to unwanted signals originating from sources other than the intended transmitter. This type of interference can greatly reduce antenna efficiency.

SMATV—Satellite Master Antenna Television. A distribution system that feeds satellite signals to a hotel, motel, apartment complex, etc.

S/N—Signal-to-Noise Ratio. The ratio of the signal power to the noise power in a specified bandwidth, expressed in dBW.

Transponder—A microwave repeater (receiver and transmitter) in a satellite which amplifies and downconverts the frequency of a received band of signals. Domestic communications satellites use either 12 or 24 transponders, which usually have a 36 MHz bandwidth.

TVRO—Television Receive-Only. An earth station capable of receiving satellite TV signals but not capable of transmitting them.

Uplink—The signal sent from the transmitter (on earth) to the satellite.

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CIRCLE 87 ON READER SERVICE CARD

Here's a discussion of interference to satellite TV.

Earth Station Interference Problems

And How To Tame Them With Filters

BY GLYN BOSTICK* AND WESLEY SCRIBA*, WA2QKU

When you pointed your dish upward to get all that good stuff, you thought you were leaving your earthly troubles behind, right? Wrong! Over 50 percent of personal earth stations suffer mild to severe picture degradation on one or more of the 24 channels, and one in five is *initially inoperable* (no lookable pictures on *any* channel) due to reception of unwanted microwave transmissions—**Terrestrial Interference** (TI, hereafter).

Industrial earth stations (for cable TV systems, newspapers, and other businesses) make out somewhat better. They hire professional teams to survey the proposed site. Working with search dishes and spectrum analyzer, they locate and chart (frequency, bearing, and strength) all microwave signals detectable at the proposed site. If this site looks too complicated, the process is repeated for an alternate site.

But how many of us can hire a professional survey team (at $2,500 a shot) to survey our backyard? Or how many of us, even if knowledgeable in its use, can borrow a $15,000 analyzer capable of 1–8 GHz operation?

So we take our chances, heeding available, published advice: nestle among trees, build in a pit, fence behind and at the sides, etc.

Where Are The Terrestrials?

The earth station band (3.7–4.2 GHz) sits in the middle of a host of microwave services. See Table I.

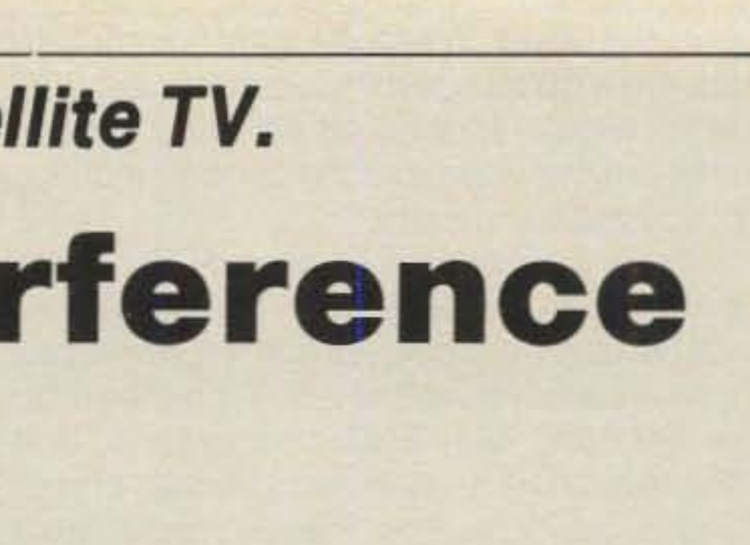
The most troublesome, giving us at least 90 percent of our grief, are the microwave telephone carriers (**"Ma Bells,"** hereafter MB), which are also in the 3.7–4.2 GHz band and *mixed among* our transponder channels. See fig. 1. The MB symptom is usually "sparklies," little dashes zipping across the screen, and not necessarily confined to the nearest transponder channel.

The second problem, carriers outside the earth station band, occurs often enough to be significant. Because most personal earth station receivers are "wide open"—having no synchronized pre-selector filter to confine the receiver's view to one transponder at a time—each one of these **Out-Of-Banders** (OOB) hits the mixer and is constantly contributing to the overall noise. This reduces signal/noise ratio and degrades picture clarity. OOB trouble resembles "over-load"; the mixer is desensitized, and many or all transponders come through cloudy on the screen, or are wiped out if the OOB is strong. The microwave public common carriers at approximately 2 and 6 GHz are the most common offenders, frequently desensitizing the receiver and wiping out at least the weakest transponder channels and sometimes all of them.

OOBs can usually be cured by placing a microwave band-pass filter between

Typical earth station "Noise Filter" for reducing out-of-band offenders: loss is low 3.7–4.2 GHz, but 50 dB on the principal out-of-band offenders (2 and 6 GHz common carriers). This 4 resonator filter also attenuates the 3.5 GHz amateur band by 15 dB. Connectors must be type N for insertion between the LNA and down converter.

Fig. 1– Satellite transponder frequency layout, showing permissible microwave telephone carriers ("Ma Bell" = MB).



Typical effect of "Ma-Bell" (in-band carriers). Note "dashes" across screen.

the LNA (low noise amplifier mounted at the horn) and the down converter. Such a filter passes 3.7–4.2 GHz without appreciable loss and rolls off on either side to suppress the common carriers at least 50 dB and the nearest OOBs (3.5 GHz amateur, and 4.4 GHz air force radar) at least 15 dB. A four-cavity filter will accomplish this. See fig. 2.

Trapping The Intermediate Frequency (I.F.)

If we take care of the MBs, we'll eliminate TI in *most* cases. Since the MBs are offset 10 MHz from the nearest transponder center frequencies, the interference will appear at the i.f. offset 10 MHz from the i.f. center frequency at 60 and 80 MHz in the case of i.f. stages with center frequencies of 70 MHz (which is the case in most earth station receivers). See fig. 3.

By installing two traps (notch filters) in series (60 MHz and 80 MHz for the above example) between the down converter and the i.f. stage, we will remove the MBs. *And* we will need *only the two* traps: the TI will appear at 60 and/or 80 MHz no matter how many MBs we have in the earth station band and regardless of the transponder we want to tune in.

The trap should have at least 30 dB notch depth to handle the full range of observed MBs' strength and should be tunable; MB signals are f.m. signals whose bandwidth is proportional to the telephone traffic being handled at the moment. Therefore, it may be necessary to stagger tune each trap to cover the full

*Unadilla/Reyco Div. Microwave Filter Co., Inc., E. Syracuse, NY 13057

f.m. deviation. When synchronously tuned, the 3 dB bandwidth should be above 3 MHz wide—enough to kill most of the MB, but not wide enough to rob us of appreciable bandwidth.

Trap connection is easiest in "two-box" receivers. See fig. 4. The down converter and i.f. stages are interconnected with a cable (RG-59/U with F connectors, or RG-58/U with BNC connectors), and the traps can be inserted at either end of this cable. "One box" receivers can be a little more trouble. The receiver must be opened to find the i.f. exit from the down converter.

V.H.F. Terrestrials

Occasionally, a strong, local v.h.f. TV station can be seen on the earth station. *No way* can v.h.f come through your horn! The horn is usually connected to the LNA by a short length of waveguide (#WR-229) which heavily attenuates signals *below 1000 MHz*. This trouble is due to r.f. entering directly into the earth station receiver through a poor ground or an inadequately shielded case. The coaxial cable from the dish to the receiver (in the house) can conduct v.h.f. (using the coaxial braid as a one-wire above ground transmission line) to the receiver. The signal can get into your receiver electronics through a poor ground, faulty connector, or inadequately shielded case.

Elimination tactics may include one or all of the following: cable braid grounding at house entry; set grounding through short, heavy leads; swathing the receiver case in screen wire mesh; and installing a power line filter (r.f. rejecting) at the 110 volt wall plate.

Summary

The three main T.I. problems and their *likely* solutions are:

Rank	Description	Remedy
1	MB - Microwave Telephone	I.F. stage traps
2	OOB - Strong out-of-band	Microwave band pass filter
3	V.H.F. ingress	Cable grounding and receiver shielding

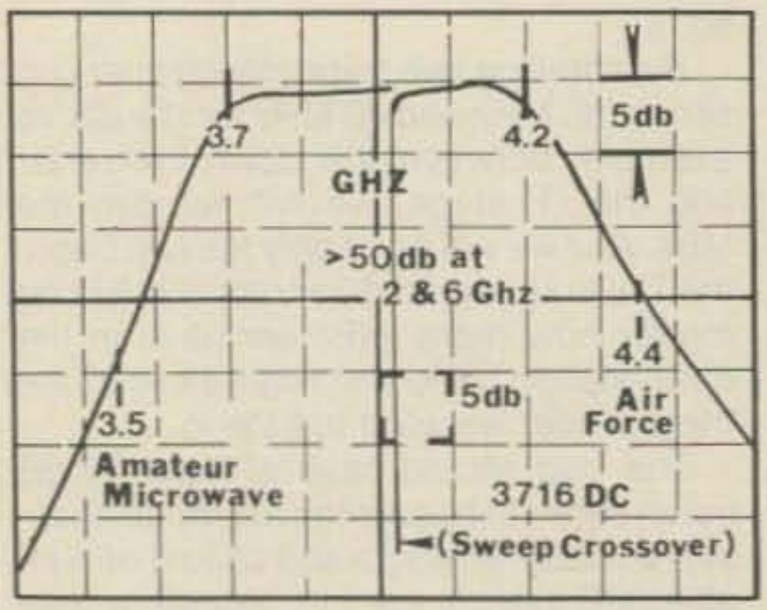


Fig. 2– Typical microwave bandpass filter for attenuation of out-of-band microwave signals.

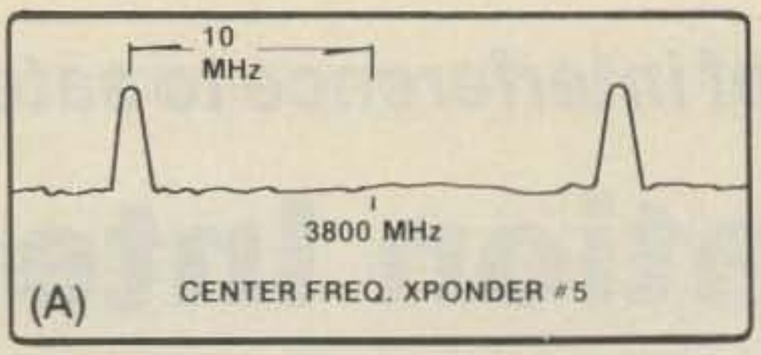


Fig. 3– (A) Microwave sweep showing unwanted carriers ± 10 MHz. (B) I.f. sweep showing unwanted carriers at ± 10 MHz.

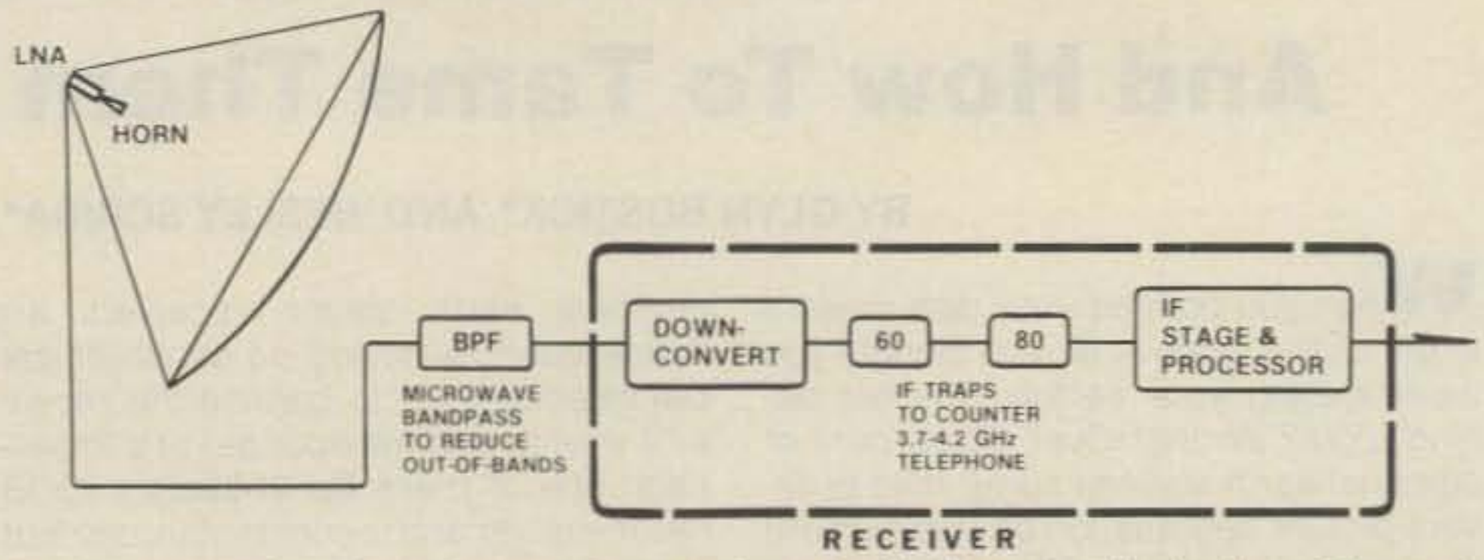


Fig. 4– A typical earth station receiver equipped with filters for elimination of the main causes of terrestrial interference.

FREQUENCY (GHZ)		NATURE OF POTENTIAL OFFENDER
0.960-1.350		Land-based air navigation systems
1.350-1.400		Armed forces
1.400-1.427		Radio astronomy
1.427-1.435		Land-mobile: police, fire, forestry, railway
1.429-1.435		Armed forces
1.435-1.535		Telemetry
1.535-1.543		SAT—maritime mobile
1.605-1.800		Radio location
1.660-1.670		Radio astronomy
1.660-1.700		Meteorological—Radiosond
1.700-1.710		Space—research
1.710-1.850		Armed forces
1.990-2.110		TV Pick-up
2.110-2.180	<2>	Public common carrier
2.130-2.150		Fixed point-to-point (non-public)
2.150-2.180		Fixed—omnidirectional
2.180-2.200		Fixed, point-to-point (non-public)
2.200-2.290		Armed forces
2.290-2.300		Space—research
2.450-2.500		Radio location
2.500-2.535		Fixed, SAT
2.500-2.690		Fixed point-to-point (non-public)
		Instructional TV
2.655-2.690		Fixed, SAT
2.690-2.700		Radio astronomy
2.700-2.900		Armed forces
2.900-3.100		Maritime radio navigation
2.900-3.700	③	Maritime radio location
3.300-3.500		Amateur radio
3.700-4.200	①	Common carrier (telephone) Earth Stations
4.200-4.400		Altimeters
4.400-4.990	③	Armed forces
4.990-5.000		Meterological—radio astronomy
5.250-5.650		Radio location (coastal radar)
5.460-5.470		Radio navigation—General
5.470-5.650		Maritime radio navigation
5.600-5.650		Meteorological—Ground based radar
5.650-5.925		Amateur
5.800		Industrial and scientific equipment
5.925-6.425		Common carrier and fixed SAT
6.425-6.525	<2>	Common carrier
6.525-6.575		Operational land and mobile
6.575-6.875		Non-public point-to point carrier
6.625-6.875		Fixed SAT
6.875-7.125		TV pick-up
7.125-8.400		Armed forces
8.800		Airborne Doppler Radar

Table I - Potential terrestrial interference frequencies.

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- ✳ VERY SMALL AND LIGHT WEIGHT (only 17 ounces)
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- ✳ AMPLE SPACE FOR PROGRAMMABLE ENCODER
- ✳ SPEAKER/MICROPHONE CONNECTOR
- ✳ ELECTRICALLY TUNED STAGES (receiving sensitivity and output power are constant over entire operating range)
- ✳ LOW PRICE...$289 S-15 with touch tone pad...$319

SUPPLIED ACCESSORIES:
Rubber antenna • Standard charger • Ear phone • Instruction manual • 450 ma/HR battery (quick charge type)

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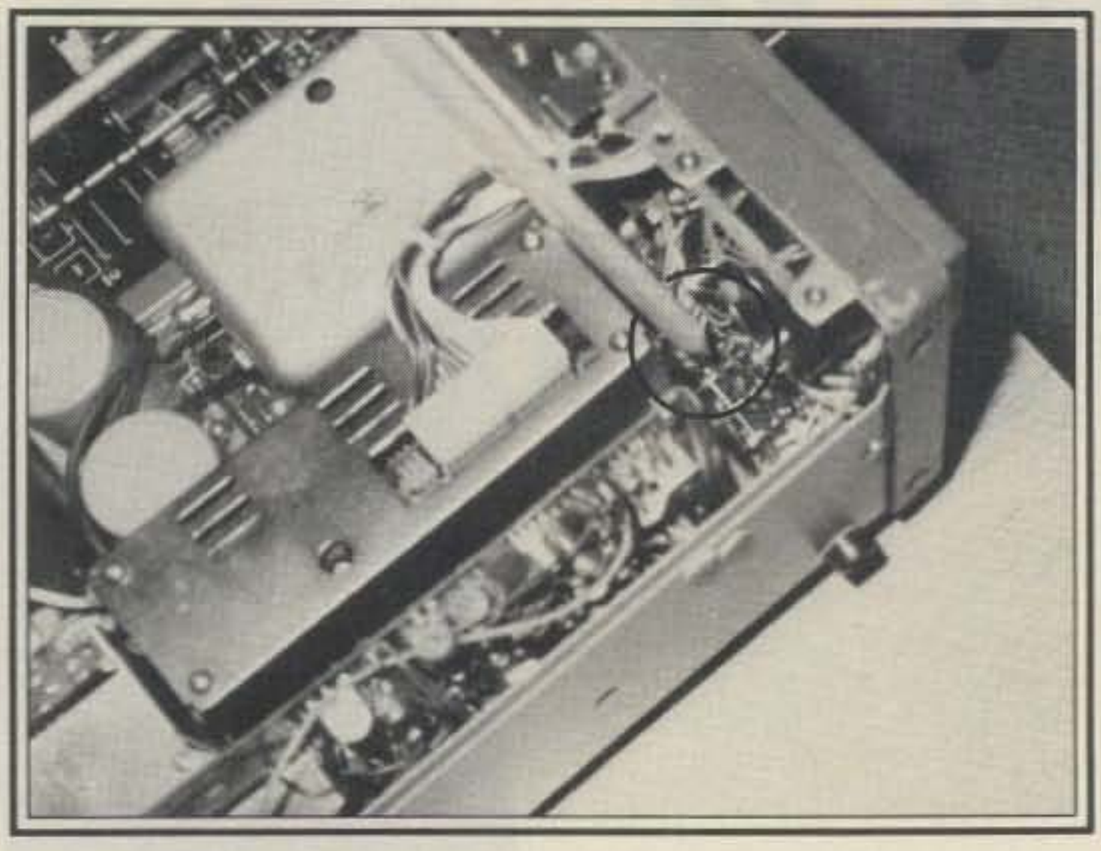
Here's another approach to RTTY operation using the familiar TS-820S. W9CRC talks us through the simple conversion from FSK to AFSK.

Converting The TS-820S To Use AFSK In The FSK Mode

BY RUSS RENNAKER*, W9CRC



TS-820S top view. Pointer shows position of mode switch.

Experience has shown the Kenwood TS-820S to be an excellent transceiver for RTTY operation, but for those of us who prefer AFSK to FSK (for whatever reasons), the FSK mode built into the set seems to be an anachronism.

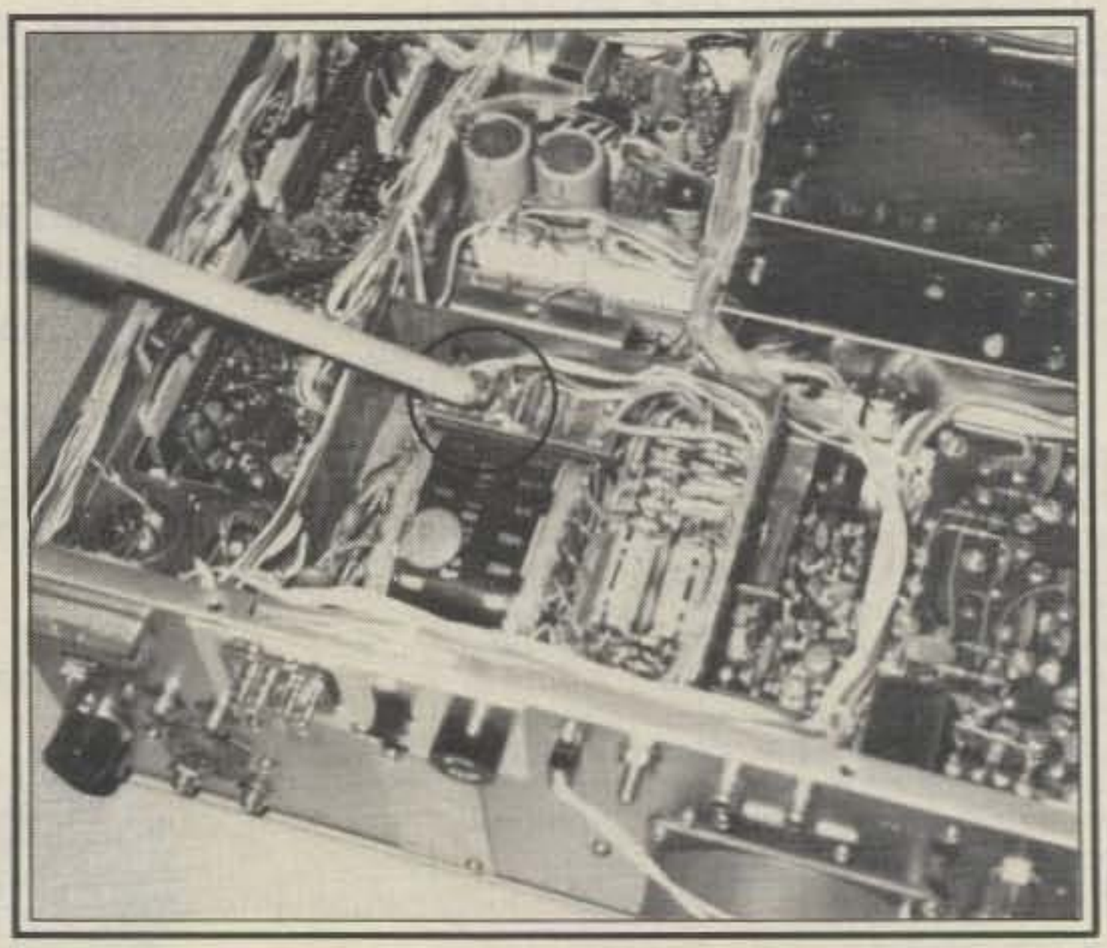
I use a cassette recorder for RTTY tapes. Obviously, AFSK is necessary for that function, and it seemed advisable to me to go AFSK all the way. The TS-820S works fine using AFSK, and this is done simply by feeding the shift tones directly into the "phone patch" input jack on the back panel, and the demodulator input from the "phone patch" output jack. Nothing wrong with that, except that you have to reduce power on the transmitter unless you have an attic full of 6146 tubes! Detuning the transmitter to 50 or 60 watts isn't all that much of a job. But after all, there is that "FSK" mode switch right there on the front panel doing absolutely nothing. That interested me. It would be ideal if there was a way to use AFSK in the "FSK" mode, since that mode provides for reduced transmitter power. And for those of us who have the 500 Hz filter in the c.w. mode, it would be most helpful if it could also be utilized in RTTY work.

As everyone knows, I guess, if you wish to run AFSK on the TS-820S, it is necessary to use the "LSB" mode, because in the "FSK" mode the carrier is generated internally and is meant only to be "FSKed."

Upon looking closely at the instruction manual schematic (albeit with a magnifying glass!) it appeared to me that the "FSK" mode position could be converted to a second "LSB" mode using the 500 Hz filter instead of the 2400 Hz s.s.b. filter. Thus, we would have all the advantages of AFSK plus the advantage of the FSK mode. The conversion took about an hour and turned out to be relatively simple. First remove the top and bottom covers from the set. Find the front panel mode switch, S-6, with the set right side up. This is a five wafer switch with ten different switch sections; however, only eight of these sections are used in the

*1011 Linda Drive, Kokomo, IN 46901

TS-820S bottom view. Pointer shows position of the X43-1110-00 board.



TS-820S bottom view. Pointer shows position of mode switch.

TS-820S. It is these wafer connections in which we are interested.

For purposes of this conversion we shall call the wafer closest to the front panel wafer A and go progressively toward the rear of the set, i.e., B, C, D, E. Now, looking down from the top, locate diode D2 on wafer A and solder a jumper across the diode, taking it out of the circuit.

Still looking down from the top, observe that terminal 5 on wafer D has no connection to anything. Solder a jumper from this empty terminal to terminals 3 and 4 of the same wafer. Note there is already a blue wire on these two terminals—*leave that connected.*

Now turn the set upside down on the work bench and again locate the wafer switch. On wafer A you will find two wires—one black and the other white with a red tracer. Snip both of these wires from the terminal and reconnect them together, *but not to the wafer switch*. Tape the bare tips. Still upside down, observe wafer B with the white-purple tracer wire attached. Snip this wire from its terminal and tape it back somewhere so that it will not short to anything. Now solder a jumper to this terminal (where the white-purple tracer wire was) and to the terminal next to it on the left (looking down from the front of the set).

Now on wafer C clip the black wire from its terminal and again tape it back out of the way. Solder a jumper from this terminal to the one next to it on the left (again looking from the front of the TS-820S). That completes the work on the S-6 wafer switch.

With the set still upside down, locate the X43-1110-00 board. This board is found in the center and near the rear of the set. There is an orange-colored wire wire-wrapped to the FSK terminal on this board. Cut the orange wire from the FSK terminal and tape it back out of the way. That's all there is to it. You may now operate AFSK with the front panel mode switch in the "FSK" position. The TS-820S is actually operating in the "LSB" mode, but with the 500 Hz filter instead of the 2400 Hz s.s.b. filter.

Put the top and bottom back on the set and reconnect the external components. Tune the transmitter as usual using the "tune" mode. Now switch to the "FSK" mode and apply a "mark" tone to the phone patch input jack. Load the transmitter to 125–150 ma, or if an r.f. in-line wattmeter is used, 50–60 watts into the antenna. After you have switched to the "FSK" mode, the mike level control may be used to adjust the final output of the transmitter. Since RTTY is essentially a "key down" condition for the transmitter, the lower the power you use, the longer the finals will last. Fifty watts is optimum, but I have operated mine at 60 watts for three years now with no noticeable deterioration in the final 6146s. You may not be so lucky. Low s.w.r. and a resonant antenna are always the best insurance.

No, your neighbors will not believe it's some new form of an above-ground swimming pool nor a bird bath that could hold all the swallows flying back to Capistrano. However, if you're serious about installing a satellite antenna at your QTH, read the following on how to do it properly.

Site Selection For Satellite TV Antennas

BY FRED STAAL

Interest in TVRO TV, satellite TV, just keeps growing (witness this issue). The quality of video and programming are almost irresistible lures. Unlike the cut and dried monotony of network TV, satellite TV offers the excitement of a new frontier—a potential just beginning to be explored.

Technologically advanced satellite TV receivers and the prospect of new satellites generate the same interest as the latest amateur transceivers, the new bands, and fresh antenna designs. Besides the obvious entertainment benefits, work is being done to make satellite TV's two-way communications capability available to a wider range of users.

In checking out satellite TV gear, you've probably realized that the receiver is relatively simple to install and operate. As long as you have a TV, a wall socket, and a hole in the wall for the cable, you're in business. But a satellite TV receiver needs its own special antenna, and it is the antenna that presents the biggest challenge to installing a successful system. If you are used to antennas that get smaller as frequencies go up, then the size of a 4 GHz "dish" antenna may surprise you. Averaging 8 to 16 feet in diameter and weighing several hundred pounds (and on up), the "dish" requires the same care and planning you would put into installing a large tower, and then some, because it is also a highly directional antenna.

The dish antenna must be pointed directly at a satellite in order to receive its microwave TV signals. This line-of-sight "window" must be clear of trees, buildings, mountains, or other objects that can reflect or deflect microwaves. Otherwise, reception will be reduced or absent.

Awe is the only word to express what he must be feeling next to this dish and LNA at the Satellite Video Show in Anaheim, California, last October.

There are 12 geosynchronous satellites now in use spread out in a long chain above the Equator (87° to 136° west longitude). Each needs its own "window." To receive all of them means a dish must swing at an appropriate elevation—about 70° to 90°. With prime "entertainment" satellites at each end of the chain, you'll need a big chunk of blue sky at your QTH to receive all of them. If your area is congested with obstacles to microwaves, however, be glad there are alternate directions in which to seek good reception from some of the satellites. Most dishes now being offered are equipped with manual or motorized mounts to make multiple satellite reception more convenient.

Besides the needed "windows," another practical consideration for a site is the sheer volume of physical space needed for a dish. A 10 foot model, for instance, may need about a 10 × 10 foot ground area, and a similar amount of vertical space to allow for movement and base mount. If you live in an area where the satellite signal or "foot print" is weaker, such as the southwest or southeast, a larger dish and installation area will be needed.

Even the design of the receiver you plan to use can affect placement of the dish. Most receivers with a remote downconverter or LNC (LNA/Downconverter hybrid) allow the dish to be located up to 1,000 feet away. However, the additional cabling required for a motorized dish mount or polarity rotator will usually limit

**KLM Electronics, P.O. Box 816, Morgan Hill, CA 95037*

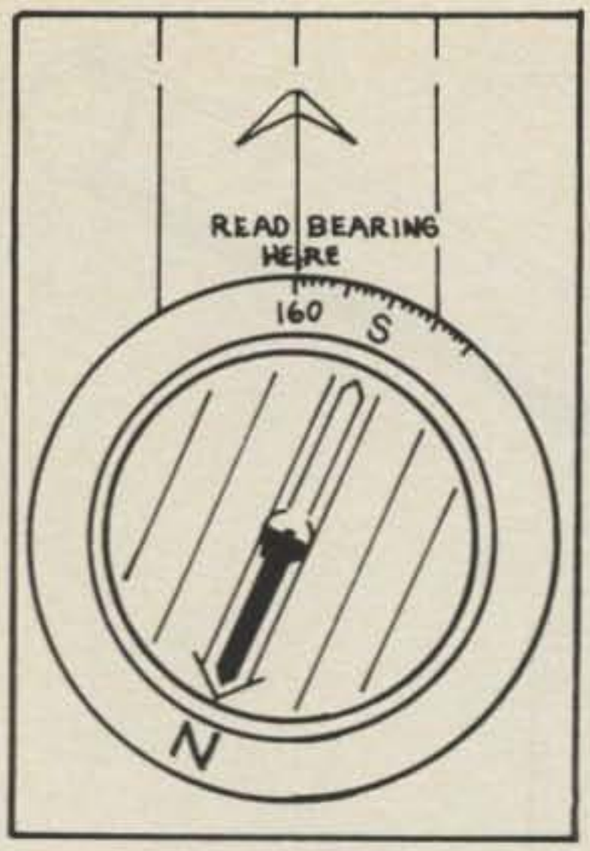


Fig. 1– The compass shows an azimuth heading of 160°.

this distance to about 300 feet. Receivers with built-in down-converters generally must be within 100 feet of the dish to keep cable signal losses from affecting picture quality.

The weight and wind load of most dishes, even the screened ones, mean they must be *firmly* anchored to the ground. Many manufacturers specify a sunken concrete pad, or separate piers for each attachment point. If excavation is needed, the area must be clear of buried pipe or conduit, septic tank, drain fields, etc. Since a "yard" or more of concrete may be needed, access to the site by a cement truck may be desirable. In most cases the foundation will need to be specifically oriented in order to deliver complete satellite coverage—know *before* you pour!

Regardless of the type of base, the ground beneath should be firm and stable. Where conditions are less than ideal (soft or sandy soil, heavy run off, strong slope, seasonal frostline, etc.), consultation with a local civil engineer or contractor is strongly recommended.

Other factors affecting the site are also worth mentioning. For instance, local codes or a deed covenant may restrict installation. If you rent or lease, get permission from the owner. Talk to your neighbors. You'll want to know their feelings about a big dish right by the fence line *before* you install it.

In metropolitan areas, microwave telephone links crossing your QTH can degrade dish performance. Check with local or regional telephone engineers to find out if you're in a path (some additional system engineering may be necessary). Snow build-up on or in front of the dish can impair reception, too. Try to locate the dish in a protected area, or where prevailing winds keep snow blown clear.

Luckily, its unlikely that all these factors will apply to you. But careful consideration of the ones that do can help you select the most suitable equipment for

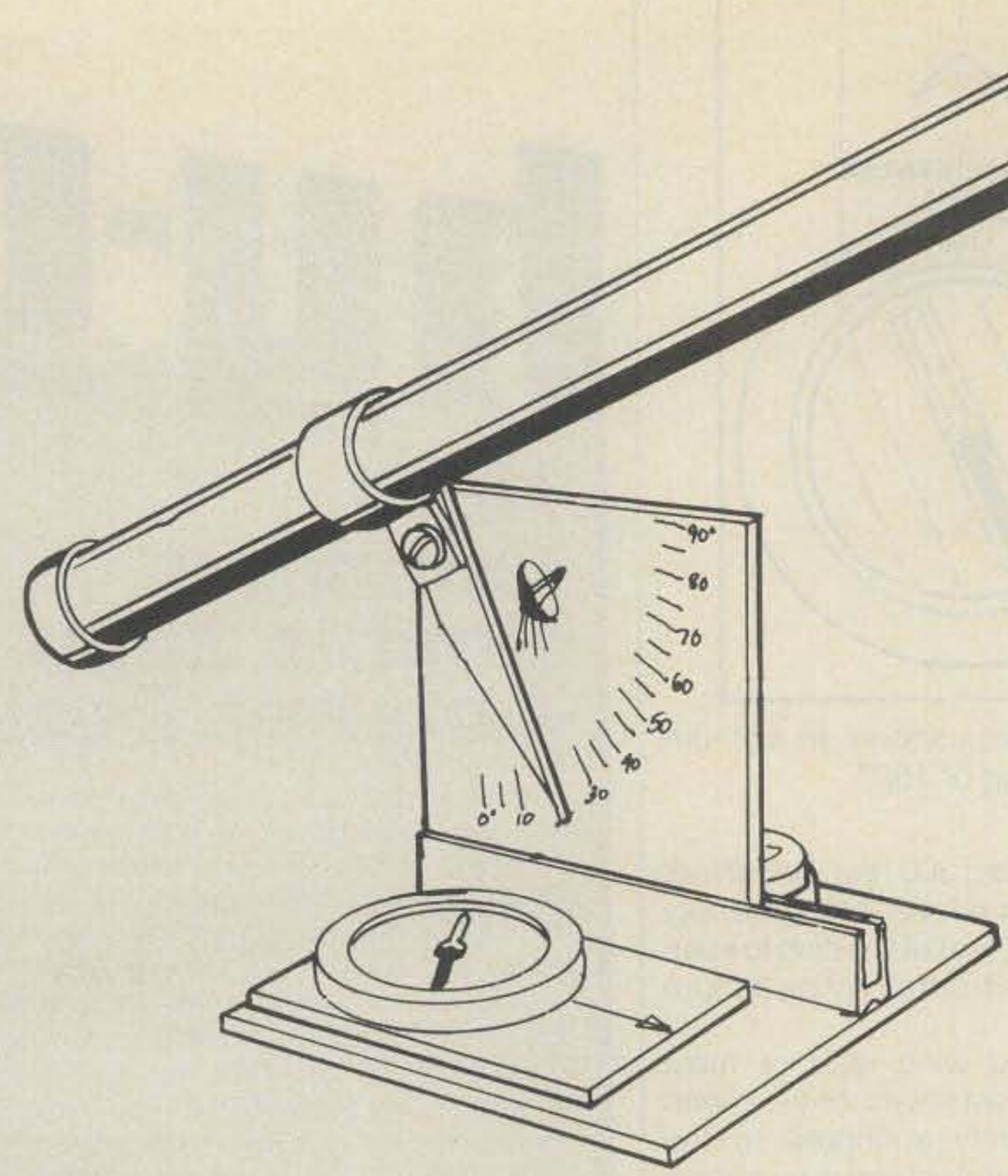


Fig. 2– This site-tester features a compass, inclinometer, and bubble level. The bubble level is located on the other side of th eelevation indicator plate. When the base of the site-tester is level, the azimuth heading of the compass can be set. Once the direction is set, the elevation of the inclinometer is set and then sightings can be made through the eye piece as in a telescope. This will ensure a clear field.

your installation, determine important design factors and installation requirements, and find the right site for your dish.

