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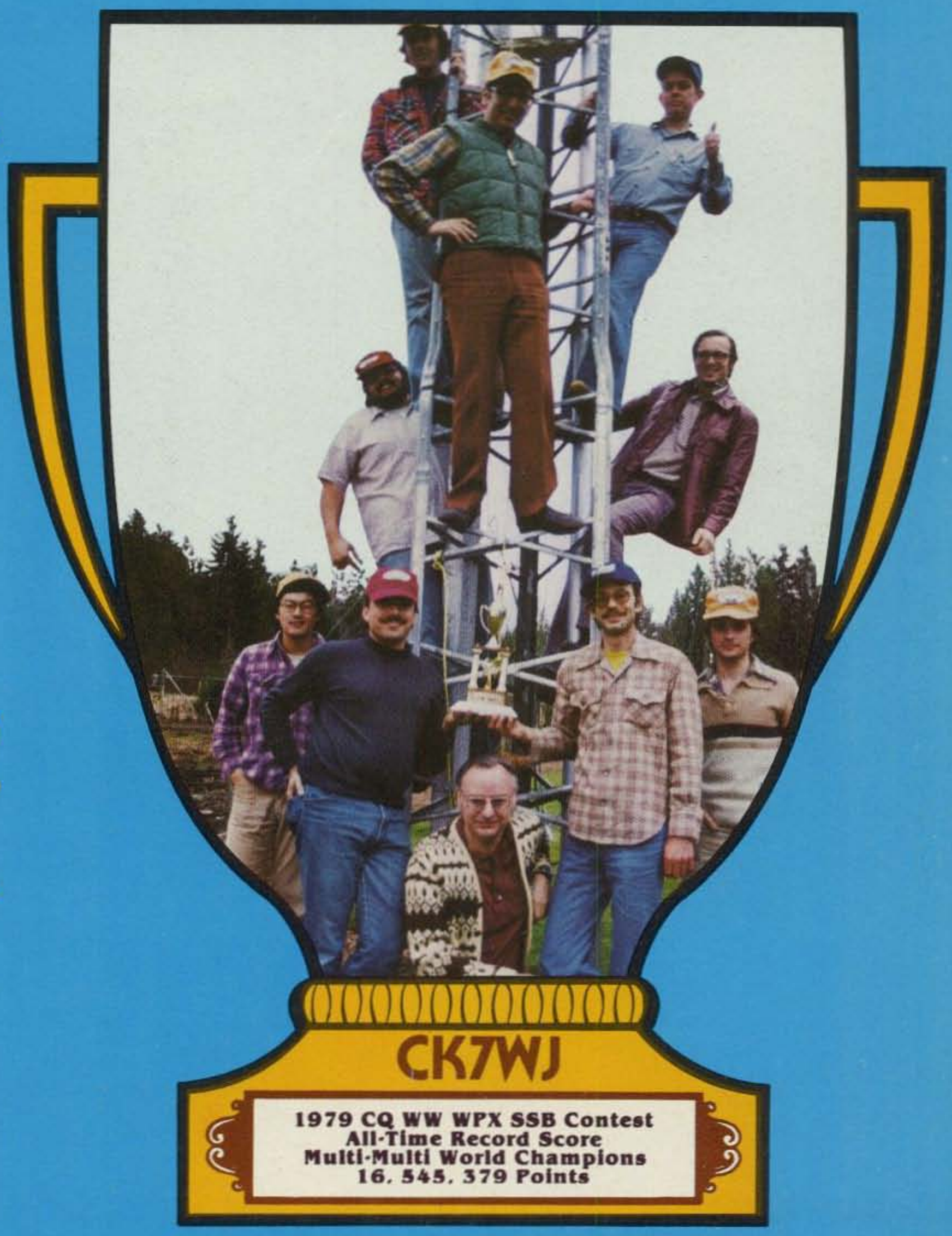

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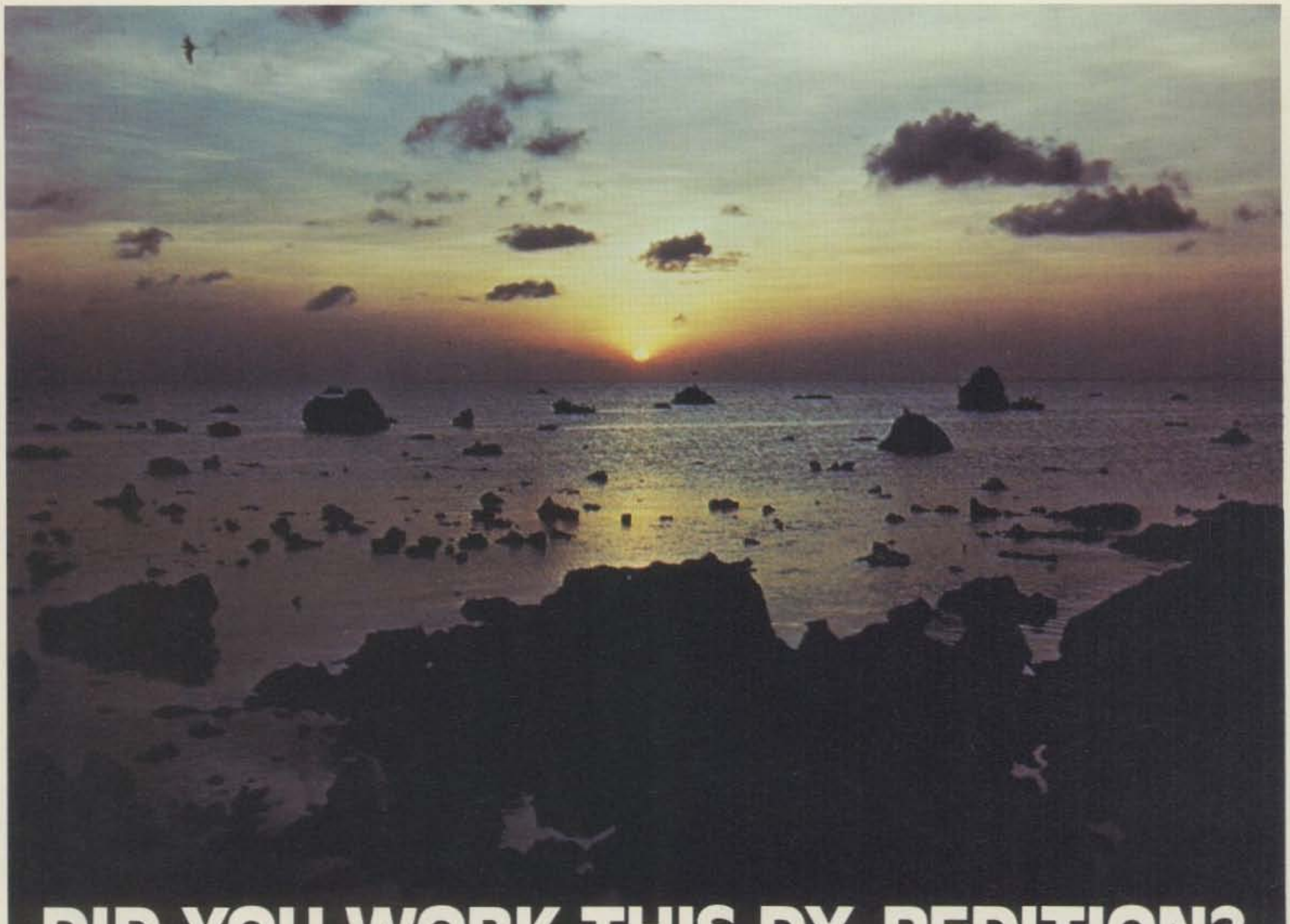

DID YOU WORK THIS DX-PEDITION?

This photo was taken during the Spratley Island expedition to the South China Sea. During this DX-pedition there were thousands of contacts made with help from several Clipperton L's. If you weren't a part of this excitement maybe it's time you hooked up with DenTron.

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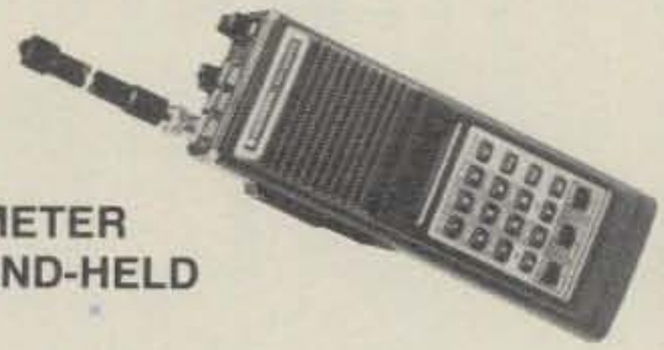

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FEBRUARY, 1980 VOL. 36, NO. 2

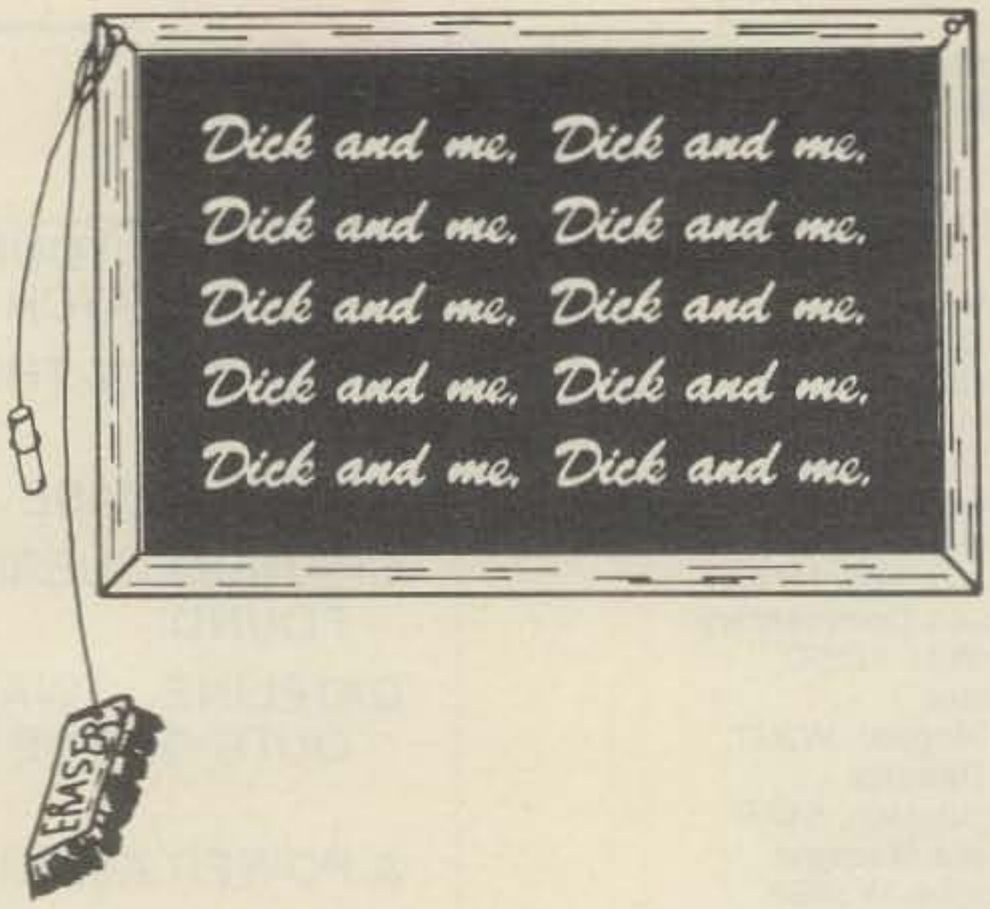
CQ The Radio Amateur's Journal

FEATURES

DEPARTMENTS

Zero Bias

an editorial



You will have noticed by now what appears to be a cartoon on this page depicting a blackboard. This is in the form of my penance for making the unforgivable grammatical error of using "Dick and I" in my December Editorial. To the many who picked up on it and wrote to correct me, I apologize. To the great silent majority (I hope that doesn't date me too much), thank you.

I have picked up by now an avid following of readers who correct my spelling, grammar and sometimes usage. At first I resented being corrected and admittedly took it personally. Part of me still doesn't like it, but I find that another part of me does indeed appreciate the concern. It reassures me that people really read my Editorials and some in fact respond to them.

I know, for example, that when I attend Conventions or Hamventions, amateurs will invariably come up to me and say they wanted to meet the person who writes Zero Bias and that they liked, disliked, agreed or disagreed with what I wrote. However, when it comes time to take pen in hand, most people comment on the construction rather than the content. While their criticism is valid and correct, there's more involved here that's being overlooked. I'm talking about the difference between responses and responsiveness.

There is an axiom in Gestalt psychology that simply states that the whole is greater than the sum of the parts. My analogy, therefore, is that somewhere in my monthly writings is hopefully a cohesive thought or idea to respond to rather than a series of individual words and punctuation marks. My purpose is to motivate the reader to think and perhaps to act. This action doesn't have to be in accordance with me or my thoughts, although that would be nice sometimes. What I try to express are my thoughts, enthusiasms, likes and dislikes, and things I think you should know. It's a sharing process which tacitly though not implicity asks for a response or responsive action. It's a mental exercise to get something off my chest and you off your duff.

So, while I work on my spelling and punctuation, I'd like you to do something for me. I'd like a responsive gesture on your part, in the form of a letter. You don't have to write to me, not unless you want to, but write to the people who really make all of this possible...the advertisers.

CQ supports five of the biggest contests in amateur radio. We support and subsidize what we think (and a lot of you think) are the best achievement Awards in amateur radio. We publish more worthwhile DX information and DXpedition write-ups than anyone else. All of these activities cost a lot of money to produce. Who pays for them? Certainly not the subscriber nor newsstand buyer. The bulk of the money used to support these well received and sought after activities comes from the advertisers. Through their advertising revenue and support of *CQ* are these things possible. Your support of them in return (and us) makes the picture complete. When you buy their product through *CQ* or tell them that you appreciate their support of *CQ* you are really helping to foster your own continued enjoyment of amateur radio. They make the Contests and achievement Awards happen through their financial support. Their involvement defrays the cost of what many amateurs take for granted. If you ever wondered who pays for it...well they do. Neither we nor you could afford to.

We support the advertisers by buying their products. Their equipment and components make amateur radio possible. We are not about to return to days of completely home-brew stations, if they ever existed at all. We all need each other for a variety of reasons.

So I am asking you to write to our advertisers and let them know if you bought their product through *CQ* and that you appreciate their support. Mention *CQ* when you fill out their warrantee card or even if you're just looking for further information on what they make or sell. If you like our Contests and Awards talk them up.

If you like our columns and columnists, tell your friends as well. Write to our authors and tell them what else you'd like to read. I'm asking *you* to get involved on an individual basis to be a spokesperson for amateur radio and the activities *CQ* offers. Having another thousand amateurs apply for an award or enter one of our Contests really doesn't support those activities; it just makes them bigger and costlier. You give these activities value by wanting and working for them, but as they say, the bottom line is that the advertiser pays for them.