A Site Survey: How It's Done

To begin finding the right dish site, you will need to know where the satellites are relative to your QTH. Computer generated azimuth and elevation charts are available through many TVRO equipment dealers, distributors, and manufacturers. If possible, supply latitude and longitude for your area.[1] Several companies, including KLM and Heathkit, offer complete kits for site evaluation that include the computer printout, instruction manual, and testing device (a combination inclinometer, compass, and level—KLM model shown). Unless you opt for one of the kits, you'll need an inclinometer/level and a card-type map-reading compass. Many hardware stores now carry these items.

Before doing any serious site-searching, familiarize yourself with using the inclinometer and compass. For practice, plug in the azimuth and elevation heading for Satcom I and Comstar 3. They are at opposite ends of the chain and will give you a good idea of how much sky you'll be needing. First dial the azimuth heading into the compass and determine which direction to align the inclinometer (illustration shows 160°). Then tilt the inclinometer until it matches the elevation heading. Sighting through or along the inclinome-

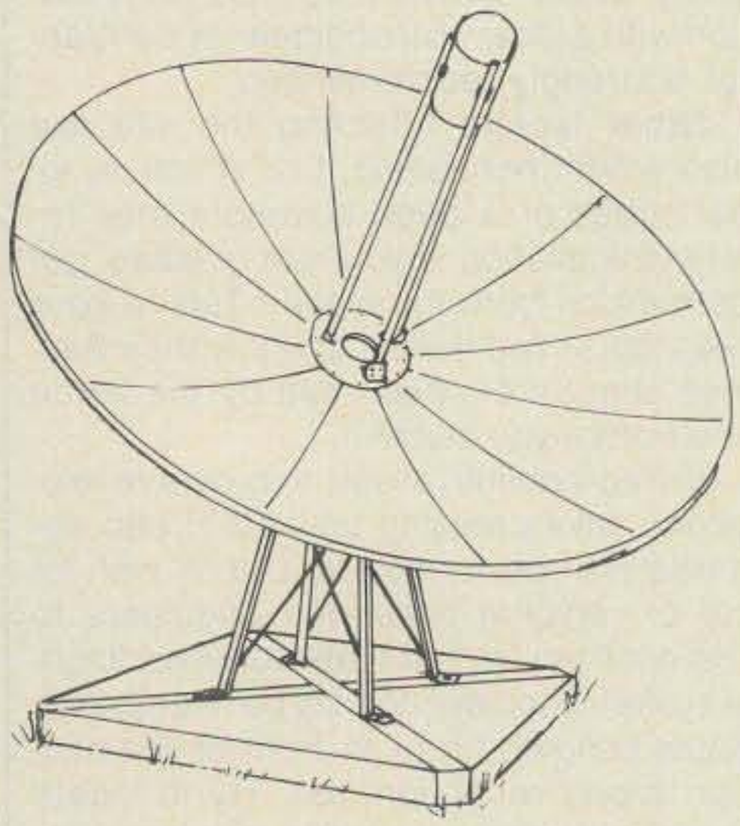


Fig. 3– The basing of a satellite antenna is of paramount importance. Remember you are presenting a tremendous wind and icing load, so the base or pad should be very secure.

[1]*Or compute your own. See QST March 1978 for formulas.*

ter will show you where the satellite is located.

With the approximate positions of Satcom I and Comstar 3 in mind, make a quick tour of your property and look for a prospective site. Also keep in mind the space needed for a dish and cabling limits to the receiver.

To thoroughly check out a site, make your azimuth and elevation measurements about 5 to 7 feet above the ground (to simulate the center of the dish). Use a wooden or aluminum ladder so compass readings are not disturbed. Start with Satcom I. Position the inclinometer to parallel the azimuth heading of the compass. Then tilt the inclinometer to match the elevation heading. Site through or along the inclinometer. If the view is clear, the site has potential. Check again 5 to 8 feet either side of the first position to verify a clear view from the perimeter of your imaginary dish. Also check, as needed, if it appears there are obstructions above or below. Repeat these steps for Comstar 3 at the other end of the chain. If your "window" on both satellites is clear, eyeball the intermediate area for obstructions. If you're in doubt or a careful person, run the intermediate satellite headings, too.

When you have verified a clear window on all the satellites, congratulate yourself on your good fortune! If your window to one or more of the satellites is blocked, and the obstruction cannot be removed, look for another site.

If limited space or abundant obstacles make your search difficult, try weeding out satellites whose programming does not interest you. Or, try finding a site with windows on the satellites that really interest you. With "entertainment" satellites at both ends of the chain, and a variety of programming in between, you're almost sure to find a satisfactory compromise.

While your impressions are fresh, take some pertinent notes on the site and make an overall sketch of your property. Sketch-in your home, with the receiver location and the dish site. Indicate cabling distance, any nearby or surrounding obstacles, and the direction of the end satellites. Whether you are contemplating a "professional" installation or doing it yourself, this information can be a valuable reference. It will contribute to a successful installation and will help you get the best performance from your whole satellite receiver system.

The first time your TV lights up with pictures from the satellites, you'll know the results are more than worth the effort.

CQ Reviews:

The Butternut HF5V-III Multiband Vertical Antenna

BY JOHN J. SCHULTZ*, W4FA

Editor's Note

The Butternut HF5V-III is being phased out in favor of their new HF6V. This new antenna will eliminate the reduced power ratings of the former antenna on 80/75 meters. Ceramic capacitors are used instead of the concentric tubing capacitors, and the 10 MHz band is included. This review, although of a previous model, depicts accurately the theory of operation of the Butternut antennas both old and new. We suggest that you check their ads for any adapter kits and/or accessories.

—K2EEK

The HF5V-III from Butternut Electronics is basically a 5 band (80–10 meter) vertical antenna which can also be operated on 160 meters with the use of an optional 160 meter base coil (TBR-160). Within its operating bandwidth on all bands, it will present a near perfect match to a 50 ohm coaxial feedline.

Electrical Concept

What makes the HF5V-III different? After all, multiband vertical antennas have been around for a long time. The difference is in the method used to achieve resonance on each given operating band given the criteria that one wants a vertical to couple to a 50 ohm transmission line that operates at a low s.w.r.

Conventional multiband vertical antennas use the resonant trap idea as shown in fig. 1. The parallel resonant LC circuits (traps) resonate, say, on 10 and 20 meters. When operating on 10 meters, the 10 meter trap is resonant, and the portion of the antenna from the trap to the base of the antenna is isolated from the rest of the antenna. The trap is placed such that the portion of the antenna from the 10 meter trap to the base is about ¼λ in length. On 20 meters, the 20 meter trap is resonant and the lower half of the antenna is dimensioned so a ¼λ exists between the 20 meter trap to the base of the antenna. On other bands the traps are not at their resonant frequencies and so present an equivalent capacitive or inductive reactance in series with the vertical antenna element. By dimensioning of the trap component values and their placement in the vertical antenna structure, one can achieve the electrical equivalent of ¼λ operation on all bands and a feed point impedance that more or less matches into a 50 ohm transmission line. The "trap" antenna concept is electrically correct and convenient.

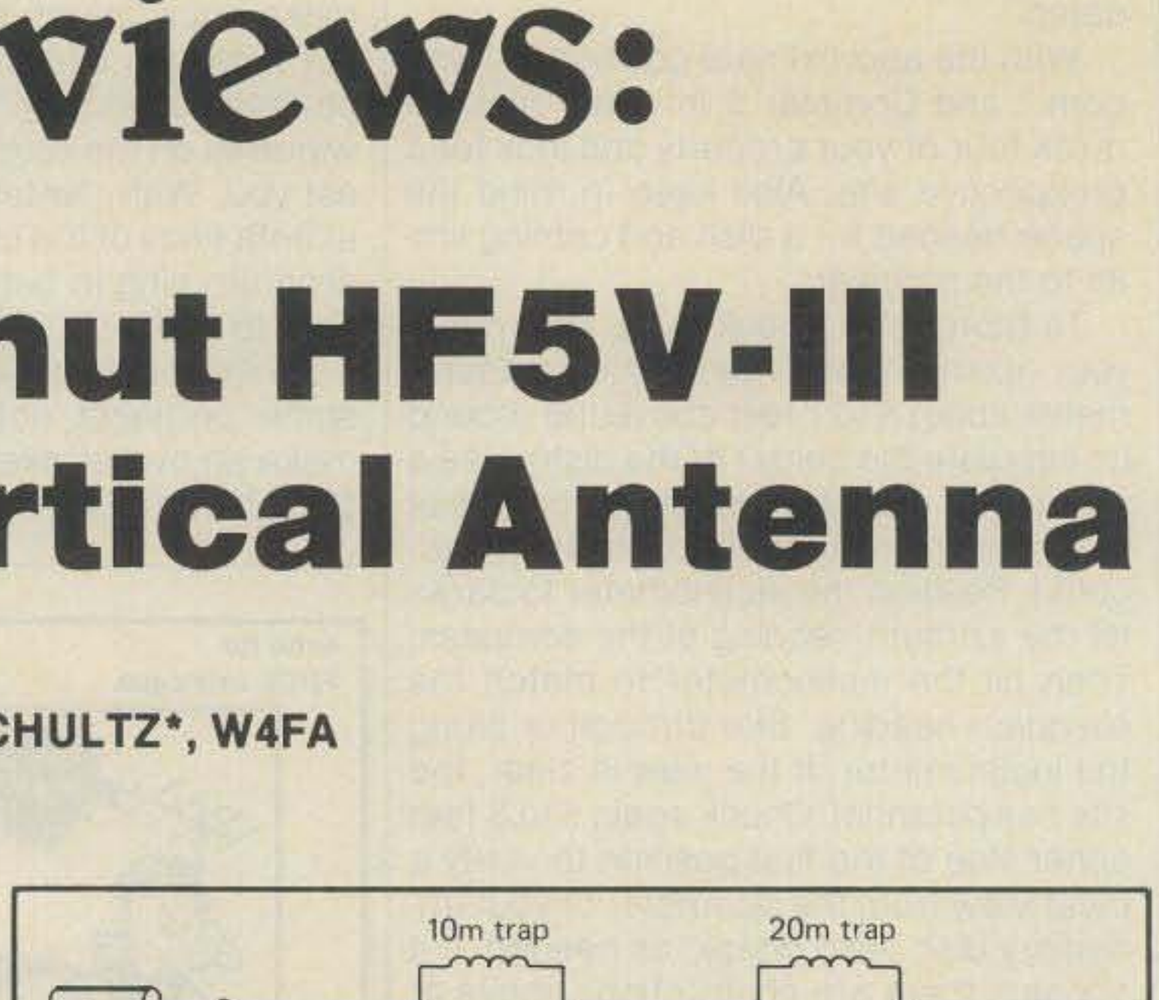
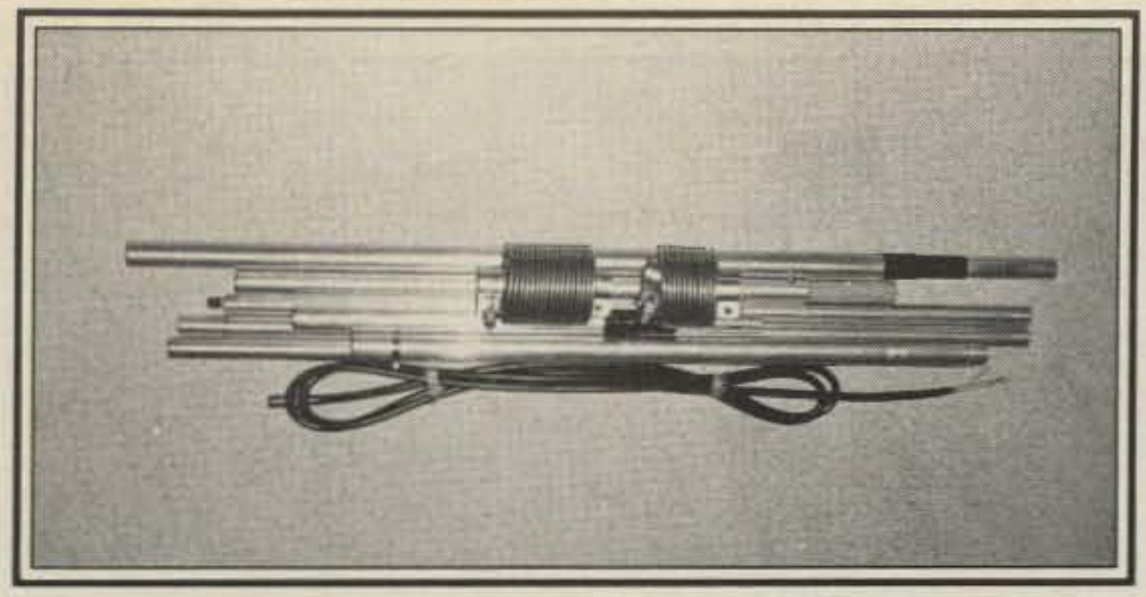


Fig. 1– Conventional "trap" type multiband antenna uses traps to electrically divorce sections of the antenna on various bands. The trap type configuration at (A) provides the electrical equivalents shown at (B) on the various bands.

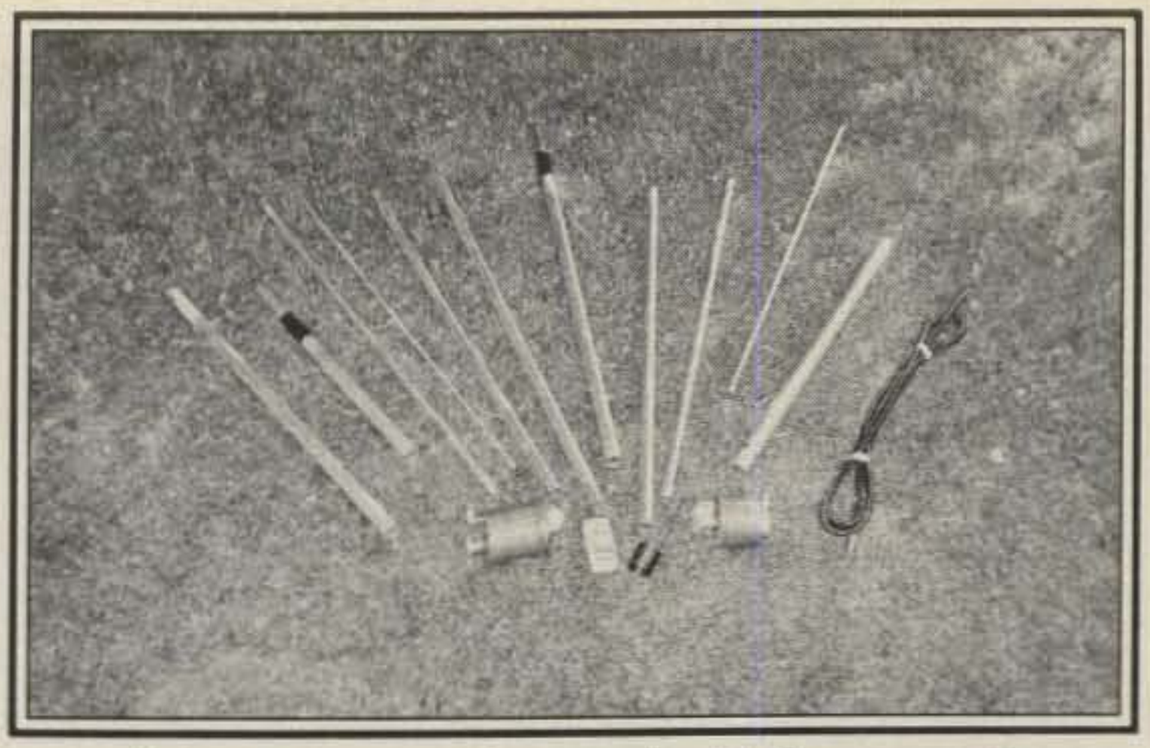
However, it is wasteful of the potential of a vertical antenna, particularly on the higher frequency bands. The reason for this is obvious, since the "trap" vertical works on the idea of isolating the physical antenna sections above that length, which forms a ¼λ from the base on the higher frequency bands. Therefore, the upper physical sections of the antenna remain electrically inactive.

The Butternut HF5V-III concept is to have all of the physical length of a vertical antenna to remain active on all bands. The advantage to this is that radiation resistance changes versus frequency excursions within a band become less sharp (improved bandwidth for a given s.w.r. limit), and that high current, high radiation points move up on the physical length of the antenna, at least on some bands, so useful radiation occurs at clearer, more elevated locations. The idea is not new. For instance, as shown in fig. 2, one can start from the idea that the maximum length one wants a vertical antenna to be is in the rough area of 20–26 feet for physical considerations. About 21 feet would represent 0.625λ on 10 meters and present a base impedance that roughly matches a 50 ohm feedline. However, the 20–26 feet of physical length does not present electrical lengths on other bands that produce approximate 50 ohm base/

*c/o CQ Magazine



All the parts for the DX version of the antenna. Everything packs together in a box smaller than 42 × 4 × 4 inches!



Antenna components spread out before assembly.

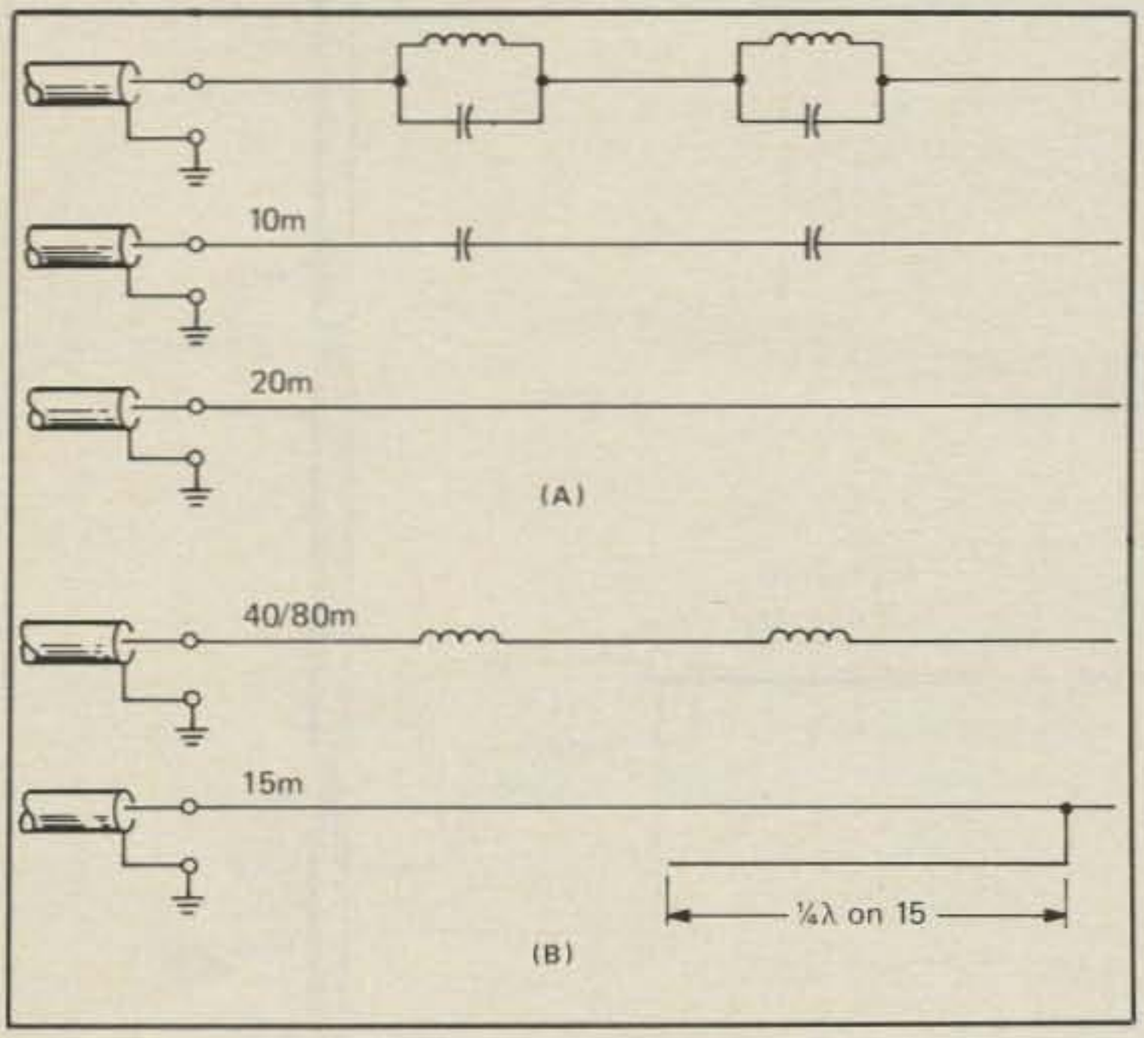


Fig. 2– Another approach to multiband antenna design is to use LC networks (not resonant traps) as shown at (B). The reactance values of these components are chosen such that the approximate electrical equivalents are produced on the various bands as shown at (B). The entire antenna length is active on all bands except 15 where a ¼λ stub decouples the upper portion of the antenna. The stub does not affect operation on the other bands.

feederline impedances. Therefore, one does have to introduce not traps, but capacitive or reactive impedances at correct physical locations within the vertical antenna structure so the whole antenna structure remains electrically active on each band while the base/feederline impedance remains around 50 ohms. The Butternut HF5V-III design has accomplished this by the design approach shown in fig. 3.

On 10 meters, the electrical length of the antenna is such that it operates as a ¾λ vertical. This length provides a low base impedance, but extremely improved bandwidth as compared to a ¼λ vertical. The electrical length is slightly more than the 0.625λ length normally regarded as the optimum to achieve maximum low-angle radiation. The vertical pattern does split into low angle and 45° lobes at the ¾λ length, but the loss (theoretical) in low-angle radiation is more than compensated for by improved bandwidth and overall radiation efficiency. On 15 meters, the antenna operates as a slightly extended ¼λ vertical. The elements next to the main vertical structure starting slightly below the antenna apex constitute a form of parallel transmission line ¼λ stub. The stub decouples the antenna structure below it as a ¼λ vertical on 15 meters. However, it provides a slight top-loading effect which improves the antenna bandwidth on 15 meters versus a simple 15 meter ¼λ design. On 20 meters, the entire antenna is active and performs as a ⅜λ vertical. The base impedance on this band is higher than 50 ohms, and the length of 75 ohm coax shown in fig. 3 is used as a matching transformer to a 50 ohm transmission line. It does not affect antenna performance on the other bands. On 40 and 80 meters, the inductors provide the necessary loading effect so the antenna performs as a loaded ¼λ vertical.

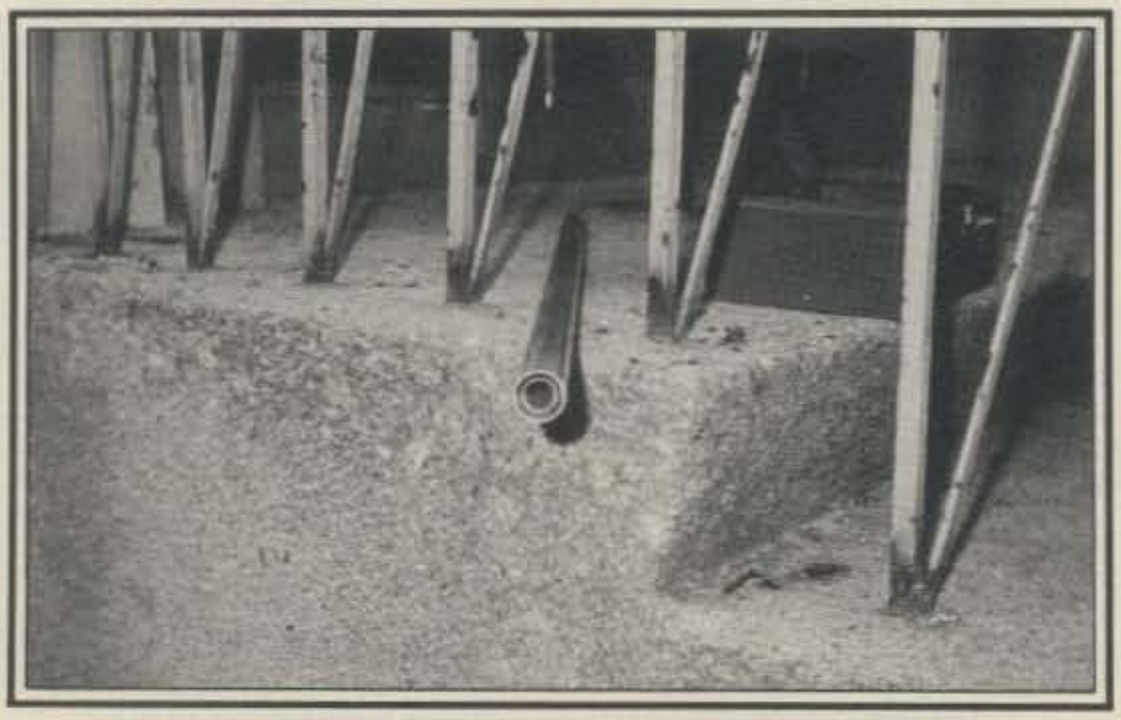
Construction And Ratings

The antenna is available in two versions which are electrically identical and which assemble to produce a total antenna length of about 26 feet with a windloading area of 1.5 square feet. The standard version consists of a 1⅛ inch O.D. aluminum tube with fiberglass insulator to serve as a mounting post, and then a series of 1⅛ inch, 1 inch, ⅞ inch, etc., sections of aluminum tubing to build up the entire antenna length. Some of these sections are 6 feet or so in length. The "DX" version is similar except that the longer tubing sections are broken up so the longest single tubing length is 41 inches. The DX version packs up into a box measuring only 4 × 4 × 42 inches and is probably the most compactly packaged full-performance vertical on the market.

The antennas are supplied complete with all the hardware needed for assembly and the 75 ohm coax matching section needed for 20 meters. The user has only to supply a placement for the mounting post and a ground connection or radials. The quality of the materials is excellent. The capacitors associated with the 80 and 40 meter coils are interestingly made in that they consist of nested and insulated aluminum tubing—*e.g.*, a ¾ inch section of tubing mounted inside a 1⅛ inch tube. This method of construction not only provides the electrical function needed, but would seem to add considerably to the overall mechanical sturdiness of the assembly. The capacitor sections are supplied completely assembled and sealed.

One needs only a few standard tools for assembly of the antenna. The instructions supplied with the antenna are quite complete and include various detailed diagrams and a complete parts pictorial. Although none of the assembly steps is difficult, one should take the time to read the instructions carefully rather than just rush into putting sections together which "appear" to fit together logically. The antenna is a quality product and deserves to be assembled carefully. There are some 21 odd parts to the standard version, plus a bunch of bolts, nuts, washers, clamps, etc. The DX version has a few more parts, and one has to go through a few dry runs in putting it together to gain proficiency, after which one should be able to put it together in 15-odd minutes.

There is no tuning required, as such, for the antenna on 20/15/10. One may want to optimize the points of lowest s.w.r. on 15 and 10, although it approaches "gilding a lily," since resonance is so broad on these bands. In any case, some simple ad-



End view showing how the capacitors are formed by meshing two diameters of aluminum tubing.

justments can be made which have to do with varying the length of the 15 meter stub and the length of one of the telescoping antenna sections. In most cases, however, some tuning will have to be done on 40 and 80 meters. The procedure is very simple, since it just has to do with loosening the clamps which hold the lower end of the 80 and/or 40 meter coils and stretching the coils while watching an s.w.r. meter to achieve the lowest s.w.r. centered in the desired portion of the 80 and/or 40 meter band.

The antenna is rated to handle power inputs of 1 kw d.c. (2 kw PEP) on 40–10 meters and 500 watts d.c. (1.2 kw PEP) on 80 meters.

Results

The DX version of the HF5V-III was assembled and tried. The installation used was above ground, and several ¼λ radials were used for 10–40 meters and a single wrap-around radial for 80 meters. The s.w.r. curves obtained were impressive to say the least and are summarized below (the antenna was adjusted for the lowest possible s.w.r.—1:1 to 1:2—in the approximate middle of each band, except on 80):

Frequency (band edges)	S.W.R.
28.0 MHz	1.5
29.5 MHz	1.7
21.0 MHz	1.2
21.45 MHz	1.4
14.0 MHz	1.15
14.35 MHz	1.0
7.0 MHz	1.8
7.3 MHz	1.5
3.7 MHz	2.0
3.8 MHz	2.0

The results are well within claimed performance of the 1:2 or less s.w.r. across the entire 40/10 meter bands, and a 90–120 kHz bandwidth within a selected portion of 80 meters. The 160 meter accessory resonator was not tried. It has a claimed bandwidth of 20 kHz.

The 20 meter s.w.r. flatness is extremely impressive. Amateurs who just need a 20 meter vertical might well want to try a ⅜λ vertical with a ¼λ, 75 ohm coaxial matching section as per the HF5V-III design.

No tests were made to determine the absolute power handling of the antenna. It did handle the output of a 1.2 kw PEP input linear on all bands without any problems. However, one should observe the power rating of the antenna on 80 meters. A report was received from one amateur who ran a 2 kw linear into the antenna on 80 meters and burned up the 80 meter coil. It's rather hard to believe, since the coil is made of 3/16 inch diameter wire, but apparently it can happen.

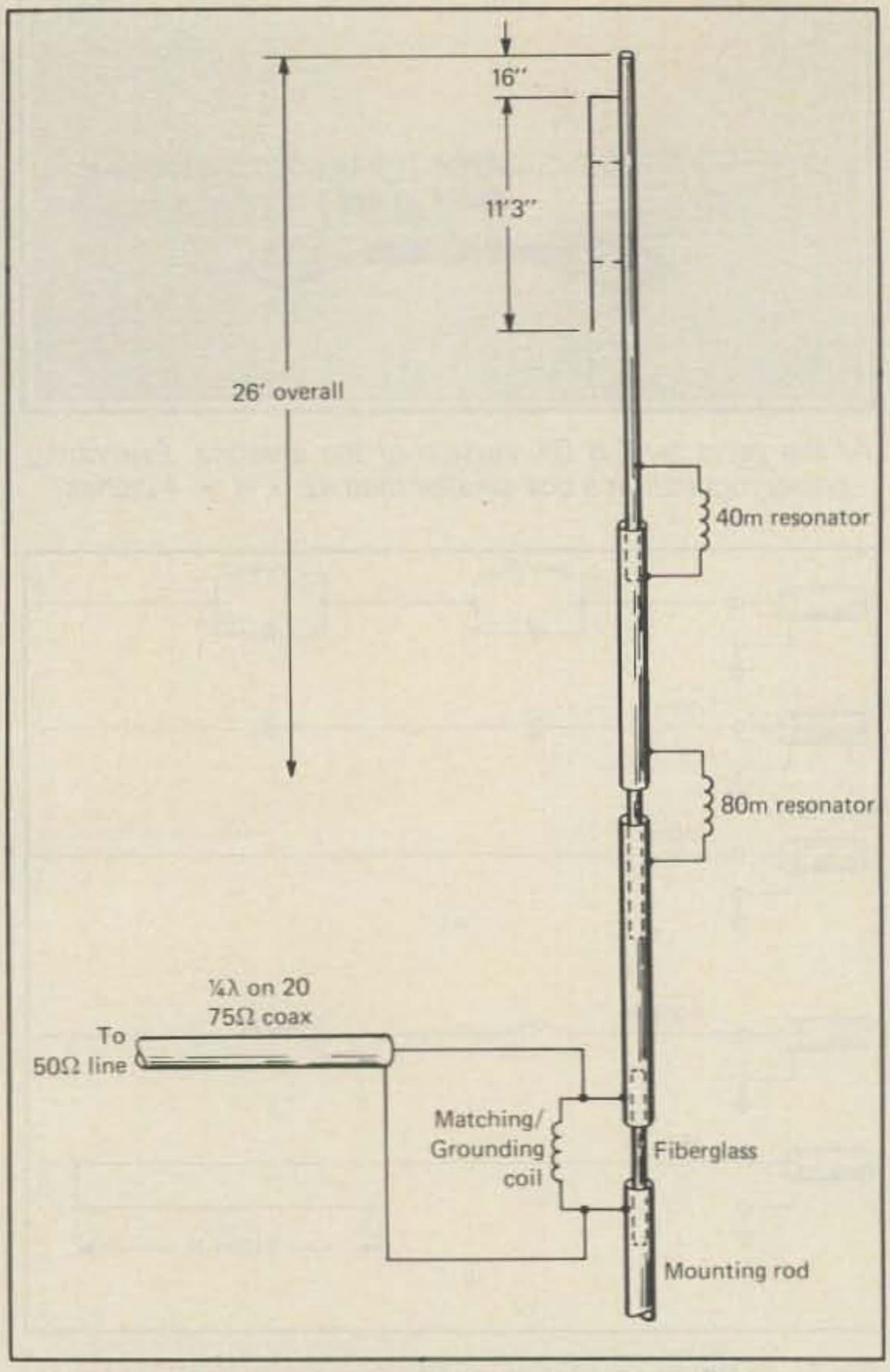
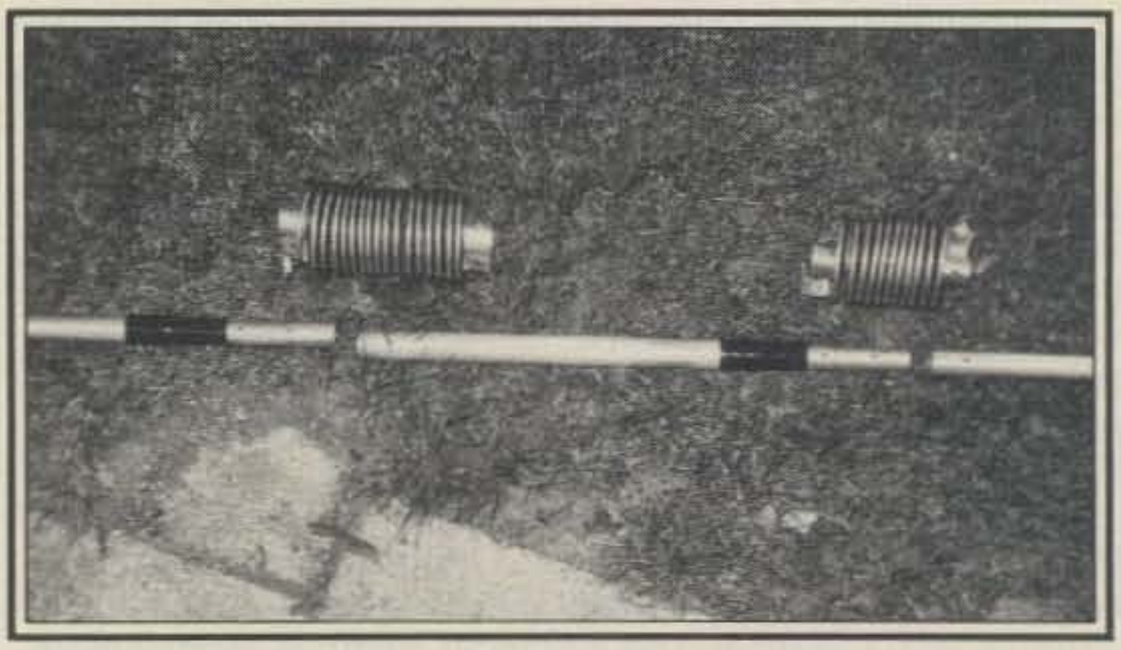


Fig. 3– Approximate makeup of the Butternut HF5V-III. Concentric tubing forms the capacitive reactances needed. The actual antenna is broken up into a number of sections of aluminum tubing, tapering down from a 1⅛ inch base size.



The 80 and 40 meter resonator coils. When the tubing sections are joined, the coils will straddle the insulating section on each tubing section.

The fact that the antenna exhibits such a flat s.w.r. response is in itself a major feature. Because of its extended electrical length, particularly on 20/15/10, one would also expect it to exhibit better radiation performance on those bands as compared to conventional trap-type verticals. This does seem to be the case, although I did not have facilities available to make exact A/B comparisons with other antennas. The distinct impression, however, was that the antenna performs better than other mul-

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tiband vertical antennas previously used. For the amateur who prefers to use a vertical antenna or who must do so because of space or other reasons, the HF5V-III must be regarded as a highly recommended choice.