SAY YOU SAW IT IN *CQ*. That's all it takes. It's not hard to do nor much of an effort to make to ensure the continued support of your favorite activities. You don't even have to be a subscriber to say "I saw it in *CQ*." Tell the world.

73, Alan K2EEK

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THE OPERATING EDGE

Our Readers Say

Hand Key or Electronic Keyer?

Editor CQ:

Re: WA3WBI's article "The Keyer Is the Key" *(CQ, July 1979).*

The time is long past when we should have taken a look at the hand key versus the electronic keyer. Let's face it, a hand key only teaches bad habits. For the past few years, I have started all novices on an electronic keyer with 100% success. The results are that everyone has a good fist, they all enjoy c.w., and when they use a hand key, the sound of perfect c.w. is so imbedded in their minds that they have a good hand key fist.

If you wanted to teach someone to plow a field, you would not start them with a horse and plow; you would start with a tractor. So why not start with a machine that will send perfect c.w. with less effort?

To those of you who think the hand key is sacred, get a tape recorder and listen to your fist. You may be shocked to hear the garbage you are putting on the air. I know one old timer who did this, and found out why people were sending his call wrong. His fist was so bad that no one could read it. A bad fist is like bad breath—even your best friends will not tell you. Get an electronic keyer and have a "sweet" signal.

73,
Joe L. Kofron, K7GW
Las Vegas, NV

FIRAC

Editor CQ:

For years I have enjoyed reading *CQ,* which has many interesting articles. I have been especially glad for all the antenna info.

I think your readers jobbing at the railroads might like to know about FIRAC, Federation Internationale Des Radio Amateurs Cheminots, an organization of railroad radio amateurs. Founded in 1964, FIRAC has a meeting each year; this year 11 nations took part. For more information, write to the president of the Federation, Fred Nielsen, OZ9FM, Anemonevej 26, DK 7600, Struer, Denmark. We already have members in the USA.

73,
Fred Nielsen, OZ9FM
Struer, Denmark

Delays Due To P.O. and "Ors"

Editor CQ:

I just retrieved by October issue of *CQ* from my post office box this afternoon. I immediately turned to "Zero Bias" (one of my favorites) and I found in column one, second paragraph, that this issue was put in the mails "by the first week in September." I admit that I haven't picked up the mail since October 4, but a month from New York?

Is our friendly U.S. Postal Service really that bad, or.....?

John P. Weibler, Sr., WD9AWG
Carol Stream, IL

The magazines are mailed from the midwest, and the delays (which is why we mail early) are due to a combination of Postal Service "efficiency" and as you suggest, "or's." —ed.

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Announcing

• **Lancaster Hamfest** - To be held 24 Feb., 1980 at the Guernsey Pavilion located on Rt. 30 East of Lancaster at the intersection with Rt. 896. Gen. admission is $3.00 except for children and XYL's. Doors open at 0800. All inside spaces by advance registration only. $3.00 each 8 ft. space, which includes table. Deadline 15 Feb. All vendors must set up between 0600-0800 Sunday. Reservations will not be held past 1000 hrs. Free tailgating in specified area outside if weather permits. Two-hour Dutch Country Tour by advance registration is $4.00. Deadline 15 Feb. Tour tickets returned by mail on 20 Feb. Food served at Hamfest. Excellent restaurants and accommodations in area. Contact Hamfest Committee for motel reservations. $17.00 DBL. Talk in 01/61. Airport pick-up by advance request. Write: Sercom, Box 6082, Roherstown, PA 17603.

• **Livonia, MI** - The Tenth Anniversary Livonia Amateur Radio Club's Swap 'n Shop will be held on Sunday, February 17, from 8 a.m. to 4 p.m., at Churhill High School in Livonia, Michigan. There will be plenty of tables, door prizes, refreshments and free parking. Talk-in on 146.52 Simplex. Reserved table space of 12-foot minimum available. For further information, send s.a.s.e. to Neil Coffin, WA8GWL, c/o Livonia Amateur Radio Club, P. O. Box 2111, Livonia, Michigan 48150.

•**Glasgow, Kentucky** -The Annual Glasgow Swapfest will be held Saturday, February 23 from 8 a.m. to 5 p.m. at the Glasgow Flea Market Building, located 2 miles south of Glasgow on Highway 31E. It is sponsored by the Mammouth Cave ARC. Large, heated building with plenty of free parking. One free space with tables and chairs for each exhibitor. Additional spaces available at $3.00 each. Building opens to exhibitors at 7 a.m. No meetings or forums, just door prizes, free coffee, large flea market, and the friendliest gathering of hams anywhere! Admission $2.00. For additional information, contact WA4JZO, 121 Adairland Court, Glasgow, Kentucky 42141. Talk-in on 34/94.

•**Mansfield, Ohio** - The Mansfield Mid-Winter Hamfest/Auction will be held February 10th at the Richland County Fairgrounds in Mansfield. Prizes, auction, flea market. Large, heated buildings. Doors open to the public at 8 a.m. Talk-in on 146.34/.94 MHz. Tickets $1.50 in advance, $2.00 at the door. For additional information or advance tickets and tables, contact Harry Frietchen, K8HF, 120 Homewood, Mansfield, Ohio 44906. Phone (419) 529-2801 or (419) 524-1441.

•**Quarter Century Wireless Women** - YLs who have been licensed 25 years or more will be interested in a new YL Chapter of the Quarter Century Wireless Association. The chapter is to be known as the Quarter Century Wireless Women. Charter was granted by the National QCWA on November 1, but it is planned to hold the charter membership open until just before the February QCWA QSO Party. It is hoped to have a large membership by that time and to offer a special certificate for "Worked 20 QCWW Members." In order to be eligible for membership in QCWW, a YL must first be a member in good standing in the International QCWA. For further information, contact QCWA Headquarters or QCWW Secretary W1ZEN or President K1IZT/K4GXZ.

•**Vienna Wireless Society** - The Vienna Wireless Society will hold its annual WINTERFEST™ on Sunday, February 24, at the Vienna Community Center. There will be indoor tables, sales, prizes and food, and outdoor frostbite tail-gating. Opens 6:30 a.m. for vendors; 8 a.m. for general admission. Admission $3, including one prize ticket; $2 for extra prize ticket. Pre-teens with parents are free. Tables from $5 to $2, depending on the quantity. Frostbite tail-gating $1. Reservations to Carroll N. Guin, 7533 Oak Glen Court, Falls Church, Virginia 22042. Reservations close February 15. For other information contact the Vienna Wireless Society, P.O. Box 418, Vienna, VA 22180.

• **Long Island Host Families for Scandinavian Students** - American host families are being sought for twelve Scandinavian high-school students from Sweden, Denmark, Norway and Finland for the 1980-1981 school year, in a program sponsored by the American Scandinavian Student Exchange (ASSE). Interested families in this area should contact: Mrs. Margaret Anderson, 479 Duryea Terrace, West Hempstad, NY 11552, Tel.: (516) IV6-5729. The students, ages 16 and 17, will arrive in the United States in late August 1980, attend the local high school and return home in late June 1981. The students, all fluent in English, have been screened by their school representatives and have pocket money and medical and liability insurance. American families with small children or grown children, as well as those with teen-age children, are welcome to participate in this program.

ASSE is also seeking American students, ages 16 and 17, who would like to spend a high-school year with a Scandinavian family or participate in a five-week family stay in the summer of 1980. Persons interested in either of these programs should contact Mrs. Anderson immediately.

• **ICOM-701 International Users Club** -Now Operational. Send s.a.s.e. for details to Rob Pohorence, N8RT, 9600 Kickapoo Pass, Streetsboro, Ohio 44240.

•**Jefferson Barracks Amateur Radio Club** - The Jefferson Barracks Amateur Radio Club will hold their annual Hamfest and Auction on March 14th at the Electricians Hall, 5850 Elizabeth Avenue, St. Louis, Missouri. This is the first event of the season in this area, and the attendance has been growing every year.

• **Vero Beach, FL** - The Treasure Coast Hamfest will be held March 22 and 23, 1980 at the Vero Beach Community Center. Prizes, drawings. Q. C. W. A. luncheon. Admission $3 per family in advance, $3.50 at door. Talk-in on 146.13/73-146.04/64-222.34/223.94. For information write P.O. Box 3088, Vero Beach, Fla. 32960.

•**Tri-County ARC Hamfest** - The Tri-County ARC Hamfest will be held March 16th at the Jefferson County Fair Grounds, Jefferson, Wisconsin. (Formerly at Whitewater.) Advance tickets are $1.50. Reserve tables $2.00 in advance, 6 ft. space $1.00. Send s.a.s.e. to Glenn Eisenbrandt, WA9VYL, 711 East St., Fort Atkinson, Wisconsin 53538.

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CIRCLE 11 ON READER SERVICE CARD

Ensuring that the most signal from your transmitter reaches the antenna is a difficult task, but is made a good deal easier by the use of a device known variously as the transmatch, antenna coupler, matchbox, or tuner. Author W8FX tells all you need to know about these helpful devices and provides some useful advice on using them in your hamshack.

Matching Your Way To DX: A Look At The Transmatch

BY KARL T. THURBER, JR.*, W8FX

The name of the game in successful operating is efficiency: efficiency in your procedures, in your transmitter or transceiver, and in your antenna system. Efficiency in the latter may indeed be most important to success; as anyone who has tried to copy a weak, low-power signal through heavy QRM will say, just a few dBs (decibels) difference in signal level can mean the difference between "solid copy" and "no copy" at all.

Efficiency in your antenna starts with the transmitter. You need to be assured that your set is properly tuned and is connected to the proper transmission line load impedance for which the set was designed. The transmatch is a popular device to help ensure that "all is well" on the sending end and that maximum power is transferred from your rig to the antenna system—where it counts.

Transmatches can be confusing, especially to the beginner. They are actually simple devices, a special kind of adjustable r.f. transformer that can be used as a step-up or step-down mechanism as necessary. The transmatch is connected to the transmitter (or transceiver) output— the transmission line to the antenna is routed through it. Its purpose is to couple the known output impedance of the transmitter (usually 50 ohms) to the not-so-precisely known transmission line end impedance so as to get the final amplifier in the transmitter to efficiently "take a load", that is, to develop all the power the set is capable of and to transfer it with a minimum loss to the antenna.

In this article, we will examine the problem of obtaining a good match at the transmitter; we will also look at the harmonic and TVI problem and how the transmatch can help. Receiver matching is important, too, and we will discuss some of the receiving-end benefits of using a transmatch. We will also look at transmatch adjustment techniques and provide some guidelines to use in transmatch selection. Finally, we will introduce some related accessories, RF transformers and balun coils.

Let's first look at why we match the line to the transmitter in the first place.

Matching at the Transmitter

Most modern transmitters have a pi-network tank circuit in the final amplifier stage that is designed to work into an unbalanced (coax) 50-75 ohm load. It isn't enough to just feed *any* antenna with coaxial cable—the antenna *itself* must present a 50-ohm impedance to enable the transmitter to actually "see" the low-impedance load it was designed to work into. Many antenna systems—and the "system" includes both the antenna and the transmission line—yield complex, reactive impedances that can make it difficult or impossible to load properly. These impedances depend on many factors including the basic antenna type, operating frequency, length and type of transmission line, antenna height, and proximity to other objects.

If you try to feed your 50-ohm set into a high-s.w.r. coaxial line, or worse yet, directly into a balanced or single-wire line, the resultant mismatch will cause the whole system to lose efficiency. With many newer transmitters, there is no means to adjust the coupling or loading circuit in the final amplifier stage to compensate for the complex impedance that is present. Not only does it become impossible to load your transmitter properly, but in the case of sets with solid-state finals,

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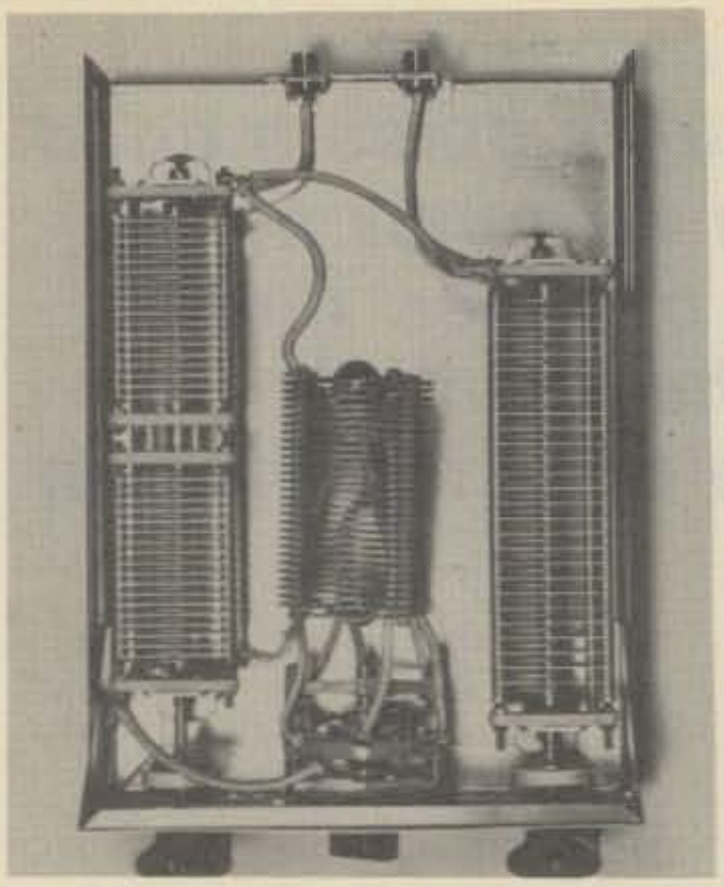


Interior view of one of the few available antenna tuner kits. The Apollo "Trans-Systems Tuner" will match almost any h.f. antenna and handles more than 1 k.w. The kit contains all necessary parts, a pre-punched and silk-screened cabinet, chassis and panels. It's not a difficult kit, and can be completed by the beginner in a few hours. Photo courtesy Apollo Systems (P.O. Box 245, Vaughnsville OH 45893)

the stage may simply "cut out" so that no power reaches the antenna, or it may even become damaged if the s.w.r. exceeds some particular value, such as 2:1 or 3:1. In some broadband, "no tune" transceivers, the output power is a direct function of the s.w.r. as seen by the set—while tuneup is eliminated, a higher-than-normal s.w.r. will cause the output power to be reduced to an unacceptable low level.

Some kind of antenna tuning device is usually in order, even if you carefully cut your antennas to frequency and direct-feed them with coax. The transmatch allows flexibility in moving from one part of the band to another (few antennas will show a perfect s.w.r. across an entire band), cuts down on harmonics (more on this later), and its link to the transmitter provides the ideal place to install an s.w.r. bridge and lowpass filter.