There are no real faults to be found with the antenna, although a few notes about its installation might be made. If used in an atmosphere which is unusually corrosive (near sea water, for instance), it would be a good idea to coat the hardware on the antenna with an aluminum oxidation retardant. Various suitable products, such as *Alu No-Ox*, can be found in hardware stores. Also, if it is used in a salt-water-heavy atmosphere, one should periodically inspect the fiberglass insulator in the base mounting post. Commercial experience has shown that such insulators over a period of *years* can develop extremely fine surface ruts which can cause cracking or accumulate dirt, which lowers the insulating quality of the fiberglass.

A Digression

Many amateurs tend to believe that vertical antennas cannot work well. Unfortunately, such thinking is reinforced when one sees verticals advertised as requiring no radials for operation, tries them, and discovers they work very poorly, although they produce reasonably decent s.w.r.'s on several bands. The low s.w.r. does not indicate that the antenna is radiating efficiently. There is no simple way to measure efficiency, but with a vertical it is directly dependent on the losses in the ground used—be it an earth connection, a wire counterpoise, or a system of resonant radial wires. The little investment required for wire to produce a good ground will pay extremely good dividends as far as the performance of *any* vertical antenna is concerned. Vertical antennas can be very good performers, especially for DX, but not without that ground system as humble or as elaborate as it may be. The Butternut catalog gives some helpful hints on practical grounds for verticals and is available free from Butternut Electronics, P.O. Box 1411, San Marcos, Texas 78666.

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IRWIN MATH, WA2NDM

Math's Notes

A LOOK AT THE TECHNICAL SIDE OF THINGS

CQ Reviews: The Kenwood TR-7730 2 Meter F.M. Transceiver

As a departure from the normal format of this column, we would like to review a new, interesting piece of gear that is representative of the current state of mobile amateur radio equipment. This unit is the new Kenwood TR-7730 2 meter f.m. transceiver.

At first glance (in person) the small size of the TR-7730 is quite impressive. Considering the fact that it is a fully synthesized 2 meter transceiver with v.f.o., 5 memories, scanning features, LED display, self-contained speaker, etc., in a 2" × 5¾" × 7¾" package, however, makes it truly amazing; you must see it in person to appreciate the small size. Now, down to facts.

The TR-7730 consists of 15 IC's, 46 transistors, 7 FET's, and 91 diodes. According to the manufacturer it will put out 25 watts at high power into 50 ohms and 5 watts at low power. We measured 28 watts and 4.5 watts respectively at 146.52 MHz. Modulation is, of course, f.m., and is by means of a vari-cap. A full ± 5 kHz is claimed and achieved when talking about 2 inches from the microphone. The main frequency control is a phase-locked loop with VCO operating at 144 MHz, and spurious levels are less than 60 dB at high power (we measured the highest spur we could find at −70 dB).

Tuning is by means of a digital dial with good feel and is selectable in steps of either 10 kHz or 5 kHz. The full frequency range of our unit was from 143.6 MHz to 148.7 MHz. Furthermore, 5 memories can be simply programmed to any desired frequencies throughout the range, complete with plus or minus 600 kHz repeater splits. Readout of operating frequency is a bright 4 digit LED "dial" which changes when switching from transmit to receive so that the frequency at any particular time is the one displayed.

The receiver section utilizes double conversion with the first i.f. at 10.7 MHz and the second at 455 kHz. The r.f. stage uses a dual gate MOSFET in the front end and detects 0.5 microvolts with a 30 dB signal to noise ratio. At 146.52 MHz, we had no trouble hearing 0.1 microvolts (the lower limit of our signal generator) and this level tripped the squelch reliability every time. Receiver selectivity is 12 kHz at −6 dB dropping to −60 dB at 25 kHz. While we could not test this specification, we could easily operate 15 kHz away from a 30 watt repeater while sitting directly under the transmitting antenna. Audio quality is good in both transmitter and receiver, and we measured 2.2 watts output across an 8 ohm load.

The Kenwood TR-7730 2 meter transceiver.

Operating the TR-7730 is a real pleasure. The instruction manual is quite clear in all phases of installation and even indicates how to install an optional tone emoder which Kenwood doesn't even manufacture. We installed our unit in a car in less than 1 hour, starting from scratch. Once the unit was working, we immediately worked a repeater 30 miles away with low power and had a 50 mile direct QSO at 25 watts—a difficult job in the New York City area. Over the next three to four days numerous contacts were made both through repeaters and in the simplex mode with excellent audio, as well as signal reports.

The TR-7730 has an automatic scanning feature which will scan the entire 2 meter band or just the memory channels as desired. We found this feature to be quite handy when searching for someone to talk to while shifting our 5 speed manual transmission. When in the scanning mode, the unit stops when a carrier is detected. The only problem encountered (which is really just an annoyance) is that signals received on the input frequency of a repeater will cause the scan to stop, but a readjustment of the squelch sensitivity easily overcomes this.

We found no problems or shortcomings at all in a one month intensive test period. Even with a shorted antenna (on purpose) the automatic v.s.w.r. protective circuitry dropped the output power to a safe level and the unit simply ran warm. Removing the short restored full operating power immediately.

As normally supplied from the manufacturer, the TR-7730 comes with microphone, mobile mounting bracket, power cable with in-line fuse holder, two fuses, and a plug for an external 8 ohm speaker.

Available as optional accessories are a full 12 button autopatch microphone, an a.c. power supply for base station use, and an external speaker.

I must add, at this point, that while we have received many pieces of gear in the past for *CQ*, this particular unit stands out as one of the most pleasurable units we have ever had the opportunity to test. From physical construction, to ease in installation and operation, to meeting published technical specifications, nothing was wrong. My only negative comment is that the excellent instruction manual should have given a bit of explanation in the actual working of parts of the circuitry for those interested in such things.

I just wish all new equipment was as well thought out and built as the TR-7730.

73, Irwin, WA2NDM

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MFJ-484 "Grandmaster" Memory Keyer, $139.95 (+$4)

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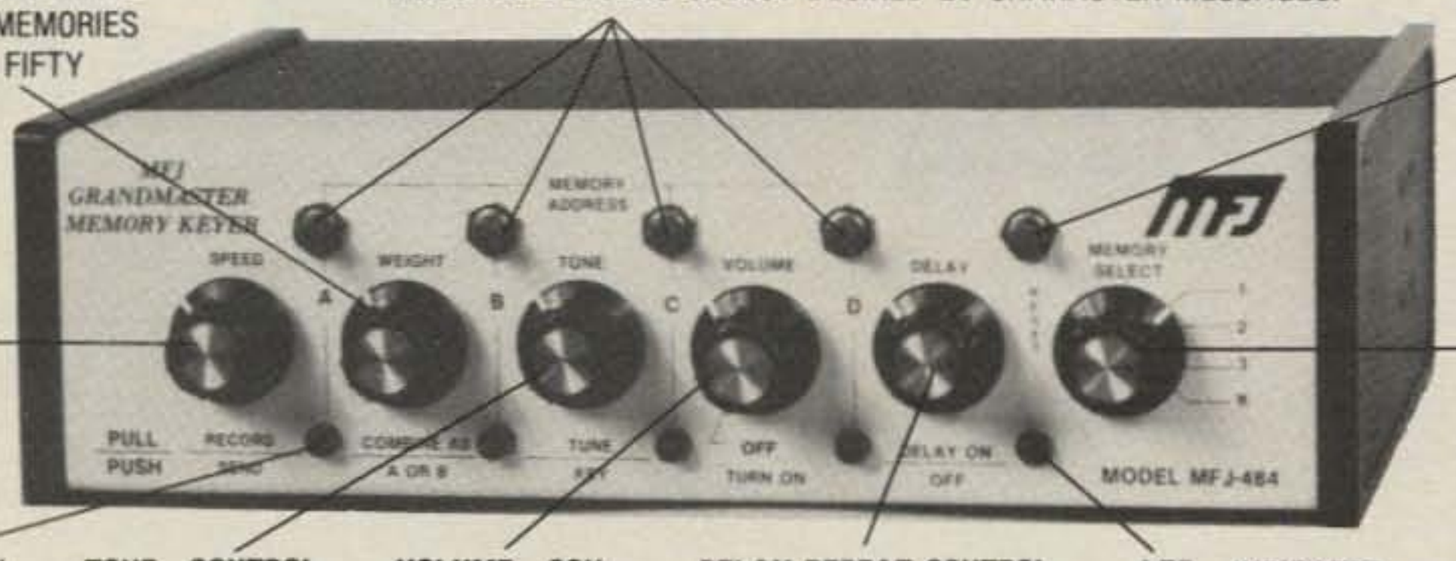

WEIGHT CONTROL TO PENETRATE QRM. **PULL** TO COMBINE MEMORIES A AND B FOR 1, 2, OR 3 FIFTY CHARACTER MESSAGES.

MESSAGE BUTTONS SELECT DESIRED 25 CHARACTER MESSAGES.

RESETS MEMORY IN USE TO BEGINNING.

SPEED CONTROL, 8 TO 50 WPM. **PULL** TO RECORD.

MEMORY SELECT: POSITIONS 1, 2, 3 ARE EACH SPLIT INTO MEMORY SECTIONS A, B, C, D (UP TO TWELVE 25 CHARACTER MESSAGES). SWITCH COMBINES A AND B. **POSITION K** GIVES YOU 100, 75, 50, OR 25 CHARACTERS BY PRESSING BUTTONS A, B, C, OR D.

LEDs (4) SHOW WHICH MEMORY IS IN USE AND WHEN IT ENDS.

TONE CONTROL. PULL TO TUNE.

VOLUME CONTROL. POWER ON-OFF.

DELAY REPEAT CONTROL (0 TO 2 MINUTES). **PULL** FOR AUTO REPEAT.

LED INDICATES DELAY REPEAT MODE.

MFJ Grandmaster series memory keyers make sending perfect CW almost effortless.

They are so easy to use that you can probably utilize all its many features without reading the instruction manual.

Controls are logically positioned and clearly labeled. Pots are used for speed, volume, tone and weight because they are human oriented and remember your settings with power off.

Up to twelve 25 character messages plus a 100, 75, 50, or 25 character message (4096 bits total).

A switch combines 25 character messages for up to three 50 character messages.

To record, pull out the speed control, touch a message button and send. **To playback,** push in the speed control, select your message and touch the button. That's it!

You can repeat any message continuously and even leave a pause between repeats (up to 2 minutes). **Example:** Call CQ. Pause. Listen. If no answer, it repeats CQ again. To answer simply start sending. LED indicates Delay Repeat Mode.

Instantly insert or make changes in any playing message by simply sending. Continue by touching another button.

Memory resets to beginning with button, or by tapping paddle when playing. Touching message button restarts message.

LEDs show which 25 character memory is in use and when it ends.

Built-in memory saver. Uses 9 volt battery, no drain when power is on. Saves messages in memory when power loss occurs or when transporting keyer. Ultra compact, 8x2x6 inches. All IC's in sockets.

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Dot-dash memories, self-completing dots and dashes, jamproof spacing, instant start (except when recording).

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MFJ-481 "Grandmaster"

MFJ-481
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Store two 50 character messages.

Repeat function lets you repeat any message continuously. LED indicates when memory is in use. Resets with button or paddle.

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CIRCLE 11 ON READER SERVICE CARD

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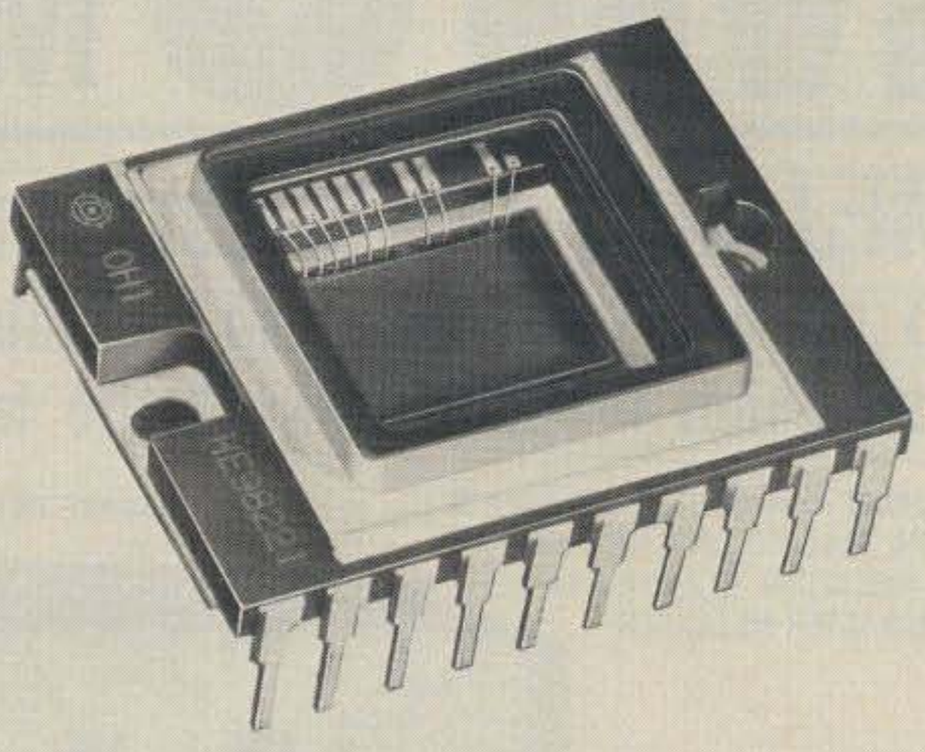
CQ LOOKS AT THE NEW HITACHI VK-C1000 (NO TUBES) COLOR CAMERA



The single chip MOS image sensor.

BY ALAN M. DORHOFFER*, K2EEK

One of the side benefits of being an Editor is that you get to go to press conferences now and then when a manufacturer wants to announce a new product. Usually this involves a nice lunch at a reasonably well-known restaurant. Food is the quickest way to get an Editor's attention, as most of us never seem to find time for lunch—especially a long lunch in a good restaurant. If a cocktail or two is perhaps thrown in before lunch, then the advertising agency or public relations firm that organized the conference is usually sure of a good turnout and press coverage of the new product. The new products themselves are usually quite interesting technologically, and contrary to popular belief, they don't give you one. You are free, however, to marvel at the ingenuity of the product.

The above is sort of an introduction to what I am about to describe. It's both background, and an acknowledgement that I do appreciate these side benefits. The new product that I recently examined and heard about is from Hitachi. In November, they introduced their new VK-C1000 color video camera which is compatible with any VTR system on the market—no great earth-shattering news in that fact alone.

What is interesting and worth marveling about is the fact that there are no tubes at all in this camera. We've all gotten used to the idea of solid-state this and that, but how about no conventional image pickup tube? The heart of this new camera is a solid state, single chip MOS image sensor with four on-wafer color filters. The MOS image sensor itself is a marvel in that it's only about the size of a postage stamp.

A general rundown of the camera's features are: "a ⅔-inch MOS image sensor which includes four additive complimentary color filters, an NTSC color sys-

The Hitachi VK-C1000 color camera. Weighing in at just under 4 pounds with a power consumption of just over 5 watts, this camera is completely solid state.

SPECIFICATIONS

1. Pick up device:	2/3" MOS image sensor including 4 additive complementary color filter
2. Color System:	NTSC
3. Sync. System:	Internal
4. Video S/N Ratio:	Better than 46 dB
5. Horizontal Resolution:	Better than 260 TV lines
6. Minimum Illumination:	100 lux
7. Automatic Sensitivity:	100—100,000 lux
8. Lens:	F 1.4, 6X zoom ratio with power zoom automatic iris, macro function
9. Lens Mount:	C mount
10. Viewfinder:	Electronic viewfinder (1-1/2" B&W CRT)
11. Microphone:	Uni-directional electret condenser mic.
12. Video Output:	1 Vp-p 75 ohms (unbalanced)
13. Audio Output:	−20 dB low impedance
14. Video Input:	1 Vp-p 75 ohms (unbalanced)
15. Ext. Mic Input:	−67 dB high impedance
16. Audio Monitor:	Magnetic earphone (10 ohms)
17. Power Requirement:	12 V DC
18. Power Consumption:	5.3 W (Camera 3.6 W, EVF 1.7 W)
19. Dimensions (W x H x D):	2½" x 4½" x 6" (without EVF, Lens)
20. Weight:	3.96 lbs.

Table I– The published specs as supplied by Hitachi for the VK-C1000 color camera.

*Editor, CQ

tem,[1] internal synchronization, more than 46 dB video signal-to-noise ratio, and a C-mount lens. The *f*/1.4 lens has a 6-power zoom (12.5 mm to 75 mm) plus a macro setting, automatic iris, a unidirectional boom-type electret condenser microphone, and a 1½-inch black-and-white electronic viewfinder."

A couple of neat things about this camera versus the conventional tube type are (1) the obvious instant on feature, and (2) the complete absence of sticking, lag, and burn-in. The three buzz words indicate those little persistant trails of light left on the screen as the camera pans various objects with different light intensities. Check their published specifications for two other interesting statistics: weight and power consumption. It's also quite rugged for those of you with more adventurous pursuits.

I don't know how many of you are in the market at the moment for one of these little gems, but it's certainly worth considering. It is priced in at about the $2000 mark, and taking in all the things it has going for it, including producing a very good quality color picture, it's not too expensive. CQ

---

[1]*The NTSC color system is that system specified by the National Television Systems Committee. This system states that in the color TV signal, the phase of a 3.58 MHz signal varies with the instantaneous hue of the transmitted color, and the amplitude varies with the instantaneous saturation of the color.*

ANNOUNCING

The 26th Annual CQ World Wide WPX Contest

SSB: March 27–28 1982
C.W.: May 29–30 1982

Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

I. Contest Period: Only 30 hours of the 48 hour contest period permitted for Single Operator stations. The 18 hours of non-operating time may be taken in up to 5 periods anytime during the contest, and must be clearly indicated on the log. Multi-operator stations may operate the full 48 hours.

II. Objective: Object of the contest is for amateurs around the world to contact as many amateurs in other parts of the world as possible during the contest period.

III. Bands: All bands, 1.8 through 28 MHz, may be used.

IV. Type of Competition: 1. Single Operator (a) All Band, (b) Single Band. 2. Multi-operator, All Band *only*. (a) Single Transmitter (only one transmitter and one band permitted during the same time period, defined as 10 minutes, no exception), (b) Multi-Transmitter (one signal per band permitted). **NOTE:** All transmitters must be located within a 500 meter diameter or within the property limits of the station licensee's address, whichever is greater. The antennas must be physically connected by wires to the transmitter.

V. Exchange: RS(T) report plus a progressive three-digit contact number starting with 001 for the first contact. (Continue to four digits if past 1000.) Multi-transmitter stations use separate numbers for each band.

VI. Points: Contacts between stations:

1. **North America Only**

A) Contacts outside of North America count 3 points on 28, 21, 14 MHz, and 6 points on 7, 3.5, 1.8 MHz.

B) Contacts with other North American countries count 2 points on 28, 21, 14 MHz, and 4 points on 7, 3.5, 1.8 MHz.

C) Contacts within own country count **0** points but are permitted for prefix multiplier credit.

2. **Europe, Asia, Africa, Oceania, S. America**

A) Contacts outside of own continent count 3 points on 28, 21, 14 MHz, and 6 points on 7, 3.5, 1.8 MHz.

B) Contacts with other countries on own continent count 1 point on 28, 21, 14 MHz, and 2 points on 7, 3.5, 1.8 MHz.

C) Contacts within own country count **0** points but are permitted for prefix multiplier credit.

VII. Multiplier: The multiplier is determined by the number of different prefixes worked. A **"PREFIX"** is counted once during the entire contest regardless of how many times the same prefix is worked.

A **"PREFIX"** is considered to be the three letter/number combination which forms the first part of an amateur radio call (N1, W2, WB3, K4, AA6, WD8, 4X4, DL7, G3, IT9, KH2, AL7, NP2, WP4, 9M2, CT9, 4J9, PY7, VK4, JE3, VE3, Y32, H31, AN8, AB8, H44, KT4, etc.). A station in a call area different than that indicated by its call sign is required to sign portable. The portable prefix would be the multiplier. Example: W8IMZ/4 would count for prefix W4 only.

Special event, commemorative, and other unique prefix stations are also encouraged to participate.

CT2100

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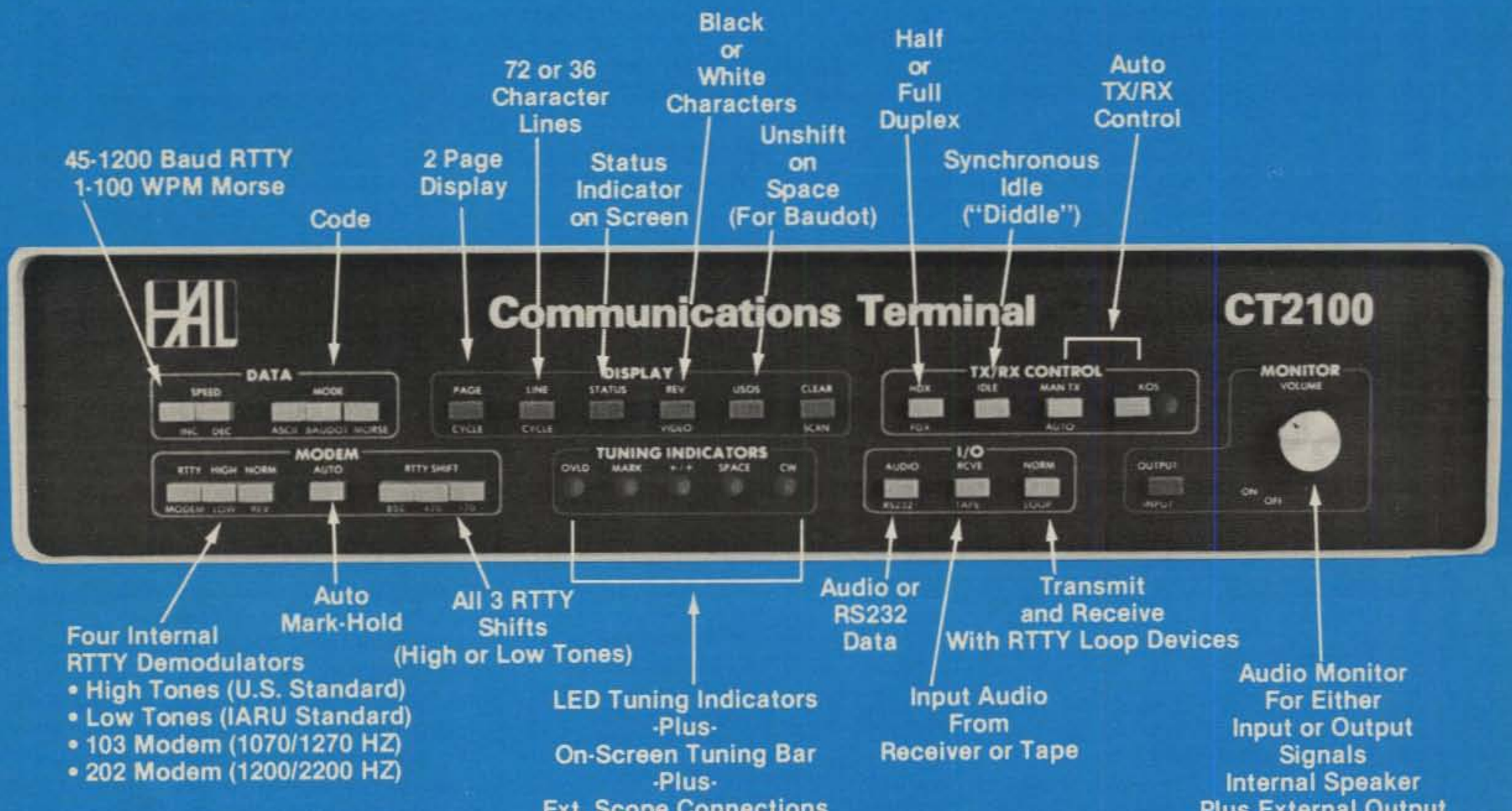

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CIRCLE 10 ON READER SERVICE CARD

VIII. Scoring: 1. Single Operator (a) All Band score, total QSO points from all bands multiplied by the number of different Prefixes worked. (b) Single Band score, QSO points on the band multiplied by the number of different Prefixes worked. See VII.

2. Multi-Operated stations. Scoring in both these categories is the same as the All Band scoring for Single Operator.

3. A station may be worked once on each band for QSO point credit. However, prefix credit can be taken only **once** regardless of the number of different bands on which the same station and/or prefix has been worked during the entire contest.

IX. QRPp Section: (Single Operator Only). Power must not exceed 5 watts output to qualify for QRPp section competition. You must denote QRPp on the summary sheet and state the actual maximum power output used for all claimed contacts. Results will be listed in a separate QRPp section and certificates will be awarded to each top scoring QRPp station in the order indicated in Section X. These certificates will be marked QRPp and will show your power output. QRPp stations will be competing only with other QRPp stations for awards. All other information contained in these rules is applicable to this section.

X. Awards: Certificates will be awarded to the highest scoring station in each category listed under Section IV.

1. In every participating country.

2. In each call area of the United States, Canada, Australia, and Asiatic USSR.

All scores will be published. However, to be eligible for an award, a Single Operator station must show a minimum of 12 hours of operation. Multi-operator stations must show a minimum of 24 hours.

A single band log is eligible for a single award **only**. If a log contains more than one band, it will be judged as an all band entry, unless specified otherwise. However, a 12 hour minimum is required on the single band.

In countries or sections where the returns justify, 2nd and 3rd place awards will be made.

XI. Trophies, Plaques and Donors:

S.S.B.
Single Operator, All Band
WORLD - North Florida DX Assn.
U.S.A. - Bob Epstein, K8IA
CANADA - Garth Hamilton, VE2VY
CARIB./C.A. - Ray Alea, KC4OV
EUROPE - Bernie Welch, W8IMZ
JAPAN - Palm Garden Radio Club
SO. AMERICA - Ron Moorefield, W8ILC
WORLD QRPp - Dayton A.R.A.

Single Operator, Single Band
WORLD - John N. Reichert, N4RV
U.S.A. - Richardson Wireless Klub.
(Joe Johnson, W5QBM Memorial)
U.S.A. - 7 MHz - William Diggins, WA8LXJ
U.S.A. - 21 MHz - Ted Pauck, Jr., K8NA
CANADA - Gene Krehbiel, VE7KB
EUROPE - Myron E. Crofoot, WB4VQO
JAPAN - Ken Ruddock, K6HNZ
WORLD - 21 MHz - Lee Wical, KH6BZF

Multi-Operator, Single Xmtr.
WORLD - Mike Badolato, W5MYA

Multi-Operator, Multi-Xmtr.
WORLD - Henry Thel, VE7WJ
U.S.A. - Bert Curwen, KL7IRT

Contest Expedition
WORLD - Northern Ohio DX Assn.

• • •

C.W.
Single Operator, All Band
WORLD - Canadian DX Assn.
U.S.A. - Steve Bolia, N8BJQ
CANADA - Canadian A.R.F.
EUROPE - Sig. Jakobsson, TF3CW
JAPAN - Palm Gardens Contest Club
WORLD QRPp - Nevada A.R.A.
(George Hewitt WB7OOQ Memorial)

Single Operator, Single Band
WORLD - Pedro Piza, Jr., NP4A
(Pedro Piza, Sr., KP4ES Memorial)
U.S.A. - Kansas City DX Club

Multi-Operator, Single Xmtr.
WORLD - Ron Blake, N4KE
CANADA - Tehrahedral Contest Circle
EUROPE - Jonas Bjarnason, TF3JB

Multi-Operator, Multi-Xmtr.
WORLD - North Florida DX Assn.

Contest Expedition
WORLD - Northern Ohio DX Assn.

Club (S.S.B. & C.W.)
WORLD - Canadian DX Assn.
(Bud Abraham, VE1VR Memorial)
U.S.A. - Northern Ohio A.R.S.

Trophy and Plaque winners may win the same award *only once* within a **TWO** year period. This does not apply to any QRPp, Club, Expedition or *CQ* Special Awards. A station winning a World Trophy will not be considered for a sub-area award. That Trophy will be awarded to the runner-up for that area.

XII. Club Competition: A trophy will be awarded each year to the club or group that has the highest aggregate score from logs submitted by members. The club must be a local group and not a national organization. Participation is limited to members operating within a local geographical area. **(Exception: DXpeditions especially organized for operation in the contest and manned by members.)** Indicate your club affiliation. To be listed, a minimum of three logs must be received from a club.

XIII. Log Instructions: 1. All times must be in GMT. The 18 hour non-operating periods must be clearly shown.

2. Prefix multipliers should be entered only the FIRST TIME they are contacted.

3. Logs must be checked for duplicate contacts and prefix multipliers. Recopied logs must be in their original form, with corrections clearly indicated.

4. An alphabetical/numerical check list of claimed PREFIX multipliers must be sent along with your contest log. (A prefix is counted one time only.)

5. Each entry must be accompanied by a Summary Sheet listing all scoring information, the category of competition, and the contestant's name and mailing address in BLOCK LETTERS.

Also submit a signed declaration that all contest rules and regulations for amateur radio in the country of the contestant have been observed.

6. Official log and sample summary sheets are available from *CQ*. A large self-addressed envelope with sufficient postage or IRCs must accompany your request.

If official forms are not available, you can make your own with 40 contacts to the page.

XIV. Disqualification: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct, taking credit for excessive duplicate contacts, unverifiable QSO's or multipliers will be deemed sufficient cause for disqualification. Actions and decisions of the *CQ* WPX Contest Committee are official and final.

XV. Deadline: All entries must be postmarked no later than May 10, 1982 for the S.S.B. section and July 10, 1982 for the C.W. section. Indicate S.S.B. or C.W. on the envelope. From rare isolated areas the deadlines will be made more flexible. Your support is appreciated.

Logs go to: CQ Magazine, WPX Contest, 76 N. Broadway, Hicksville, NY 11801.

or to
CQ WPX Contest Director
Bernie Welch, W8IMZ
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Dayton, Ohio 45424, U.S.A.

• • •

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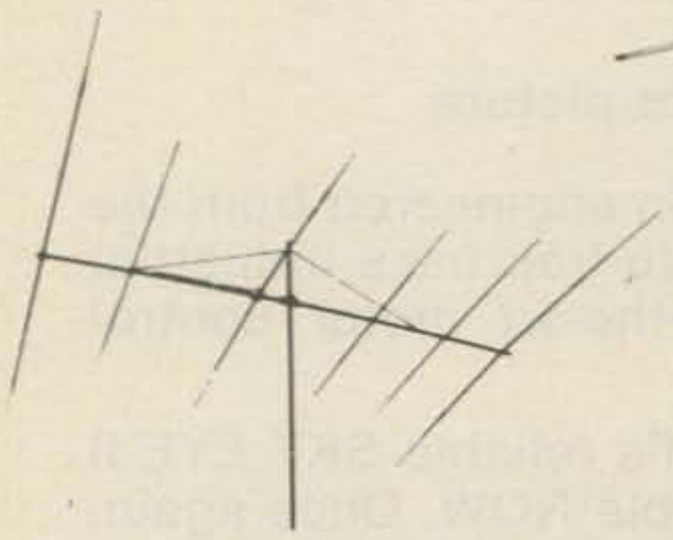

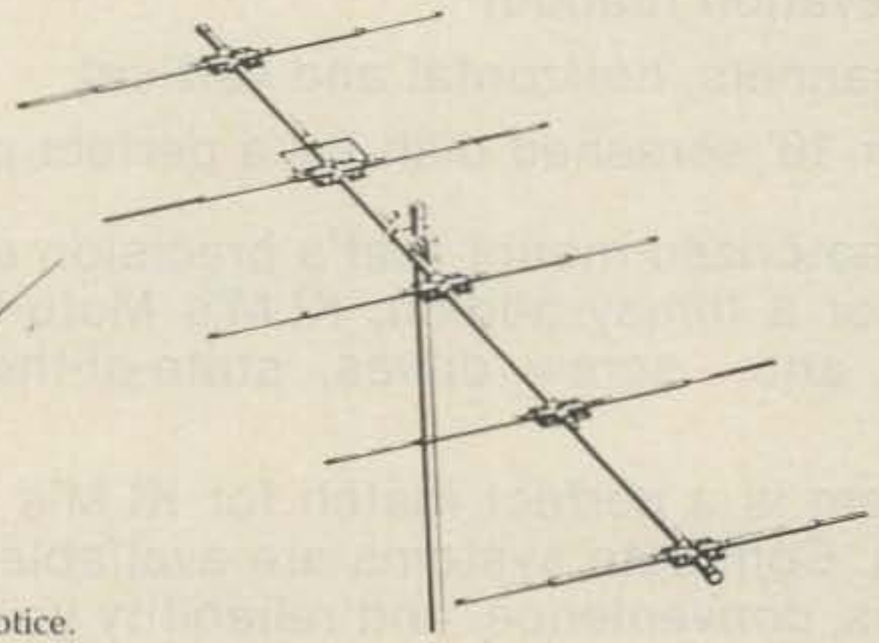

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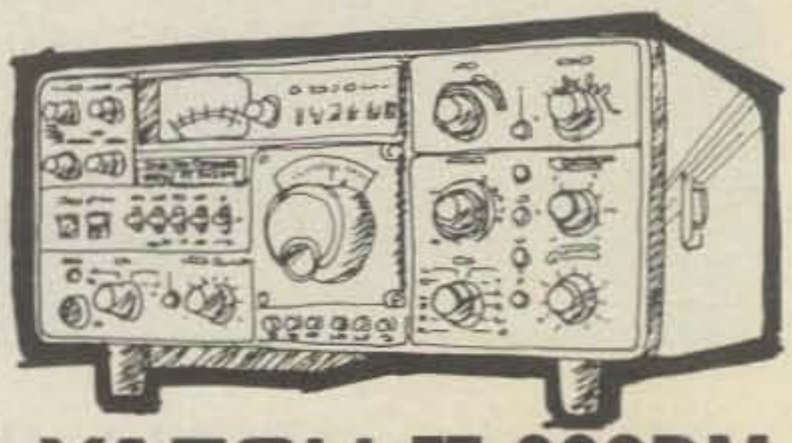

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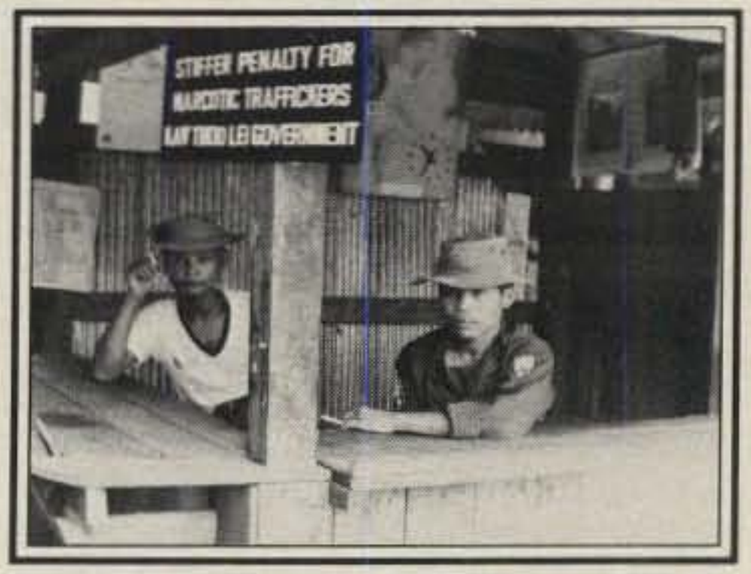
It's more than an empty building or a deserted coral encrusted strip of land barely out of water. There are indigenous people, there are towns and all of the rudiments of life ever present but yet there is the question of whether or not it exists. JA8BMK was there at the beginning and helped make it happen, he put Burma back on the map.

Indian market at a Karen village near the site of XZ5A.

A money changer at an Indian Village.



Warning for narcotic traffickers at the border.