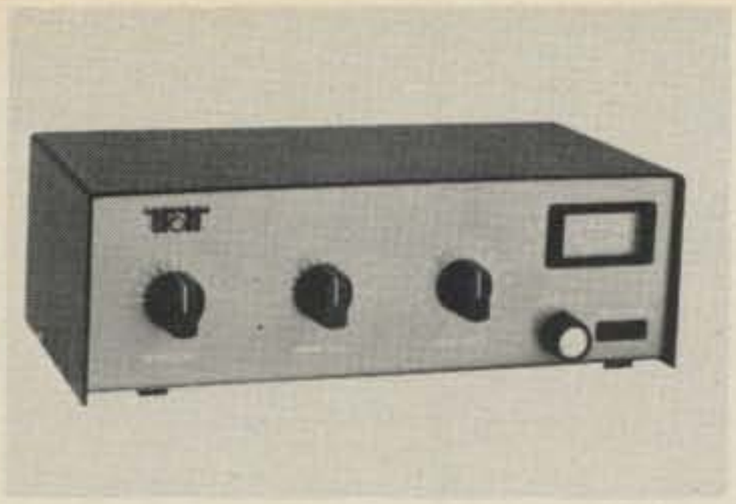
The transmatch itself is a device made up of tuned circuits (a matching network) that is designed to tune out the reactance on the transmission line. This network can also serve as an r.f. transformer to step the antenna's feed-point impedance up or down, as necessary, to effect a good match to the feedline's characteristic impedance. Hence, the name "transmatch": transmitter-transmission line-matcher.

Bear in mind that the transmatch cannot *change* the impedance of the

Front view of a completed Apollo Systems tuner kit. The kilowatt-rated unit is designed to match 50-ohm transmitter output to nearly every type of antenna or random-length wire likely to be used on the six HF bands, 160 through 10 meters. A clean, simple design, the kit should be able to be constructed by the beginner in just a few hours. (Photo courtesy Apollo Systems, P.O. Box 245, Vaughnsville, OH 45893)

transmission line—that characteristic is fixed and depends on the line itself; nor can the transmatch change the s.w.r. *at the antenna*. What the transmatch does is to act as a sort of catalyst to enable the transmitter to load into the transmission line, whatever the impedance may *actually* be. It's still up to you to try to get a good match at the antenna, to tune up the antenna as best you can, and to install it as high and in the clear as possible. The tuner makes it a lot easier to work with coax-fed antennas such as trap dipoles and beams, quads and verticals; the transmatch also makes it possible to load into multiband antennas fed with open-wire "tuned" line (perhaps the simplest all-round band-hopping

The compact (9 x 2½ x 5") size of this SST antenna tuner makes it suitable for mobile as well as fixed station operation. It is designed to match almost any antenna (coax fed or random wire) over the range 1.8 to 30 MHz. A back panel antenna switch allows you to select between two coax fed systems, a random wire, or tuner bypass. An s.w.r. indicator affords easy tuning of this 300 watt coupler. Price class is $65. (Photo courtesy SST Electronics)



This attractive Ten-Tec antenna tuner features clearly labeled front panel controls and a built-in s.w.r. (standing wave ratio) bridge for easy tuning and adjustment. It is designed to be used with its line of low- and medium-power transceivers. (Photo courtesy Ten-Tec, Inc.)

antenna design), 300-ohm folded dipoles, and high-impedance "random-wire" antennas.

The transmatch is very popular with amateurs who live in apartments and who otherwise would be unable to get on the air at all if they could not find some way to load a random length of wire strung out a window or taped around the walls of the living room or bedroom. A good transmatch is often worth a fistfull of dollars in portable and emergency use, where one may not be able to install a proper conventional antenna. Ditto for h.f. mobile work, where the loading coils used with short whips may enable resonating to your favorite operating frequency, but leave you with a very nar-

This RF Power Components "Maxi-Tuner" is billed as a no-compromise antenna tuner, based on the Ultimate Transmatch circuit described in QST Magazine *for August 1976. It sports some especially desirable features such as continuous coverage from 160-10 meters, rotary tuning inductor with a logging scale, built-in balun for matching openwire or twinlead lines, vernier tuning capacitors, 3 kw power-handling capability, and s.w.r. metering. The 15-pound unit is available in kit form or fully assembled, and can be obtained less the s.w.r. bridge for those who have their own meter. (Photo courtesy RF Power Components)*

A classic tuner design is this Drake MN-2000 matching network. It is intended to be used with coaxial cable leadin having an s.w.r. of up to 5:1 or more. It boasts switchable antenna outputs (3), and a built-in forward/reflected power meter. Note that it is not designed to match balanced or randomwire lines. (Photo courtesy R. L. Drake Co.)

row usable antenna bandwidth and a high s.w.r. that prevents proper transmitter tuning and loading.

Installing a transmatch in your antenna system will not introduce a great deal of r.f. loss, as long as it is tuned properly; normally, this loss is negligible, under 1 or 2 decibels. However, as the tuner now becomes the "r.f. focal point" of your setup, it must be connected to a good r.f. ground— especially when working with "random-wire" antennas—lest you lose excessive power to a poor ground path. Heavy, large-diameter wire or braid should be run to both the tuner's and the transmitter's cases and terminated at a cold water pipe and/or direct earth connection. Consult a good antenna text such as the ARRL *Antenna Book* for more information on how to go about getting a good ground for your station. My favorite antenna "idea book" is J.A. Stanley's *Ham Antenna Construction Projects*, published by Howard W. Sams & Co., Inc., Indianapolis, Indiana 46206. Grounding procedures are just one of the many practical subject areas covered in this useful paperback.

Transmatches and Harmonics

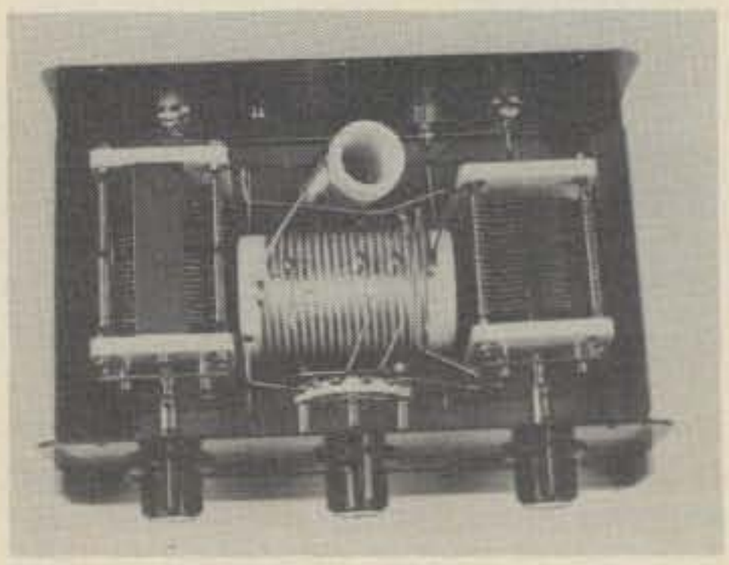
A big problem for beginners is caused by unwanted harmonics of the signal being radiated. Harmonics are, of course, integral multiples of the fundamental operating frequency. For example, your 7100 kHz signal would generate h.f. harmonics on 14,200, 21,300, 28,400, 35,500 kHZ, and so on. These could cause trouble for you, either with neighboring amateurs or with the FCC (if a monitoring station should detect the signals). Higher-order harmonics, falling in v.h.f. ranges, can wreak havoc with TV, f.m.

This attractive Japanese import is distributed by United High Power Associates. A simple, three-control transmatch, it is designed to match 10-600 ohm transmission lines over the range 1.9-30 MHz and will handle up to 500 watts p.e.p. The company's literature alludes to the side-benefits of effective antenna coupling: reduction of TVI and BCI due to the coupler's inherent "bandpass effect," and improvement of the signal-to-noise (S/N) ratio and cross-modulation on receiving. (Photo courtesy United High Power Lab (R), div. of United High Power Associates)

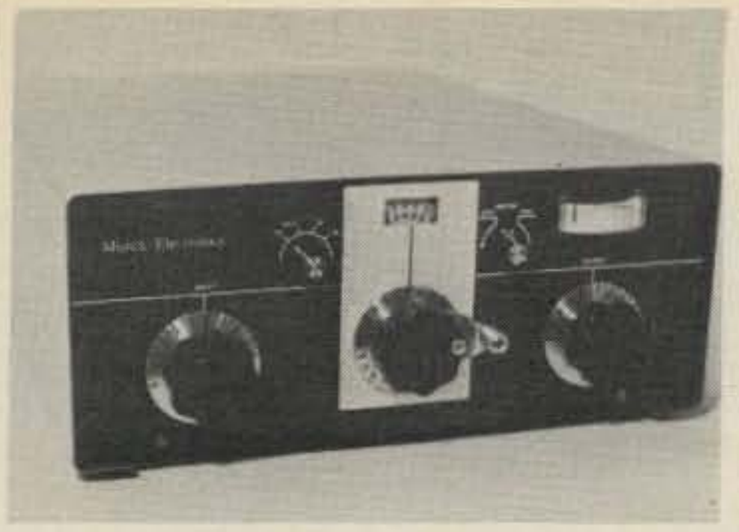
and other services.

All transmitters produce harmonics. But you can usually stay out of trouble by taking several precautions:

1. Don't use one of the older Novice transmitters that "doubles" in the final amplifier stage on the higher bands, such as on 10 and 15 meters.
2. Make sure your transmitter/transceiver is well shielded and grounded.
3. Use a lowpass TVI filter in conjunction with your h.f. rig's output.
4. Use a bandpass TVI filter in conjunction with your v.h.f. rig.



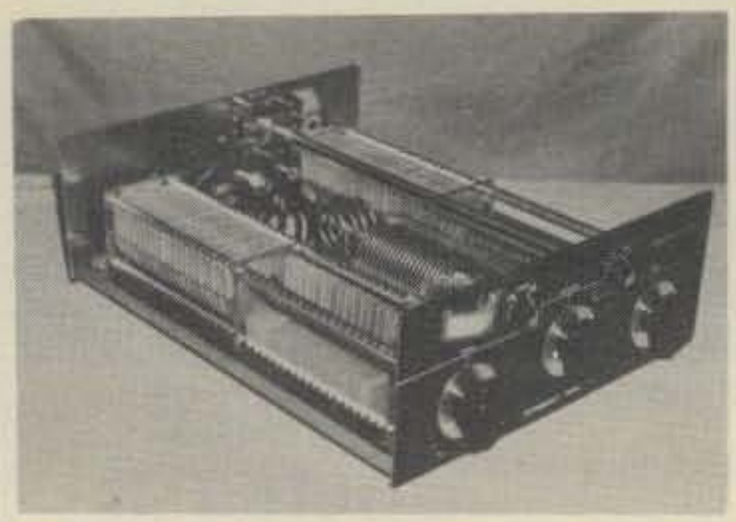
Yes, but what does it look like inside? Top view of the popular HC-500A imported coupler sold by United High Power Associates shows the large "tuning" and "loading" variable capacitors, high r.f. voltage rotary switch, and tapped tuning inductors. This particular unit is rated at 500 watts r.f. power (p.e.p.) and can be used in the range 1.9-30 MHz. There are no provisions for internal s.w.r. metering or antenna switching. (Photo courtesy United High Power Lab (R), div. of United High Power Associates)



This Murch UT-2000B is the latest in the company's series of "Ultimate Transmatches" based on Lewis McCoy's design published in July 1970 QST. *This 2kw matcher can be used with almost any antenna and transmission line and includes a built-in balun transformer. An internal switching arrangement allows in-and-out tuner switching and selection of dummy load (not supplied); the rotary inductor sports a turns counter for handy logging of tuning settings. Note the r.f. relative power output meter; an external s.w.r. bridge must be used to insure proper tuning. (Photo courtesy Murch Electronics, Inc.)*

5. Route the transmitter's output through an antenna coupler or transmatch for added "r.f. selectivity." Note that it's especially important to do this when using multiband antennas of all kinds, since such antennas will radiate harmonics almost as well as the fundamental frequency applied to them.

Several manufacturers sell effective lowpass filters that will attenuate harmonics in the v.h.f. range by 60-80 dB or more. These filters will not reduce harmonics falling *below* their cutoff frequency, usually somewhere between 35 and 45 MHz, but if installed properly will lockout TVI-producing harmonics from your antenna. If you suspect a problem with *h.f.* harmonics, have a nearby amateur listen in at the harmonic frequencies—pick an operator who lives at least a mile or two from your shack to make this check. If he can detect your signal, you probably need the extra suppression a transmatch will provide. Another way to go about harmonic reduction is to install special lowpass filters, designed to pass certain amateur bands but sharply attenuate signals at all higher frequencies. You may want to use a *bandpass* filter for 50 MHz (6-meter) and 144 MHz (2-meter) operation, to prevent both spurious radiation and harmonics from interfering with local TV reception. (Barker and Williamson makes a complete line of regular and special-purpose filters for amateur applications; Radio Shack, Ameco, Drake, Nye Viking, and others sell a variety of



Rugged interior of the Murch UT-160 MB transmatch. The 4000-volt capacitors and heavy coils allow full legal power to be used on any band, 10 thru 160 meters. The air wound tuning inductor is tapped every turn each band to allow more precise LC ratios and efficiency, and the heavy duty 3-core balun allows effective use with balanced transmission lines. An external s.w.r. bridge must be used in conjunction with the built-in r.f. relative power meter for tuneup. (Photo courtesy Murch Electronics, Inc.)

excellent lowpass models).

Your best bet is to use *both* the filter and the transmatch—there are even v.h.f. transmatches on the market (Leader Instruments makes 6- and 2-meter models). The filter should be installed in the line between the transmitter and the transmatch, *not* on the "antenna side" of the coupler. Doing this will help insure that the filter works into the right impedance, and that its operation will not be upset by a high s.w.r. on the line. Fig. 1 shows suggested interconnections.

Receiver Benefits

Receivers as well as transmitters can benefit from the use of a transmatch. Most sets, and the receiver portions of transceivers, are designed to handle antenna input impedances ranging from 50 to 600 ohms. Coaxing the last microvolt of signal from the transmission line can't always be accomplished effectively without the use of a transmatch; the antenna trimmer or preselector controls on the set will *tune* the input stages, but rarely are flexible enough to insure a proper *match*—particulary on the higher bands.

If you prefer to use a separate antenna for receiving, you can build a small, receiving-type transmatch for your set; it doesn't have to handle any signficant power. Far easier is to use your main station transmatch for *both* receiving and transmitting, using a coaxial switching relay or r.f.-actuated T-R (transmit-receive) switch to shift between transmitter and receiver. My preference—even when using a separate transmitter and receiver—is to use a common antenna for both, since antenna characteristics should be the same whether transmitting or receiving, and I won't waste calls to stations my transmitting antenna isn't "right" for. Of course, switching is accomplished automatically in the transceiver, though some sets do have provision for a separate receiving antenna input.

Besides improved matching and enhanced signal-to-noise ratio, you will find that the transmatch has some side benefits worth noting. It will significantly increase your set's "front end" selectivity, or rejection of unwanted, out-of-band signals, just as in the transmitter. The added selectivity provided by the tuned circuit in the transmatch will reduce such problems as image reception and cross-modulation as well.