The Burma Story
XZ5A And XZ9A Are On The Air

BY JIM FUKUTA*, JA8BMK

Looking back to my editorial in the January issue, where I discussed the relative merits of having a building declared a country and a "country" declared persona non grata, *one can only wonder where it's all heading. The following story has recently been told in bits and pieces in the various bulletins and magazines throughout the world. This full version was made available to CQ by Joe Iwakura, N2AIR of The DX Family Foundation.*

While some of the sentiments expressed seem extreme and harsh, I am not in a position to either support or deny the contentions or historical references as fact. Neither should you as the reader accept the printed word as absolute fact. Underlying a questionable amateur radio operation which may be important to us as amateurs, is the realization brought home by this record and series of photographs of a struggle of differences (regardless of origin) whereby people feel forced to settle those differences by killing one another. There is far more of a serious nature at stake here than the legitimization of an amateur radio operation.

To simply dismiss the operation is hiding one's head in the sand. To formally querie the designated "foe" of the Karens as to their legitimacy goes beyond the definition of naive. So it is very plain that the matter is not as simple as deciding whether or not a building is a country or not. In one case there are no occupants to worry about, and in the other the occupants are trying to stay alive.

I am not personally involved with the issues that are being fought over in Burma, and I doubt whether many of you are. I also don't know the motivations of the authors and the principal operators of XZ5A and XZ9A, nor to what other uses the "amateur radio equipment" could be put. I do know that there is the definite excitement of hearing and working Burma on the bands and of sending and receiving QSL cards from them. That part is real and easy to identify with. The part that I have difficulty with is that I would hope that the amateur radio aspect does not become an abstraction whereby we forget to notice the weapons, the uniforms, and the clandestine nature of the operation.

I may be overreacting, and the amateur radio operation may be nothing more than a calm respite from the everyday toils of war, but I still am left with the feeling that if the Rangoon Government were to "tire" of this exploitation and broadcasting phenomenon, then their FCC, should they catch up with XZ5A and XZ9A, might feel obliged to issue more than a simple "pink ticket." —K2EEK

This trip was not planned specifically as a DXpedition, but it was planned with hopes to transmit from various areas of the Far East as conditions would permit.

On April 25, 1981, at 1600 JST, we (JA8BMK and JA8BKM) departed from Narita Tokyo airport via JAL Jumbo 747. We did not have a specific destination planned for the trip, as we had thought of many areas to go to, such as VU7, 3V8, Tunisa, etc. Nevertheless, we did enter Burma on April 30, 1981, five days after our departure from Tokyo.

Our entry into Kaw Thoo Lei, East Burma via Thailand, was accomplished with the cooperation and goodwill of many, many individuals, including the Japanese, Chinese, Burmese, Indians, and Thais.

We arrived before dawn at a small Karen town. I telephoned a Karen friend, Lilia, from the local hotel and was advised to wait in the lobby for a messenger whom she would send.

She was nervous about the authorities, and I remembered that the previous night several of the border patrols who checked us were armed with machine guns. At

**c/o Joe Iwakura, N2AIR/7, 20703 Occidental Ave. S., Seattle, Washington 98148*

Sanplo, XZ5A and Laydohmoo, XZ9A at the rig. This is the photo that appears on the back of XZ5A's QSL card.

JA8BMK and other members of the crew working on the 14 MHz 3-element yagi.

The 14 MHz 3-element yagi made of wooden boom and aluminum pipes.

The man in the foreground with a rifle over his shoulder observes the raising of the beam in the back of the shack.

the time I was very glad we did not have any radio equipment with us. I could envision a terrible experience like having the rig confiscated and being tortured. Even in the best case, they probably would have expelled us from the country immediately.

We were met by trucks and taken to a military liason office which was located about four miles from the town. We were met there by Lilia, since she was responsible for handling foreign visitors to the area. She mentioned that the Karen State has been at war with their neighboring states for the past thirty years.

In the liason office we noted a number of military weapons; there were three or four cots under which we saw several M-16's, M-1's, carbines, and Ak47's, American and Russian military equipment. We suddenly realized that we were in a world never reported by TV, radio, or newspapers.

We proceeded to talk with Lilia and explained the reason for our being there. However, she and the other Karens could not understand why two Japanese men would venture to such a remote area. They were very suspicious of us from the beginning. This suspicion never seemed to disappear during our ten-day stay. Lilia spoke excellent English and until the previous year had been a teacher in Rangoon. She was in her thirties and a beautiful, fair-complected woman.

She told us we would have to go to the General Headquarters of the State. In addition to Lilia, to whom we talked several times, there was a Mr. Thooto. Mr. Thooto was in his sixties and was the foreign minister. He was proficient in English, and very intelligent. He continually chewed on some red berries, similar to an American chewing gum.

Mr. Thooto acted as guide and escort. With him, we arrived at the Karen/Thailand border after a thirty-minute ride through rain-soaked roads. There we crossed the river border on a well-constructed wooden bridge. After passing the Burma (Karen State) customs gate, we arrived at a small village which was dominated by an open-air market where Indian merchants sold goods at small stalls.

We were taken to rest at a large house in an encampment located near the village. A number of soldiers gathered and asked us many questions about Japan. It appeared that they were pleased to have the opportunity to meet and talk with foreigners. As it happened, they were aware of our interest in amateur radio, and therefore our discussion turned to electronics. One of them who happened to know about amateur radio was Sanplo, and we explained to him the difference between professional and amateur radio.

Several of their radio operators had started to bring suitcases and cartons into the room, and we were surprised to see what they contained. There in front of us were U.S.-made Collins and Drake equipment. The receiver was a 20-year-old 75A-4. The dial was scratched, but the internal mechanisms were in good order. The Drake T-4XB transmitter appeared to be slightly rusted. We immediately connected the 75A-4 and T-4XB to an antenna, listened at 7.030 kHz, and heard heavy key clicking noises. We wondered if the signal might be from Russia and asked them as much.

"No, the signal you hear is coming from our enemy!"

"What is the signal we hear at 5 kHz down?"

"The s.s.b. signal is from the Karen State military forces broadcasting the progress of a battle."

"Why are they broadcasting when they are so close to each other?"

"Since the transmission is in code, it is not a problem."

"Don't you have a problem with carrier QRM?"

"Of course they overpower us with the strong signal, but we overcome it with our techniques and our inborn, strong characteristics."

The rig was connected to a doublet antenna. The key and speaker box appeared to have come from a neighboring country and have been used for military purposes.

We listened on the 7 MHz band for Japanese stations. However, we were disappointed and did not hear even one—only a lot of jamming noises from South Asia.

They mentioned that the transmitter had been used only one time. It was certainly a surprise to find U.S. equipment in such a remote location. It appeared that considerable numbers of Japanese radio equipment were also available here.

We told them that there were countless hundreds of thousands of amateurs throughout the world, and they immediately replied that they would like to communicate with them.

The following day I asked Mr. Thooto, the foreign minister, to ask the President for permission to operate. I continued to talk with the radio operators while waiting for the license to be issued.

"Do you know what is meant by the word '*ham*'?" I asked.

"I think it must mean a fish or a meat."

"Hamming is a hobby associated with radios." It appeared that although they did not know the meaning of the word "*ham*," they did seem to know a little about the world of amateur radio. They brought out a copy of an ARRL amateur radio handbook dated 1975. Of course, with this book they would have no problem understanding the subject. They only needed to know the correct way to conduct a QSO, the call signs of countries, and how to operate current radio equipment. With this knowledge they should have no problem communicating with other people throughout the world.

We decided to start an amateur radio class with the two of us as instructors. Two days of intensive classes on amateur radio were started with ten soldiers who ranged in age from twenty to fifty years old. They appeared to know about the ARRL and also seemed to be familiar with Q codes, which may possibly have been used in their military activities. They were also proficient in c.w. and in their Karen Morse code. They listened very diligently to my lecture on the correct procedure for conducting a QSO in English.

We finally covered all aspects with the exception of the actual operation of the equipment. I mentioned that Japan is a world leader in electronics, that Japanese amateur equipment is among the best in the world, and "would it be possible to find Japanese equipment?"

"Oh yes, there is new Japanese equipment in our area. We have seen a number of them in our battalion; however, it will take ten to fourteen days to get them because of our remote location. Furthermore, we must also get military permission."

"Yes, we understand. We will be back here by then. Our visa will be expiring soon and we must ask for an extension." It appeared that we might yet get our operating license.

We wished to meet the President and the Prime Minister before leaving the country, and so left for General Headquarters to do so.

Karen State is one of the States in Burma, and it is world-famous for its jade. There were several Chinese from Hong Kong here to purchase jade.

Seven of us climbed into a pick-up truck and headed toward GHQ, located about ninety kilometers away, which took us three hours. We finally reached the river at the border and came to a boat moorage where we waited for two days before meeting with the President.

The President is a militarist and a Baptist, as are roughly the seven million Karens. It was a surprise to find so many Christians in this remote region of East Asia, which is predominately Buddhist. The people seemed to have a fair knowledge of English.

According to an octogenarian sage, the Karen history stretches back thousands of years. Among the Karen people were considerable numbers who had graduated from high schools in Rangoon. These people were affected in the past by the British, and also by the Japanese military during World War II. After spending many days with the people we felt a sense of family with them.

They spoke of their appreciation for Japan and surprised us with a Japanese tune which they whistled. It was unfamiliar to us, being an old military song, which was before our time.

We finally left Karen two days before our visas expired. Our plan was to go to Australia or New Zealand while we were waiting for the radio equipment to arrive. Another possibility was a trip to the U.S.A., but the expense involved ruled it out. We finally decided on Sri Lanka, Maldive, and India as our destinations. We were to be welcomed in Sri Lanka by 4S7EA, 4S7JA, and 4S7VG. In India we were welcomed by VU2AID and VU2RX, and in Maldive by 8Q7AZ.

In Colombo, 4S7EA insisted that we stay at his home rather than in a hotel. The price of a hotel in Sri Lanka is higher than in Japan, and we were most grateful for his hospitality. Staying with 4S7EA also gave us the opportunity to use the radio station.

To get a call sign in Maldive is not difficult. It is only necessary to show a copy of your operating license, and an okay to operate will be forthcoming in ten to fifteen minutes. We understand that more than half of the license holders in Maldive are Japanese. Having a free port, there are no problems in bringing radio equipment into the country.

We did learn that being an Islamic nation, it is illegal to bring in liquor. Interestingly, German beer was available on tap in the hotel. The lowest fare to Maldive from Tokyo is about $650. The hotel room with three meals runs about $13 per day. Two thousand or more of the islands are

The man pictured on the calendar is General Saw Bo Mya, President of Kaw Thoo Lei, East Burma. Note the 1975 ARRL Handbook on the left.

coral islands; therefore, only ten percent of the islands are populated. Beaches are sandy white, and the ocean is a beautiful emerald green. Fish can be seen swimming to a depth of fifty centimeters. It looked like a vast swimming pool, and I was tempted to jump in. It is now a resort area for Europeans. We understand that in Sri Lanka and Maldive a family of three owning a house and land can subsist for a year on no more than $1300.

It was May 20th when we left Colombo for our return to Burma and the Karen State, where we were soon to meet Mr. Thooto.

"And what happened to the radio equipment?"

"No problem."

"Where is the equipment?"

"It is located about an hour away by car. We will go get it now. Will you wait a while for us?"

It was more than eight hours later when they returned soaking wet with the equipment.

"Has the rainy season arrived?" I asked.

In his hands was a relatively new Trio TS-130S. We noticed the equipment manual was in English, and therefore we assumed that is must have come through Singapore or Rangoon.

The time in Japan was close to midnight, and we thought it might be possible for us to get on the air from Burma. We had told several Japanese friends of our possible transmission date from Burma when we were in Colombo. It was already a half day into the planned shceduled date.

As we had previously discussed our tentative operating schedule with our friends, we hoped that they would be listening. In any event, at 1503 GMT on May 22nd, 1981, after 16 years of silence, we transmitted from Burma on 21.270 MHz. Tac Yonemura, JA1BRK, has been watching for us for more than half a day. Tiring from his long watch for us, Tac told us later that he was falling asleep from weariness and from consumption of alcohol which he was using to displace the boredom, hi!

Jin, JA8BMK (left foreground) and Yasu, JA8BKM (right foreground) at XZ5A.

The Karens at the XZ5A station.

A military operation near XZ5A.

After our first QSO ended with JA1BRK, the band turned into bedlam. It appeared that may DXers had been staying up late into the evening listening for us. We asked that people call us 200 to 300 up the band, but the pile-up was horrendous, and we could not distinguish one call from another. It was pure bedlam! After sifting through the pile-up, we contacted over 300 stations.

At 1720 GMT, May 22nd, we started to hear some European and North American signals. The propagation from Burma to North America, especially to the east coast, is similar to the conditions we JA's experience to West Africa. Our additional problem was the time factor.

Nevertheless, we finally made our first U.S.A. contact with W6UY at 1735 GMT. We worked many W5, 6, and 7 stations, and some W1, 2, 3, and 4's. Our antenna was only a dipole, and our reports were mostly 44 and 34—not very good reports. At 1907 GMT the U.S. signals dropped out completely and European signals were heard. Starting with PA0LEG, we worked over 250 stations until 2109 GMT.

The Europeans were very strong, and a number of Italian stations were out-doing each other. This was our first experience with such tremendous pile-ups. We continued operating until 2136 GMT, and finally ended our day with the last contact to JA8BFO.

Looking over our log, we noted that we did not have many entries from the east coast of the U.S.A. We heard that the east coast was coming in quite strong into Japan. Next morning we pondered as to what we might do in regard to our antenna. In order to work the east coast, we decided to make a beam antenna which JA1BRK had explained how to build during our previous QSO with him when we were in Sri Lanka. We could build the boom from the bamboo in the jungle. We did not have any new connectors, but some old ones were available. The last thing we needed was some pipe, and we asked if it could be obtained on the black market. We were informed it could and would be gotten. It would take at least three hours.

We figured that we would need seven or eight ⅝-inch and ½-inch aluminum tubes about 6 meters long. Before long we had built a three-element beam for twenty meters with a matching network similar to that for a dipole. We wondered whether the s.w.r. would be high. If the s.w.r. was very high, we would ruin the rig. Whenever we talked into the mike,

the equipment would get hot. Somehow or other, our signal was getting out. The antenna was to be hoisted up a tall tree, over thirty meters high, and therefore, any adjustments to the antenna would be extremely difficult. We did lower the antenna and directed the beam toward Japan and sent out a signal. We immediately created a big pile-up. With so many signals being received by our rig, it appeared that it had saturated the transistors and IC's to the fullest.

Later in the day we continued listening for the east coast of the U.S. without success. We did hear from VS5TH, who advised that we should direct our beam toward the long path. However, it was impossible to move our beam at this time because it was dark and up in the tree. On this day, we worked fifty percent U.S. and the other half with Japan on 14 MHz. We then shifted to 21 MHz and worked Japan, Europe, and South America. From here we transferred the operation to Sanplo and Laydoh Moo, the XZ operators. They did not know how to end a QSO, like a car without breaks, but they started to get their feet wet. Their first QRV was a pile-up. They must think that a QSO is nothing more than an exchange of signal reports. It would be difficult for them to carry on a ten to twenty minute QSO like us. If we were to show them how to have a relaxed QSO, we should call a W station and conduct a sample QSO. At 0900 p.m. in the evening the lights were turned off by the military, and it was at this time that it was best for DX. Each evening our 2 kw generator started and the noise reverberated throughout the jungle. We realized that we must consider the disturbance that we were creating to nearby military units. Therefore, we changed over to a smaller 400 watt Honda generator.

Output was reduced somewhat, and the power regulation was not as good as before. However, our surroundings were made quieter. In this way we were able to operate all night without any problems. We even tried moving the generator to the basement to reduce the noise; however, our output was lower so we gave up the idea.

Our biggest problem was that our signal disturbed the military radio operation which required we shut down four or five times a day, amounting to about four hours QRT. We started our first c.w. operation in the afternoon.

They watched our professional c.w. operation with great envy. if they could learn to operate a hand key, undoubtedly they could become excellent c.w. operators. We operated c.w. on 15 and 20 meters with U.S., Japanese, and European stations. Eventually, we operated during the time that our Burmese friends rested. On May 26th, I had plans to meet a business associate and therefore had to leave Kaw Thoo Lei State. JA8BKM was to operate by himself the next two days.

When I departed, my friends all came

out to see me off and mentioned that they were having a farewell party at a nearby teahouse. We drank some beer and exchanged our farewells.

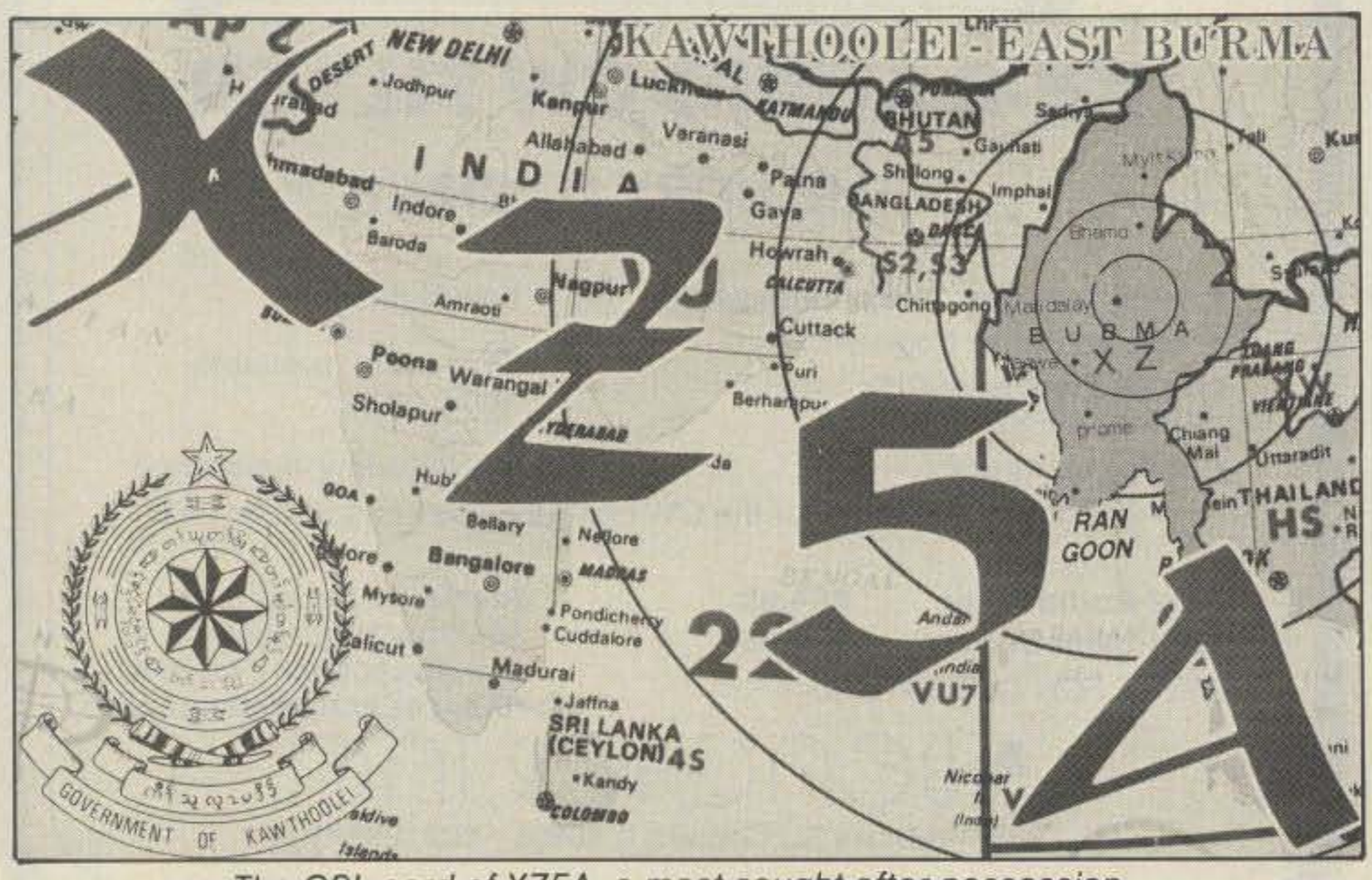
We had been in XZ land for about a week, from May 22nd until May 28th, and we worked approximately 3500 contacts.

Of this, forty percent were Japanese, fifteen percent were U.S., and thirty percent were Europeans. From the grand total about thirty percent were c.w. contacts.

This DXpedition included four operators who were hampered with only 100 watts to a dipole and very poor conditions (especially on 20 meters). Our prime purpose for coming here was not a DXpedition, but to mingle with the natives and to advise and teach them about amateur radio. Through ham radio many friends can be made throughout the world.

The Karens had operated more than two thirds of the entire one-week operation. Now they were operating completely by themselves. For us the one-week operation was the highlight of our tour .

We want to thank our many, many friends for their patience and their assistance during our operation. We especially want to thank the following for their help: W7PHO, and the Family Hour, DU9RG, F6CYL, DK2OC, JA1BRK, and JA8IXM. Today we hear the signal from XZ5A and XZ9A. We pray that they will continue to enjoy ham radio and a long life.



The QSL card of XZ5A, a most sought-after possession.

XZ5A And XZ9A Follow-Up

by Tac Yonemura JA1BRK

It will be interesting to see how the ARRL and others will react to the operation of XZ5A and XZ9A, which was founded with the instruction of JA8BMK and JA8BKM. Both of the stations are not licensed by the Rangoon government but are allowed to operate with the license issued by the Kaw Thoo Lei government. Are the Kaw Thoo Lei rebel government forces against the Rangoon government? It's difficult for the Japanese, who live on the island and speak only Japanese, to understand such status because Burma is surrounded by India, Bangladesh, China, and Thailand, and furthermore, Burma itself has several self-governing states which have their own cultures and languages. After JA8BMK and JA8BKM's operation, I became interested in Burma and started to collect data about the Karen tribe. When I was compiling the data, K2HFX and the gang sent me a linear amplifier and asked me to forward it to XZ5A. That triggered my desire to go and find out what is going on over there in Kaw Thoo Lei.

In the 19th century Burma was invaded three times by England, and in 1886 it became an English colony. During World War II Japan invaded Burma on the pretext of emancipating the colony. But when Japanese troops got over the Arakan range to India, English, U.S., and Chinese forces fought back. Japan lost a lot of people there, and the name "mission Imphal" has been given to this effort.

After the war, in 1947, Burma became independent from England and the federal government was born. At that time the government gave autonomy to minority races which had their own cultures and languages. But there was discrimination, and reaction to the colonial period, and only the Karens were ignored. Karens are Christians and speak English well, so in Burma's colonial period many Karens were appointed to important positions in the government.

The Burmese, whose religion is Buddhism, suppressed, attacked, and massacred the Karens. At the very limit of the Karen's patience, they organized a "self-defense organization" and started striking back. The Karens brought many cities under their control, and when they reached near Rangoon, the Prime Minister negotiated with the Karens, and promised to give them autonomy with ten years of adjustment. The peace-loving Karens were satisfied with the result and gave back those cities which they had brought under their control. But in 1958, Newin carried out a coup and established a socialist government, and they gave up the promise of autonomy.

The Burmese army again attacked Karen villages, plundered all their valu-

ables, and killed the villagers. The Karens raised arms again to defend themselves and formed their own cabinet. This situation has been continuing.

When we met the President, Mr. Bo Mya, of the Kaw Thoo Lei government, he said "Our enemy is not the Burmese but the Burmese government. We have our army only because we have to defend ourselves. We never want to bring all of Burma under control."

The Thai government has a friendly relationship with the Rangoon government officially, but it has also unofficially recognized the Kaw Thoo Lei government and is giving them not only commodities, but also munitions.

We can enter into the Kaw Thoo Lei territory rather safely by way of Thailand, and it is not strange that Thailand supports the Kaw Thoo Lei government, because Thailand is the only free nation surrounded by socialist countries.

According to the *DX Bulletin*, the ARRL is asking the Rangoon government about the status of the XZ5A and XZ9A licenses. It's impossible for me to know how the ARRL will make their decision, but my opinion is that since they have their own cabinet (government), educational system, hospital, and army, the Kaw Thoo Lei territory should be a separate country from Burma–Rangoon, because it is "under different jurisdiction" from the Rangoon government, even Thailand. It might be bad news for those who want XZ (Burma) as a new one, but there is nothing we can do about it.

I have never visited Rangoon, and I knew I should not interpret the situation with only a small piece of information. Nowadays Burma gives sightseers permission to enter through Rangoon and stay only seven days. You have to have a visa and may not have much freedom to go around in the country. To investigate into this political situation is "out of the question" I'm afraid.

Karen people who live in Kaw Thoo Lei are free to listen to shortwave broadcasts from foreign countries, such as BBC from Singapore's relay station, or even Rangoon.

They are not rich, but they are cheerful and educated. Once you visit there and get to know them, you'll understand they are not a "guerrilla group" with plans to overthrow the government.

Sanplo and Laydoh are only beginners in amateur radio, but you'll be surprised to learn that they are very quick to understand and improve their operations. Even apart from DXCC status, we are very glad to have them as our friends.

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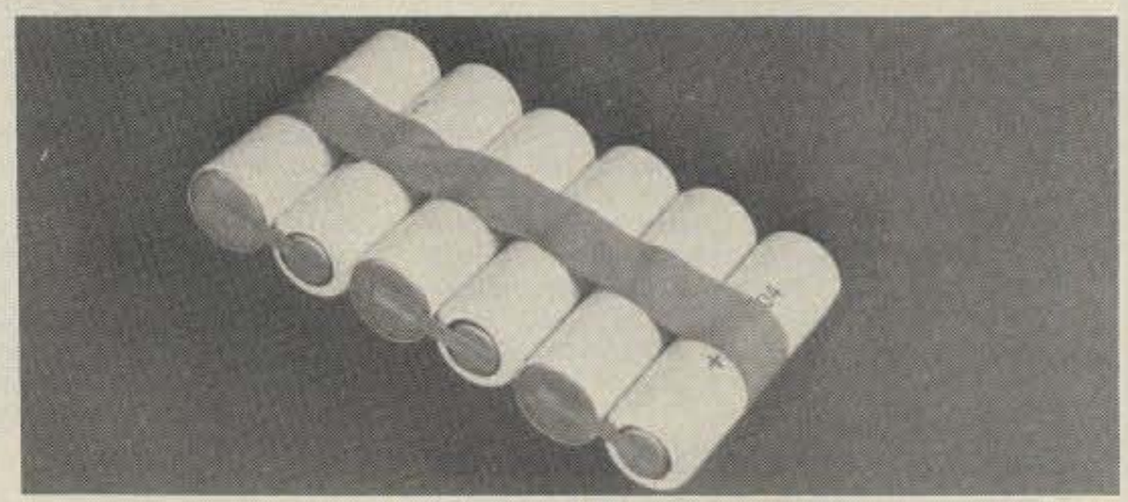

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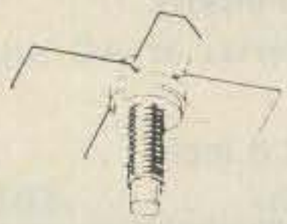

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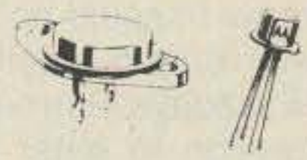

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a monthly feature by
KARL T. THURBER, JR., W8FX

Antennas

DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

It's every amateur's desire to have his signal heard as best he can, and to be able to hear everything he wants to hear. For most h.f.'ers, the Yagi probably represents the best overall *choice in antennas to realize these goals. In this series, contributing editor W8FX summarizes the case for the Yagi.*

Last month, we went back to 1926 to discuss the origins of the Yagi, or more properly, the Yagi-Uda, antenna, recounting highlights of the life and times of the eminent Japanese engineer and scientist, Dr. Hidetsugu Yagi, and his colleague, Dr. Shintaro Uda.

In this and upcoming columns, we will bring ourselves up to modern times with a discussion of the Yagi as it's used on h.f. today. First we will review the dipole in its central role relative to the Yagi. We will cover basic parasitic element design principles, and discuss two-, three-, and multiple-element arrays. Later, we will highlight the multi-band (trap) Yagi, discuss beam construction and installation, and cover feeding, matching, and tuning. We'll also review important "Quad vs Yagi" considerations and present some useful beam operating tips.

Let's look first at the dipole and how it relates to the Yagi.

The Basic Dipole

It's important to briefly review the dipole's characteristics for three reasons: (1) the dipole is probably the simplest and most common form of h.f. antenna in use today; (2) it's a highly useful standard of reference; and (3) the dipole element constitutes the basic "building block" of the Yagi array, particularly as the driven element.

The dipole has two arms (poles) separated by a center insulator and connected to one another by means of the transmission line. Normally made of wire, but often of tubing or rod (as in the Yagi), the

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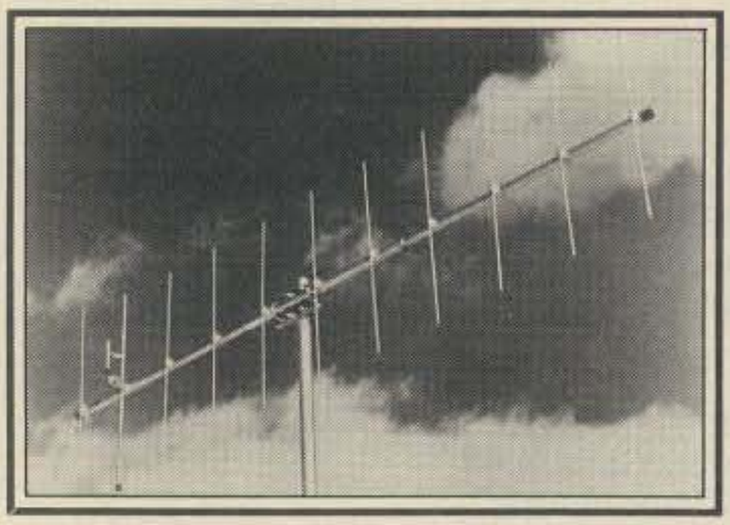


"Long" Yagis, generally impractical on the h.f. bands for reasons of size, can be put to good use on v.h.f. and u.h.f. bands. The 11-element Cushcraft Yagi in this photo has a claimed gain in excess of 11 dB over a dipole. The antenna's characteristic focuses radiation fairly narrowly to a 38-degree arc at the 3 dB points; larger, longer, or stacked beams will narrow the antenna's focus much more, requiring accurate positioning for consistent results. Four 11-element beams such as these can be stacked to form a "quad array" to yield a gain of better than 17 dBd. When this is done, 3 dB beamwidth is reduced to about 29 degrees. (Photo courtesy Cushcraft)

dipole is a resonant half-wavelength antenna; its overall length is cut to about 5% less than one-half of the "free space" wavelength of the frequency for which the antenna is designed. The length is determined by the formula

$$L = \frac{468}{f}$$

In this formula, **L** = length in feet and **f** = frequency in MHz. On the h.f. bands, dipole lengths range from about 253 feet for 160-meter (1850 kHz) operation, down to about 16 feet for 10-meter (29 MHz) work.

In the simple dipole, the wire is cut exactly in the middle of the span and a transmission line is attached at the center point. The ends of the dipole and the two halves are insulated so that there is no electrical connection between them and other objects.

The theoretical radiation resistance (feedpoint impedance) of the half-wavelength wire dipole is in the vicinity of 72 ohms, although this will vary with height above ground and other factors. The dipole is balanced with respect to ground—that is, both sections of the antenna are symmetrical. Feeding the balanced antenna with 72-ohm transmitting twin-lead is fine, although due to its expense, loss, and potential for feedline radiation, coaxial cable has largely replaced it. In practice, the dipole is usually fed with one of several types of 50- to 75-ohm coaxial cables. The smaller RG-58/U (53-ohm) and RG-59/U (73-ohm) varieties are fine for medium power levels and short runs on the h.f. bands, but they are not designed for high power. Also, losses rise significantly with high s.w.r.'s and with increasing frequency. Larger, more efficient RG-8/U or RG-11/U should be used for best results. A new, small-diameter, low-loss, high-power cable known as RG-8X was introduced several years ago; it holds real promise for holding down the weight, bulk, and expense of the transmission line without sacrificing performance. A balun is often used at the feedpoint to allow direct feed with coax while retaining the balanced characteristic of the antenna.

In addition to the simple dipole, the *folded dipole* is a long-time favorite. It's similar to its ordinary cousin, except that it has a broader frequency response, and the feedpoint impedance is considerably higher—around 300 ohms. As the name suggests, it's a dipole that has been folded back on itself. Adding the top wire effectively quadruples the center impedance to 300 ohms, as opposed to about 70 ohms for the straight dipole. The folded dipole is a balanced, single-band antenna, although it—like the simple dipole—can be excited on odd harmonics. It can be fed directly with 300-ohm twin line through an antenna coupler or a set of balun coils installed at the transmitter, or fed with coaxial cable using a 4:1 transformer-type balun at the antenna. This kind of element is sometimes used as the driven element on Yagi arrays due to its exceptionally wide bandwidth characteristic. While the bandwidth of the ordinary dipole is typically about ± 2% of the design frequency for a 2:1 s.w.r., the bandwidth of the folded dipole is wider.

Listed below are the power gain, expressed in decibels (dBs), of several popular Yagi configurations relative to isotropic (point) and dipole sources. The gain figures shown are typical, and are not meant to represent maximum or minimum possible or theoretical figures. Gain achieved in practice will involve a number of factors, particularly physical element spacing and overall boom length.

Number of elements	dB gain over half-wave dipole	dB gain over isotropic source
Half-wave dipole	—	2.1
2-element Yagi	5.0	7.1
3-element Yagi	8.0	10.1
4-element Yagi	10.0	12.1
7-element Yagi	11.0	13.1
10-element Yagi	13.0	15.1
15-element Yagi	16.0	18.1
20-element Yagi	19.0	21.1

Note: The larger Yagis listed above would, of course, normally be practical only at v.h.f. and u.h.f. frequencies and are shown for comparative purposes only.

Fig. 1– Yagi comparative gain table.

The dipole typically has a doughnut-shaped, bidirectional radiation pattern, with maximum radiation occurring at right angles to the axis of the antenna. Generally speaking, if the antenna can be mounted at least ⅛-wavelength above ground, results will be satisfactory. Practically speaking, directionality is not usually too pronounced on the lower bands (80 and 40 meters), but "beam effects" can be significant on the higher bands. Under normal conditions, the practical difference between broadside and "off the ends" signal reports when using a half-wavelength dipole may be an S-unit (6 dB) or less on 80 and 40 meters, while on 15 meters and higher may reach two or three S-units. Those amateurs who can afford the space sometimes mount two dipoles at right angles to one another. By switching from one antenna to the other, a "rotating" beam effect can be obtained, which can be useful for DX.

For the most part you can do very well with the no-frills, coax-fed half-wavelength dipole on h.f. Despite its limitations, the dipole can be a very inexpensive, useful, and easy-to-install antenna that allows one to get on the air with minimum difficulty. Nevertheless, a very important difference between the station that "works out" and one that doesn't lies in the quality of the antenna system. While it's possible to obtain satisfactory results with minimal equipment, low power, and a simple dipole, just about everyone recognizes that the beam can act as a very potent power multiplier . . . thus enter the Yagi, the subject of this month's column.

Parasitic Element Operation

As related in a previous column, Drs. Hidetsugu Yagi and Shintaro Uda were the first to propose a type of antenna array that used a single driven element, closely coupled to "parasite," or parasitic, elements, the latter operating as either reflectors (as a result of inductive reactance) or directors (as a result of capacitive reactance)—depending on the length and spacing of these parasitic elements. The radically new designs were initially proposed for v.h.f., u.h.f., and microwave transmission by the Japanese scientists in the late twenties. It wasn't long after, however, that forward-looking engineers, scientists, and amateurs saw the Yagi's application at h.f. frequencies as a practical, efficient, and compact alternative to the Beverage, or wave, antenna—the then-standard antenna used when directivity was required in an antenna system. In the early thirties, the first really practical h.f. designs appeared in the radio and amateur press, but it wasn't until about 1938 that Yagis based on the now-familiar aluminum tubing design came to be known. In the early-to-mid 1940s, as aluminum became a more familiar, rugged, and inexpensive material, the Yagi truly came into vogue, with many pages in *QST* and *CQ* devoted to construction articles.

How does the Yagi work? The heart of the array is the driven element, which receives power directly from the transmitter through the transmission line. The other two key elements are the director and reflector, which constitute the parasitic elements. The length of the parasitic elements depends on whether they act as directors or reflectors.