Transmatch Techniques

Proper adjustment of your transmatch is essential to good performance. The best method of adjusting it involves the use of a standing wave ratio (s.w.r.) bridge installed in the coaxial cable running to the transmitter. Just what tuning procedure to follow will depend on the design and controls on the transmatch. In any case, the tuner is adjusted for lowest possible reflected power readings. Normally, it's possible to attain a perfect "1:1" s.w.r. indication if the antenna system is within matching range of the transmatch. Once adjusted, you can be reasonably certain that the transmission line reactance has been compensated for, that proper impedance transformation has taken place, and in the case of balanced-wire lines, that the right balanced-to-unbalanced condition has been

This MFJ Versa Tuner II sports many of the most desirable features at a modest cost. This 300-watt tuner features built-in dummy load, forward/reflected power meter, antenna switch, and internal balun. It matches most every kind of antenna you might construct—coax, random wire, or balanced line fed—from 1.8 through 30 MHz. This $120 tuner is one of many tuner designs the company offers from $30 up to fit practically any transmatch need. (Photo courtesy MFJ Enterprises)

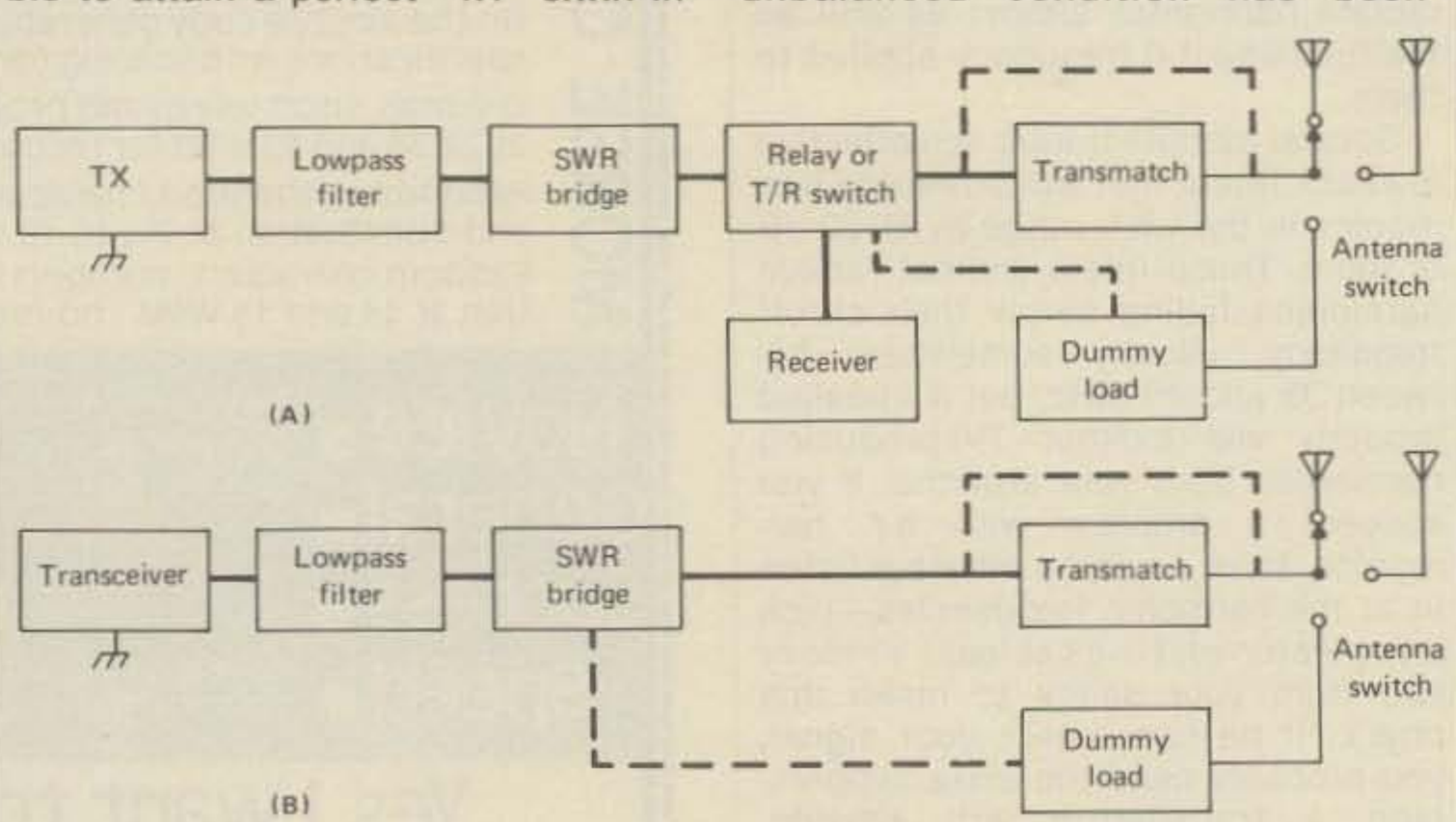


Fig. 1 - A block diagram showing how various parts of your station are interconnected when using a transmatch.
The diagram at (A) shows suggested wiring for use with a separate transmitter and receiver; either a relay or electronic transmit/receive switch can be used to effect r.f. switching from the transmitter to the receiver, if your transmitter does not already have a built-in means of antenna switching.
The diagram at (B) shows equivalent connections for use when a transceiver is used in your hamshack. Most transceivers have internal swtiching arrangements. Transmatches will work equally well with transceivers or "separates."
NOTE: *A double-pole, double-throw (d.p.d.t.) switch can be used to bypass the transmatch for direct antenna feeding. The dummy load can also be "switched in" on the transmitter side of the transmatch. (See dotted lines.) A heavy bonding strap should connect all equipment and the entire installation should be well grounded.*

This rugged, no-nonsense Millen Transmatch is a 2 kw bandswitching, adjustable r.f. transformer with a reflectometer (s.w.r. bridge) as the tuning indicator. Inserted between a transmitter and a transmission line, it will convert the impedance of any 15 to 500 ohm coaxial fed antenna system to 50 ohms so that the transmitter may at all frequencies work into the impedance for which it was designed. This particular unit is designed only for coax lines and is not intended for use with balanced or randomwire transmission lines. A smaller unit, the Transmatch Junior, is similar and is intended for use with transmitters up to 300 watts. (Photo courtesy Caywood Electronics)

achieved. After the adjustments have been completed, they can be left alone unless frequency is shifted to another portion of the band, or to a different band.

An alternate approach you can take if you don't own or can't borrow an s.w.r. bridge is to tune up the transmitter using a 50-75 ohm dummy load, making all subsequent adjustments to the antenna coupler and leaving the transmitter controls as they are except when changing bands. Another method is to use an r.f. power meter or ammeter in the output line to the transmatch; optimum tuner settings should coincide with lowest s.w.r. and maximum power transfer to the antenna. These two methods are not as precise as the s.w.r. bridge method, but should give good results if you take care in making the adjustments, and should be accurate enough for most purposes.

The objective, regardless of the method used, is to get the amplifier in your transmitter to "take a load"—to efficiently transfer power from the rig to the antenna. What you have accomplished by making these adjustments—whether by using an s.w.r. bridge of an r.f. power meter—is to adjust the transmatch so that the transmitter (or transceiver) looks into the 50-ohm load it was intended to see.

A few transmatch tune-up cautions are in order:

1. **Take the time to log the correct transmatch control settings for each band (or band segment).** Doing so will allow you to change bands rapidly and to easily arrive at the correct loading adjustments. Once you have a good match, final transmitter adjustments can be made and coupler controls left alone. (Many solid-state tranceivers are "broadband" tuned—ensuring that the rig looks into a 50-ohm load practically guarantees proper transmitter tuning and power transfer).

2. **Beware of harmonics in your signal.** If you are unable to reduce s.w.r. to a 1:1 level, it may be because there is an excessive harmonic content in your signal that "distorts" the s.w.r. readings. If this occurs, carefully check transmitter loading procedure. A bandpass or lowpass filter may need to be installed at the output of the transmitter.

3. **Watch for "bogus" tuning conditions.** With many transmatches it's possible (especially in those with dual tuning capacitors and tapped inductors) to "load up the coupler," so to speak, and to obtain a 1:1 s.w.r. with little or no r.f. power actually reaching the antenna. Be especially wary of tun-

Antenna coupler advantages are not limited to the lower (h.f.) bands. This Leader v.h.f. coupler is designed for 2-meter use and handles up to 100 watts transmitter output. It will allow matching of antenna/line impedances of from 10 to 250 ohms. The matching capability is useful in extending the bandwidth of an antenna (such as one cut for the "s.s.b. end" of 2 meters and using it on the "f.m. end"). Another special advantage of using a v.h.f. coupler is in the increased selectivity on receive and the filtering effect on transmit (reducing TVI). (Photo courtesy Leader Instruments Corp.)

ing adjustments that leave the tuning capacitors fully open or meshed, or that have the coil either fully "in" or "out" of the circuit. An r.f. power meter in the output line or a small field strength meter in the shack will serve as a cross-check on correct tuning by giving an actual (though relative) indication of power transfer to the antenna.

Transmatch Selection

Fortunately, the transmatch need not be an expensive accessory. While there are now several deluxe models available with all the trimmings that top $300, their high price tags are due mainly to extra-heavy-duty construction and the addition of a number of custom-deluxe features and operating conveniences.

There are about as many different antenna tuner designs as there are antennas. You will see series- and parallel-tuned kinds, L-networks, pi-networks, link-couplers, and many other impedance matching circuits designed to handle various types of antennas and transmission lines. Probably the most popular and widely used basic design is the so-called "ultimate" or "universal" transmatch, pioneered by ARRL staffer Lew McCoy in a series of *QST* articles several years back. (The term "transmatch" has almost become generic for any antenna tuner.)

These transmatches are so named because they are designed to enable the operator to couple his transmitter to practically *any* antenna system, regardless of impedance. Many variations of Lew's basic designs exist.

It's entirely possible to build your own transmatch; construction and wiring are relatively easy, and there are no complex circuits to worry about. The main problems, if any, revolve around the mechanical tasks of mounting components and drilling the chassis. The ARRL *Radio Amateur's Handbook* and the *Antenna Book* include several popular and well-tested designs that should give you little trouble. One of the better circuits appeared in the March 1979 issue of *73*. Rick Ferranti (WA6NCX/1)'s article, "The NCX-Match," describes a low-cost, highly flexible circuit along with some good "prepping" on antenna matching procedures. A designed-for-the-beginner QRP coupler is also found in *73* for January 1978; John Halliwell (WB4VLQ)'s article, "Build a Deluxe QRP Transmatch" gives you all the facts you'll need to know to tackle a simple coupler's construction.

Surprisingly, there aren't many transmatch *kits* sold today; however, the author knows of two kits popular with beginners. One is the "Maxi-Tuner," a wide-range coupler based on the ultimate transmatch circuit. This heavy-duty, 3-KW PEP tuner features a rotary inductor, counter dial, balun, and vernier tuning drive; it will load almost any kind of antenna system. Price class is $230 without s.w.r. meter, $260 with. It is sold by RF Power Components, P.O. Box 11, Ladysmith, WI 54848. Another unit, designed by Stan Byquist, K8VRM, costs about $130, will match almost any antenna to 50-ohm coax on six

Sometimes, "simplest is best." This small antenna coupler matches coax, random wire, or balanced-line antenna lead-ins, but does not have a built-in s.w.r. bridge. Instead, it has a simple "r.f. power output meter" to indicate maximum r.f. current reaching the antenna. Its small size makes it a good compromise for the apartment dweller, or for portable operations. Dentron also makes a full line of high power tuners. (Photo courtesy Dentron Radio Co.)

through 160 meters, and it will handle more than one kilowatt DC power input. An external s.w.r. bridge is required for adjustment. (Available from Apollo Products, PO Box 245, Vaughnsville, Ohio 45893.) Heath Company is bringing out a new kit this winter which features a front panel chart to record your own band settings.

What should you look for in selecting a transmatch? The final choice is yours, but some of the design features you may wish to evaluate are these:

1. Overall quality of construction, including cabinet shielding.
2. Power handling capacity—how much is enough?
3. Frequency coverage—discrete bands vs. continuous coverage.
4. Impedance matching range.
5. Types of transmission lines that can be matched: coax, single wire, and balanced line.
6. Internal balun transformer—standard, optional, or not available?
7. Tuning meter, s.w.r. bridge, r.f. power sensing, or none.
8. Antenna switching capability.
9. Built-in dummy load, or provisions to switch in an external load.
10. Tuner bypass switching (for automatic bypassing of the tuner when it is not needed).
11. Easy tuning features: rotary turns counter, logging scale, vernier tuning, or similar aids.

What, you may ask, makes some commercial tuners so expensive? There are two main cost drivers: expensive components (such as rotary inductors and precision counter drives), and special convenience features, such as built-in dummy loads, antenna switching, dual power/s.w.r. meters, etc. Rugged, high power tuners are very costly, due to the large coils and heavy-duty capacitors that must be used if the tuner isn't to "arc-over" when running the legal power limit. Rotary inductors are particularly costly, and they are used in many of the top-of-the-line tuners (as opposed to tapped coils) in order to get the coil inductance "just right."

Whereas the beginner 25 years ago had perhaps one or two commercial wide-range tuners from which he could choose (such as the Johnson Viking series of Matchboxes), the newcomer today has a wide range of models from which to select. Manufacturers such as Drake, Dentron, Murch Electronics, United High Power Associates, Yaesu, Kenwood, Ten-Tec, SST Electronics, MFJ, and many others offer a wide assortment. Apollo, RF Power Components, and Heath sell the kits mentioned earlier; Leader Instruments makes a line of v.h.f. antenna couplers for six and two meters; and MFJ offers upwards of a dozen transmatch designs to fit any budget.

The balun ("balanced-to-unbalanced") transformer is recommended by many antenna theorists because of its ability to convert the "balanced" nature of most antennas to the popular "unbalanced" type of transmission line (coaxial cable). This type of balun is mounted at the antenna and becomes the center insulator for it, as shown in the accompanying photo. This is a "1-to-1" type of balun, meaning that there is no impedance changing action; 4-to-1 models are also available for use with folded dipoles and other medium-impedance antennas. Many amateurs prefer to feed their antennas (dipoles and beams) with balanced transmission lines, such as openwire line or twinlead, and for that reason a number of popular antenna couplers include a built-in balun either as an option or in some cases as standard equipment. (Photo courtesy Palomar Engineers)

Closely related to the antenna tuner or coupler is the r.f. transformer. This Palomar Engineers model allows precise, efficient matching of 50-ohm transmitter or transceiver outputs to known antenna impedances such as encountered with loaded mobile whips and base station vertical antennas. Most mobile antennas and verticals have very low impedances that are difficult to match directly to 50-ohm coaxial cable. (Photo courtesy Palomar Engineers)

Automatic transmit/receive antenna switching can be accomplished by the use of a "T/R switch" such as the Barker and Williamson unit pictured here. (Photo courtesy B&W, Inc.)

Close Cousins: Baluns and R.F. Transformers

Closely related to the transmatch are two other important matching devices, the balun and the r.f. transformer. Let's examine both.

The balun (from "balanced-to-unbalanced") is a special kind of matcher that transforms an unbalanced transmission line condition (one side at ground potential) to a balanced one (neither conductor at ground potential). Whereas coaxial cable is now the most popular transmission line, many amateurs still prefer to use openwire or twinlead lines; both of these are considered to be "balanced." Mounted at the transmitter, the balun allows the coaxial output, standard on most popular transmitters and tansceivers, to be adapted to these balanced lines. A balun can also be mounted at the antenna itself, to enable coaxial feedline to be effectively coupled to balanced antennas, such as dipoles and beams. The simplest balun is the "1:1" kind—that is, one that has the same impedance at its input side as that at its output side; in other words, there is no transformer action (step-up or step-down) involved. On the other hand, the "4:1" balun *is* a transformer; it is used either as a step-up or step-down device as well as a means of converting balance conditions. The former type of balun is usually used to feed simple dipoles and beam antennas with coaxial cable, while the latter is frequently used to feed antennas such as 300-ohm folded dipoles. Many different kinds of balun coils are made by a number of manufacturers including

A high quality lowpass filter is recommended for installation on all h.f. transmitters and transceivers as an easy way to avoid or at least minimize trouble with irate TV-watching neighbors as well as with the FCC. The filter shown provides a minimum harmonic attenuation of 70 dB (decibels), representing a reduction factor of 1 to 10,000,000! Filter shown handles 1000 watts. (Photo courtesy Barker and Williamson, Inc.)

Palomar Engineers, Van Gorden Engineering, Unadilla-Reyco, and Kaufman Industries. Several transmatch designs include built-in baluns for the direct feeding of openwire or twinlead transmission lines, and you can build your own balun coils from designs in the *ARRL Radio Amateur's Handbook* and the *Antenna Book*.

The RF transformer is a relative newcomer. Its popularity is increasing since the development of low-loss r.f. ferrite materials and winding materials which allow very efficient and compact designs. The devices also require no tuning other than impedance-tap selection. The typical r.f. transformer matches a 50-ohm transmitter's output to a half-dozen or more fixed impedances, usually ranging from about 32 ohms down to about 5 or 10 ohms, over the band 1.8 to 30 MHz. The biggest application is in the matching of h.f. vertical antennas to

Many of the more elaborate antenna couplers feature convenient built-in antenna switching and/or selection of a dummy load for tuneup. If your tuner does not sport such a feature you may wish to purchase an external coaxial switch such as the B&W model shown. This unit features automatic grounding of all antennas except the one actually in use, an important lightning protection measure. (Photo courtesy Barker and Williamson)

Remember these basic facts about antenna matching and transmatches:

1. **YOU'LL GET BEST RESULTS** if your antenna's impedance is purely resistive, with this resistance equaling transmission line impedance and transmitter output impedance.
2. **A TRANSMATCH** helps to correct for the fact that an antenna will seldom present a perfect match to a transmission line over a band segment, or from band to band. The accessory allows you to convert the resultant impedance to that for which the transmitter was designed. It cannot improve the antenna's basic efficiency, however.
3. **A TRANSMATCH** *can't* alter the antenna's impedance or the actual s.w.r. (standing wave ratio) on the transmission line, nor can it alter the characteristic impedance of the line. But it *can* correct the s.w.r. on the line to the transmitter to enable it to "take a load."
4. **SWR** provides a measure of the mismatch of the antenna system. It is the ratio of the load impedance to the transmission line impedance. An s.w.r. of 2 to 1 (2:1) or less is usually considered to be a good match. High s.w.r.'s can waste power.
5. **MANY MODERN TRANSMITTER/TRANSCEIVER CIRCUITS** must work into a 50-75 ohm load. If the set doesn't "see" such a load, it won't be able to deliver its advertised power to the antenna, and may even be damaged. It will work best when properly loaded and matched.
6. **USE OF A TRANSMATCH** will usually enable the transmitter to work into a low (1:1) s.w.r. load. The line between the transmatch and the transmitter is ideal for installing a lowpass filter for TVI suppression.
7. **THE TRANSMATCH** will help reduce harmonic output on transmission as well as image response and cross-modulation on reception. Seven-to-10 dB improvement is typical.
8. **BALUNS AND RF TRANSFORMERS** are useful specialized devices that can make matching a great deal easier for certain kinds of antennas, such as those showing fixed impedance loads. Beware of inexpensive, cheaply constructed devices—they can introduce considerable power loss in your antenna system.
9. **A TRANSMATCH** actually may not be needed if you use single-band, coax-fed antennas that normally present few matching and harmonic-radiation problems.

Fig. 2 - Transmatch facts.

coaxial feedline, important since verticals typically show a very low resistance, usually about 35 ohms for a quarter-wave vertical and much lower for a short trap or base-loaded whip. Because a vertical antenna's resistance changes little across a band, once you adjust the transformer tap for the proper impedance match, you can do all your tuning with but one adjustment, at the loading coil—especially handy in mobile work. In fixed station operation using a full-size vertical, it's possible to make especially good use of the r.f. transformer with solid-state, broadband transmitters and transceivers; you don't have three or four antenna matching and loading knobs to adjust when you change frequency. Several firms market r.f. transformers, including Palomar Engineers and SST Electronics. The latter firm's Model T-3 matcher is an inexpensive and compact 300-watt unit designed for mobile applications.

If you use a separate transmitter and receiver as opposed to a transceiver, you may want to use a coaxial antenna changeover relay such as this B&W unit. This two-position relay can be operated from the transmitter's VOX or PTT circuits for completely automatic operation; the receiver input is grounded when the relay is in the transmit position. For best results, the relay is installed between the transmatch and the transmitter/receiver—not directly in the antenna leadin. (Photo courtesy Barker and Williamson, Inc.)

Heath's new tuner features a front logging chart for individual band settings. It's a complete kit even down to assembling your own capacitors (Photo courtesy Heath Company.)

Neither the balun nor the r.f. transformer can take the place of a good, wide-range transmatch when flexibility is paramount, but both are "best bets" for the special matching jobs we discussed.

Summary

We've looked at the basic matching problem, harmonics and TVI, and transmatch selection. We've also examined some of the matchbox "pulses" and have discussed adjustment techniques you'll need to learn; we have looked, too, at related matching devices such as r.f. transformers and baluns. In a nutshell, that's about all you really need to know about antenna tuners and their close cousins to enable you to get on the air with a good signal (see fig. 2).

Remember, though, that we have only talked about *half* of the antenna system equation—the other part is at the business end, at the antenna itself. A good transmatch can enable even the proverbial bedspring or a wet string to take power, but it can't make anything radiate. Read up on antenna theory and matching to insure that the power you've worked so hard at getting *to* the antenna is radiated in first class fashion.

Ever think about operating portable RR? Cal Cotner heeded the "All Aboard" cry and headed out with rigs for 2 and 220.

Workin' On The Railroad

Amateur F.M. That Is

BY CAL COTNER*, K4JSI/6

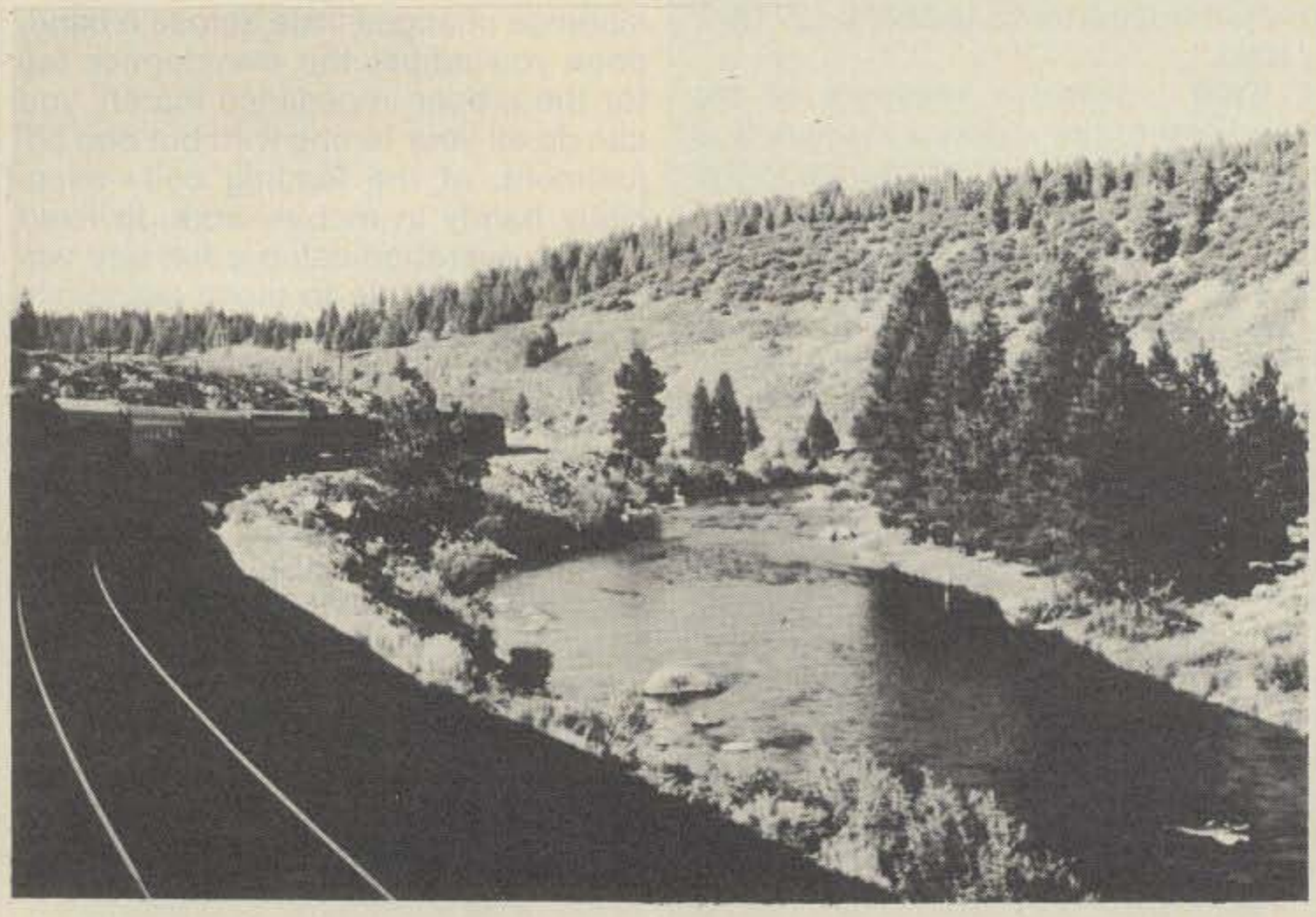
While I'm not quite qualified for QCWA membership and still look ahead to a 40th birthday I do occasionally succumb to nostalgia. It may come as a shock to many younger members of the amateur fraternity but there's a fourth mode of long distance travel available in this country besides air, automobile, and bus. I'm referring to the passenger railroad service operated by Amtrak and others.

A recent need to travel from the Los Angeles area to Reno, Nevada coupled with uncertain gasoline supplies led me to make train reservations. Realizing that I'd have considerable time to relax during the trip I decided to try some v.h.f. f.m. operation as a railroad mobile.

I enjoyed the whole experience but the last article which I know of describing railroad mobiling appeared about twenty years ago in *CQ* Magazine. Therefore it seemed that a description of rail travel, the equipment I used and the trip itself would be of interest to those amateurs who have pleasant memories of train travel and to those who have never experienced it.

If you are accustomed to the polite but rushed service characteristic of air travel you are in for a surprise. Passenger rail travel is relaxed and for the most part the service is gracious. The staff on your train are in two different categories. Amtrak employees are concerned with your comfort, attending to the needs of sleeping car passengers, operation of the dining car and the serving of light refreshment in lounge cars.

The operation and safety of the train itself is the concern of employees of the railroad on whose trackage the passenger train is operating. As amateurs you'll notice that the trainmen make extensive use of v.h.f. f.m. in operation of the train. I didn't get a chance to see what equipment may be in use in the engine. However the trainmen all carried HT 220s which were used particularly when passing another train or when pulling into a siding. I also noticed advertisements for v.h.f. scanners in magazines published for "railfans" whose hobby is the various aspects of railroading. Apparently many of the railfans enjoy listening to railroad operation traffic.



Descending the east slope of the mountains along the Truckee River.

On long distance trains and certain others such as the Metroliner all seating is reserved while on shorter haul trains it may be on a first-come-first-served basis. There are two classes of accommodations available to the railroad traveller. Coach accommodations are just that but the seating is much more spacious and comfortable than air travellers are accustomed to. First Class accommodations usually mean sleeping quarters and these range from roomettes meant for one or two people to compartments for an entire family. Both have wash basins and toilets although in a roomette your bed takes up the entire space. The old style of upper and lower berths opening on a central corridor are no longer seen in the United States although they may be found on the Mexican railroads. Of particular interest to a travelling amateur is the availability of 117 v.a.c. in the sleeping accommodations though the current capacity is limited.

For the journey to Reno I paid the additional price for a roomette which offerd space to relax and to set up the

**215 Rosencrans Pl., Manhattan Beach, CA 90266*

r.m. rig as well as allowing me to smoke.

Meals in the dining car were most pleasant. Service was excellent, the food was good and I found the price quite reasonable. You will notice two interesting differences between the railroad dining car and the unusual restaurant. First you'll be asked to fill out a form with your choices from the menu. This is a practice from the past when most of the dining car staff couldn't read or write and the practice is now a part of railroad tradition. Second your table will be filled out by the headwaiter with other passengers because of the limited dining space. But don't despair; its a pleasant way to meet people. By the way its wise to head immediately for the dining car when the first seating is announced or else you may be in for a long wait.

Friendliness is characteristic of rail travel because there's usually ample time to chat and you have the freedom to wander about the train. Of course anyone who observes you in the midst of a QSO is likely to be curious so seize the opportunity to explain amateur radio and thereby gain a friend for our hobby.

There are some negative aspects of present day rail travel which I must mention. On many trains the equipment is old so be prepared for air conditioning breakdowns or other such problems. Even the relatively new Metroliner cars are beginning to show some wear. Unless the staff can move you to a car in which the air conditioning is working you'll be quite uncomfortable. However Amtrak is purchasing a large number of new cars and it's none too soon.

Don't expect First Class rail travel to be inexpensive for it isn't. The fare along with an overnight stay in Oakland dictated by the train schedules made the overall trip cost from Los Angeles to Reno considerably more expensive than air travel.

The last negative aspect is that you are quite likely to arrive late at your destination. Passenger trains with a few exceptions like the Metroliner do not run as fast as they once did nor are the roadbeds as well maintained as they should be. A major reason for this is that you are on trackage owned by the individual railroads. They are concerned with moving freight so that despite contractual requirements and incentives freight trains have priority over Amtrak passenger trains.