The key is **reinforcement** of the radiated wave by the parasitic elements. It's easiest to understand Yagi operation by looking at the receiving case, where we have a dipole driven element and a director and reflector. The received signal is first intercepted by a parasitic element, which extracts energy from the radio wave and reradiates it. The dipole receives the signal directly from the signal source as well as from the parasitic element; the latter signal reaches the dipole slightly out-of-phase with the original signal.

The signal from the parasitic element, if the element is not connected to a load and the signal reaches the dipole at the right instant, will reinforce the signal received directly by the dipole. The director is placed "in front of" the dipole, while the reflector is situated "in back of" the dipole to perform similar functions but in opposite directions. Both kinds of parasitic elements provide signal reinforcement when adjusted properly in terms of spacing and length to ensure that the reradiated energy reaches the resonant dipole in proper phase with the radio signal received directly by the dipole.

The dipole itself, which is resonant and terminated in a load, will enable energy to be extracted from it and be sent down the transmission line to the receiver. Not only will a significant power gain in a given di-

rection be realized, but signals from the side and rear of the array will be attenuated appreciably, thus affording a good deal of "physical selectivity" in reception. A similar phenomenon to that described takes place when transmitting, but in reverse: the transmitted signal is reinforced in the desired direction and attenuated off the rear and sides of the antenna.

In practice, the Yagi is typically referred to as a **beam antenna**—an antenna that has gain and has marked unidirectional characteristics. It is one that radiates energy mainly in one direction at the expense of other directions, much in the fashion of a flashlight's beam. The long-range potential of a good directional beam antenna is vastly better than that of an omnidirectional antenna, such as a vertical or vertical ground plane. A good beam can easily mean the difference between working stations that can't even be heard, much less worked, when using a simpler, non-gain-type antenna.

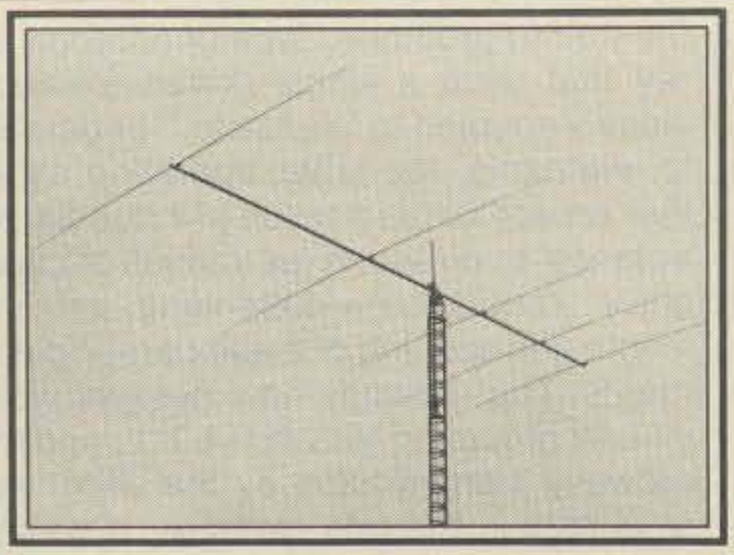
To this point, we have mainly spoken about Yagis in the abstract. Let's now look at practical two-, three-, and multi-element arrays.

The Yagi Beam

The advantages offered by the Yagi are well-known; an important difference between a station that "works out" and one that doesn't is usually found in the antenna being used. With a beam, it's often possible to obtain excellent, competitive results even if running low power and using simple gear. For top DX and contest work, use of a Yagi beam is usually necessary for top performance, and is second only to a few specialized antennas, such as the rhombic and some quads.

Both two- and three-element arrays are popular and efficient beam antennas. They can provide considerable power gain not possible with simple dipole and vertical antenna systems. The entire antenna is normally rotated to allow its directivity and gain—both on transmitting and receiving—to be focused on any desired point on the compass; the beam can be aimed (directors in front) in the desired direction for optimum performance. Yagis may be single-band or multi-band arrays; this month we will consider only the monobander. The arrays can be mounted either horizontally, with the plane containing the elements parallel to the earth, or vertically. Typically, the Yagi is polarized horizontally on h.f., v.h.f., and u.h.f. frequencies, although vertical polarization is popular on 10 meters, 11-meter CB, and v.h.f.-f.m., where communications with vertically polarized mobiles is common.

The two-element array is a good bet where space and mechanical considerations preclude the larger structure required for a three-element or larger array. Generally, the reflector is spaced about 0.15 wavelength from the driven element, though spacings as low as 0.1 wavelength are effective. Typical 2-element array gain is about 7.1 dBi, or 5.0 dBd, depending on spacing and other factors. Front-to-back (F/B) ratio is typically 12–15 dB.

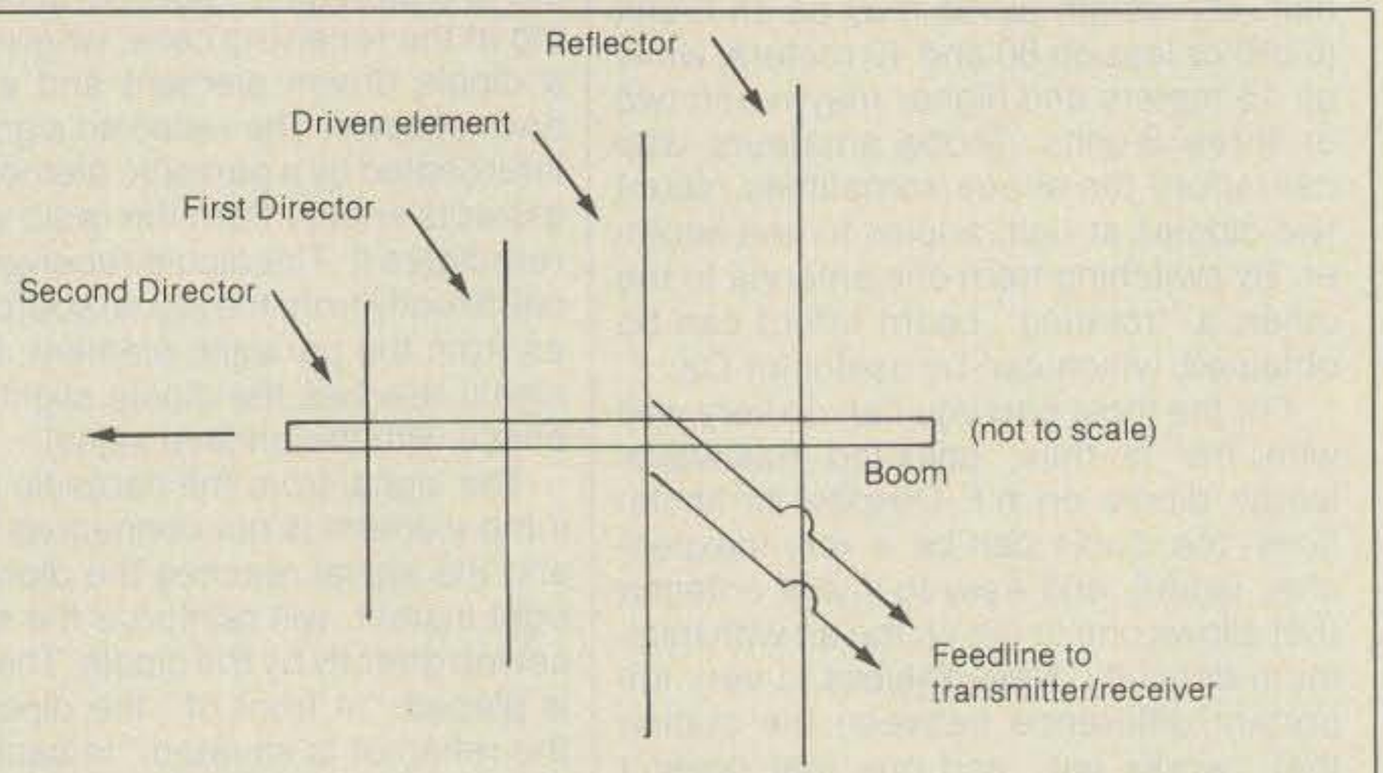


Departing from conventional Yagi design, KLM's 20-meter "Big Sticker" monobander has dual driven elements for a uniform gain over a considerable bandwidth and a high F/B ratio. The 5-element design pictured has a claimed gain of 9.7 dBd and an impressive 30 dB F/B ratio. The 65-pound antenna has a boom length of 42 feet 3 inches and a maximum element length of 37 feet. (Photo courtesy KLM Electronics, Inc.)

Probably the most popular beam is the three-element array, representing a popular compromise between the lower cost, gain, and size of larger arrays. The three-element array, with a director, driven element, and reflector, exhibits a typical gain of 10.1 dBi, or 8.0 dBd, depending mainly on spacing; F/B ratio usually runs 15–20 dB. Usual driven-element reflector spacing is in the range of 0.15 to 0.25 wavelength, with 0.2 wavelength representing a good compromise. Director spacing is relatively uncritical over a broad range of dimensions. So-called "wide" spacing of both directors and reflector is generally desirable from a gain, impedance matching, and tuning standpoint. But the mechanical problems occasioned by wide spacing on the lower bands, such as 20 meters, can introduce considerable construction difficulty. For this reason, overall boom lengths are usually constrained when designing beams for use on this band. Fig. 1 shows comparative forward gain figures.

Larger arrays are often practical on the higher h.f. and v.h.f./u.h.f. ranges. Generally speaking, the more elements, the better the performance. A four-element beam will afford more gain than will a three-element array, as long as the boom used will allow for at least 0.2 wavelength spacing between elements. Obviously, tuning for maximum gain or F/B ratio involves a number of interlocking variables, including element spacing, length of elements, and element diameter. A four-element array typically provides a usable gain of about 12.1 dBi, or 10.0 dBd, and an F/B ratio of 20–25 dB. A simplified diagram of a four-element array is shown in fig. 2.

Four-element and larger arrays present some special problems, particularly if element-to-element spacing is close (less than about 0.2 wavelength). With close-spaced arrays, the radiation resistance of the driven element may be very low, so low that ohmic losses in the conductor can consume a significant amount of power. The elements should



Sketch above shows a four-element Yagi, consisting of two directors and one reflector in conjunction with a driven (directly excited) element.

The elements may be either in the horizontal or vertical plane. The directors are made shorter than the driven element, while the reflector is slightly longer. The metal elements, usually made of aluminum tubing, are mounted to the boom by special brackets and mounting hardware. Inter-element spacings of 0.15 to 0.25 wavelength are commonly used.

The antenna system may be fed by breaking the driven element in the center and feeding in dipole fashion, or a Gamma match can be used. Using the latter feeding method allows the array to be at DC ground potential for better lightning protection.

Fig. 2– Simplified diagram, four-element Yagi array.

be made of heavy tubing (one-half to one inch in diameter): a conductor of large diameter has less ohmic resistance as well as lower Q—both factors being important in such antenna systems because of the low impedance involved. From a practical standpoint, while the four-element array can offer an improvement on reception and be sharper on transmit than smaller arrays, the advantages of having more elements may not justify the mechanical problems associated with optimum spacing, or the electrical problems caused by close spacing.

More About Gain And F/B Ratio

We've indicated that the parasitic array's gain is dependent on several interrelated factors, foremost among which is element spacing. For a given spacing, a tuning condition exists that will yield maximum gain. The gain "passband curve" is a bit lopsided, with more gain occurring on the high-frequency side of the design frequency and less gain occurring below the design frequency. For example, a three-element array cut for 14,150 kHz may show a 1 dB or greater difference in gain between frequencies 1% lower to 1% higher than the design frequency. Gain will drop off dramatically past these limits, notably as the resonant frequencies of the parasitic elements are approached. Gain eventually drops close to zero, about 3% off the design frequency of the driven element. The maximum operational bandwidth for a three-element Yagi is usually considered to be about ± 2% of the design frequency.

Maximum F/B ratio rarely coincides exactly with the condition that gives maximum forward gain; although the beam is usually tuned for maximum forward gain, in some cases the beam is actually tuned for maximum F/B ratio—an operator's decision. The F/B ratio curve is a very sharp one, and it deteriorates sharply at both ends of the usable frequency band. F/B ratio is also quite sensitive to boom length. F/B ratio can deteriorate or become erratic due to the electrical effects of nearby objects, including other antennas, especially as the array is rotated through the compass.

Since the impedance of the driven element varies with tuning and spacing, it's important to note that if the antenna system is to be precisely tuned, it's done *before* the match between the transmission line and the antenna's driven element is completed. Tuning and matching are interrelated, however, so it's usually necessary to go through several adjustment iterations to ensure that both matching and tuning are correct. For electrical convenience, grounding safety, and ease of tuning, most modern beam designs put the entire array at d.c. ground potential, with a gamma match used for matching the feedline to the array. More on matching and tuning later.

Frequency (kHz)	Driven Element	Reflector	First Director	Second Director
14050	33′ 5⅜″	35′ 2½″	31′ 9⅜″	31′ 1¼″
14250	32′ 11¾″	34′ 8½″	31′ 4″	30′ 8″
21050	22′ 4″	23′ 6″	21′ 2½″	20′ 9⅛″
21300	22′ ¾″	23′ 2⅝″	20′ 11½″	20′ 6¼″
28050	16′ 9″	17′ 7⅝″	15′ 11″	15′ 7″
28600	16′ 5¼″	17′ 3½″	15′ 7¼″	15′ 3⅜″

The table above shows nominal element lengths for a typical h.f. 4-element array using 0.2-wavelength inter-element spacing. For closer spacing, on the order of 0.15 wavelength, the length of each element is increased slightly. Use of 0.2 wavelength spacing results in wider bandwidth and slightly higher gain than if 0.15 wavelength spacing were used.

The table can be used to determine the element lengths needed, interpolating between the listed dimensions if compromise c.w./phone coverage is desired in the same array. The element lengths given also apply to two- and three-element beams.

Although a beam's tuning can be checked as part of the installation process, the dimensions shown in the table will generally be found to be close enough without resorting to further checking, unless optimization of either gain or F/B ratio is a must.

Fig. 3– Nominal element lengths for h.f. 4-element arrays (10/15/20-meter phone/c.w.).

Just what does a few dB of forward gain, or F/B ratio, mean in practical terms? A gain increase over the simple dipole or vertical is substantial, as it may, for example, mean a 6 dB gain, equivalent to a power gain of four times; this represents a full S-unit change on the receiving end. This is equivalent to increasing power from 100 to 400 watts, a substantial increase. As a result of this power multiplier effect, a good beam antenna, coupled with moderate to high power, often means the difference between working the rare DX station and not working it in a pileup. On the other hand, trying to squeeze out the last possible dB of antenna gain or F/B ratio, possibly going to a mechanically oversized array, is marginal at best. If you're in a DX pileup with hundreds of competing amateurs trying to work a rare station, it's doubtful that a 1 or 2 dB difference would help, and such a small increase just doesn't mean much in the real world of nuts-and-bolts antennas. A gain of 4–5 dB is in the "gray area," however, and might thrust your signal up over the noise and the competition and make it stand out.

A final point: The standard linear Yagi is by far the most common type of beam in use today. Although beyond the scope of this survey series, we should point out that it's possible to stack Yagis either in broadside or collinear fashion for added directivity and gain, although these techniques are applicable mainly on v.h.f./u.h.f. frequencies. The ARRL *Antenna Book* and other standard antenna texts have details.

Fig. 3 shows typical h.f. monoband beam antenna dimensions for a four-element array.

Summing Up

In this month's column, we highlighted the significance of the dipole, introduced parasitic element theory and operation as it applies to the Yagi, and covered various single-band beam configurations. In upcoming columns, we will continue the discussion, getting into multi-band or trap arrays; construction and installation; feeding, matching, and tuning; on-the-air techniques; and "which antenna is best" considerations. See you then.

73, Karl, W8FX

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CIRCLE 62 ON READER SERVICE CARD

Listening and comprehending what you hear can be worth more than an amplifier. Working DX starts with hearing DX. It's as simple as that.

The Gentle Art Of Listening

How To Hear And Work DX

BY LARRY BROCKMAN*, N6AR

In conjunction with our regular series on DXing by Bill Kennamer, K5FUV, I asked Larry to prepare a co-series, if you will, on DXing from his point of view. It's really meant as a "double-hit" selling job on the joys and pitfalls of DXing. It's also a strong pitch to the newcomer and newcomer to DXing to "do it right." We've all heard what passes for amateur radio on the bands these days, and a lot of it can be avoided in future generations of DXers, providing they get a good foundation today.

Some of us don't live that close to an "Elmer" these days, and the ranks of Elmers that one can emulate and learn from have thinned out. Since CQ has traditionally been the DXer's choice of magazine and the magazine for operators in general, we thought it only proper and fitting to provide the educational material for the novice in this specialized area of amateur radio. We at CQ are fortunate in being able to tap some of the greatest "pros" in DXing today and have them share their knowledge and experience. This is another part of what, in the words of WA6AUD, "DX is." —K2EEK

I've been quite critical regarding certain DXing practices that have popped up over the last five years—specifically, the growing emphasis on list and net uses for working DX. Some have suggested that the problem ought to be approached from a positive rather than a negative point of view. One positive approach is to provide a "How To" service to the readers. This may, in fact, be an ideal time to do a "How To" article on DXing. Today amateur radio is experiencing a tremendous growth in numbers. With that growth are inevitable growing pains. Among them are the formulative attitudes of that new sea of amateurs who stumble onto DX, repeaters, contests, traffic, or whatever. Just what is the approach preferred by experienced DXers, and how do the host of newcomers find out what the best way of approaching DXing is?

I learned to DX from a combination of on-the-air experience and apprenticeship over a 20-year period. There is just no substitute for the experience that time provides, not to mention the benefits accrued by observing the old timers in action. However, I cannot claim to be the reigning authority on DXing, even with 20 years of experience. Perhaps guys like W6AM and W6YY can, but I doubt that very many can make that claim. So, I will just attempt to do my best. Oh, one other thing: these "How To" notes are going to be circulated among some of the old timers for critique, so don't blame me for all of this advice.

The Appeal Of DX

In late 1958 I listened eagerly one day as a high-school buddy tuned his old SX-100 across the 10 meter band in the *CQ* WW Phone Contest. Although I had been interested in shortwave listening, I hadn't yet really been bitten by the bug. Here, however, was a buddy in just a few short hours contacting Laos, Japan, New Zealand, Argentina, the Philippines, Russia, and other exotic lands. He was using an old beat-up rig and a small beam just 10 feet above the roof. I'll never forget his rotor—a pole through the roof with a handle on it. I got bitten by the DX bug right then and there.

As I continued to listen over the next few weeks, it became even more fascinating—all those rare and exotic places to talk to. I just loved eavesdropping on all those VK and ZL ragchewers from down under. And then there were all the competitive challenges—lots of awards and contests to participate in. The propagation also fascinated me, especially "long path" and some of the weird paths to India and Central Asia. Yes, DXing really sounded like the thing.

Just imagine how dissappointed I was when I got on the air as a newly licensed Novice. I couldn't copy much of anything, let alone work any of it. And where was all that DX I had heard on phone? Well, my buddy worked with me until I got my General Class license. Then things were more fun, but boy was the DX hard to come by. Why was I always getting beat out? Why didn't some of the guys give a little guy a chance?

It wasn't until I met an honest to goodness old timer (I'll call him Ralph) that things really began to click on how to DX. Ralph was, and still is, a simply amazing example of a DXer. He showed me one month's harvest from the QSL bureau, and I couldn't believe what he had worked. How did he do it? I'd spent all kinds of time listening after school, and calling too, but I just never seemed to achieve Ralph's results. Why?

Well, he didn't do it with umpteen kw or with wide-spaced multi-element yagis. He simply didn't have that kind of station. From listening to him, I knew he didn't do it with non-stop calling. He didn't do it with lists and nets, because in those days there were none. How he did it (and still does) took some time to appreciate. It is simply a combination of patience, endurance, listening, and experience. We will explore how all of these ingredients can be mixed to make a DXer in this series of articles. We will cover some techniques and rules of thumb as well.

The Gentle Art Of Listening

Beyond a shadow of a doubt, the most important thing to learn about DXing is the art of listening. First let us assume that you do not have the biggest signal. Be realistic—you don't. And that's when listening is of the utmost importance. Listening can help you in so many ways, it's hard to even begin to describe them. Maybe the best way to introduce the concept is by postulating a few "ifs."

1. **If** you know when and where to look for a DX station, but he's not there on the

*7164 Rock Ridge Terrace, Canoga Park, CA 91307

air as yet, then if you are a keen listener, you can catch him right away when he first comes up—before everyone else has spotted him.

2. If you listen very carefully, and if the DX station gives a verbal change of plans that others might not hear or were not paying attention to, then if you respond to that change in direction fast enough, you can outwit the rest of the pileup. (How many times does the DX station say where he is listening, yet many continue to call him on his own frequency!)

3. If the DX station is weak, or covered up with a carrier and/or QRM, if you are a good enough listener, you can hear him and work him while others are standing by or calling totally out of synchronization with him.

4. If you pass by the big, juicy pileup that everyone and his brother are in and tune around and really listen, you might catch a really rare one. In other words, it's not just the loud DX station that counts, it's anything that you can hear that you need.

5. If you really and truly develop your ability to listen during a pileup, you will find that the DX station answers many fellows who never hear their calls being answered by the DX. In other words, your call may already have been answered, but you are not listening well enough to recognize that you were answered.

6. If you listen to a DX station with a big pileup on him (don't call at first, just listen), keep track of who got through and how (frequency, timing of the call, etc.) You can learn more about how to work him by doing this for a while than if you called him non-stop.

What Does It Mean To Listen?

We could go on, but our point would just be beaten to death. Lest we be misinterpreted, though, it is really essential that "listening" be defined a little better. Listening does not mean the same thing as hearing. You can hear a concert or a song, but if you do not listen to it, you are not necessarily aware of what you heard. What we mean by listening is to pay very, very close attention to, to be very keenly aware of, *what* you want to hear, and to reject whatever else you could be hearing that you don't want to listen to at the same time.

Suppose you are operating in a contest from W6 land in a multi-multi effort. Operator 1 sits down at the 40 meter position the second day of the contest, tunes across the band a few times, gets up in disgust, and announces, "We've worked everything; I give up." Operator 2 sits down and works 15 stations over the next 30 minutes, and comments that Operator 1 was not listening. He is absolutely correct. They both heard the same thing, but only one of them was listening. How can the ability to listen that Operator 2 displayed be learned?

Well, believe me, it takes effort. I suggest that a few exercizes would help, so a few exercises have been given below for your consideration.

1. Just listen to a big split-type pileup (the DX station is listening on a different frequency than he is transmitting on) for a while. Don't call. Make it a point to find every station the DX station comes back to. Observe, make notes, whatever, how these guys are getting through. What is the DX station's tuning pattern? (I'll bet you the loudest guy doesn't always get through first.)

2. Tune in a loud DX station. Now detune your receiver 1 or 2 kHz either way and find a weaker DX station. Force yourself to copy the weak one with the loud DX station present.

3. Observe one of those non-stop pileups that are transceive. Watch your S meter, and listen to the din of stations calling. Now, as a function of time, evaluate when during that pileup a "window" existed where a guy had a chance to get through. (What I mean is that if you were the DX station, when would you be able to pick out a call?) Then make a note to yourself about who was calling during that window. See how well you guessed when someone is answered by the DX station. Did you notice that the window occurs sometime in the middle of the pileup quite often, not just when the pile begins to call or finishes calling? Also, if you listen often enough, I'll bet you will see that the same guys are getting through all the time, and they are not always the loudest either.

4. In that same pileup listen very intently to the DX station when you can hear him. How strong is he on your S meter, or what is his pitch on c.w.? After a few transmissions, see how well you can pick him out of the mess when he is transmitting right in the middle of it. (It happens often, believe it or not.) If you learn to do that well, you can synchronize your transmissions ever so much more effectively than the guy who is not really trying to listen.

5. Listen to a few semi-rare DX stations (ones that attract a half dozen callers all the time). Observe how they like the guys to call them. Do they like long calls or short calls? Tailending? How do they like to be tailended? Suffixes only? Phonetics? Fast c.w. or slow c.w.? Watch what works and what doesn't work.

6. Tune around and listen to a few Ws call CQ DX. What kind of CQs get answers? Long ones, short ones, fast ones, slow ones, directional ones, ones at the beginning of the band or at the end of the band, etc.? Then try one other thing: listen to CQs by DX stations, and ask yourself the question, which ones would you pass over, which ones would you answer, and why?

Next Time

Next time we will discuss the proper attitudes one must display to be a successful DXer.

a monthly feature by
FRANK ANZALONE, W1WY

Contest Calendar

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Complete rules for our 160 Meter Contest appeared in the December 1981 issue with a follow-up in last month's Calendar, so it would serve little purpose to repeat them again, especially since they are the same as in previous years.

Last year's phone section did not generate the DX activity generated by the c.w. section in which we were fortunate in hitting a good weekend. However, considering the fact that this was our first time on phone, and also that many DX countries do not permit phone on 160, I think we did very well. We should do much better this year now that the word has gotten around.

Our 160 Contest Director, Don McClenon, N4IN, reported that only a very small percentage of the active stations submitted logs. That's regrettable, since it's only by your returns and remarks and suggestions that we are able to plan future activities.

The C.W. results story in the December issue referred to the World Trophy as the W0AW plaque presented by the NCCC (Northern California Contest Club). This is true, but a clarification is in order. It's the W0AW Memorial Plaque sponsored by the NCCC from donations by "Friends of John Doremus." John had many top band friends, and donations to continue this award can be sent to me. I will see to it that you get due credit with the NCCC's W0AW Memorial Fund awards committee.

The West Gulf A.R.C. continues its sponsorship of plaques for the winning U.S. and European single operator c.w. stations. How about a couple of donors for the phone section of the contest? Write to me for details.

I continue to receive contest announcements too late to make a current issue. May I again remind you that our deadline is three months prior to the month of the activity: February 15th for the May issue, March 15th for the June issue. And send it to my home address; that's why it's listed in the Column.

73 for now, Frank, W1WY

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

*	**Jan.**	**29-31**	**CQ WW 160 M. C.W. Contest**
	Jn.31	- Fb.1	Classic Radio Exchange
	Feb.	6-7	Arizona QSO Party
*	Feb.	6-7	South Carolina QSO Party
*	Feb.	6-7	RSGB 7 MHz Phone Contest
	Feb.	7-9	NH-VT QSO Party
	Feb.	13-14	Dutch "PACC" Contest
	Feb.	13-14	QCWA C.W. QSO Party
	Feb.	13-14	YL-OM Phone Contest
	Feb.	13-14	YU 40 & 80 M. CW Contest
	Feb.	13-14	WAS SSTV Contest
	Feb.	13-14	Oregon QSO Party
	Feb.	13-15	TWO Land QSO Party
	Feb.	20-21	ARRL DX C.W. Contest
*	**Feb.**	**26-28**	**CQ WW 160 M. Phone Contest**
*	Feb.	27-28	French Phone Contest
	Feb.	27-28	YL-OM C.W. Contest
	Feb.	27-28	RSGB 7 MHz C.W. Contest
	Feb.	27-28	G-QRP Activity
	Mar.	6-7	ARRL DX Phone Contest
	Mar.	13-14	QCWA Phone QSO Party
	Mar.	13-14	Virginia QSO Party
	Mar.	20-21	Bermuda Contest
	Mar.	20-21	BARTG RTTY Contest
	Mar.	20-21	Tennessee QSO Party
	Mar.	**27-28**	**CQ WW WPX SSB Contest**
	Apr.	3-4	Polish C.W. Contest
	Apr.	7-8	DX-YL to N.A. YL C.W.
	Apr.	14-15	DX-YL to N.A. YL Phone
	Apr.	17-18	Polish Phone Contest
	Apr.	17-18	ARCI QRP SSB Party
	May	**29-30**	**CQ WW WPX C.W. Contest**

* Covered last month.

Classic Radio Exchange

Starts: 2100Z Sun., January 31
Ends: 0400Z Mon., February 1

This is the winter edition of this unusual event. Unfortunately, copy was not received in time to make the January column. Rules are the same as for previous events.

Object is to restore, operate, and enjoy older equipment with likeminded hams.

A classic radio is defined as any equipment at least 10 years old, an advantage in the scoring, but not required in the contest. (It would seem to me that at least 25 years old would be more appropriate for a classic rating.)

The same station may be worked on each band and mode and with different equipment combinations. Non-contestants may be worked for credit.

Exchange: Name, RS(T), state, province, or DX country, and receiver and transmitter type (*i.e.*, home brew, 807 final, etc.). Also any other interesting comments or information.

Scoring: Add number of different transmitters, receivers, and state, provinces, and DX countries worked on each band. Multiply that total by the number of QSOs made on all bands. Multiply that total by your classic multiplier (total years old of all transmitters and receivers used) (3 QSOs minimum per unit). If your equipment is a transceiver, multiply age by two.

Frequencies: C.W.—60 kHz up from low band edge, 1810 on 160. Phone—3910, 7280, 14280, 21380, 28580. Novice—3720, 7120, 21120, 28120. (Try 10 on the first quarter hour, 15 on the half hour, and 20 on the three-quarter hour.)

Awards: None were specified, but I'm sure all leading scorers will be rewarded.

Send logs with comments, pictures, anecdotes, etc., to: Stu Stephens, K8SJ, 1407 Hollyrood Road, Sandusky, Ohio 44870. Include a large s.a.s.e. for a copy of the *Classic Newsletter* with the results.

Arizona QSO Party

Starts: 2000Z Saturday, February 6
Ends: 0800Z Sunday, February 7

This I believe is a new one sponsored by the Arizona A.R.C. The dates are the same as for the South Carolina QSO Party. To make matters more confusing, the suggested operating frequencies are exactly the same for both activities. The only saving feature is that this is only a 12-hour affair, as opposed to 30 hours for South Carolina. (The South Carolina Party was held in March last year, so the change of dates is not to their advantage.)

Exchange: RS(T) and QTH. County for Arizona stations; state, province, or country for all others. Each station may be worked once only per band.

Scoring: One point for s.s.b. contacts, 2 points if on c.w. Out-of-state stations will use Arizona counties for their multiplier

(14 possible), plus an additional multiplier if you work the Club station, W7IO. If you work all counties and W7IO, you get a bonus and can double your multiplier (mult. of 30).

Arizona stations use states, provinces, and DX countries for their multiplier.

Frequencies: C.W.—1805, 3560, 7060, 14060, 21060, 28060. S.S.B.—1815, 3895, 7230, 14280, 21365, 28560. Novice—3725, 7125, 21125, 28125.

Awards: Certificates to the highest scoring station in each state, province, and DX country. Also in each Arizona county.

Include a summary sheet with your log and a large s.a.s.e. for a copy of the results. They go to: The Arizona Amateur Radio Club, 16647 North 34th Ave., Phoenix, AZ 85023.

New Hampshire-Vermont QSO Party

2100Z Sun. to 0500Z Mon. February 7/8
1100Z Mon. to 0100Z Tues. February 8/9

This is the usual date for the Vermont party, but this year it has been combined with the New Hampshire party. The times seem to be a bit unusual, however.

Exchange: QSO no., RS(T), and QTH. County and state for NH/VT, state or country for others.

Scoring: One point per contact. NH/VT multiply total by number of states and countries worked. Others use NH (10), VT (14) counties for their multiplier.

The same station may be worked once only on each band regardless of mode, and NH/VT may contact other in-state stations for QSO points.

Frequencies: Phone—3930, 3960, 7230, 7260, 14280, 14320, 21360, 28570, 50110, 144.2. C.W.—3530, 3760, 7030, 7130, 14080, 21060, 21150, 28070, 144.1.

Awards: A wide selection of certificates for all areas; the W-NH award for working all NH counties; the W-VT award for working 13 of the 14 VT counties; and plaques to the top scoring NH and VT single operator stations.

Logs go to: Rex Lint, K1HI, 10 Hartwood Drive, Merrimack, NH 03054. Include an s.a.s.e. for a copy of the results. Deadline is March 15th.

Dutch "PACC" Contest

Starts: 1400Z Sat., February 13
Ends: 1700Z Sun., February 14

The main purpose of this contest is to help amateurs obtain the PACC Award. QSL's or other written confirmation is needed from 100 different PA stations. However, applicants for this award will not have to submit cards for QSO's made in the contest, provided that the station claimed has submitted a log. This also applies for the "Worked All Provinces" award.

Use all bands 1.8 through 28 MHz, phone or c.w. The same station may be worked on each band but on one mode only for QSO and multiplier credit.

Exchange: RS(T) plus a QSO number starting with 001. PA/PI stations will also include two letters which will indicate their province (599001/GR).

There are 12 provinces: DR, FR, GD, GR, LB, NB, NH, OV, UT, YP, ZH, ZL.

Scoring: Each QSO with a PA/PI station counts 1 point. DX stations determine their multiplier by the number of provinces worked on each band (max. of 72 possible).

Final Score: Total number of QSO's multiplied by the sum of provinces worked on each band.

Awards: Certificates to the top scoring station, single operator, multi-operator, and s.w.l. in each country and call areas of JA, LU, PY, UA9/0, VE/VO, VK, W/K, ZL, and ZS.

There is also an s.w.l. section. Call of the Dutch station heard and the serial number as well as the station being worked must be logged. Scoring same as above.

Indicate the multiplier in a separate column in your log only the first time it is worked on each band. Include a summary sheet showing the scoring, your name and address in Block Letters, and the usual signed declaration.

Mailing deadline is March 31st to: PACC Contest, Att: F. Th. Oosthoek, PA0INA, Fred. Maystraat 36, 4614 EH Bergen op Zoom, Netherlands.

QCWA QSO Party

CW: Feb. 13–14 SSB: Mar. 13–14
Starts: 0001 UTC Saturday
Ends: 2400 UTC Sunday

The Quarter Century Wireless Association will be celebrating their quarter century QSO Party this year. And like in each of the past 25 years, they have again made a change in their scoring system, this year in the multiplier.

Only members are eligible to participate, the theme being to renew old acquaintances and meet new members, also offering an excellent opportunity to build up your totals for the many QCWA awards. Working members in 50 states, 60 chapters, 100 members, and 500 members.

Non-members who have been licensed for 25 or more years can write to QCWA, 1409 Cooper Drive, Irving, Texas 75061 for application information.

The same station may be worked once only regardless of the band. C.w. and s.s.b. are separate contests and require separate logs.

Exchange: QSO number, your name, and Chapter I.D. (name or number, members with no affiliation use "At Large," or AL).

Scoring: One QSO point for each member contacted. This year there are two multipliers. Each different chapter worked is a multiplier of one. Each DX member contacted is a multiplier of two.

(*Example:* 40 QSO's, 10 Chapters, 6 DX stations. *Final score:* 40 × (10 + 12) = 880.)

Frequencies: C.W.—3545, 7045, 14045, 21055, 28055. S.S.B.—3915, 7245, 14295, 21365, 28615. Plus or minus 15 kHz.

Awards: Certificates to the top 5 scorers in each section, and Plaques for the overall winner, c.w. and s.s.b.

Mailing deadline for all entries is March 31st. It is suggested you submit your c.w. log by Feb. 28th.

This year they go to: The Pine Tree Chapter, Att: Glen Baxter, K1MAN, Long Pond Lodge, Belgrade Lakes, ME 04918.

YL-OM Contest

Phone: Feb. 13–14 C.W.: Feb. 27–28
Starts: 1800 UTC Saturday
Ends: 1800 UTC Sunday

It's the YL's working the OM's in this annual activity organized by the YLRL. All bands may be used, but cross-band or contacts with stations on Net frequencies do not count. *(I would suggest that a list of frequencies on each band be indicated.)*

Phone and c.w. are separate contests and require separate logs. The same station may be worked once only regardless of band.

Exchange: QSO no., RS(T) and ARRL section or DX country. (See *QST* for section list.)

Scoring: Each QSO is worth 1 point. Multiply total by number of ARRL sections and DX countries worked.

There is also a power multiplier of 1.25 for stations running 150 watts or less on c.w., and 300 watts p.e.p. on s.s.b. Multiply your score by the above factor for your final score.

There is a penalty of 3 contacts for each duplicate contact removed from the log by the contest committee.

Awards: First place cups to both YL and OM winners in each contest, 2nd and 3rd place winners wil receive certificates. The top scorers in each U.S. and VE call district and DX countries will also receive certificates.

Logs must be mailed by March 15th and received no later than April 5th to be eligible *(with the cooperation of the Postal Department).*

This year they go to: Sandra Heyn, WA6WZN, 962 Cheyenne Street, Costa Mesa, CA 92626.

YU 40/80 Meter C.W. Contest

Starts: 2100Z Sat., February 13
Ends: 2100Z Sun., February 14

This evidently replaces the old YU 80 Meter Contest that was usually held in January. It's a world-wide type contest, c.w. only on two bands, 40 and 80 meters.

Classes: Single operator, multi-operator, and s.w.l.

Exchange: RST plus a 3-figure QSO number starting with 001.

Scoring: QSO's with YU's are worth 5 points on 40 and 10 points on 80. Contacts between stations in the same continent, 1 point on 40 and 2 points on 80. DX contacts, 2 points on 40 and 5 points on 80.

Multiplier: Sum of DX countries and YU prefixes worked on each band.

Final Score: Total QSO points times the multiplier from both bands.

Single operator stations must stay on one band a minimum of 30 minutes. Multi-operator stations are permitted to operate both bands simultaneously, providing the station worked on the second band is a new multiplier, but you must stay on the main band at least 10 minutes.

Frequencies: 7010 to 7040 and 3520 to 3590.

Awards: To top scoring stations in each DX country and 2nd and 3rd place continental winners. The first-place continental winners and the top YU stations will be awarded Trophies (at least 12 hours of operation).

Taking credit for duplicate contacts in excess of 3% of the total will be cause for disqualification.

(K3TW was the only U.S. entry in the 1980 Contest and was a Continental Plaque winner with a score of 10,650. Maybe the new format will encourage additional entries this year.)

Include a summary sheet showing the scoring, and the usual signed declaration that rules and regulations have been observed.

Mailing deadline is March 15th to: Savez Radio Amatera Jugoslavije, P.O. Box 48, 11001 Beograd, Yugoslavia.

1980 "SAC" Contest Results North America

C.W.

U.S.A.

SM0COP/W1	26,080
W1AQE	7,632
AK1A	5,588
W1CNU	4,360
K1GQ	1,066
W1OPJ	357
K2SX	9,920
WA3DMH	1,323
W3ICM	1,131
KA3DDJ	1,064
N3RL	297
K4RZ	27,115
WA4QMQ	7,728
W4KMS	5,537
WA4OML	1,950
W4KO	1,428
WA4EFE	280
N5TP	32,508
K5BDX	14,697
N6AR	28,101
N6MU	21,560
W6UA	15,352
N6ZZ	5,408
N6AA	3,108
AE6U	1,092
AA6EE	414
N7ZZ	11,682
W7QK	4,085
N7DF	56
K8MR	6,136
W8UVZ	5,200
AA8S	3,913
K9BG	31,255
AI9J	12,925
N9EZ	10,560
W9QWM	3,612
KB9KU	1,200
KA9EAT	1,140
W0WP	42,240
W0IUB	19,710
W0KEA	7,425
K0DEQ	4,418
KA0CLS	630

Panama

HP1AC	3,440

Canada

VE1ASJ	30,770
VE3CGO	20,574
VE3DAP	20,124
VE3MFT	17,854
VO1AW	13,067
VE7IQ	8,880
VE2WA	8,056
XJ5AAD	345

Br. Virgin Is.

VP2VGS	31,598

Phone

U.S.A.

K1GQ	26,765
SM0COP/W1	18,360
AK1A	7,260
N1AFC	4,704
W1BZ	2,960
WA1ORP	1,650
N2CW	23,424
WA2UDT	598
W2CC	110
WA3DMH	15,136
W3ICM	11,154
LA4LN/W3	4,128
N3LA	1,275
WA4QMQ	19,980
K4HGG	13,260
W4KMS	6,784
WB4RZS	2,992
W4KO	1,890
W5SOD	1,008
N6ND	14,857
N6ZZ	667
N6AA	294
N7DF	12,312
N8BJQ	8,450
K9BG	27,063
K9ECE	20,680
W9SS	7,672
AI9J	1,898
W9QWM	1,350
W0WUU	6,161
KB0C	1,815

Multi-Op.

W6UA	10,360
KC0P	3,150

Cuba

CM2ER	330

Dom. Rep.

HI8LC	1,920

Puerto Rico

KP4AM	1,148

Canada

VE1AVX	65,303
VE3GCO	37,730
VE1IN	3,796
VE1CCC	3,588
VE3FEA	2,660

Br. Virgin Is.

VP2VGS	1,518

WAS SSTV Contest

1400Z Sat. to 0200Z Mon., Feb. 13–15

Organized by *A5 Magazine*, the object of this contest is to contact as many states as possible, with the emphasis on "quality," not just quantity, of contact.

Activity will be on all authorized and recognized SSTV frequencies in the h.f. bands.

Following is a verbatim description of the scoring. Score 100 points for each new state listed, 25 points per contact, with 10 bonus points awarded for live exchange of "mugshots." Color two-way contacts, or 256 or 128 (one-half speed) mode transmission. Station calls and signal reports must be exchanged in video format by either camera, keyboard, or light-pen generators. Alaska and Hawaii contacts count a bonus factor of 500 points. *(You figure it out.)*

Awards will be made in the form of certificates and subscriptions to *A5 Magazine*.

Mailing deadline for all entries is March 1st to: Contest Manager, A5 Magazine, P.O. Box H, Lowden, IA 52255.

Oregon QSO Party

1700Z to 0800Z Sat./Sun., Feb. 13/14
And 1500Z to 2400Z Sun. Feb. 14

This is a new one sponsored by the Brand-X Amateur Radio Assn. in commemoration of Oregon becoming the 33rd state on Feb. 14, 1859.

Exchange: RS(T) and QTH. County for Oregon stations; state, province, or DX country for others. (A station may be worked on each band and each mode.)

Scoring: One point per QSO, 3 points if its a Novice/Tech. Oregon stations multiply total QSO points by sum of Oregon counties, states, provinces, and DX countries worked. All others use Oregon counties for their multiplier (max. of 36).

Frequencies: Phone—1810, 3920, 7260, 14300, 21370, 28600. C.W.—60 kHz up from bottom of each band. Novice/Tech—10 kHz up from bottom of the Novice bands.

No specific awards mentioned, but I'm sure the usual certificates will be available.

Include a summary sheet with your entry. Novice and Techs must indicate their license class. Also include an s.a.s.e. for results, or if you desire official summary sheets.

Mail your requests and your logs to: Tim Burdick, WA7NVT, 138 N. 20th Street, Philomath, OR 97370. Logs must be received by March 8th to be eligible.

Two Land QSO Party

Starts: 2100Z Saturday, February 13
Ends: 0300Z Monday, February 15

Again sponsored by the South Jersey Contest Coalition, it's the states of NJ and NY working all comers in this one.

The same station may be worked once per band and mode, mobiles and portables each county change.

NJ and NY may also contact other in-state stations for QSO and multiplier credit.

Single operator stations are limited to 24 hours out of the 30 hours in the contest; multi-operators may operate the full 30 hours.

Exchange: RS(T) and QTH. County and state for Two Landers; state, province, or DX country for others.

Scoring: Each QSO is worth 2 points. Two's multiply total points by number of (states + VE provinces + DXCC countries + Two Land counties) worked. (NJ, NY, and the U.S. are multipliers.)

All others multiply total QSO points by the number of Two Land counties worked per band (10 through 160, 83 per band, maximum of 498 possible).

Frequencies: C.W.—1805, 3560, 7060, 14060, 21060, 28060. S.S.B.—1815, 3900, 7230, 14280, 21355, 28600. Novice—3725, 7125, 21125, 28125.

Awards: Certificates to the top scorers in each Two Land county, each state, VE province, and DX country. Also top mobile, portable, Novice, and multi-operator station.

Indicate each new multiplier in a separate column as worked. A summary sheet and the usual signed declaration are also requested. A large s.a.s.e. will get you a copy of the results.

Mailing deadline for your logs is March 20th, and they go to: South Jersey Contest Coalition, c/o Ken Newman, N2CQ, 81 Holly Drive, Woodbury, NJ 08096.

ARRL International DX Contest

C.W.: Feb. 20–21 Phone: March 6–7
Starts: 0000 UTC Saturday
Ends: 2400 UTC Sunday

Although we do not agree with the introduction in *QST* that this is the #1 DX Contest in all of "Hamdom," we will acknowledge the fact that it does stir up a lot of stateside activity.

Rules are the same as last year with one slight modification: aeronautical and maritime mobile stations may not be worked by W/VE's for contact credit.

I would strongly recommend that you send a large s.a.s.e. (2 IRC's for DX) to the ARRL for detailed information and sample entry forms.

Categories: Single operator, both single and all band. Multi-operator, single and multi-transmitter, and QRP, all band only, 5 watts or less output.

Multi-single transmitter stations must remain on a band at least 10 minutes once a contact is made, with one exception. One other band may be used during that 10-minute period if the station worked is a new multiplier only. Multi-transmitter, no limit but only one signal per band.

Exchange: RS(T) and state or province for W/VE's. RS(T) and power input for DX stations (3-digit number).

QSO Points: W/VE earns 3 points for each DX contact. DX gets 3 points for each W/VE contact.

Multiplier: Each DXCC country worked on each band for W/VE's. DX stations use U.S. states (48) and VE1-8, VO for their multiplier (max. of 57 per band).

Final Score: Total QSO points times the sum of the multiplier from each band.

Awards: Certificates in each category, in each country, and each ARRL section, plus a wide selection of plaques. Also certificates to DX stations making over 500 QSO's.

There are several disqualification rules which are listed in the official rules.

Mailing deadline for all entries is April 6th, and of course they go to the ARRL.

G-QRP Club Activity

Saturday & Sunday, February 27 & 28

The G-QRP Club holds three of these affairs each year. This year they will be held on Feb. 27 and 28, Sept. 11 and 12, and Dec. 26 to 31.

Times (GMT) and frequencies are as follows:

3560 kHz: 1200–1300, 1400–1500, 2100–2200.

7030 kHz: 1100–1200, 1300–1400, 2000–2100.

14060 kHz: 0900–1000, 1730–2000, 2200–2300.

21060/28060 kHz: 1000–1100, 1500–1730.

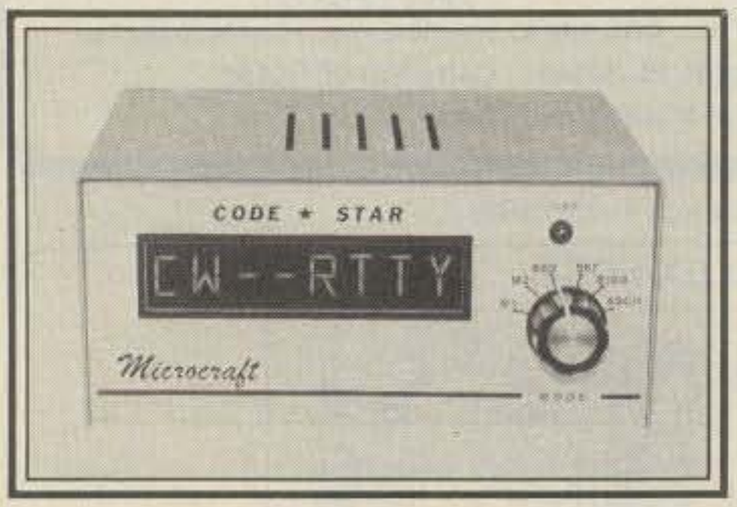
The Club also has weekly periods on Sundays, 1100Z to 1230Z and 1400Z to 1530Z on the above frequencies.

This is not a contest, but QRPers are requested to report their activity to: Christopher J. Page, G4BUE, Alamosa, The Paddocks, Upper Beeding, Steyning, West Sussex, BN4 3JW, England.

CQ SHOWCASE

Microcraft Code Reader

The all-mode code reader and code converter, CODE*STAR, is designed for Novices, s.w.l.'s, and veteran amateur radio operators. It is useful for persons trying to learn or improve their code skills. CODE*STAR's microcomputer monitors the incoming signal and converts it to characters on its large, easy-to-read LEDs. The unit decodes Morse code, Baudot (RTTY), and ASCII codes.



The code reader features two specially optimized Morse code ranges with auto-tracking of speed from 3 to 70 wpm. Proprietary analog and digital filter methods are employed to substantially reduce errors. An automatic gain control circuit providing up to 16 dB gain is used to help maintain signals under fading conditions. A built-in code practice oscillator is handy for code practice and learning the code. As an option, CODE*STAR can be used to drive a serial or parallel ASCII printer, TV terminal, or computer. The unit is available as a kit or factory wired and tested. The kit, Model CS-K, sells for $169.95 plus $5.00 shipping and handling. The factory wired unit, Model CSF, sells for $249.95 plus $5.00 shipping and handling. The optional ASCII output port kit, Model CS-IK, sells for $69.95, plus $2.50 shipping and handling. For more information, contact Microcraft Corporation, P.O. Box 513, Thiensville, WI 53092, or circle number 101 on the reader service card.

MFJ Video-Audio Distribution Amplifier/Switcher

The MFJ-1410 is both a distribution amplifier and a switcher. The distribution amplifier lets you tape up to four copies of the original with results that are as good as the original, the maker states. The video-audio switcher has interlocking push buttons that switch both video and audio signals. You can select from four incoming video-audio sources and instantly distribute to as many as four separate outputs at the same time without touching a cable.

The unit measures 6″ × 2″ × 6″. It uses standard RCA phono connectors that match those on VHS and BETA VCRs. The MFJ-1410 is available for $99.95 plus $4.00 shipping and handling. For more information, contact MFJ Enterprizes, Inc., 921 Louisville Road, Starkville, MS 39759, or circle number 104 on the reader service card.

Hal CWR685A Telereader Portable RTTY/CW Terminal

This compact electronic communications terminal is designed for reception and transmission of Baudot and ASCII tel-

eprinter signals as well as Morse code signals. The CWR685A includes a built-in green phospher CRT display screen and RTTY and Morse demodulators. The small size (12¾" × 11" × 5") makes it ideal for portable installations where space for equipment is limited. The terminal operates from 12 vdc. It comes with a fully detachable keyboard. The screen is formatted in 20 lines of 32 characters per line; a total of four different screen pages may be selected. The internal RTTY demodulator allows selection of all three standard shifts for either high tones or low tones.

Other transmit features include up to 15 lines of pretype on-screen buffer, automatic transmit/receive control, and a total of six 64-character programmable HERE IS messages. A parallel ASCII printer output is provided for connection to a receive printer. For more information, contact Hal Communications Corp., Box 365, Urbana, IL 61801, or circle number 107 on the reader service card.

Switchcraft Miniature Instrument Connector

The Tini "Q-G" instrument-grade miniaturized connectors with 3, 4, or 5 contacts are plug-in connectors with housings less than one inch in diameter. These Tini "Q-G" plugs and receptacles meet interconnection specs for high-density circuitry. The 4- and 5-pin contact versions are well suited to multi-circuit connections.

Either shielded or unshielded cables up to 0.115-inch diameter can be utilized with these connectors. A maximum cable diameter of 0.170 is possible on special order when the flex relief bushing is not used. For more information, contact Switchcraft, Inc., 5555 North Elston Ave., Chicago, IL 60630, or circle number 105 on the reader service card.

a monthly feature by
BILL WELSH, W6DDB

Novice

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Novice Roundup

The American Radio Relay League (ARRL) sponsors the Novice Roundup (NR) Contest each February. The Novice class of license came into existence in 1951 and the first Novice Roundup was held in 1952. This year's NR is the 31st one.

The name "Novice Roundup" began many years before Technician licensees were granted code operating privileges in the so-called Novice bands. The name remains appropriate because operation remains confined to the frequency segments (bands) available to Novice class licensees on a shared basis with all other classes of American amateur radio licensees.

The ARRL Novice Roundup Certificate.

Participants

This contest is primarily for American Novice and Technician class licensees, but General, Advanced, Extra, and foreign (DX) operators are also invited to operate in it. Novices and Technicians can work all amateurs (Novice, Technician, General, Advanced, Extra, and DX), but General, Advanced, Extra, and DX amateurs are only allowed to work Novices and Technicians in the contest. This is a good rule, because it guarantees that at least one Novice or Technician is involved in each NR contact.

Benefits

I advise you to operate in the NR even if you have a poor station and/or low code proficiency. It will be nice if you get a certificate (see picture of ARRL Novice Roundup Certificate of Merit) for working at least 200 NR contacts, and you will have just cause to be extremely proud if you are the top scorer in your ARRL section, or one of the ten top scorers in the country. However, you do not need to achieve these lofty accomplishments to benefit from NR activity. This contest provides a great opportunity to contact amateurs in many counties, states, and countries. You probably can work more different contacts during one day of the NR contest than you normally work in a month. These contacts can help you qualify for hundreds of operating awards.

NR operation will let you judge your operating skills and station performance against those of other operators. NR participation can also help you increase code receiving and sending proficiency. You can benefit in many ways by operating in contests, and there are contests every week, as listed in the Contest Calendar of this magazine.

2814 Empire Ave., Burbank, CA 91504

Competition And Awards

This contest provides a unique opportunity for Novices and Technicians to compete on the air against other Novices and Technicians in their own ARRL sections, plus those who operate from other ARRL sections. Novices just compete against Novices, and Technicians only compete against Technicians; Novices and Technicians do not compete against each other in this contest.

The ARRL issues a nice certificate to each Novice and Technician who makes at least 200 NR contacts, and an ARRL certificate is awarded to the top-scoring Novice and Technician in each ARRL section. The ARRL also issues appropriate certificates to the ten top scorers in the country.

General, Advanced, Extra, and foreign (DX) amateurs are invited to take part in the NR contest, but they are not eligible for NR certificates. These operators provide contacts, cards, and code practice for Novices and Technicians.

Multi-operator stations (two or more operators using the same callsign at one location, including loggers) are also ineligible to win NR contest awards. This rule keeps it a one-on-one contest and prevents a group (such as a club) from competing directly against an individual Novice or Technician operator.

No certificates are awarded to DX Novices who operate in the NR. However, American Novices will greatly appreciate opportunities to contact DX amateurs, and I hope many of you will be on the air. Very few (150) Novices and Technicians will earn a contest certificate, but the others are likely to be happy with a few DX contacts.

Dates And Times

The NR contest starts at 0001 UTC on the 30th of January and it ends at 2359 UTC on the 7th of February. To state it more simply, it starts Friday evening January 30th (local time) and it ends Sunday evening February 7th. The NR starts one minute past 4, 5, 6, and 7 p.m. PST, MST, CST, and EST, respectively. Similarly, the NR ends one minute before 4, 5, 6, and 7 Pacific, Mountain, Central, and Eastern Standard Times, respectively.

The NR contest length is 215 hours and 58 minutes. Novices and Technicians are allowed to work a maximum of 30 hours in the NR. The NR log must show each time one goes on and off the air during the contest, and the minimum allowable time off the air is 15 minutes. Listening time on the air counts as contest operating time, and it must not be shown as time off the air. I advise you to be completely honest in all contest matters; it helps you to accurately gage your improvement in subsequent contests.

Operating

Bands. All NR contacts must be made in the 80, 40, 15, or 10 meter Novice bands. No crossband contacts are allowed, such as listening on 10 meters and calling or answering on the 15 meter Novice

Jim Rhodes, KA4SZD, sent this picture of Skeet, his station logger. Jim advises that Skeet is strong on code but weak on radio theory. Kim Willingham, KA4JBX, helped Jim get started as an amateur. Jim obtained his Novice license in February 1981 and he is very active on the 40 and 15 meter bands. His station includes a Drake TR-4C Transceiver, Hammarlund HQ-129-X Receiver, plus 15 and 40 meter dipole antennas. Jim is 22 years old and he works for Albany Communications. He is an enthusiastic CQ reader. Jim advises that the Novice Roundup article really helped him enjoy that contest.

band. It does not help to work the same station more than one time on a band, or on more than one band, since credit is just allowed for one contact with each different station worked. It is fairly common to have DX amateurs call American Novices using voice (usually s.s.b.) on the 10 and 15 meter Novice bands; these cross-mode (voice-code) contacts do count in the NR, as long as both sides of the contact are within the same Novice band. Keep an up-to-the-minute alphanumeric check list (see single-sheet check list and dupe sheets [the dupe sheets are two-sided]) of all stations contacted during the NR to help you avoid working the same station more than one time.

Identification. Novices add /N and Technicians add /T to their callsigns during this contest to indicate their eligibility to all amateurs participating in the NR. As examples, a Novice with a callsign such as KA4ABC uses KA4ABC/N, and a Technician with a callsign like WA6FNM uses WA6FNM/T during the contest. Out-of-area operation is also indicated in callsigns to minimize confusion. As an example, if a Technician with an apparent California callsign such as WA6FNM is operating in the NR from Louisiana, he would identify as WA6FNM/5T to indicate that he is operating from the ARRL Louisiana section instead of the Los Angeles section.

General, Advanced, and Extra class licensees are not required to indicate class of license as part of the callsign used in the NR. However, many of us use /G, /A, or /E to make it very clear to other General, Advanced, Extra, and DX amateurs that we are not valid NR contacts for them; we are only valid NR contacts for Novices and Technicians. This additional identification is particularly useful in cases where callsigns such as KA6CUT and WB6PNY are used. Such callsigns might lead one to believe that these amateurs are Novice or Technician licensees, whereas they are both Extra class amateurs.

Objective. The idea is to work as many amateurs as possible in all the countries and ARRL sections you can contact. It is very helpful to maintain a check sheet to let you see at a glance which countries and ARRL sections you still need to multiply your NR score as you operate in the contest. It is simple to start with a list that shows all ARRL sections grouped by callsign areas and to cross out each section as it is worked to show that it is no longer needed as a contest multiplier. The following list of ARRL sections can be reproduced to serve as an aid during the NR.

Each time a new section or country is worked, it must be indicated (in sequence) in the NR log. Simply start with number one and continue up as you earn multipliers, including countries.

More than one section abbreviation is shown in the preceding list, if more than one is known to be commonly used. Very few foreign amateurs are usually contacted during this contest, and it is common practice to simply add the callsign of the first amateur contacted in each country to the check-off list to show it is no longer needed for NR multiplier credit.

Typical Contact. As is true in all contests, NR contacts should be as brief as possible. A typical good NR contact between KA4ABC and W6JEP in the first few days of this contest could be as follows:

CQ NR CQ NR CQ NR CQ NR CQ NR DE KA4ABC/N
CQ NR CQ NR CQ NR DE KA4ABC/N KA4ABC/N
CQ NR CQ NR CQ NR DE KA4ABC/N KA4ABC/N KA4ABC/N NR K
KA4ABC KA4ABC DE W6JEP W6JEP NR K
W6JEP DE KA4ABC $\overline{BT}$ 579 NC 579 NC $\overline{BK}$
$\overline{BK}$ R 589 LA 589 LA DE W6JEP $\overline{BK}$
$\overline{BK}$ R 73 CQ NR CQ NR CQ NR DE KA4ABC/N KA4ABC/N NR K

Look at the preceding typical exchange and evaluate it very carefully with regard to the comments in the rest of this paragraph. In the initial call, KA4ABC included the /N each time with his callsign to indicate contact eligibility to all other amateurs. Notice also that the number of CQ NR transmissions decreased from five to three and station identification increased from one to three during the calling sequence and that NR contest activity was again indicated prior to the invitation to transmit (K). When W6JEP answered the call, she just identified both stations twice, left off the /N, and indicated contest participation by sending NR before the invitation to transmit. Once the two-way contact has been established, there is no need to continue using /N or /T. The KA4ABC reply to W6JEP is very brief; the callsigns are just sent one time each and only at the beginning of the reply. The RST report and ARRL section are sent twice to minimize possible requests for repeats. Neither the term *RST* nor the word *section* precedes the report and League section, since it is obvious what both are, and the break sign ($\overline{BK}$) is used to eliminate unnecessary identifications. It is legal to use the break sign as long as each transmission in the series of two-way transmissions is less than 3 minutes long and identification is transmitted at least every 10 minutes during a long series of short transmissions. During contest activity, a series of short transmissions is not likely to extend 10 minutes, and the identification shown in the sample exchange suffices. Note that the W6JEP response is short; the R advises that the KA4ABC contest data has been received. W6JEP then sends the report (RST) and her section twice, identifies with just her callsign to give KA4ABC assurance that he is copying the correct signal, and sends the break sign to invite KA4ABC to respond. When KA4ABC answers, he sends R to indicate the contest data has been received, he may send best regards (73), and he then sends a short contest call in case another station

Jack Baker, KA0IFZ, has been licensed since May of 1980. He works 40 meters most of the time with just occasional contacts on 15 meters. He runs a crystal-controlled homebrew transmitter into a homebrew Novice kilowatt (250 watts) amplifier. His receiver is a Realistic DX-160 aided by a Q-multiplier and the antenna is a 40 meter inverted vee. Jack worked more than 300 contacts during his first year on the air, including almost all states and a few countries. Jack lives in Fort Collins, Colorado, which is also the location of the WWV time and frequency standards station.

Do not write above this line.

NOVICE ROUNDUP

License Class
☐ Novice
☐ Technician
☐ Other

CALL USED _____ ARRL SECTION or COUNTRY _____

CHECK ONE: Single Operator Station _____ Multioperator Station _____

If multioperator, show calls of all operators, loggers _____

(_____ QSOs × CP credit _____) × (_____ Sections + Countries* _____) =

_____ Claimed score Hours of operation _____

*Do not list U.S.A. or Canada here.

Transmitter _____ Power Input _____

Receiver _____ Antenna _____

"I have observed all competition rules as well as all regulations established for amateur radio in my country. My report is correct and true to the best of my knowledge. I agree to be bound by the decisions of the ARRL Awards Committee."

Date _____ Signature _____ Call _____

Please enclose log, photos, comments, ideas, etc. with your entry and mail promptly to: ARRL Communications Department, 225, Main Street, Newington, Conn. 06111

MULTIPLIER CHECK-OFF LIST

(CROSS OFF EACH NEW MULTIPLIER AS WORKED.)

1	2	3	4	5	6	7	8	9	0	VE	DX (list)
Conn	ENY	EPa	Ala	Ark	EBay	Ariz	Mich	Ill	Colo	Mar-Nfld	
EMass	NLI	Del	Ga	La	LA	Ida	Ohio	Ind	Iowa	Que	
Me	NNJ	MDC	Ky	Miss	Org	Mont	WVa	Wisc	Kans	Ont	
NH	SNJ	WPa	NC	NMex	SBar	Nev			Minn	Man	
RI	WNY		NFla	NTex	SCV	Oreg			Mo	Sask	
Vt			SC	Okla	SDgo	Utah			Nebr	Alta	
WMass			SFla	STex	SF	Wash			NDak	BC	
			Tenn	C.Z.	SJV	Wyo			SDak	YE8	
			Va		SV	KL7					
			W.I.		Pac.						

Print or type:

NAME: _____ CALL: _____

ADDRESS: _____

_____ _____

CD-49 (R977)
Printed in U.S.A.

Sample summary sheet.

call _____ band _____

	AA-AL	KA-KZ	K	N	W	WA	WB	WD	VE	MISC.	
1											1
2											2
3											3
4											4
5											5
6											6
7											7
8											8
9											9
ø											ø

CD-77A DIRECTIONS: Enter the suffix for each station worked. Use additional sheets if necessary. Printed in U.S.A.

Sample check sheet.

is waiting for a contest contact. When the short call is sent, the /N is again added to indicate contest eligibility to all amateurs. This indicated brief exchange is further abbreviated after the first few days the contest has been in progress, but the sample exchange is suitable at the start of each year's NR.

After the first few days of NR activity, shorten the call to a single 3 by 3 or 2 by 2 (CQ NR CQ NR DE KA4ABC/N KA4ABC/N NR K, as an example) and listen carefully (above and below your transmitting frequency) for answers before repeating this call. The rest of the previous explanation holds true when using this preferred shorter calling procedure.

Brevity. Do not routinely exchange normal contact information during contest contacts. In other words, do not send your name, location (QTH), rig, antenna, weather (WX), or mailing address information as parts of contest contacts. Keep each contact brief. Do not send faster than you can receive accurately; let the other fellow slow down to a speed you can copy. If the other operator sends too fast, tell her/him to send more slowly (QRS).

If you contact a state or country you need to have confirmed, simply request a QSL when you send your card. I send a card to each amateur contacted for the first time, which is not a common practice among most amateurs. However, most amateurs send a QSL in response to each card received. If all amateurs just responded to cards received, none would be exchanged. Nevertheless, if received cards initiate completion of the QSL exchange, that is okay; the person who wants the other amateur's card is simply the one who begins the exchange.

Logging

Required Entries. Your NR log must show the time each contest contact started. It is preferable to use Universal Time Coordinate (UTC) when logging radio contacts, since it eliminates possible time zone confusion. Most experienced amateurs only use UTC. UTC is still called Greenwich Mean Time (GMT), Greenwich Civil Time (GCT), Zebra time, or Zulu (Z) time by many amateurs, and they are all meant to indicate the same time. However, UTC has been the correct term for several years and it should be used. The other amateur's callsign (/N and /T indicators not required) and ARRL section (or country) must be logged for each contact. Received and sent signal (RST) reports must both appear in the NR log. Your station callsign and dates of contest operation are also required. (See typical Novice Roundup log form.)

Forms. Special NR contest log sheets can be requested from the American Radio Relay League, 225 Main Street, Newington, Connecticut 06111.

The NR logs do not have to be mailed to the ARRL until one month after the contest ends, so you should have time to request logs from the ARRL, fill them in, and mail them. If you transcribe NR contest entries from your original log, be sure to repeat *all* contact information on the forms to be turned in. ARRL entry forms and summary sheets (see sample) should also be requested to accompany your contest logs. Send a self-addressed and stamped envelope (s.a.s.e.) with your request for these ARRL forms and send your request without delay. The ARRL also has contest check sheets, but it may be too late for you to request them for use in this contest by the time you read this column; if so, it is a good idea to get them for use in future contests.

Submitted Material. The contest material submitted to the ARRL is not returned, so do not send your only (original) log sheets. It is a simple matter for most of us to duplicate material before mailing it to the ARRL. Take your time and try to submit correct material that is easy to read. Checking contest entries is a tough job, but you can make it easier for League checkers by turning in good material.

The League appreciates receiving check logs from General, Advanced, Extra, and DX operators who take part in the NR.

Scoring

Contact Points. One point is earned for each station contacted while on the air in the NR, whether or not contacted ama-

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Write for our helpful Amateur Catalog and the name of the dealer nearest you.

CIRCLE 72 ON READER SERVICE CARD

ARRL 74 Sections Check-Off List

(1)	CT	CONN	Connecticut
	EM	E MASS	Eastern Massachusetts
	ME		Maine
	NH		New Hampshire
	RI		Rhode Island
	VT		Vermont
	WM	W MASS	Western Massachusetts
(2)	ENY		Eastern New York
	NLI		New York City and Long Island
	NNJ		Northern New Jersey
	SNJ		Southern New Jersey
	WNY		Western New York
(3)	DEL	DE	Delaware
	E PA	E PENN	Eastern Pennsylvania
	MDC	MD or DC	Maryland or District of Columbia
	W PA	W PENN	Western Pennsylvania
(4)	ALA	AL	Alabama
	GA		Georgia
	KY		Kentucky
	NC	N CAR	North Carolina
	N FLA	N FL	Northern Florida
	SC	S CAR	South Carolina
	S FLA	S FL	Southern Florida
	TN	TENN	Tennessee
	VA		Virginia
	WI		West Indies (KG4, KP4, KV4, etc.)
(5)	ARK	AR	Arkansas
	LA		Louisiana
	MISS	MS	Mississippi
	NM		New Mexico
	N TEX	N TX	Northern Texas
	OK	OKLA	Oklahoma
	S TEX	S TX	Southern Texas
(6)	EB	E BAY	East Bay
	LA	LAX	Los Angeles
	ORG		Orange
	PAC		Pacific (KH6, etc.)
	SB	S BAR	Santa Barbara
	SCV		Santa Clara Valley
	SD		San Diego
	SF		San Francisco
	SJV		San Joaquin Valley
	SV		Sacramento Valley
(7)	AK	ALAS	Alaska
	AZ	ARIZ	Arizona
	ID	IDA	Idaho
	MT	MONT	Montana
	NEV	NV	Nevada
	OR	ORE	Oregon
	UT		Utah
	WA	WASH	Washington
	WY	WYO	Wyoming
(8)	MI	MICH	Michigan
	OH		Ohio
	W VA	WV	West Virginia
(9)	ILL	IL	Illinois
	IND	IN	Indiana
	WI	WIS	Wisconsin
(Ø)	CO	COLO	Colorado
	IA		Iowa
	KS	KANS	Kansas
	MN	MINN	Minnesota
	MO		Missouri
	NE	NEBR	Nebraska
	ND	N DAK	North Dakota
	SD	S DAK	South Dakota

Canadian Provinces

VE1	MAR/NFLD	Maritimes or Newfoundland
VE2	QUE	Quebec
VE3	ONT	Ontario
VE4	MAN	Manitoba
VE5	SASK	Saskatchewan
VE6	ALTA	Alberta
VE7	BC	British Columbia
VE8	NWT/YUKON	Northwest Territories or Yukon

CONTEST
DUPE SHEET

CALL _____ BAND _____ MODE _____

	AA—AL complete	KA—KZ call sign	K	N	W	WA suffixes only	WB	WD	VE	
1										1
2										2
3										3
4										4
5										5

CC-178(2811) Printed in U.S.A.

Sample check sheet.

Novice Roundup

CALL USED _____ SECTION _____

50 QSOs per side
Number each new multiplier as worked

FREQ.	DATE/TIME GMT	STATION WORKED	EXCHANGE SENT	EXCHANGE RCVD*	POINTS

CD-48(1074) -over- Printed in U.S.A.

Sample log sheet.

teurs are participating in the contest, as long as the report and ARRL section are obtained.

Code Proficiency Points. If you have an ARRL code proficiency certificate, your stated receiving speed (words per minute) is added to your point total for the stations you contacted. If you do not hold an ARRL code proficiency certificate, or if you want to increase the rate shown on your certificate, you can submit your January or February W1AW or W6OWP qualifying copy with your NR material to claim these extra points.

Multipliers. The total number of points derived from your contest contacts and your ARRL (not FCC) certificated code proficiency rate are multiplied by the number of foreign countries and ARRL sections you contacted during your NR contest operation. Remember that Alaska, Canadian Provinces, Hawaii, and the West Indies (Guantanamo Bay, Puerto Rico, and Virgin Islands) are ARRL sections and they do not count as countries.

Summary

I hope to contact you on one of the Novice bands. I was never a Novice because that class of license did not exist when I was getting started in our amateur radio service. Nevertheless, I work about 1000 Novice band contacts every year and I have participated in each Novice Roundup. When the NR contests were held in the 1952 through mid-1970 era, the Novice license was just valid one year. It could not be renewed, and it was not available to anyone who had previously held any class of amateur radio operator license. In that time frame, no Novice could compete in more than one NR as a Novice and newer Novices seldom participated at all. Novice licenses now are valid a maximum of five years and they can be renewed, which means that Novices can be experienced in previous NR contests and improved scores should result. Similarly, it is a recent change that allows Technicians to use the Novice code bands. Enjoy this contest by putting your station in good condition and reserving adequate good operating time during the NR.

NR contest activity has always been slow at the start, and it is common to have other operators request an explanation of contest rules. I advise you to direct them to NR coverage in this column or in other magazines, which is simpler and better than trying to give all this information to each amateur who requests it. NR activity continues to build as the days pass and more amateurs become aware of it. By the last day of the contest, activity is excellent. If you get this issue before the contest starts, please mention the Novice Roundup to every amateur you contact in the Novice bands to let them prepare for this excellent contest.

73, Bill, W6DDB

a monthly feature by
HUGH CASSIDY, WA6AUD

DX

NEWS OF COMMUNICATIONS AROUND THE WORLD

Let us probe the silent places,
Let us seek what luck betides us,
Let us journey to a lonely land I know.
There's a whisper on the night wind,
There's a star agleam to guide us,
And the wild DX is calling . . .
Let us go . . .

Over the years most of us learn a variety of maneuvers to be employed when faced with hard questions. Last week one of the local QRPers was by to test us. It happens every Spring.