Still if you want to travel in a gracious, relaxing manner, if you are free of strict deadlines, you want to enjoy spectacular scenery and want to cause something of a sensation on the repeaters you pass, consider the service Amtrak (VIA in Canada) offers. I'll remember train trips through the Canadian Rockies in January, climbing Horseshoe Curve west of Harrisburg Pennsylvania at dusk, watching the California coast and the Sierra Nevada mountains as well as pleasant QSOs for a long time.

Having made the decision to take the train in a roomette and get in some hamming I determined the actual train route as best I could and consulted the *ARRL Repeater Directory*. I made a list of those repeaters I felt would be in range. Since no one would trade me a synthesized handheld for my right arm (inflation) I was somewhat limited by the crystals in my TR22C on 146 MHz.

While the TR22C is self powered I own a good 12 volt battery of Ni-Cad D cells and a charger. I decided to take these because of the increased operating time they would allow. This necessitated making up a couple of new power cables. I also purchased a miniature ear piece to use with the TR22C on the philosophy that while the dome car might be a good place from which to operate my fellow passengers wouldn't be enraptured by squelch tails, repeater IDers and ham to ham conversations.

About that time the classic idea-indicating incandescant bulb lit up over my head. I had recently obtained a Midland 13-509 for 220 MHz and added an Engineering Specialties Synthacoder 509. The Ni-Cad battery had plenty of capacity to run this pair at least on low power (1 watt) since the Midland receiver draws fairly low current (about 220 milliamperes) and the Synthacoder only adds about 60 milliamperes to that. Such low current drain is a useful feature for portable operation and is in contrast to the 700 milliamperes or so drawn by most synthesized amateur f.m. transceivers. And for a marginal path to a repeater I could call on 10 watts though I wasn't overly enthusiastic about being within a couple of feet of an antenna radiating that much v.h.f. power.

The antenna situation required a bit of thought. I knew I'd be within a steel railroad car which is a pretty fair shield except for the windows. I didn't think Amtrak or the Southern Pacific Railroad would be sympathetic to an outside antenna so I didn't pursue that thought. While I could take the TR22C with its built in whip to the lounge car I wasn't about to drag the 220 MHz mobile rig and battery along as well. Nor did that resolve the 220 MHz antenna problem.

My only 220 MHz antenna was a 5/8 wave Larsen magnetic mount type. In the past I've used magnetic mount antennas in motel rooms, providing a ground plane with a couple of sheets of kitchen aluminum foil, each about two feet long.

Events proved that luck was with me as I was able to put my suitcase on the seat next to the roomette window, spread out the aluminum foil, and set the antenna on top. This just about centered the antenna in the window which was about two feet on a side. I imagine a fair radiation pattern about 135 degrees wide and perpendicular to the car resulted. While the antenna swayed a bit the heavy Larsen base kept it in place rather well. I think the v.s.w.r. was somewhere between bad and horrible but the Midland worked fine on low power and it's automatic protective circuitry which senses reflected power just reduced the output in the 10 watt position.

While my trip could hardly be compared with a DX-pedition I did put in some advance planning as outlined above. I also made sure the 12 volt Ni-Cad battery and the internal TR22C battery were fully charged. I didn't make provision to operate from the a.c. power in the roomette since I had the batteries and didn't know how much current the outlet would provide. Having determined what repeaters I would find along the route I changed the programming of the Synthacoder to accommodate some of these and took along the necessary tools (a pair of needle nose pliers and a small screwdriver) to make more changes if necessary. Remembering that I was going to rent a car in Reno I added a cable to adapt from my standard 12 volt interface (banana plugs) to a cigar lighter as well as a ¼ wave 146 MHz whip to use with the magnetic mount. The one question which remained as I boarded the train was whether the 220 MHz antenna would work from the roomette.

I barded The Coast Starlight which runs between Los Angeles and Seattle at Los Angeles' Union Station which is still impressive in spite of the great decrease in rail passenger traffic since it was built. Finding my roomette I set up the 220 MHz equipment with the antenna placed as described earlier.

The mothball fleet in the Sacramento River as seen from my train.

After a pleasant lunch in the dining car the Santa Barbara stop was announced so I keyed up N6ZF/R (222.36/223.96) and found myself in contact with Red, W6BLK near San Diego and Ed, WB6BHT/M en route to Santa Maria. That was a promising start and after a pleasant chat the train passed out of range so I turned my attention to watching and photographing the California coastline along which the train runs.

At San Luis Obispo the train turns inland and I put the TR22C to work via AE6R/R (146.22/82) and the California Polytechnic 146.16/76 repeaters by simply holding the rig up to the roomette window. I chatted with Dee, N6BQR, Bill, AG6B and others but again turned to sightseeing as the train climbed Cuesta Grade. We passed through a couple of tunnels and for the first time most of the train was visible as it rounded a curve onto a trestle.

The next stop was in Salinas and I had a couple of QSOs via the Monterey 146.37/97 repeater and the Mt. Chual 146.16/76 repeater. By then the pattern of the contacts was fairly well established. I described the trip, the equipment and how it was set up and the fellows I worked commented on previous train trips they had taken or in many cases said they had never tried rail travel and perhaps it was time to do so. A frequent comment was that it was surprising that it was possible to work out from a railroad car.

As we neared San Jose I switched to 220 MHz and worked Rod, WD6AKS on the K6GZK/R (223.02/224.62) repeater. George, K6GZK, broke in to tell me he was entering the event in the repeater log since I was the first railroad mobile to work through his repeater. After one more QSO with K6LLK via WA6YCZ/R (223.34/224.94) it was time to put away the radio since we were passing the crowds in Oakland's Jack London Square.

The next morning I boarded The San Francisco Zephyr and before we moved I was in contact with Fred, WB6VXP via WR6ANR (222.82/224.42). Although I was only travelling to Reno the Zephyr runs between Oakland and

Chicago. Our route skirted the east side of San Pablo Bay and as we crossed the Sacramento River I interrupted a QSO with Jerry, WD6BCH on WR6APA (222.78/224.38) in Fairfield to take pictures of the mothball fleet anchored in the river.

Near Sacramento I worked Jim, W6MYP, via the WR6ACV (223.02/224.62) repeater near Stockton. What proved to be my last QSO was reverse direct with Fred, W6YKM, who was about 45 miles away in Pine Grove. But that didn't matter since by then the train was entering the foothills of the Sierra Nevadas and I wanted to watch and photograph the spectacular scenery.

The air conditioning in my railroad car had broken down but this wasn't all bad; while most of the occupants headed for the lounge car the staff left the upper half of the car's Dutch doors open in an effort to cool the car. I was able to stand there and get some great pictures of the vistas we passed.

The train passed through tunnels marked with dates such as 1913 and 1925, some of them quite long, as well as more modern snowsheds. We passed spectacular gorges and through beautiful mountain meadows and I wondered at the effort it took to run those tracks in the first place. I was told later that as many as 100,000 Chinese laborers were employed at the task.

Leaving Truckee, California we headed down the east slope of the Sierra Nevada along the beautiful Truckee River. The train passed small ranches and a number of mines and I saw extensive flumes which routed water to the mines and then back to the river. The Zephyr pulled into Reno right on schedule.

Would I do the same thing again? You bet! I might make a few equipment changes though. Obviously the best solution for railroad operation would be a synthesized handheld. I would also head for the dome car if one is included in the train's "consist" with an earpiece so as not to disturb other passengers. For operation from a roomette I think that taping a 1/4 wave antenna with a couple of 1/4 wave radials or a Quad loop to the window would prove better than what I used. Still 45 miles direct from inside the railroad car is satisfactory. I might try to make use of the 117 v.a.c. power in the roomette though the Ni-Cads performed very well. Finally I probably wouldn't attempt operation on more than one band although the 220 MHz operation added a touch of pioneering.

If this tale intrigued you and you'd like to investigate further Amtrak has toll free telephone lines throughout the United States as well as many travel agents who will book your reservation and issue your tickets. Amtrak operates over several transcontinental routes as well as providing service along both seacoasts and through the Mississippi valley. The northeast "corridor" is well served by some of Amtrak's most modern trains. VE's are in luck as Canada operates fine passenger trains under VIA which is similar to Amtrak. I am also told that the Mexican railroads are excellent.

In addition there is the Auto Train which will carry you and your car between northern Virginia and Florida, there is a passenger railroad in Alaska and the Denver and Rio Grande Western may still operate a passenger service between Denver and Salt Lake City. There are a number of special interest excursion trains operated from time to time, and finally, there are commuter lines which in the northeast are operated by Conrail.

But make your reservations well in advance since the scarcity of gasoline has caused a tremendous increase in travel by rail. You'll wait for some time to get through on those toll free lines these days. DX

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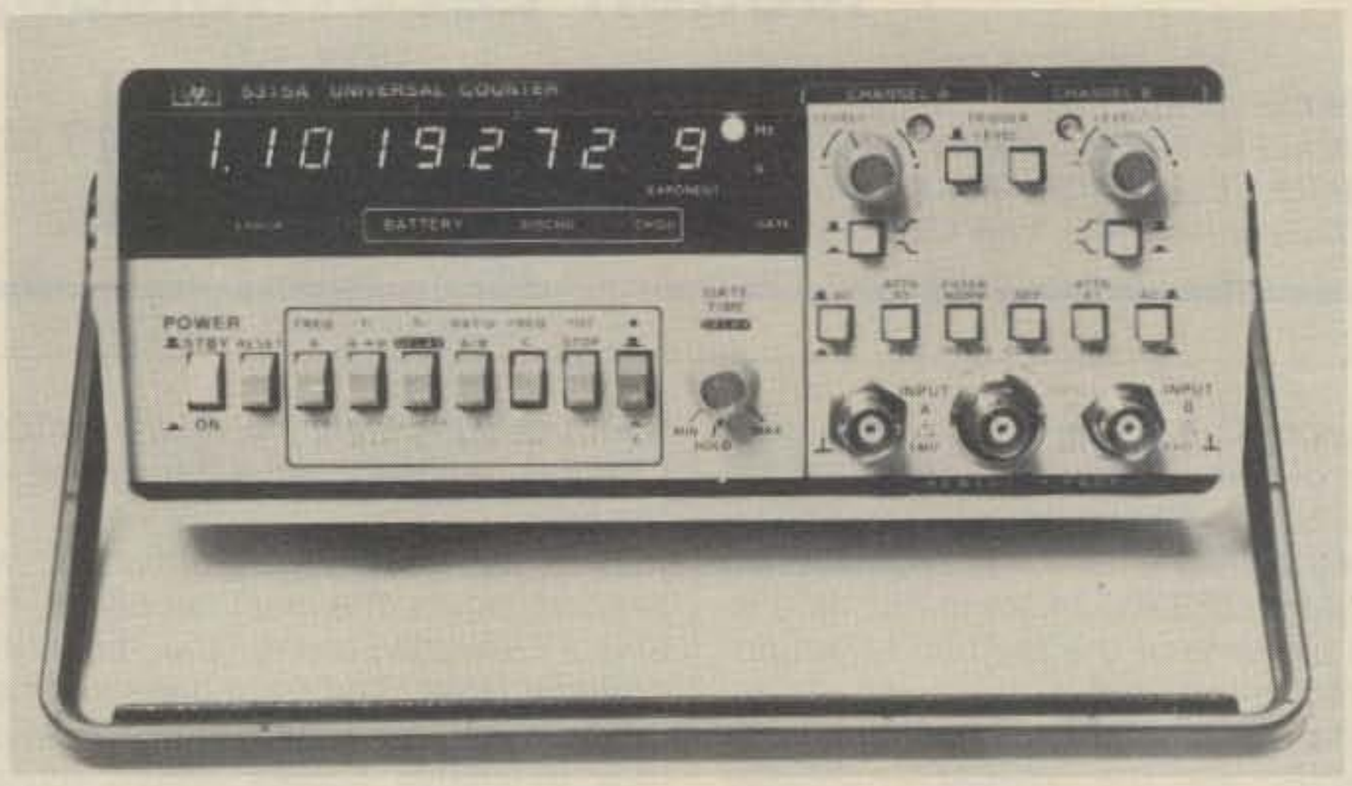
with ultimate rejection of over 80 dB and superior shape factors. Most types are $55. There are also Diode Switching Boards for the Yaesu and Kenwood lines which permit in-board mounting of up to two filters more than those for which the manufacturer provides room. For more information, contact Fox-Tango Corp., Box 15944, West Palm Beach, Florida 33406, or circle number 83 on the reader service card.

Fox-Tango Crystal Filters

Fox-Tango has announced the expansion of its line of 8-pole crystal filters and related accessories to include not only popular models produced by Yaesu, but also those of Kenwood, Heath, Drake, and Collins. This makes available a variety of filter types and bandwidths never previous available or adaptable to many rigs, and allows the amateur to supplant inferior filters supplied or supplement them to add flexibility.

The filters are made up entirely of specially treated, high Q crystals. They are custom-made to each set



Hewlett-Packard Universal Counter

Hewlett-Packard's Model 5315A Universal Counter now extends its 100 MHz frequency measurement range to 1 GHz with a new Option 003. This expanded measurement range opens up uses for the 5315A in new areas of design, production and maintenance of equipment for communications.

The unit also measures low frequency pilot tones to a high resolution in communications systems. Because it measures input waveform period and inverts the measurement to display frequency directly, the 5315A achieves a resolution of at least seven digits (0.0001%) in a measurement time of only one second, from 1 Hz up to 1 GHz. Also featured are very low electrical noise for testing sensitive receivers, battery-pack option with built-in charging circuits for portable field use and high stability time base option.

The 5315A has measurement functions of frequency, frequency ratio, period, period average, time interval, time interval with delay, time interval average and will totalize events.

U.S. price of the 5315A is $800; Option 003, $250; Option 001, high stability time base, $100; Option 002, battery and charger, $225. The 5315B is the 5315A in a metal, rack-mountable package for $950, More information is available from Hewlett-Packard Company, 1507 Page Mill Road, Palo Alto, CA 94304, or circle number 76 on the reader service card.