"How come," this QRPer asked, "that every time you get a hot DX question to handle, you start mumbling about the Mysteries of the Ages and the Eternal Enigmas. Why don't you tell things just the way they are?" He might have thought he had cornered us, but any of the Deserving who have been around the track for a couple of decades know more than one escape hole. Perhaps we didn't even need one.

"Remember the first hundred countries you worked," we asked, and the QRPer quickly nodded his head. "Sure do," he said, "and those were the tough ones that took a couple of years to catch. I used to be on the bands day and night and every weekend trying to get a new one, and I missed a whole bunch along the way." He paused to think about those days and started right in again. "And the waiting for QSL cards! It was a forever wait and . . ." We held up our hands at this point. We had heard all the plaints before. We wanted to head him in the right direction again.

"And remember when you made DXCC and how far off the 200 country sticker looked, and how you would wonder how long it would take you to get the second hundred after you'd worked all the easy ones? Remember?"

He did. He pounded a fist into the palm of the other hand in remembrance. "I sure do," he agreed, "and it sure did look like an impossible task then. That 200 country sticker sure looked a long way

77 Coleman Dr., San Rafael, CA 94901

Members of the Syosset High School Radio Club recently qualified for the CQ DX S.S.B. Award. The photo shows some of the club members and the tower for WA2JAS, club station. (Photo via N4UF)

off. But I got them. Maybe some weeks I only worked one or two new ones. But they came, and so did that 200 country sticker. It sure was a good feeling to get it in my hand. It sure was." It must have been, because he was standing there smiling at the memory of those days.

We were not through with this one. "Then how about the 300 country sticker? When you got that 200 country sticker, how did the 300 mark look?" We got a groan at this question.

"It's an impossibility, that one is," the QRPer advised us. "I'm stuck at 273, and I'll never make 300. Never! Heck, I've only worked 11 new ones in the last year. There are very few new ones on these days for me. DXing isn't very good, and the sunspot count is sliding downhill." We could see that the DX miseries were catching up with this one, but suddenly his head lifted.

"Wait a minute!" he said, "what's this got to do with my question? Let's get back to those Eternal Mysteries you are always hinting about. How about them?"

It was our turn to smile. "You've been talking about them," we advised. "As you said, more or less, all things are relative, some more so than others." What looked to be an impossibility at one stage, is regarded later as an easy task, right?" All we got was that beady eye on us and a single word: "And? . . ."

"That's one of the Mysteries of the Ages," we got in quickly. "Why is it that so many take so long to realize that DX is a movable feast, that the joy usually comes from the desire to attain that which is out of reach, although possibly near, and that the perspective at the 300 mark is nothing like that below the 100 mark, but over all is the desire to get what you haven't got."

The QRPer held up his hand, wanting to get a few shots in, but we weren't stopping. "And somewhere along the line most DXers realize that the goal of working everything possible is hardly attainable, but that the joy of DXing and the friendships gained around the world count more and are always within reach." We leaned close to the QRPer so that he could not get away from us this time. "Now, do you understand that?" we demanded.

What we got was a QRPer trying to draw back from us. "Of course I do," he said, "but what's such a mystery about that? Even I can understand that!" Perhaps we were making him a bit nervous, as he was trying to stand up and back towards the door.

"The mystery is that so many DXers have a hard time understanding it," we rasped. "They spend so much time gouging and fighting to gain something that in retrospect it may not bring the joy that was expected. But the joy of having someone in the middle of a contest greet you by name from downtown Moscow is something remembered for years. Get it?"

We probably will never know the answer, for he was up and out and gone, and all we could hear was the mumble of words over his shoulder. Perhaps one of these days he will learn, as Albert would

The WPX Program

Mixed

952	EA8BF	956	JR1VST
953	N5BA	957	YU2BST
954	KC9AT	958	N6HK
955	CO2PY	959	KE4E

S.S.B.

1438	N7AIF	1445	K5MLG
1439	JT1BG	1446	WB6SRK
1440	WB3IGR	1447	SM0JOQ
1441	VE3FEA	1448	I2TZK
1442	WB3KAM	1449	JA2FUJ
1443	JF1CPH	1450	WB2TKD
1444	I0POR	1451	OE1SKS

C. W.

2108	N3KR	2111	PA0MTJ
2109	W2IBZ	2112	KE4E
2110	OZ1EHL		

Endorsements

Mixed: 400 EA8BF, IT9MTH, N5BA, KC9AT, CO2PY, JF1VST, YU2BST, N6HK, KE4E. 450 EA8BF, IT9MTH, N5BA, CO2PY, YU2BST, KE4E. 500 EA8BF, IT9MTH, N5BA, WB3DNA, CO2PY. 550 EA8BF, IT9MTH, WB3DNA, CO2PY. 600 EA8BF, IT9MTH, CO2PY. 650 EA8BF, CO2PY, AE1T. 700 EA8BF, I1ZQD, AE1T, WA2IFS. 750 EA8BF, WA2IES. 800 WB8ZRL, K9XJ. 850 IT9LMK. 1100 K6DT. 1150 K6DT. 1200 K6DT. 1250 K6DT. 1300 K6DT.

S.S.B: 300 JT1BG, WB3KAM, JF1CPH, K5MLG, WB6SRK, SM0JOQ, I2TZK, JA2FUJ, WB2TKD. 350 JT1BG, I0POR, WB6SRK, SM0JOQ, KB0C, I3DUB, WB2TKD, OE1SKS. 400 JT1BG, I0POR, WB6SRK, KB0C, JA2FUJ, WB2TKD, SM6HCJ. 450 JT1BG, ITJHW, K0POR, I6MRD, KB0C, JA2FUJ, WB2TKD, WD8IIA. 500 JT1BG, VE3FEA, I5JHW, I0POR, KB0C, JA2FUJ, WB2TKD, WB8IIA. 550 VE3FEA, I5JHW, I0POR. 600 I5JHW, SM2AHP, W6LQC. 650 W6LQC. 700 WB8ZRL, I0PSB, W6LQC. 750 I0RIZ. 800 TG9GI, WA2FKF, I8KCI, I0RIZ. 850 I8KCI, I0RIZ. 950 WA4OIB. 1050 WD8NGQ. 1100 WD8MGQ. 1550 ZL3NS.

C.W.: 300 W2IBZ, OZ1BHL, PA0MTJ, KE4E. 350 HA8UB, OZ1EHL, ZL2AWW, PA0MTJ, WA3GNW. 400 HA8UB, PA0MTJ, VE2FOU. 450 HA8UB, VE2FOU. 500 AK9Z, HA8UB. 550 HA8UB, W6YMH. 600 HA8UB. 700 KL7AF, I2BVS. 750 HP1AC, I2BVS. 850 SM6AYM. 900 DL7MQ. 1100 W3TVG. 1150 W3TVB. 1300 W3ARK. 1350 N2AC. 1500 N6JV. 1700 W2NC.

10 meters:	WB8ZRL, I0POR.
15 meters:	JH2QAY, AK9Z.
20 meters:	WD0AVG, JA1KRU.
40 meters:	JA1KRU, I0RIZ.
80 meters:	I0RIZ.
160 meters:	JA2FUJ.

Asia:	JF1CPH, I0POR.
Europe:	I0POR.
No. America:	I0POR, I0RIZ.
Oceania:	WA2IFS, WA4OIB.

WPX Award Of Excellence holders to date: K6JG, W4WSF, W4CRW, WA5VDH, K6XP, WA2EAH, VE3GCO, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, YU2DX, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, I0JX, WA1JMP, K0JN, K4IEX, WA2AUB, W8CNL, W1JR, F9RM.

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.

often say and as we mentioned a bit back: "All things are relative, some more so than others." DX is always a relative thing, and more so when it is a country you need.

Thus, this February passes, and soon there will be other QRPers with questions. All will be welcomed as long as they come saying, "I Believe!" Those who believe eventually will understand all the Mysteries of the Ages. Those who doubt are really not yet the true-blue DX type. But that's the way it has always been.

Northern California DX Foundation

The Foundation will be publishing another in their series of newsletters in the next couple of months, and if you are interested in a copy, drop a line to the Foundation at P.O. Box 2368, Stanford University, California 94305. This is the new mailing address of the Foundation and any correspondence should be directed to this listing.

On the forward-looking plan of the Foundation to establish an archive for the preservation of DX and DXpedition records, logs, photos, and memorabilia, WB6ZUC reports a good response to the initial announcement. One interested correspondent offered the loan of his tapes going back over a quarter-century of DX action on the air. This included tapes of RAEM in QSO and tapes of Captain Kurt Carlsen operating his amateur rig on that foundering freighter in the North Atlantic. It does seem almost inevitable that as time goes by the DX Foundation will be accumulating a significant amount of DX history.

WAZ

Leo Haijsman, W4KA, who handles the WAZ Award, notes that Venda, Transkei, and Walvis Bay are being accepted for WAZ credits. Consideration on Burma contacts for Zone 26 credit were still being kicked around before the recent holidays, and if you worked XZ9A or XZ5A, you can always check with Leo on their status—that is, if you are thirsting for a Zone 26 for the valued WAZ Award.

World's Fair—Knoxville

A World's Fair will open in Knoxville, Tennessee, this May and will run to October. In connection with the Fair, the Delta Division will hold its annual convention in Knoxville in May as part of the 16th Annual Greater Knoxville Hamfest. With Spring a possibility before long, it might be time to plan a trip to eastern Tennessee. The big amateur radio activity will be over the Memorial Day weekend, May 22 and 23rd. Ray Adams, N4BAQ, is handling the banquet arrangements and assistance with accommodations. Stephen Kercel, AA4AK, is the Convention Chairman for the ARRL Delta Division Convention.

From the DXCC Desk, Don Search, W3AZD, will be on hand during the convention. For those looking for a check point for their WAZ cards, Bob May, K4SE, will be present. There will be a good number of well-known DX figures. Early planning for travel and accommodations is advisable, especially for the Memorial Day weekend. If you need more information, check with AA4AK or N4BAQ. They will aim you in the right direction.

Knoxville is on the Tennessee River, the Gateway to the Great Smoky Mountains National Park, and a generally scenic area. For this one, as Lord Baden Powell, the hero of Mafeking, would often say, "Be Prepared!"

Here's 9N1MM, Father Marshall Moran, at the lunar landing display at the Johnson Space Center in Houston. One of the living legends of DXing, Father Moran has probably been the Nepal contact for 90 percent or more QSOs in the last couple of decades. After visiting here in the states, Father Moran returned to Kathmandu, where he directs the St. Xavier School. (NASA photo via K5RC)

Very High-Speed Club

This VHSC club should interest just about everyone working c.w. All it requires is at least a 30-minute QSO, solid copy, excellent keying, and speed of 200 letters per minute or higher. If you think that this just burst over the horizon, the club was founded by PA0LXL back in 1961.

Membership in the club requires four recommendations from VHSC members that you've had a QSO meeting the above requirements. No keyboards or decoders. An application along with 10 IRCs will bring you a life membership if all is in order. VHSC coordinates with another speedy group, the High Speed Club. If you need more information, check with PA0DIN at VERON, Schoutstraat 15, 6525 XR Nijmegen, Netherlands.

Some of the W/K-type members in VHSC are K9OKD, K9PLT, W1JYH, W2HAQ, W4ML, W9WPU, WA2BQK, WA2YBR, and WA3KOS. It is really not an overcrowded group, a recent roster listing about 70 members.

GB2BC

A special-event radio station will be active from March 26th to April 1st to mark the 110th anniversary of the establishment of British Columbia's Agent General to England. The Surrey Amateur Radio Club in British Columbia will join with the Sutton and Cheam Radio Society of Surrey in England to operate the special call-sign GB2BC around the clock. The station will be active in the WPX S.S.B. Test on March 27–28th and will try working all the h.f. bands. Anyone working GB2BC will receive a special QSL, these being handled by VE7SAR. Anyone needing more information might drop a line to Jim Johnson, VE7CSJ, or to Ralph Webb, VE7BVG.

Russian DX Newsletter

Craig Maxey, WB7RFA, in Corvallis, Oregon, has started publication of the "Russian DX Close-up." To be published bi-weekly,the newsletter will publish only Russian DX information.

The initial publication went deep into the callsigns for the Russian oblasts along with some information on how callsigns are determined. If you'd like to see a sample, send an s.a.s.e. to Craig M. Maxey, WB7RFA, 3085 NW Autumn, Corvallis, Oregon 97330. Craig will also give you the rates and nonessential information like that.

Father Moran

9N1MM was in the states this last Fall visiting a number of areas, including the Texas territory and the home turf around Chicago. He was due to return to his school in Kathmandu in December.

During his visit, Father Moran visited the Johnson Space Center in Houston. The photo of him, which should be around here somewhere, was taken by NASA while Father Moran was visiting the APOLLO lunar landing display. He was also a guest at the Texas DX Society's hospitality suite at the Houston Convention last Fall.

While it may seem that Father Moran has been around since Guglielmo was working on his first spark-gap, he really hasn't. And if it had not been for Father Moran over the years, Nepal would have varied from the extremely rare to the very rare. Those working Father Moran should be well aware that they are working one of the legends of DXing.

KK2XJM Beacon

This station at Daytona Beach, Florida will continue its tests until March 4th. The tests start at 7:00 p.m. Eastern Standard Time (1200Z), and there are announcements each ten minutes when the station is on the air.

For the rest of the tests, check

28 Jan.	18.108 MHz	3w power
4 Feb.	24.930	3w
11 Feb.	24.930	3w
18 Feb.	10.140	30w
25 Feb.	18.108	30w
4 Mar.	24.930	30w

For information, QSLs, or to establish special test schedules, write to W4MB, R. P. Haviland, 2100 South Nova Road, Box 45, Daytona Beach, Florida 32019.

The WAZ Program

10 Meter Phone

162	N5AXB	165	VE3HD
163	JA5QJD	166	EA3WZ
164	I2XIP		

15 Meter Phone

107	K8ZR	109	WB0LXM
108	KB8DB		

20 Meter Phone

381	VK2HD	383	PT7TP
382	W0RAO	384	YB2CR

40 Meter Phone

12 ON4UN

15 Meter C.W.

55 JH7ARV

20 Meter C.W.

155 W3ODJ

40 Meter C.W.

29 JE3MCC

All Band WAZ

S.S.B.

2264	WA6MHZ	2311	W4KHW
2303	VK5NKP	2312	YC1GJ
2304	JT1BG	2313	W0TT
2305	NC6H	2314	JA7FFY
2306	W6NLG	2315	I2UBT
2307	I2JQ	2316	N2AQH
2308	I3LDP	2317	W4MGN
2309	I5HOR	2318	AA4M
2310	K4KAK	2319	KA6V

C.W. and Phone

5241	KJ4S	5252	JA1DNZ
5242	W5DV	5253	N1AKX
5243	N9KW	5254	K0OSW
5244	DM2FBL	5255	G5VQ
5245	DF7GK	5256	I1BWI
5246	N5BA	5257	N3AUE
5247	LZ1XL	5258	I0XXR
5248	KG9J	5259	JA1SVP
5249	FG7AM	5260	VE3DAP
5250	WB6YNI	5261	K1JA
5251	WB6WSD		

Applications and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (30 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

A Handful Of DX Notes

The Colvins were out again before Christmas and were active from a number of Caribbean stops. In the CQ WW Phone test they operated the full 48 hours signing 8P6QL. They made over 9K QSOs at that stop, over 3K in the WW Phone action. Later they moved on to Trinidad where they signed 9Y4KG.

Lloyd reports that during their operation from Barbados, on October 22nd, and with no prearranged scheduling, they ran a WAC in 5 minutes on 15 meters, catching F6HEW/ZS1JD/KA1CY/4X4FU/VK4SS/PY1DFJ starting at 2059 and ending at 2104Z.

Late word on their DX plans can be found by checking the W6TI DX bulletins on Mondays at 0200Z, 14002 kHz. W6RGG is close to the Colvin plans and will announce any moves in their itinerary. W6TI is also a good spot to keep up with late DX information.

George Donatello, KA1BXA, has been licensed just over two years, but he has close to 200 DXCC countries worked. George has not neglected any possibility, SSTV being one of the modes used at his station. He made WAS in four months and DXCC in a bit over a year. George would like to hear from any DX station in need of a faithful QSL Manager.

Publishing DX Bulletins is not always uncontainable joy. Alan Leith of the Canadian "DX Report" last summer had to bother with a strike in the Canadian Postal Service. Al managed to get the bulletin in the mail by slipping across the border and posting it in the U.S. system. That took care of the outgoing mail, but incoming was another matter. He is still picking up traces of mail that was returned to sender during the strike period. If you got one back, he'd like you to try again.

Also in the CQ WW Test, P41C was a special contest call in the Netherland Antilles. Located in Curacao, the station had twelve operators, and you can QSL via Bernie McClenny, WB3JRU, Box 9, Ashton, Maryland 20861. During the contest for the sake of brevity they were saying to QSL to N4RV. WB3JRU is also available as a QSL manager for other DX stations. An s.a.s.e. would be appreciated.

During the CQ WW CW Test in November, P4IE was also heard, this being a multi-operator, single transmitter effort by K4BAI, W6OAT, KR4M, PJ9EE, and a couple more helpers. QSLs for this one, P41E, go to John Laney, K4BAI, Box 421, Columbus, Georgia 31902. Again, s.a.s.e.

GM4FNE in the far Shetlands reports that during the CQ WW Tests GM4FNE was active from Yell Island in the Shetlands, while GM3RFR, GM3KLA, GM4GPN, and GM3SKX were on from Unst Island. Bruce Spencer, GM4FNE, notes that you might check the Shetlands as a separate counter in the WW Tests.

Brazil continues to make some changes in their callsigns. A change made just before the WW Test provided for the ZY0- prefix to be used for stations operating in contests or special events from the offshore islands.

For DXpeditions, the first letter in the name of the island will follow the number: ZY0F for Fernando Noronha and ZY0T for Trinidade. Remy Flores Toscano, PT2VE, President of LABRE in Brazil, is passing along the changes as they occur. This prefix will also apply to St. Peter and Paul Rocks, Rocas, and Martin Vaz.

The Boeing Employees Amateur Radio Society is still optimistic that their brief action from BY-Beijing last September will help bring more action from BY-land, a few DX types still needing that one for DXCC. The initial contact with W7PHO was followed a couple of days later when Y. S. Hsu, who used to sign XU8CH, put gear on the air from Shanghai and worked Cehn Ren Mo in Beijing. Chen once signed C1CH.

All this rash of activity ended 32 years of amateur radio silence in mainland China. The Boeing group is hopeful that something eventually will come of this demonstration, and they feel that there is an inclination to some relaxation of the long ban. They also reported finding a good number of former amateurs still waiting to get back on the air.

The National Capitol DX Assn. recently voted that the club policy will be not to make any contributions to any DXpedition until after the fact. The club plans to so advise when there are requests for some assistance, and then after the action, to review the operation and then make a decision on any aid.

5 Band WAZ

Standings as of November 1, 1981

All 200 zones worked:

1. ON4UN, John Devoldere (Belgium)
2. K4MQG, Gary Dixon (U.S.A.)
3. SM4CAN, Kent Svensson (Sweden)
4. AA6AA, Steve Orland (U.S.A.)
5. W8AH, Albert Hix (U.S.A.)
6. W6KUT, E. A. Andress (U.S.A.)
7. EA8AK, Fernando Fernande (Spain)
8. LA7JO, Stig Lindblom (Norway)
9. EA3SF, Fernando Blenert (Spain)
10. OH1XX, Hannu Nieminen (Finland)
11. EA8OZ, Julio Rosello (Spain)
12. W0SD, Edward Gray (U.S.A.)
13. K0ZZ, Gary Knutson (U.S.A.)
14. ON6OS, P. Michiels (Belgium)
15. OK3TCA, E. Melcer (Czech.)
16. K6SSS, Fred Capossela (U.S.A.)
17. ZL3GQ, Peter W. Watson (New Zealand)
18. OK3CGP, Stefan Melcer (Czech.)
19. SM0AJU, Leif Lundin (Sweden)

The top 12 contenders for 5 Band WAZ:

1. K5UR, 199
2. OZ3PZ, 199
3. DL3RK, 198
4. LA5YJ, 197
5. 4X4DX, 196
6. W8GT, 195
7. K1MEM, 195
8. G3MCS, 194
9. N4RR, 192
10. LA9GV, 191
11. N6DX, 191
12. F6DZU, 191

118 Stations have attained the 150 zone level

CQ DX Awards Program

S.S.B.

1059	N8BQB	1063	W8JXM
1060	K@MPR	1064	VE6CBX
1061	JA1QWF	1065	N5AXB
1062	W@ANZ	1066	I1WZT

C.W.

512	N6DFY	513	KE4E

S.S.B. Endorsements

310	K2FL/318	250	TG9GI/263
300	W@YDB/308	200	JA1QWF/225
300	W2SUA/309	200	VK2DPN/201
300	VE3FJE/301	150	N5AXB/196
275	I@MBX/293	150	K@MPR/156
275	W8JXM/282	150	N8BQB/151
275	I5BDE/282	28 MHz	W8JXM
275	I8KCI/280	3.5/7 MHz	W8JXM
275	KB9KD/275		

C.W. Endorsements

250	N8BM/250	150	N6DFY/151
150	I5BDE/199	150	GI4DQO/150

With the addition of SMOM, the total number of active countries is now 319. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply.

Eduard Melcer, a riverboat captain on the Danube, is the winner of the fifteenth 5 Band WAZ to be given since the difficult award was established. Ed signs OK3TCA at home, and OK4TCA when afloat on the Danube River on the m/s "ORLIK." He comes from an active amateur family; his brothers Stefan and Ivan are amateurs.

If you have ever been involved in making decisions on assistance for planned DX efforts, the knowledge is quickly attained that determinations of the validity of the requested assistance or the extent of aid to be extended are not easy decisions. It is not unusual to get children's Xmas shopping lists: "send me two complete Collins stations, Telrex mono-banders for all bands, and a couple of generators. Also send first-class airplane tickets. And hurry I'd like to depart by the end of the month."

Any group that seeks to help DXpeditions will eventually come up with a dazed look and a depleted purse. The bewildered look eventually is replaced by the wary look of caution and a tendency to scan very carefully a request for aid. Also, a thicker skin is acquired to turn the barbs hurled when applicants with long lists but short verification voice their disappointment and displeasures.

But actions such as the National Capitol DX Assn. are showing, and there probably will be a few more along the way. Ed Kuebert, K3KA, is the new president of the NCDXA; Lorie Fraser, W3LMZ, the Vice-president; Bob Short, N3TO, the Secretary; with Henry Herman, W3UJ, the honored Treasurer.

Don't forget to get your logs to Bernie Welch, W8IMZ, 7735 Redbank Lane, Dayton, Ohio 45424 for the WPX Contest. There is still enough time left to write for contest logs and summary sheets.

5 Band WAZ #15

Eduard Melcer, OK3TCA/OK4TCA, is the winner of the fifteenth 5 Band WAZ Award. Ed comes from a family deep into amateur radio. His brother Stefan signs OK3CGP and another brother, Ivan, signs OK3CSC.

Ed lives in Banovce in Czechoslovakia and is employed on the Motorship "ORLIK" on the Danube River. The OK4TCA call is used when he is aboard the vessel, as he is the captain of the vessel. However, if you will check the accompanying photo, you'll note that the T-shirt is emblazoned with a yacht club insignia. The "ORLIK" is a large river vessel used to push barge traffic on the Danube, the main water traffic artery in eastern Europe.

Ed has also received 5BWAS. He runs a TS520 with a 500 watt amplifier. He uses verticals on 80 and 40 and a beam for the higher bands, all up 100 to 150 feet.

QSL Information

Somewhere along the way, one often learns that among the really unsure things are tomorrow's plans and today's QSL information. But, as we Deserving though suffering types also learn, the only thing that is is, and what was will not come again, while might be is imbedded with maybes. Or something like that! And while you puzzle that one out, and realize more fully why a lot of DXers have that imbedded dazed look, let's rush with the QSL information before it changes.

Ed Landerson, W2JPO, of Delmar, New York, says that he is *not* the QSL manager for 7Z@UA. He's been getting cards, a lot from Japan, for action last July. Not only is Ed not the QSL Manager for 7Z@UA, but he is not the QSL manager

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. No fee required for additions to Honor Roll totals.

MIXED

2202	YU2DX	1575	W2NUT	1240	K6ZDL	1019	PY4OD	807	WB8ZRL
2154	F9RM	1550	N6CW	1238	K5DB	1017	W7CB	800	K7AGJ
1975	K6XP	1542	N6JV	1236	YU1AG	1005	K8LJG	793	DK2BL
1942	K6JG	1538	PA0SNG	1230	W0SFU	1001	N6JM	775	WB8YQX
1913	K2VV	1504	N9AF	1205	DL1MD	1001	YU3APR	753	N3RL
1907	W2NC	1475	N2AC	1190	N6FX	920	W0IUB	750	KA3A
1863	VE3GCO	1434	YU2RTW	1180	WA1JMP	903	KL7AF	750	W6YMH
1762	YU7BCD	1415	AA4A	1175	IN3ANE	902	K6DT	700	I1ZQD
1738	N4MM	1411	N4NO	1155	W8CNL	893	JA1KRU	700	NN4Q
1723	W3PVZ	1368	YU1ODS	1151	UK3AAO	865	DA2DC	662	KO8T
1713	N4UU	1350	KE4I	1148	JH1VRQ	864	G4CHP	661	K2QF
1673	W7LLC	1332	W9FD	1127	K9BG	859	UA3FT	643	WD9IIC
1665	W4BQY	1325	N6AV	1116	SM3EVR	853	I2MQP	623	W0JIE
1623	K5UR	1309	SM7TV	1108	KF2O	836	LA7JO	618	JA9FAI
1622	W9DWQ	1301	I6SF	1050	K8LJG	819	N4IB	600	OE1KJW
1584	DJ7CX	1269	PA0TMS						

S.S.B.

2066	F9RM	1375	K5UR	1114	WA4QMQ	932	W6YMV	802	I4LCK
1868	I0AMU	1331	I0MBX	1105	WB2NYM	912	KF2O	752	KL7AF
1833	I0ZV	1300	PA0SNG	1100	WD8MGQ	909	PY3BXW	743	WB8YQX
1759	K6XP	1285	W9DWQ	1072	DL1MD	893	YU1AG	716	EA3KW
1682	K2POA	1276	OZ5EV	1060	DJ7CX	853	I2MQP	702	WB8ZRL
1672	K6JG	1262	N4UU	1040	I6ZJC	852	CT1UA	700	AC2J
1590	K2VV	1234	PA2TMS	1035	W2CC	851	I8KCI	651	I5AFC
1552	ZL3NS	1203	W0YDB	1010	N4NO	850	ZP5RS	641	N4IB
1543	N4MM	1201	AA4A	1001	W4BQY	850	N2AC	633	N3RL
1500	I8YRK	1189	HP1JC	996	JH1VRQ	833	TG9GI	629	YU3APR
1499	I8KDB	1150	N2SS	989	OE2EGL	828	I0RIZ	619	VK3NDY
1421	YU7BCD	1127	YU7ODS	944	W2NC	820	WA2FKF	606	VK6YL
1408	I4ZSQ	1121	DJ6VM	938	N6FX	810	I6NOA		

C.W.

1684	W2NC	1415	N4UU	1220	N4NO	1000	VE7CNE	750	JH1VRQ
1653	W8KPL	1414	K2VV	1218	N4MM	989	LZ1XL	750	N4YB
1550	ON4QX	1344	W3ARK	1205	VO1AW	965	JE1JKL	735	DL1MD
1502	N6JV	1328	G2GM	1127	W1WLW	964	N6FX	731	AA4A
1491	WA2HZK	1316	N2AC	1108	VK4SS	854	PY4OD	703	K2FO
1471	K7JG	1262	K5UR	1077	K6ZDL	851	KH6HC	700	K7LJG
1467	DL1QT	1261	W4BQY	1066	YU7ODS	813	YU3APR	679	I1YRL
1434	K6XP	1234	W9FD	1058	I6SF	808	I5IZ	651	KL7AF
1420	YU7BCD	1225	DJ7CX	1002	YU1AG	802	DJ3LR	615	KA3A

for anyone and has not been on the air himself for some years.

WB3ERX says that he is no longer the QSL manager for KL7IB. W. Rass, A7XE, says that QSLs should go to DF4NW via DARC. There was a QSL manager for a short period some time back, but that has ended. A7XE is in Qatar for work there, and while he travels considerably, the only way QSLs can be handled is through DARC.

KA1CY wants it noted that only his operations from May 9th to 15, 1981, from D4CBC in the Republic of Cape Verde are QSLed by him. Anytime else outside of this period go direct to Julio Vera-Cruz in Mindelo. Or, to put it in plain language, he is not the QSL manager for anything but his own operation.

Lou DeFusco, N4FFN, happily announces that he is the QSL manager for 9M2HB. You'll not find N4FFN in any but the new 1982 Call Books. But you may try 4410 47th Avenue South, Lake Worth, FL 33463. Lou's old call is WD4GSF.

Tom Gallagher, N6RA, was down in FS-land for the CQ WW C.W. Test, and you can QSL the St. Martin activity of FG0FOO/FS to Box 31365, San Francisco, CA 94131. S.a.s.e. naturally.

The Aland Islands effort of OH2OT/OH0 goes to OH3CV as well as OH3CV/OH0, Box 179, SF33191 Tampere 10, Finland.

A22ZM to ZS5CW
A7XE to DF4NW via DARC
C21NI to OE2DYL
EA6IT to WB1DQC
FK8DD to KA3A
FM0EOM to REF
FP0GBG to W8AH
FP0GAP to W8NR
FP0GAQ to K8CJQ
FW0BE to DJ9ZB
HL9CXT to W3DNM
HI8LC to W2KF
I25ARI to I5HCH
IU6ONU to I6JVH
KB3UO to KA3FTW
KC4BH/KH0 to JA2VUP
K1GW/PJ7 to K1GW
NQ4C to WD4NWW
N6DY to KP4 Bureau
OE5JLT/YK to OE5UYL
OK0ISK to OK1PGT
P29DP to K7TRG
P41C to N4RV
T30AC to WB6FBN
U1M0L to UK1OAZ
UP0L-22 to UA1ABY
ZL0AES to K1MM
ZZ5EG to PY5CJE
9G1DJ to WD5GXB
9U5WR to SP6FER
9V1UQ to KH6LV
9Y4LL to K2QIE
C6ANI P.O. Box 106, Nassau, Bahamas
CR9VT P.O. Box 798, Macao
HI3VAK P.O. Box 591, Santiago, Dominican Republic
HP1LC P.O. Box 9A, Panama City, Panama
J6LT P.O. Box 1026, Castries, St. Lucia, West Indies
NL7N P.O. Box 709, Barrow, Alaska 99723
P29CF P.O. Box 369, Okarumpa, via Lae, Papua
V3AWS P.O. Box 306, Belize City, Belize
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73, Hugh, WA6AUD

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a monthly feature by
GEORGE JACOBS, W3ASK

Propagation

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Excellent DX propagation conditions are expected to continue through February. During the daylight hours, three bands should be available for worldwide DX—*10, 15,* and *20* meters, with a fourth, the *6* meter band, a bonus from time to time. *Fifteen* meters is likely to be the best DX band from shortly after sunrise until just after sunset, with *10* and *20* meters not far behind. Be sure to check the *6* meter band for unusual daytime DX openings, particularly when conditions are High or Above Normal. Look for openings towards Europe and the east before Noon, towards the South Pacific and the west during the late afternoon, and towards Central and South America during most of the daylight hours. The best times to listen for *6* meter DX openings are shown in the *DX Propagation Charts* on the following pages by a **.

During the period from sundown to Midnight, as many as *five* bands may be available for DX. *Fifteen* meters is expected to hold up well past sundown for DX openings towards Central and South America, the Pacific area, Far East, and Asia. *Twenty* meters should be available to most areas of the world during this period, but with signals strongest from southerly and westerly directions. Good DX towards the east and the south should be possible on both *40* and *80* meters during this time period, with some openings in the same directions also possible on *160* meters.

Between Midnight and the sunrise period it should be a toss-up between *20* and *40* meters for worldwide DX honors. Good DX openings to most areas of the world should be possible on *80* meters as well. Be sure to also check *160* meters for some unusual DX openings during this period. Conditions on all bands, *20, 40, 80,* and *160* meters, should peak at local sunrise.

Equinoctial Propagation

Beginning late in February and continuing through March and early April, look for a considerable improvement in DX conditions between the northern and southern hemispheres. This should result from the effects of the spring equinox on the ionosphere. The spring equinox is marked by the period when the sun crosses the equator in its apparent travels towards northern skies. A similar period occurs in September, as the sun appears to head south. Improved openings between northern and southern hemispheres should be noticeable on bands *6* through *160* meters. Equinoctial propagation tends to maximize during the sunrise and sunset periods, and over both short and long path openings.

This month's *Propagation Charts* contain band opening predictions for major DX paths for the period February 15 through April 15, 1982. A short-skip propagation forecast for February appeared in last month's column. The Charts are based on a predicted smoothed sunspot number of 118.

11307 Clara St., Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for February 1982

	Expected Signal Quality			
Propagation Index	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 11, 20, 26	**A**	**A**	**B**	**C**
High Normal: 5-6, 12-13, 18-19, 25, 27	**A**	**B**	**C**	**C-D**
Low Normal: 1-2, 4, 9-10, 14, 16-17, 21, 24, 28	**A-B**	**B-C**	**C-D**	**D-E**
Below Normal: 3, 7, 15, 22-23	**B-C**	**C-D**	**D-E**	**E**
Disturbed: 8	**C-E**	**D-E**	**E**	**E**

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

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

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

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

E—No opening expected.

HOW TO USE THIS FORECAST

1. **Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.**
2. **With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good-to-fair (B-C) on Feb. 1st, fair-to-poor (C-D) on the 3rd, good-to-fair (B-C) on the 4th, good (B) on the 5th, etc.**

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

V.H.F. Ionospheric Openings

The combination of equinoctial propagation conditions, and an expected relatively high level of solar activity, should result in a number of *6* meter DX openings, particularly when conditions are expected to be High or Above Normal. (Check the "Last Minute Forecast" appearing at the beginning of this column.) These openings will result from *F*-layer reflection. Signal levels may at times be relatively strong, and openings will follow the sun.

Another form of *6* meter ionospheric propagation tends to peak during the equinoctial seasons. This is called *trans-equatorial* scatter (TE) propagation. Some TE openings should be possible during February between the southern tier states and South America, with paths approximately perpendicular to the equator. The best time to check for TE openings is between 7 and 10 p.m. local time. An occasional opening may also be possible on *2* meters. TE openings are usually characterized by very weak signals and considerable flutter fading.

Some radio storminess is expected during February. (Check the "Last Minute Forecast" for those days expected to be Below Normal or Disturbed.) During radio storms there is a good chance for widespread auroral activity to take place. Intense ionization associated with auroral activity can produce conditions favorable to *6* and *2* meter propagation. Whether by auroral-scatter or by reflection from sporadic-*E* ionization associated with auroras, openings on both *6* and *2* meters for distances up to approximately 1300 miles may often be possible.

No significant meteor showers are expected during February.

DYNAMICS EXPLORER Satellites

On August 3, 1981 NASA launched into space a set of twin scientific satellites called DYNAMICS EXPLORER A and DY-

HOW TO USE THE DX PROPAGATION CHARTS

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

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

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

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

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

February 15 - April 15, 1982
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

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

Time Zones: CST & MST
(24-Hour Time)
CENTRAL USA TO:

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

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

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western Europe & North Africa	08-09 (1) 09-11 (2) 11-12 (1)	07-08 (1) 08-10 (2) 10-12 (3) 12-13 (2) 13-14 (1) 19-21 (1)	00-06 (1) 06-09 (2) 09-11 (1) 11-14 (2) 14-16 (3) 16-19 (2) 19-22 (1) 22-00 (2)	19-20 (1) 20-22 (2) 22-00 (1) 20-22 (1)*
Central & Northern Europe & European USSR	08-09 (1) 09-10 (2) 10-11 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-12 (1) 19-21 (1)	06-06 (1) 06-09 (2) 09-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	19-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*

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

*Indicates best times to listen for 80 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.