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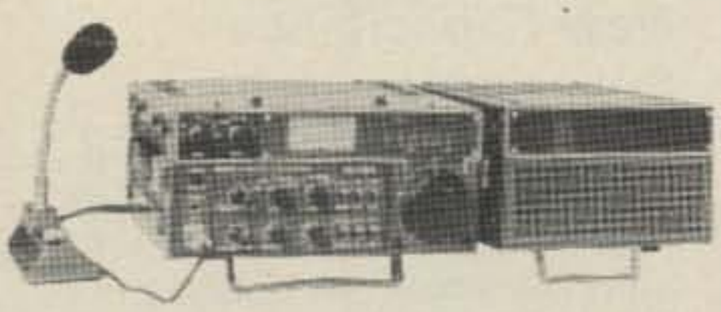

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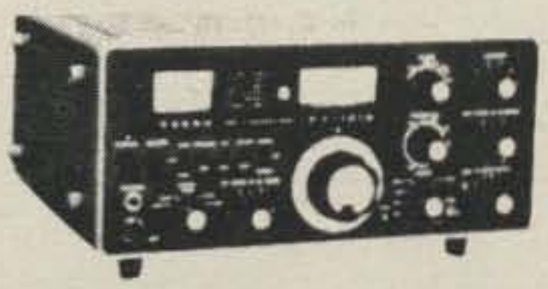

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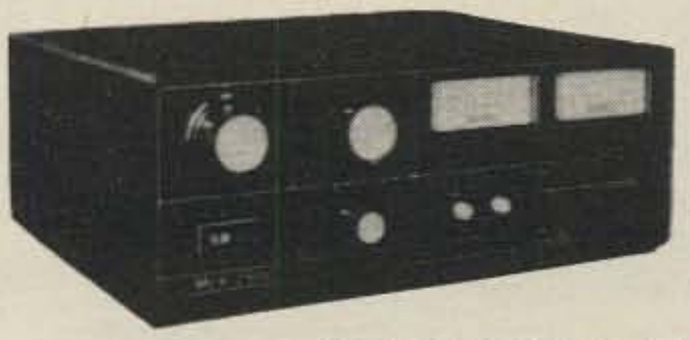

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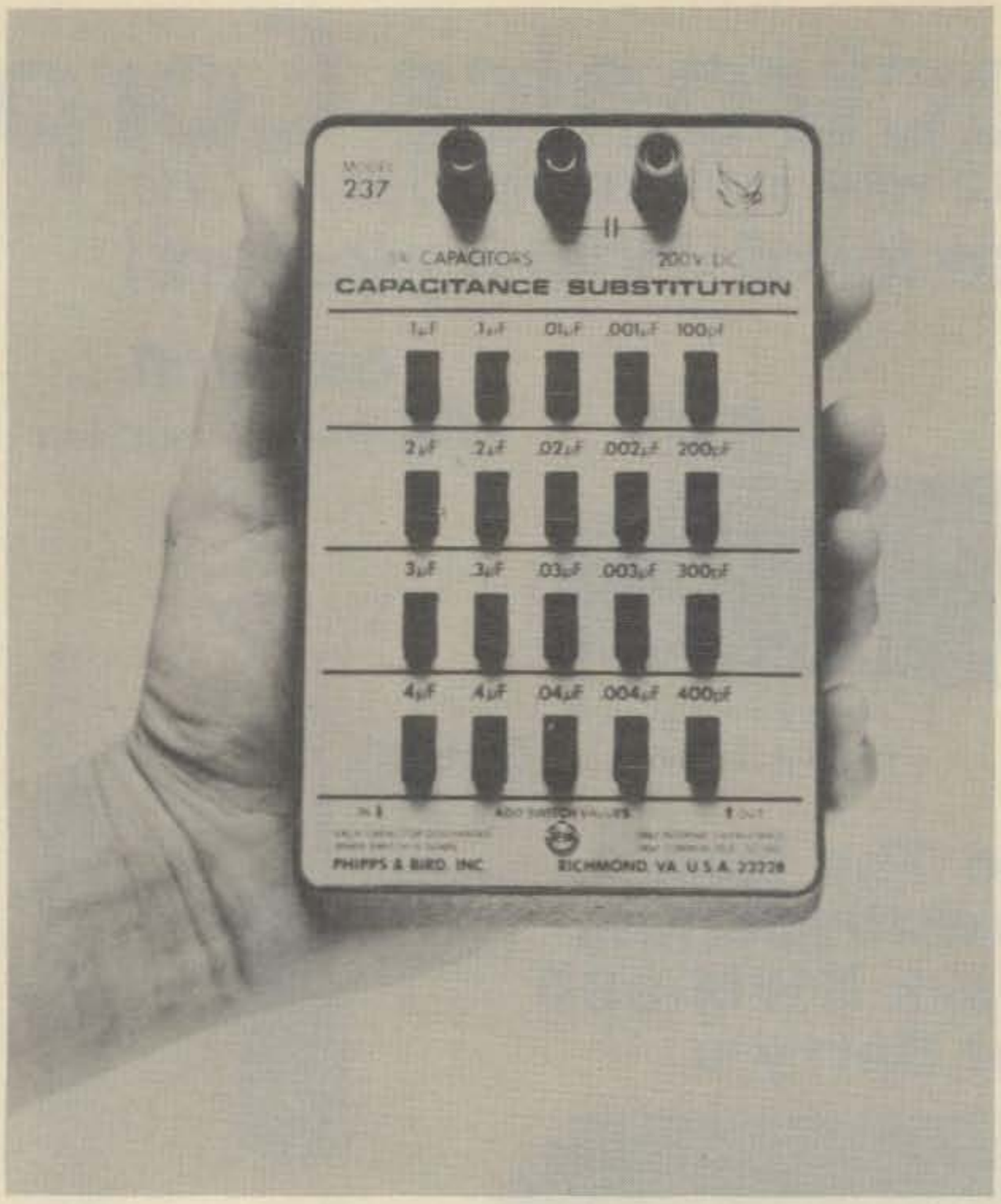


New Capacitance Substitution Unit

New from Phipps and Bird is the Model #237 lightweight, hand-held capacitance substitution unit. The small, one-pound unit offers a wide five-decade range of capacitance. It is useful for designers, trouble-shooters and electrical or lab technicians who can simply add or subtract capacitance to the value desired. It includes a discharge feature which provides safe substitution in sensitive circuits.

The case is sturdy metal and measures 4″ × 6″ × 1½″. It works on non-polarized 5% capacitors and features 5-way binding posts.

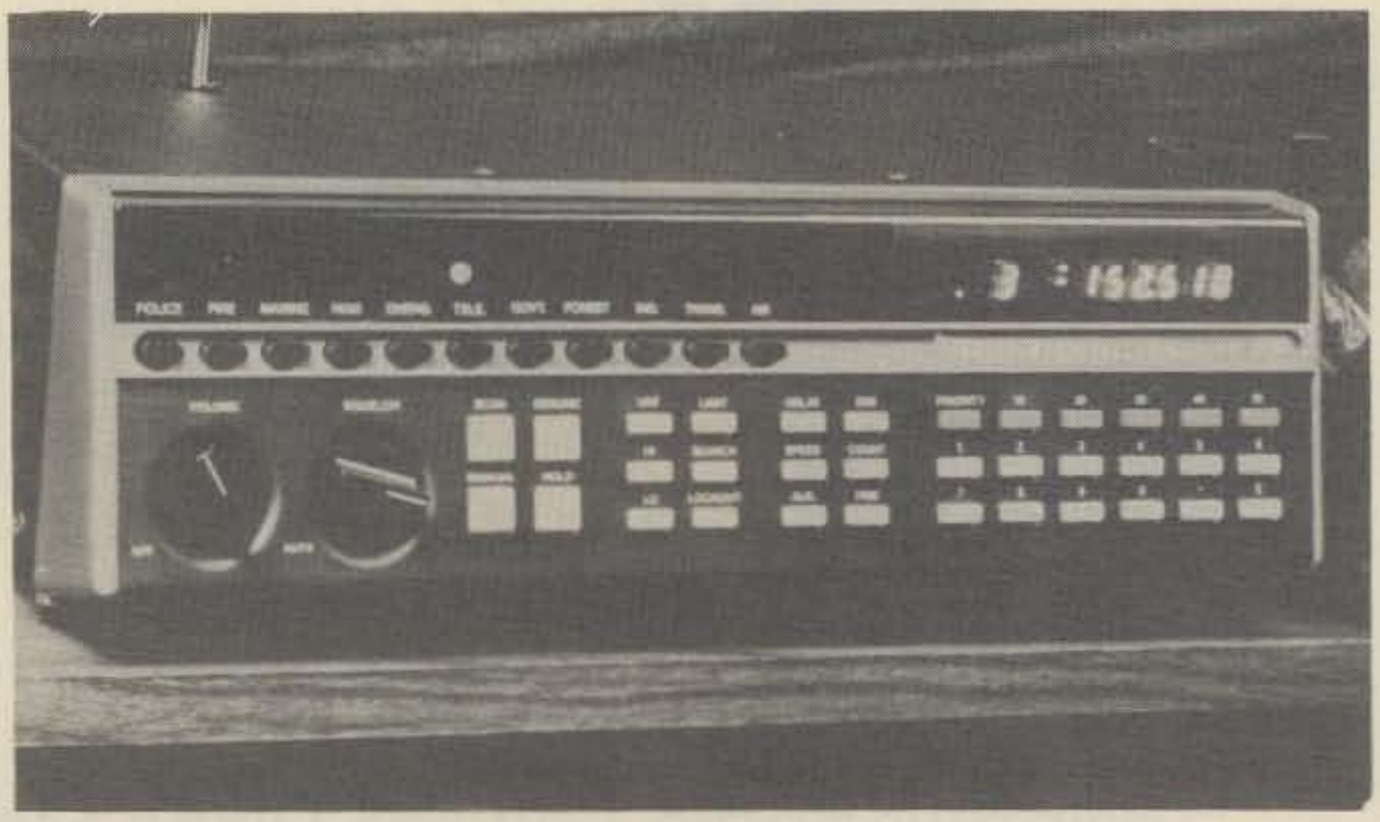
For further information contact Phipps and Bird, P.O. Box 27324, Richmond, VA 23261, or circle number 80 on the reader service card.

Bearcat 300 Service Search

Electra Company has introduced the Bearcat 300 Service Search scanning monitor radio, which has over 2,000 pre-programmed channels.

By pushing a single button, the radio will search the actively assigned frequencies for the service selected. This feature completely eliminates the need to know in advance the frequencies for the most-listened-to services. The Service Search has 11 different services, and in all there are 2,138 frequencies pre-programmed into the memory of the unit.

In addition to Service Search, the scanner also features the flexibility of user-programmed memory. The frequencies for up to 50 channels can be stored or changed in this memory by simple keyboard entry. These frequencies can be in any mix from the 7 VHF and UHF frequency bands covered by the radio, including the AM aircraft band.



The die-cast front panel is accented by a vacuum fluorescent digital display. The radio measures 12¼″W × 3-7/8″H × 7″D, permitting easy shelf or vehicle installation. The unit sells for $499.95.

For more information on the Bearcat 300 contact Electra Company, P.O. Box 29243, Cumberland, IN 46229, or circle number 81 on the reader service card.

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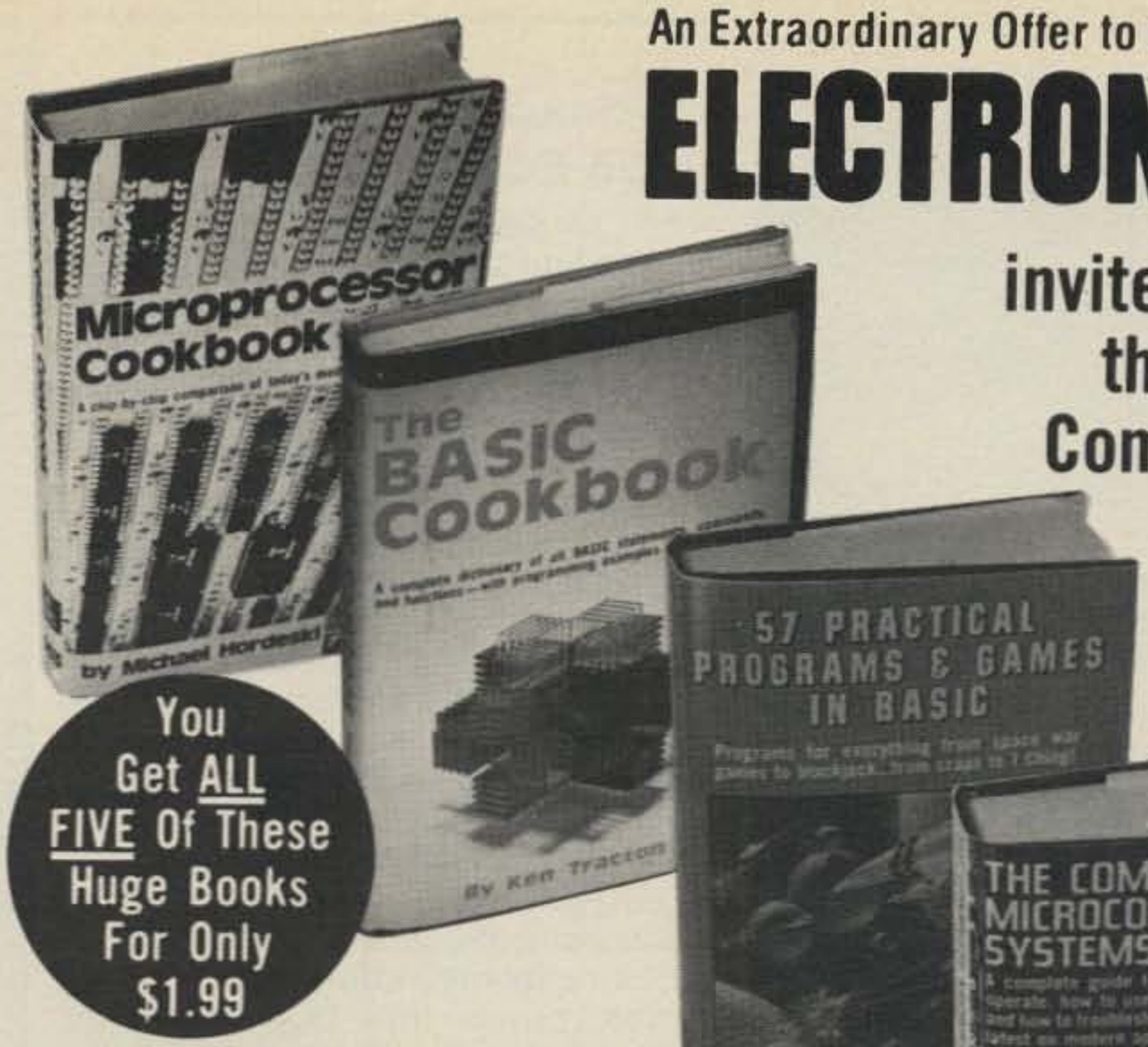

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Panasonic's Catalog On ECQ-M Capacitors

An easy-to-read 6-page fold-out bulletin on Panasonic's ECQ-M polyester and foil capacitors is available from the Electronic Components Division. Design features include non-inductive construction with tinned copper leads welded to the foils, high-peak current capability, solvent-resistant resin-coated body and automatic insertion capability.

The bulletin presents detailed and general specifications on the family of capacitors. This includes voltage range, capacitance values, complete capacitor dimensions, lead configurations, variety of mechanical and electrical specifications and other performance factors. Information on how to order the ECQ-M series capacitors directly from the bulletin is also included.

For a free copy of the bulletin, write to Panasonic Company, One Panasonic Way, Secaucus, NJ 07094 and ask for the "ECQ-M Series Polyester and Foil Capacitor Bulletin," or circle number 82 on the reader service card.

Omnicron's Automatic Logging Recorder

Omnicron's new automatic logging recorder documents 10 hours of telephone conversations, two-way radio messages, computer data or dictation on each standard cassette tape. Every recording is available at the touch of a single button, either immediately after receipt or months later.