**Indicates best times to listen for F-2 layer openings on 6 Meters.

NAMICS EXPLORER B. Both satellites are designed to work in harmony to provide a greater understanding of the processes by which energy from the sun, in the form of light waves and matter, flows through interplanetary space and enters the region around the earth controlled by the magnetic forces from the earth's magnetic field. The satellites hope to shed information on the formation of the ionosphere and the creation of auroras. They are intended to provide specific data and knowledge about the interaction of energy, electric currents, electric fields, and ionized particles above the earth's atmosphere.

Although the twin satellites did not reach their intended orbits, and other operational difficulties developed, both sent back a high volume of data during 1981, which, when fully evaluated by scientists, may help unlock some of the remaining secrets of ionospheric propagation!

73, George, W3ASK

a monthly feature by
A. EDWARD HOPPER, W2GT

Awards

NEWS OF CERTIFICATE AND AWARD COLLECTING

The February "Story of The Month" as told by Vivian is:

Vivian K. Scott, WDØEMS All Counties #304, 11-6-80

"In 1946, just before Scotty and I were married, we were allowed to talk to Canada via ham radio. His best friend's Dad was a ham but became a Silent Key over a year ago. When we first decided to become hams we were thrilled. However, we thought that maybe it was over our heads, and we didn't have enough money, so becoming hams was just a distant dream until 1977.

"Scotty bought me a 23-channel CB for Christmas in 1976, but after a *very* brief time, we decided there must be something better. We saw a notice that Radio Theory Classes were being offered by KØRK, and Scotty said that if I became a ham, he would buy the equipment and would also become one when he got his Bachelor's Degree from Washigton University night school.

"I faithfully went to class, received my Novice ticket in August 1977, upgraded to General on January 10, 1978, and upgraded again to Advanced on February 14, 1978. I was only on 10 meters for about 18 months, and then I heard about County Hunting. I finally got up the nerve to transmit on 20 on March 14, 1979.

"On March 14, 1979, I started collecting counties on the 20 meter Independent County Hunters Net. *CQ* magazine gives a much sought-after Award for working All Counties in the 50 states. So what is so difficult about that? At first, not much, because you need them all. Besides, working the mobiles is only the first step; confirming them is much more tedious and time consuming. We have a Mobile QSL Bureau which handles the Mobile Reply Cards (MRCs) to keep the cost to a minimum. When a card is confirmed, you officially "put it in the book"—the *CQ* Record Book—and then color it in in the Coloring Book (the older books or those from W6CCM). Imagine, at my age, having to learn to color all over again.

Vivian K. Scott, WDØEMS, working her Last County, November 2, 1980. She was so excited, she forgot to turn on her tape recorder.

"Exactly one year later I only needed 66 more counties, but that is when the going got really tough. Countless hours were spent at the rig just listening, hoping, and not transmitting much. By July 1980 I only needed one, but one which seemed like it might as well be located on the moon. It was Kalawoa County, Hawaii, the site of the old leper colony located on the Island of Molokai. When I got down to the last one, I listened constantly, wrote letters to Hawaiian stations hoping they would go visit the colony for me, listened, made sure everyone I talked with knew which county I needed, chewed my nails, tore my hair, despaired greatly, and became a nervous wreck.

"On October 10th there was an announcement that a fellow County Hunter, WØEWH, was planning a trip to Kalawao early in November. Immediately we, Scotty and I, called him long distance and found that he was indeed going there and when. At that point I really went crazy, waiting, waiting, and waiting, dreaming about it at night, worrying about the propagation and if it would be right, would I be able to hear him, or would I maybe faint dead away at the crucial moment.

"Finally on Saturday evening, November 2, 1980 at 0203Z, we made the contact. As everyone congratulated me, I just went limp after yelling 'Yippeeeeee' into the microphone and alternately laughing and crying. After listening to the rest of Al's run, I calmly ate a snack, went to bed, and found that I was not sleepy after all, but wanted to jump up, dance on the ceiling, the roof, and up and down the street. On Monday I received the confirming telegram from Hawaii, had my record book verified by two hams, and sent all the paperwork to the Awards Chairman, Ed Hopper, W2GT, in New Jersey, ordered the "Last For ALL" plaque for that wonderful ham, Al Miller, WØEWH, and settled down very impatiently to wait.

"On Friday, November 7, at 1810, W2GT came on the Net and awarded me All Counties #304 dated 11-6-80. As I yelled 'Hooray' and again alternately laughed and cried, I breathed a sigh of relief and pinched myself to make sure I was not dreaming and really *had* joined the elite group of 303 hams who had achieved this goal before me. I had really done it; my long hours of hard work had paid off. Scotty would be coming home from work to a warm stove and cold transmitter for a change. And then—the next mobile was announced on the Net and began to run his county. At 1816Z I worked a county line in Louisiana for the first two counties for a second time around. Crazy? Possibly, but I just did not want to leave all my friends, and now Scotty is starting to collect counties.

"I made 99% of my contacts with my Kenwood TS-520S barefoot with a 6-element TH6DXX beam at 30 feet. Scotty did get his Novice license in June 1979 after graduating from Washington University, and upgraded to General in May 1980. When we give out counties, he is the driver and I usually transmit. I could not do it without him, nor could I have worked as hard collecting the counties without his total cooperation.

"I am 53 years old (same as Mickey Mouse) and Scotty (officially, Harrison B. Scott, KAØFJA) is 55. We were married 35 years last July and have no children, but we do have a gorgeous black-and-white long-haired cat named Simba, who owns us totally, and we love it.

"All the people I have met in amateur

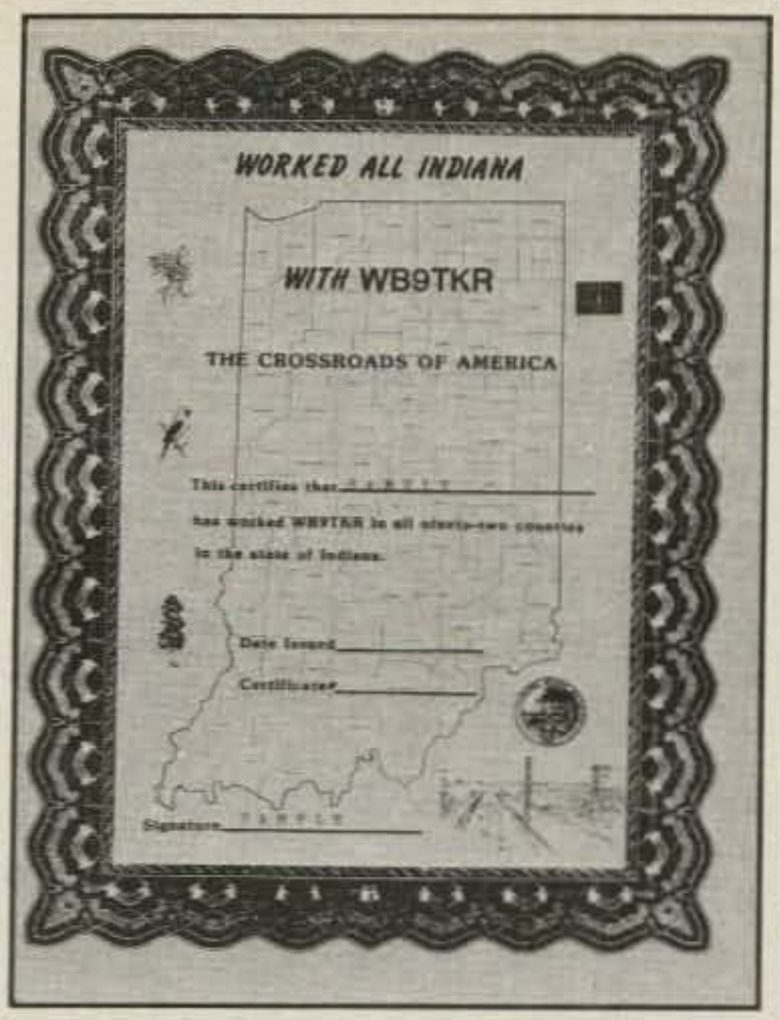
P.O. Box 73, Rochelle Park, NJ 07662

radio have been nice, but I'm partial to the County Hunters. We have been to several of the conventions and have had marvelous times meeting all the nice people. Thanks to them all for their help!"

Note: Portions of this story came from the "Barricks Bugle" of the Jefferson Barricks Amateur Radio Club. Vivian, "Early Morning Sunshine," is the Editor, and she was pressured into writing her experiences—Ed.)

Special Honor Roll
All Counties

#347 Daniel R. Broadbooks, KBØYU 11-5-81.
#348 Hoppy Hopkins, WB5UJO 11-6-81.
#349 Arthur M. Labahn, WBØGRN 11-9-81.
#350 Gordon R. Baker, KA5A, 11-9-81.
#351 Richard D. Bolster, WBØMNE 11-9-81.



Worked All Indiana With WB9TKR Award.

Awards Issued

Dan Broadbooks, KBØYU (ex-WA9WIF), added to his fine collection USA-CA-3000 endorsed All 2XC.W. and All Counties endorsed Mixed.

"Hoppy" Hopkins, WB5UJO, waited until he had them All and acquired USA-CA-500 through All Counties endorsed Mixed.

Art Labahn, WBØGRN, became #1 to obtain USA-CA-500 through All Counties endorsed All S.S.B, All Mobiles to Mobiles using not more than 5 watts!

Gordy Baker, KA5A (ex-WA5KQD), added All Counties endorsed All 2XC.W. to his nice collection.

Dick Bolster, WBØMNE, waited until he had them All and picked up USA-CA-500 through USA-CA-3000 endorsed All 14, All S.S.B., All Mobiles and All Counties endorsed Mixed.

John Sebastian, N8BGF, added USA-CA-2500 endorsed All S.S.B., All Mobiles, All 20.

Joe Reisert, Jr., W1JR, claimed USA-CA-2000 endorsed Mixed.

Bill Fourt, WD9CQF, sent for USA-CA-500, 1000, and 1500 endorsed All S.S.B., All Mobiles.

Bob Gosnell, W9GBC, applied for USA-CA-500 and 1000 endorsed All S.S.B.

Frances Gideon, WB8WXZ, qualified for USA-CA-500 endorsed All 6 meters (#16), All S.S.B. (#3).

Bengt Sward, SM3DXC, gained USA-CA-500 endorsed Mixed.

Warren Ash, AK2H, had me send him USA-CA-500 endorsed All C.W.

Awards

Worked All Indiana With WB9TKR: This Award will be issued (free) to any amateur who has worked all 92 Indiana Counties with "Eli," WB9TKR (All Counties #256). Send log info, one time only, after completion of working all 92 to: Jim Elias, WB9TKR, 8651 Meadow Vista Drive, Indianapolis, Indiana 46217.

Vernon Winter Carnival Certificate of Merit: Sponsored by the North Okanagan Radio Amateur Club (NORAC) and the Vernon Winter Carnival Society to celebrate the 22nd Annual Vernon Winter Carnival, Western Canada's largest winter carnival. It is held annually in February, this year February 5 to 14. Operation will be daily from 2100–2400Z and on February 7th from 2000–0200Z. Actually, this Award is available all year round, not just in February. The Award is free. Send log data of QSOs with three (3) Vernon Area stations or one contact with the Club station, VE7NOR, to P.O. Box 1706, Vernon, B.C. V1T 8C3 Canada. The Vernon area is defined as Armstrong, Enderby, Oyama, Winfield, Lumby, and Vernon. Look on 28.575, 21.375, and 14.295, and there is a possibility of c.w. and RTTY operation. (Thanks to VE7EGD for this data.)

Vernon Winter Carnival Merit Award.

Worked All Hawaii Awards: Sponsored by the Big Island Amateur Radio Club.
General rules:

1. Awards available to all licensed amateurs.

2. Contacts made after 0000Z January 1, 1982 are valid for the awards.

3. Any mode on any band is acceptable. No terrestrial repeater contacts will be accepted.

USA-CA Honor Roll

3000		2000		1000	
KB0YU	375	W1JR	492	W9GBC	676
WB5UJO	376	WB5UJO	493	WD9CQF	677
WB0GRN	377	WB0GRN	494	WB5UJO	678
WB0MNE	378	WB0MNE	495	WB0MNE	679
2500		**1500**		**500**	
N8BGF	436	WD9CQF	552	W9GBC	1660
WB5UJO	437	WB5UJO	553	WD9CQF	1661
WB0GRN	438	WB0GRN	554	WB8WXZ	1662
WB0MNE	439	WB0MNE	555	WB5UJO	1663
				SM3DXC	1664
				WB0MNE	1665
				AK2H	1666

4. Only land-based stations are valid for the awards.

5. Do not send QSL cards. A list showing the date, time, signal report, mode, call sign, and band, certified by a club or society official, is sufficient.

6. The fee for the award is $3.50 U.S.

7. Three awards are available:

Class A—Wood carved tiki (certificate only for stations located in the state of Hawaii).

Class B—Certificate.

Class C—Certificate.

8. Address all award applications to: Big Island Amateur Radio Club, P.O. Box 1688, Kamuela, Hawaii 96743, USA.

Requirements:

Class A:

1. Work 100 Hawaiian stations to include the following:

A. The islands of Hawaii, Maui, Lanai, Molokai, Oahu, and Kauai.

B. The counties of Hawaii, Maui, Kalawao, Honolulu, and Kauai.

C. One of the following islands: Kure, Midway, Necker, Laysan, French Frigate Shoals, Niihau, or Kahoolawe.

D. 10 or more BIARC members.

Class B:

1. Work 50 Hawaiian stations to include the following:

A. The islands of Hawaii, Maui, Molokai, Oahu, and Kauai.

B. Five or more BIARC members.

Class C:

1. Work 25 Hawaiian stations to include the following:

A. The islands of Hawaii, Maui, Oahu, and Kauai.

B. Three or more BIARC members.

Vatican Award: The Radio Vaticana on the occasion of the 50th anniversary of its foundation issues an Award available to licensed amateurs (and s.w.l.s) anywhere in the world under the following rules:

1. Contacts with stations in the Vatican State must be made during the period starting from October 1, 1981 on any amateur band from 3.5 MHz to 144 MHz and any mode (a.m., s.s.b., c.w., RTTY) including cross-band relay and mixed. This period ends on February 1, 1982.

2. Stations in Europe (including the USSR in the European territory) and the USA (except Alaska and Hawaii) must work (or hear) at least 2 different stations operating from the Vatican State. At present there are only three licensed stations: HV1CN, HV2VO, and HV3SJ.

Garry V. Hammond, VE3GCO, and daughter, Sarah (4 years). Garry sells a fine Awards Directory for $7.00.

3. Stations outside the abovementioned countries must work (or hear) at least one HV station.

4. The applicant must prove the required contact/contacts by sending a photocopy of the QSL/QSLs received from the HV stations during this period.

5. The application must be sent before December 31, 1983 and addressed to: HV1CN, Radio Vaticana, Citta' del Vaticano, Europa.

Notes

A thank you to Rod, WA0QII, who on last September 10 operated from what he thought was a tri-county line. He later found it was not, so he sent notice to the affected 29 QSOs to advise that he could not count Sonoma County, CA.

73, Ed, W2GT

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Charles T. Allen, W5DV, and James M. Allen, W6OGC, eds.
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Computers and the Radio Amateur
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The 10 Meter FM Handbook
by Bob Heil, K9EID
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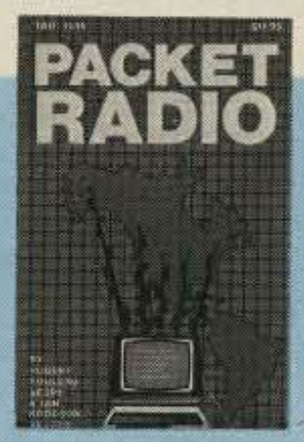

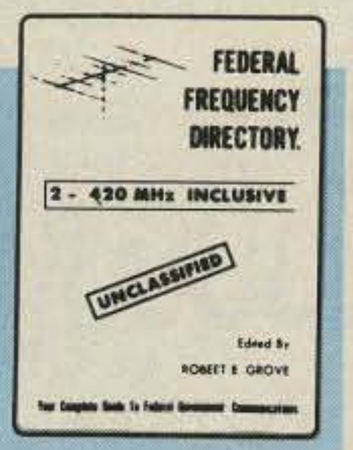

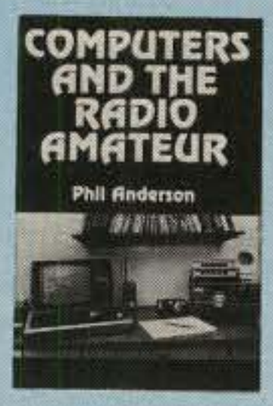

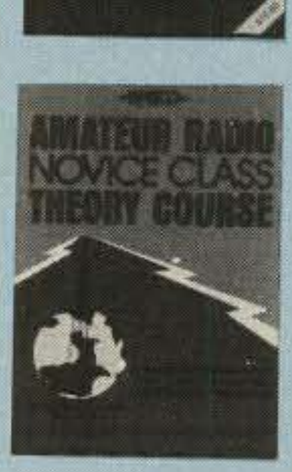

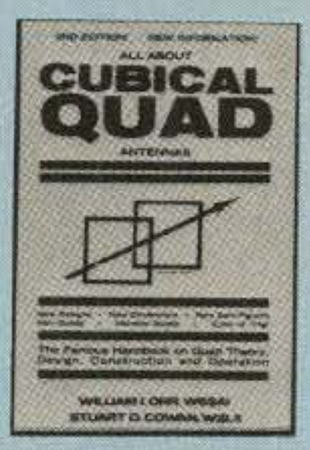

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a regular feature by
THEODORE J. COHEN, N4XX

dateline... Washington, D.C.

THE INS AND OUTS OF THE WASHINGTON SCENE

Lines Drawn For Battle Over FCC Budget

At this writing, there is every indication that Congress will not go along with the Reagan Administration's proposed 12 percent cut in the FCC's budget. The Senate Committee on Appropriations did not approve the proposal, and while the full Senate has still to vote on the measure, reliable sources indicate that the proposal will be defeated.

These same sources indicate that the House, too, will not go along with the President's planned reductions.

In all probability, Mr. Reagan will veto any bill which does not include his proposed 12 percent cut in funding to Federal agencies. Since our analyses indicate that the Congress will not override such a veto, it would appear that a compromise will have to be worked out, with the actual reductions being less than the Administration's proposed 12 percent.

One can only hope that the matter is settled by the time this appears in print so that the Commission, together with the other Federal agencies, can proceed with their FY82 programs.

R.F.I. Complaints Continue To Rise

Jeffrey Young, Enforcement Division, Field Operations Bureau, FCC, reported that r.f.i. complaints for the Government's FY81 ending in October 1981 totaled 82,084. This is almost 2,000 more complaints than were received in FY80, and indicates that r.f.i. problems are still increasing on a long-term basis.

For the last quarter of FY81 (July–September), Young stated that the FCC received 19,905 complaints, of which 12,598 were related to CB operations; amateurs were only involved in 1,082 cases.

The majority of the r.f.i. complaints cited a television receiver as the victim device. Of 15,568 so-called "t.v.i." complaints, CB operations were alleged to be the interference source in 10,944 cases, while amateurs were alleged to be involved in only 655 cases. "Television interference" is really a misnomer, since in almost all cases, the problem stems from the TV receiver's inability to reject signals it was not intended to receive.

Cases of interference to amateur operations by other amateurs was cited in 396 interference complaints, down slightly from the 449 complaints reported in the previous quarter (April–June).

Finally, Young noted that incidental radiation from Part 15 devices (computers, hair dryers, electric shavers, etc.) totaled 1,581 in the last quarter of FY81. In 1,495 of the cases, a TV receiver was the victim device. Interference from Part 15 devices may be on the rise, and this is one area that the Commission is watching with interest and concern.

Intense Lobbying Pressure By Electronics Industry Could Kill R.F.I. Measures In S.929

With Sen. Goldwater's bill, S.929, now up for consideration in the House of Representatives, an intense lobbying effort to kill this bill's r.f.i. provisions is being mounted by the electronics industry. Led by the Electronics Industries Association (EIA), the lobbying effort is aimed at having the r.f.i. measures of the bill declared "controversial." Once this is done, the r.f.i. protection measures would be stripped from the house version of the bill.

As we go to press, it appears likely that the electronics industry will succeed in their efforts. And while the revised bill still must face reconciliation with the Senate version, it appears that the move to write r.f.i. provisions into the FCC's rules is in serious trouble.

FCC Reinstates Program On R.F. Imports

As reported in *Electronic News* (October 1981), the FCC has reinstated its program for ensuring that imported r.f. equipment meets the Commission's rules protecting against harmful interference to the various radio services.

Under the reinstated program, importers or their brokers must submit forms directly to the Commission which indicate that the devices being imported have received FCC authorization and that they comply with the FCC's technical standards for r.f. emissions.

Under the reinstated program, the FCC will make spot checks at the over-300 ports of entry in the U.S. to verify that shipments are consistent with submitted forms. In addition, the Commission's field personnel are authorized to make unannounced inspections of crated goods. If forms are not submitted, or if goods are not found to be in compliance with the FCC's rules, the case may be referred for forfeiture and other customs service actions.

Bill Introduced To Establish Penalties For Violations Of Section 605

Congressmen Waxman and Wirth, in late 1981, introduced H.R. 4727, which would amend the Communications Act of 1934 to establish penalties for violations of the "so-called" secrecy provisions of the Act (Section 605).

Among the provisions of the bill are the following:

- Any person who violates (the Act) willfully shall be fined not more than $1,000 or imprisoned for not more than six months, or both;
- Any person who violates (the Act) willfully and for purposes of commercial advantage or private financial gain shall be fined not more than $25,000 or imprisoned for not more than one year, or both, for the first such offense, and shall be fined not more than $50,000 or imprisoned for not more than two years, or both, for any subsequent offense.

While the bill is intended primarily to discourage the piracy of television sig-

8603 Conover Place, Alexandria, VA 22308

nals from stations operating, for example, in the multi-point distribution service, operators should be aware that licensees in the amateur service are also subject to the provisions of Section 605.

Amateur Operator Sets A New Record In Marathon

Dr. Earl Skelton, N3ES, recently participated in the sixth annual Marine Corps Marathon, finishing the run in a little over three and one-half hours. That's not unusual, given Skelton's running skills. What was unusual, however, was that during the marathon, Skelton completed 69 contacts with amateurs all over the world!

That he was able to accomplish such a feat testifies not only to the capable teamwork of the members of the Naval Research Laboratory's Amateur Radio Club (W3NKF), but also to the flexibility of communications afforded by amateur radio.

During the marathon, Skelton wore a 2-meter transceiver, headset, and a head-mounted 2-meter antenna. Using three mobile stations which were stationed along the marathon course, Skelton's transmissions were relayed via a 220 MHz link to NRL, where they were retransmitted on 15 or 20 meters. The same type of links were used to enable Skelton to hear on 15 or 20 meters.

During the marathon, Skelton contacted stations all over the world, including conversations with operators in the USSR and Sweden. "The guy in Moscow's English was about as good as my Russian, but we did make contact," he said.

During one very tiring stretch of the marathon, NRL operators were even able to patch Skelton into his mother in Ohio, and into his family in the Washington, D.C., area. Both calls lifted his spirits and encouraged him on.

Perhaps Skelton's feat of being the first man to maintain 2-way radio contact while communicating world-wide may not make the *Guinness Book of Records*, but it certainly adds another chapter to amateur radio's well-documented history of demonstrated communication preparedness.

FCC Authorizes Beacons On New Amateur Bands

In an attempt to permit amateurs to become familiar with propagation characteristics on the new bands allocated to the amateur service at WARC-79, the FCC has authorized an experimental beacon on the bands 10.1–10.15, 18.068–18.168, and 24.89–24.99 MHz.

Initial operations will use 3 watts ERP on the 10 MHz band, with identification and announcements occurring at 2, 12, 32, 42, and 52 minutes past each hour. The station is assigned call sign KK2XJM.

Operations should have commenced on 1 October 1981. Depending on the results obtained, the schedule will be expanded to include transmissions on the 18 and 25 MHz bands using power levels of up to 30 watts ERP.

Persons copying KK2XJM are encouraged to send reports to R.P. Haviland, W4MB, 2100 S. Nova Rd., Dayton Beach, FL 32019. Reports should include the following information: date, time, signal strength, location of receiver, nature of receiving installation, and other signals heard on the band. All reports will be acknowledged by a QSL card.

U.S. amateurs are cautioned that the three new bands noted above are still not available for general use, since, among other reasons, the U.S. Senate has not yet ratified the WARC treaty. Be aware, however, that operations on these bands by amateurs in countries which have already implemented the WARC changes may have begun on 1 January 1982.

IEEE Co-sponsors Teleconferencing Radio Network

An IEEE group on Long Island, NY, in cooperation with the Long Island Mobile Amateur Radio Club, will sponsor a teleconferencing radio network that will feature guest speakers on the communications/electronics industry.

The broadcasts, which are now scheduled to occur once a month, will be on 147.375 MHz, and should be able to be received at distances of up to 50 miles from the tower in Plainview, NY.

Amateurs will be able to submit questions and comments during the broadcasts, and listeners with amateur facilities can participate by phone patch through the facilities of Joseph Kolb (president of the LIMARC).

According to Edwin Piller, W2KPQ (chairman of the cosponsoring LI Section of the Communications Technology Subsection), "This experimental network is the first effort by the IEEE to reach its members in any area through teleconferencing."

For further information, call Mr. Piller at (516) 349-2484 (office) or (516) 938-5661 (home).

Engineering Graduates Get Major Share Of Job Offers

As reported in *Electronic Engineering Times*, 63 percent of the jobs offered to college graduates are directed to engineering grads. This statement, made by Dr. Robert A. Frosch, president of the American Association of Engineering Societies, supports the observation that unemployment for engineers is at an all-time low, with less than 1 percent of all engineers unemployed.

Said Frosch, "The situation is such that there is little incentive for the person with a bachelor's degree in engineering to continue their education to the graduate-school level." Frosch also noted that salaries offered to engineers are so high that engineering school professors are

being drawn into industry in ever-increasing numbers.

Industry observers believe that we are now sowing the seeds for a disaster in the technology industry. For without adequately staffed engineering schools and personnel with advanced degrees, we will not have the ability to pursue business in advanced technologies by the mid to late 1980s.

Court Rules That Taping Over-The-Air TV Violates Copyright Law

In a major setback to the home video recording industry, the Ninth U.S. Circuit Court of Appeals in San Francisco late last year ruled that manufacturers, distributors, and users of home video recorders are liable for damages if the devices are used to tape over-the-air programs.

The appeal was filed by MCA, Inc. and Walt Disney Productions. Both corporations produce television programing, and they alleged that the use of video recorders to copy material would seriously affect their earnings.

The Appeals Court's decision addressed only the matter of taping over-the-air programs for noncommercial home use. Yet to be dealt with is the question of copying over-the-air programing from sources such as pay television broadcasts when such copies are to be used out of the home.

It would appear that one way to enforce the court decision would be to tax blank video tapes (for example, the tax would be equivalent to the royalty fees charged for copyrighted material). Another solution to the illegal taping problem would be to require that video recorders be redesigned to prevent them from being used to tape material directly from a television receiver.

Some industry observers suggest that the case could go all the way to the Supreme Court. But as Jay Rosenfield, publisher of *Video* magazine, noted the Appeals Court decision is a straightforward interpretation of the Communications Act of 1934. Thus, it may literally take an act of Congress to address the matter.

Operator Fined For Illegal TV Broadcasting

In late October 1981, the operator of an unlicensed low-power television station at Southern Pines, NC, was issued a Notice of Apparent Liability for a forfeiture of $2,000 for broadcasting without a license.

The operator was broadcasting on v.h.f. Channel 7, and was retransmitting "adult" and other programing from a satellite receiving station. Intermittent operation of the station began on 15 October, and overnight programing began on 22 October. During the nighttime hours, the operator rebroadcast The Movie Channel and Eastern Sports Programing Network programs, all of which he received on his own earth station.

The Commission began a rulemaking in 1980 to create the low-power television service. Applications for such stations were accepted before the rulemaking was completed. The rulemaking has not been completed at this writing, and the FCC is no longer accepting applications, pending final action in the matter.

Docket On Plain-Language Rules Closed

In the FCC's 12 November 1981 agenda meeting, the controversial docket on plain-language rules for the amateur service was closed without action.

According to James McKinney, Chief of the FCC's Private Radio Bureau, "There was no support whatsoever from the amateur community for the proposed rules." Intense pressure from Capitol Hill to kill the measure was also cited as a reason for abandoning the docket.

Though the docket was closed, McKinney noted that as a result of the inquiry, the Commission had obtained a great deal of information on amateur views. He noted, however, that any further efforts to develop plain-language rules for the amateur service would have to be initiated by amateurs themselves.

Announcing

- **Operation Icebox** - The Robbinsdale ARC, K0LTC, has announced its second annual Operation Icebox from the frozen surface of Rainy Lake near International Falls, Minnesota. Operation will begin on February 5 at 0000 GMT and run until 0000 GMT on February 6. Frequencies used will be 10 kHz up from the bottom of the general phone bands. Novice operation is also planned. There will be two stations to cover 80 meters through 10 meters. K0LTC is offering a commemorative QSL for an s.a.s.e. enclosed with your QSL. Send to KB0PM.
- **Wheaton Community Radio Amateurs Hamfest** - This hamfest will be held at the Arlington Park Expo Center, Arlington Heights, IL. For more information, contact WB9PWM/KA9KDC.
- **Mid-Winter Hamfest/Auction** - This hamfest/auction will be held on Sunday, February 14 at the Richland County Fairgrounds in Mansfield, Ohio. Prizes, auction, and flea market. Doors open at 8 a.m. Tickets are $2.00 in advance, $3.00 at the door. Tables are $5.00 in advance, $6.00 at the door. Talk-in on 146.34/94. For information and tickets send an s.a.s.e. to Harry Frietchen, K8HF, 120 Homewood Road, Mansfield, OH 44906.
- **Cherryland ARC Swap 'N Shop** - This ninth annual event will be held on Saturday, February 13 at the Immaculate Conception Middle School gym, 218 Vine Street, Traverse City, Michigan. Doors open from 8 a.m. to 2:30 p.m. Admission is $2.50; single tables are $3.00. Talk-in on 146.85 or 146.52 simplex. For more information, contact Jerry Cermak, K8YVU, 3905 Slusher Road, Traverse City, MI 49684.
- **Treasure Coast Hamfest** - The Treasure Coast Hamfest will be held on February 20 at the Vero Beach Community Center, Vero Beach, Florida. Prizes, drawings, Q.C.W.A. luncheon. Admission $2.00 in advance, $2.50 at the door. Talk-in on 146.13/73, 146.04/64, 146.52, and 222.34/223.94. For more information write to P.O. Box 3088, Beach Station, Vero Beach, FL 32960.
- **Plateau ARA 4th Annual Hamfest** - This event will be held on Sunday, February 21, at the Memorial Building in Fayetteville, West Virginia. Doors open at 9 a.m. Admission is $2.50, children free. Flea market tables $2.00. All activities indoors. Hot food, refreshments, and free parking available. Activities include ARRL displays, forums, exhibits, door prizes, and women's programs. Talk-in on 19/79 and 52 simplex. For more information, contact Bill Wilson, WA8YTM, 302 Central Ave., Apt. 2, Oak Hill, WV 25901, phone 304-469-9910 or 469-9313.
- **Lancaster Hamfest** - The Lancaster Hamfest wil be held on February 21 at the Guernsey Pavillion, Route 30, East of Lancaster, Pennsylvania, at the intersection of Route 896. Admission is $3.00, except for children and XYLs. All inside spaces by advance registration only. Each 8-foot space with table is $5.00. (Deadline for table registration is February 10.) Free tailgating outside. Talk-in on 146.01/61 or 146.52. For more information, write to SERCOM, Inc., P.O. Box 6082, Rohrerstown, PA 17603.
- **George Washington's 250th Birthday Special Event** - This occasion will be commemorated on February 22 by amateur radio operations from Mount Vernon, Virginia. Members of the Mount Vernon Radio Club will operate from 0900–1600 EST on the 22nd using the call sign WB4IGW. Look for WB4IGW at or near 7.260 and 14.285 MHz (s.s.b.) and on 146.055/655 MVARC repeater. Additional s.s.b. operations may take place on 28.745 and/or 21.415 MHz, and via a Novice c.w. station at or near 21.120 MHz. For a special commemorative QSL send an s.a.s.e. and, if possible, your own QSL, to Amateur Radio Station WB4IGW, Elmer Zborofsky, 5912 Brookview Dr., Alexandria, VA 22310.
- **Brenham Radio Club Special Event Station** - Special event station WB5STR will be operating from the site of the Texas insurrection from Mexico, Washington on the Bracos, on February 26 at 8 p.m. through February 28 at 4 p.m. Opertion will be on the general phone bands. Special QSL cards will be issued upon receipt of an s.a.s.e. For more information, write to BARC, P.O. Box 44, Brenham, TX 77833.
- **Cuyahoga Falls ARC 28th Annual Electronic Equipment Auction and Flea Market** - This annual event will take place on Sunday, February 28, at North High School, Akron, Ohio from 8:30 a.m. to 4 p.m. Tickets are $2.00 in advance and $2.50 at the door. Prizes, free parking. Talk-in on 146.04/64. For more information, contact CFARC, P.O. Box 6, Cuyahoga Falls, OH 44222, or phone K8JSL at 216-923-3830.
- **12th Annual Livonia ARC Swap 'N Shop** - This swap 'n shop will be held on Sunday, February 28, from 8 a.m. to 4 p.m. at Churchill High School in Livonia, Michigan. Tables, prizes, refreshments, and free parking. Talk-in on 146.52 simplex. Reserved table space of 12-foot minimum available. For more information, send an s.a.s.e. to Neil Coffin, WA8GWL, c/o Livonia Amateur Radio Club, P.O. Box 2111, Livonia, MI 48151.

Ham Shop

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1982 CALLBOOKS! Set $31.00 postpaid. Canada, Hawaii, Alaska, Mexico, Guam, PR add $4.00. DX add $9.00. K4CLA, 562C Oak, Lexington, SC 29072.

RUBIC'S CUBE SOLUTION BOOKLET $2.00 postpaid. Carla, 562D Oak, Lexington, SC 29072.

PLAYBOY CLUB: Plan ahead now to attend the ARRL Hudson Division Convention October 30-31, 1982, at the Playboy Club, Great Gorge, McAfee, NJ. For info send SASE to HARC, Box 528, Englewood, NJ 07631.

FREE SAMPLE - Award winning ham insider newsletter - Best in the business! Judge for yourself! Send SASE w/2 stamps: THE W5YI REPORT; Box #10101-C; Dallas, Texas 75207.

WATER ISLAND DXPEDITIONS story October CQ, page 66. "SWEET" KV4 Virgin Island vacations. Club rates. Limestone Reservations, RD4, Princeton, NJ 08540, (201) 329-6309.

SATELLITE TV . . . HOWARD/COLEMAN TVRO BOARDS . . . Build your own satellite TV receiver. For more information write . . . Robert Coleman, Rt. 3, Box 58-ACQ, Travelers Rest, SC 29690.

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ROHN TOWERS: Wholesale direct to users. All products available. Write or call for price list. Also we are wholesale distributors for Antenna Specialists and Regency FM Radios. Hill Radio, P.O. Box 1405, 2503 G E Rd., Bloomington, IL 61701, (309) 663-2141.

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INTERESTED IN QRP? Full information for s.a.s.e. QRP/ARCI, Box 12072, Capitol Station, Austin, Texas 78711.

CINCINNATI ARRL '82: Hamilton County ARPSC invites all hams to participate in the second annual Ohio State Convention. Two full days of amateur activities: forums, meetings, exhibits, flea market, and more! This ALL INDOORS activity will take place on Saturday and Sunday, February 27 and 28. For further information contact Cincinnati ARRL '82, Committee for Amateur Radio, P.O. Box 46311, Cincinnati, Ohio 45246. Dealer and exhibitor inquiries invited. Registration $4, Flea Market $3.

FOR SALE: Dentron GLA-1000B linear, 1200 watts PEP, Dentron AT-1K antenna tuner, 1200 watts PEP. Both brand new in sealed cartons. $400.00 plus shipping. K2EEK, CQ Magazine, 76 N. Broadway, Hicksville, NY 11801.

FOR SALE: Macrotronics FSD-1/M-650 RTTY system. PET 2001 computer. Venus C-1 SSTV camera and SS-2 monitor. Karl Thurber, W8FX, 317 Poplar Drive, Millbrook, AL 36054.

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