Other features of the CTR-8LP recorder include: monitor while recording; end-of-tape alarm which beeps when the tape needs to be turned or replaced; digital tape footage counter; LED record indicator; AC/rechargeable battery operation; and adjustable audio threshold with DC sensing to prevent activation between conversations. Dimensions are 2-3/4"H × 5-3/4"W × 10-1/4"L, and weight is 4 pounds.

Optional accessories include a TCE-124 Talking Clock to automatically index each recording with a verbal announcement of time of day; ASC-920 Recorder Sequencer for automatic sequential operation of two recorders; TCR-600 FCC registered telephone coupler; RMC-8 remote microphone; RBC-4 rechargeable battery pack; WFC-101 ruggedized enclosure; and magnetic leader cassettes.

For further information on the CTR-8LP recorder, which sells for $257.50, contact Omnicron Electronics, 1 Mechanics Street, P.O. Box 623, Putnam, CT 06260, or circle number 75 on the reader service card.

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CRANIUM QUERIES

" FIND THE ERROR"

BY MARTIN BRADLEY WEINSTEIN, WB8LBV
130 Coe Avenue, Apt. 73
East Haven, CT 06512

More elusive than the DNA molecule! Harder to find than the source of the Nile. As mysterious as the disappearance of Judge Crater! The secret whereabouts of the "Find The Error" folder have been unearthed (as opposed to undergrounded). This month we resume our "Find The Error" Contest with hearts gladdened, heads erect and a lilt to our step. For the real low down, got to know everything about everything nit pickers, the folder was in the last carton to be unpacked and mixed in with some decrepit drawings used several years ago. For the "I told you so" and "that's where you should've looked in the first place" people... keep it to yourself, who asked you?

As a precursor to this month's edition of "Find the Error", I would like to commend reader Jake L. Jacobs' astute observation that there were two errors in the October edition (page 88). Although Jake does not hold an amateur license, he did teach electronics at the Army Intelligence School, Fort Devans, Mass. His letter is reproduced below, followed by author Weinstein's reply. Both are highly informative.

-K2EEK

Dear Alan,

Find enclosed a copy of the letter I sent to Martin Weinstein last week. Here is a summary of that second, more subtle, error in the circuit contained in the October issue's "Find The Error" feature.

The drain (load) resistor and coupling capacitor actually combine to form a passive (RC) filter. This filter determines the frequency response of the output signal. Since the filter is in the form of a high-pass, these two components actually set the point at which the lower frequencies are attenuated enough to become a 3 dB loss. Before calculation starts you must remember that X_C will be one tenth of the value of R_L.

$$X_c = R/10 = \frac{1}{2\,TT\,f\,C}$$

thus:

$$X_c = 6800/10 = 680 = \frac{1}{2\,TT\,f\,C}$$

recombining:

$$f = \frac{1}{2\,TT\,C(680)} = 23{,}405\ Hz$$

That is the lowest frequency that mic preamp will output. In adults the upper limits is considered to be 16,000 Hz (as a rule of thumb). Thus what you will hear from this circuit is .... nothing!

Calculating the input frequency response yields 33.4 Hz. To match this at the output would require a 7 u^F output capacitor in place of the 0.01 u^F value shown.

Incidently, the source bypass capacitor is a bit large. Using the same procedure yields 15.4 Hz as a frequency response. If a 21 u^F value were to replace 47 u^F capacitor shown, there would be no waste in the circuit, size, weight, or cost. However a 25 u^F value would be easier and cheaper to find.

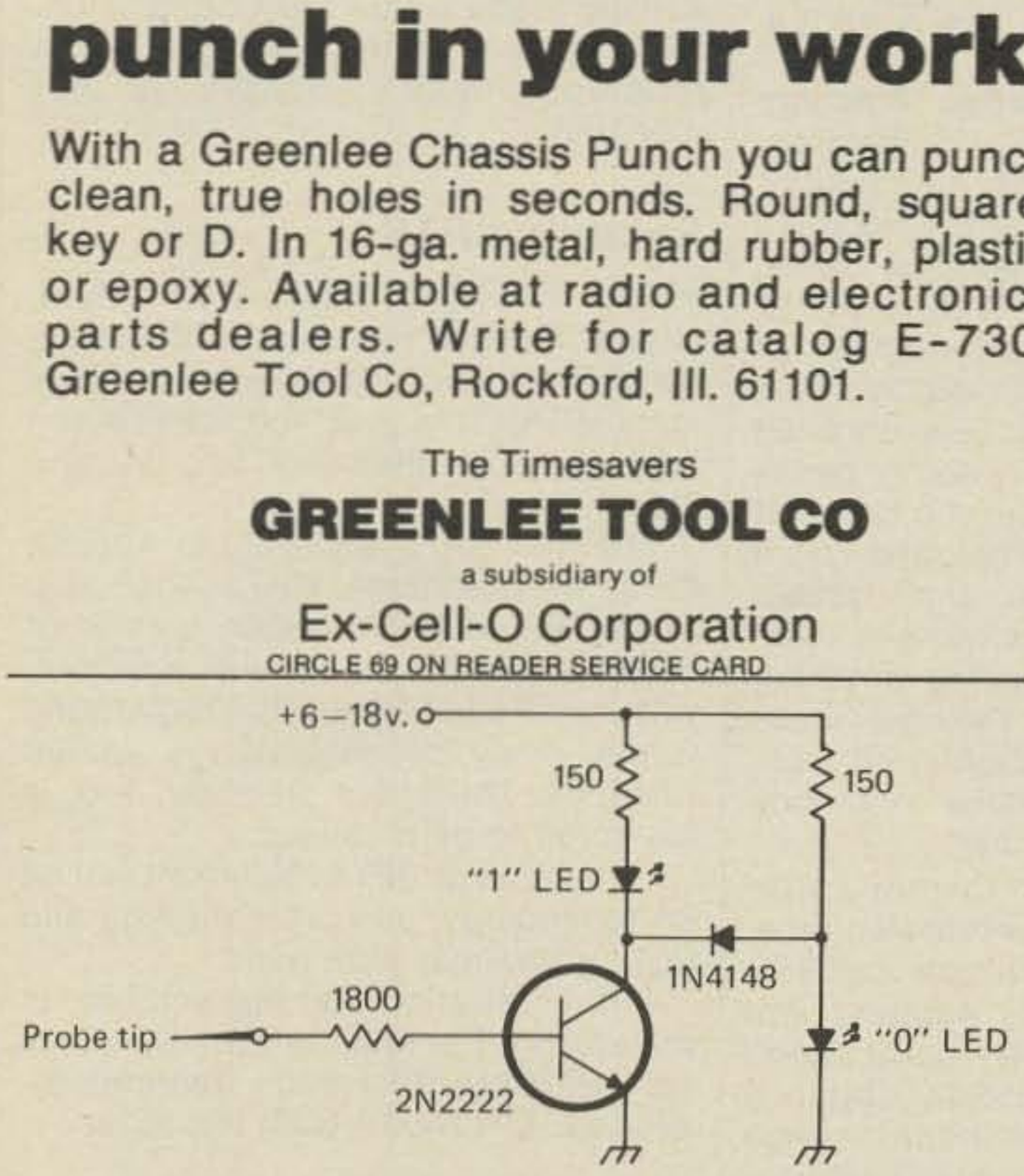
Jake L. Jacobs

A Wire From Weinstein

Mr. Jacobs is right, of course. There were two switcheroos originally - both source for drain and the two cap values. I'll give myself two demerits and walk my post until the sultry girl with the foreign accent asks me if I'm new in town, and if I'll buy a girl a drink.

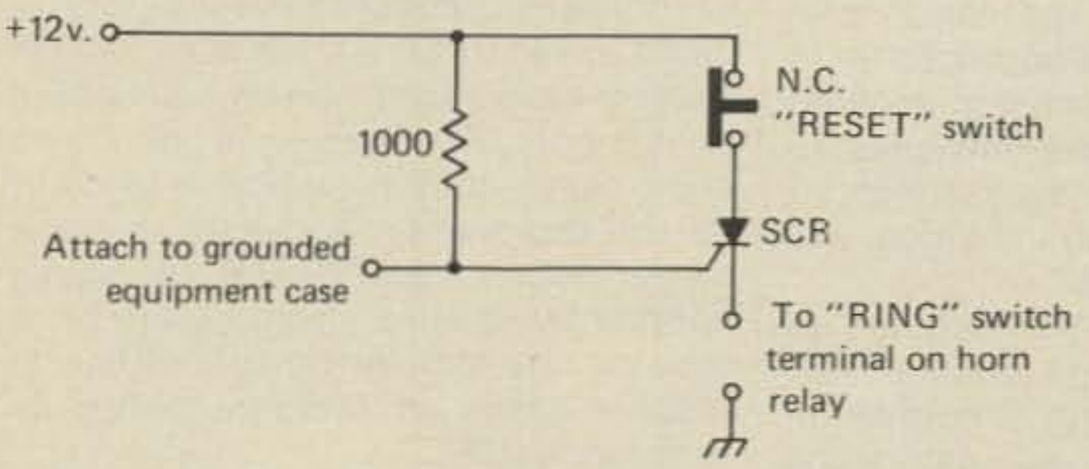
By the way, here's one for the caveat emptor department. I bought myself a watch this summer with all the functions in the world - LCD display, month, day, countdown timer with alarm, two kinds of stopwatches, a snooze alarm, even a bank of solar cells to recharge the two batteries inside. Unfortunately, it also comes with one additional unannounced function - suicide. Something brought one of the batteries down to under ½ a Volt. The cell was a Duracell 10SL19. Fine. I checked with the local Radio Shack. They never heard of it. Neither did the drug store, the electronics counter at the local discount department store, the local jeweler, or my local electronic distributor. No dice. No stock. No cross reference. Not even a line listing in the 1980 Duracell catalog. So, undauntable as ever, I called Duracell. Seems the 10SL19 was a special. They weren't sure when, if ever, it would be available again. So my Jupiter super-duper watch (the same watch is sold with a variety of brand names - it's wholesaled by General Time) sits in a drawer. That's progress for you. At least when my old two-handed number pointer stopped, it showed me the right time twice a day. Now the only thing I can put on my wrist to show me a good time is my XYL.

Marty Weinstein



Here's What Was Wrong

The IN4148 steering diode was backwards. Reverse it and you have yourself a simple but useful logic probe.



What's Wrong?

How could anybody screw up with just three parts. This Rip-Off Alarm guards a mobile rig with a lead screwed to its case. Lift or break the lead and the Ik pullup resistor should fire the SCR, which latches on until the Reset switch breaks the circuit. So why won't the horn honk? [00]

a regular feature by

THEODORE J. COHEN N4XX

dateline... Washington, D.C.

The ins and outs of the Washington scene

FCC Orders Action Against Ham Licensees

In late 1979, the Federal Communications Commission ordered its staff to initiate enforcement actions against persons who have fraudulently obtained Amateur Radio licenses or upgrades without taking and passing the required Commission examinations. Said to be involved in such cases are a number of diplomats and industrialists.

The FCC staff was also directed to change the call signs of Commission employees who obtained their call signs in a manner inconsistent with the Commission's rules.

Investigations into licensing and call sign irregularities began in June 1976, when the FBI found that an Indianapolis, Indiana, Amateur was arranging for the improper issuance of Amateur licenses through Richard Zeigler (then Chief of the FCC's Special Licensing Section at Gettysburg, Pennsylvania). Subsequently, the FBI's Cincinnati Office received information that Zeigler had accepted $100 payments from four licensees in the Columbus, Ohio, area in connection with the issuance or reservation of specific call signs.

In addition to the FBI's findings, the Commission itself became aware of other questionable Amateur licensing and call sign practices. Such practices included:

- The payment of cash or other consideration in connection with the issuance of Amateur licenses, upgraded licenses, or call signs to persons not qualified to receive them;
- The issuance of Amateur licences, upgraded licenses, or call signs to persons not qualified to receive them without payment of cash or other consideration;
- The receipt of call signs in a manner inconsistent with the Commission's rules.

Based on investigative hearings held in Indianapolis and Washington, D.C., about 50 persons obtained or tried to obtain Amateur licenses without taking the required tests. Sources in Washington, D.C., however, suggest that the actual number of violators may have been higher. That information may not have been obtained by the Commission in some cases could have resulted from the fact that investigators were prohibited from asking anything other than preset questions. Then, too, witnesses were prohibited from discussing anything but material related to their own case (i.e., witnesses were prohibited from discussing other potential violations of which they were aware).

Regardless, the Commission authorized its staff to initiate enforcement proceedings to revoke and suspend the license of any Amateur who appears to have actively participated in an effort to fraudulently obtain a new or upgraded Amateur license without examination. In cases where a person received a new or upgraded Amateur license without examination, but did so in good faith and without fraudulent intent (such as when the license was unsolicited), the Commission felt that license revocation proceedings would not be appropriate. In such cases, the Commission ordered its staff to return these licensees to their original license status (which, in some cases, means the individual will be left with no license).

Finally, the Commission directed its staff to order call sign changes for those past or present Commission employees whose current call signs were not assigned in accordance with Commission rules. As many as 40 FCC employees (past and present) may be involved in such actions.

It hoped that the actions to be taken, as noted above, together with organizational and policy changes already made within the Commission, will ensure that this sad chapter in Amateur Radio's history is not repeated.

Second SPTS

The Bayfront Park Auditorium, Miami, Florida, is the site of the second Satellite Private Terminal Seminar (SPTS). This year, the seminar will take place on February 5th, 6th and 7th.

The first SPTS was held in August, 1979, in Oklahoma City, Oklahoma. According to Bob Cooper, creator of SPTS, the first seminar was a sellout, with hundreds of potential registrants turned away because of the limited facilities. The Miami seminar, too, is expected to be a sellout.

Emphasis at SPTS '80/Miami will be on technology, and on marketing and selling low-cost terminals.

Pre-registration for the seminar is mandatory. For more information, contact Satellite Television Technology, Arcadia, OK 73007; (405) 396-2574.

U.S. Attorney's Office Active In Amateur/CB

According to Mr. Jeffrey Young, Chief, Investigations Branch, FCC, the Commission, more than ever before, is being asked to assist U.S. Marshalls in seizing illegal and non-type-accepted equipment, in obtaining evidence in such cases, and in testifying in court on the Government's behalf. In some cases, action taken by U.S. Marshalls apparently resulted from public pressure on the U.S. Attorney's Office to resolve cases of radio-frequency interference (RFI).

Action by the U.S. Attorney's Office is also being taken in matters pertaining to abusive operating practices which extend beyond simple rule violations. In some cases, these practices include threats by one or more operators towards other operators. Then,

*8603 Conover Place, Alexandria VA 22308

too, some investigations center around cases of deliberate interference in the operations of certain Amateurs and CBers.

The FCC is assisting the U.S. Attorney's Office in these matters to the maximum extent possible.

TVRO Licensing Requirements Lifted

Following a deluge of applications for licenses to construct and operate TV receive-only (TVRO) earth stations, the Commission removed the requirement for such licenses. The catch in this deregulation move, however, is that unlicensed TVRO installations have no protection from interference caused by other users of the frequency bands employed (3.7 to 4.2 GHz). Operators of TVRO installations who *do* want protection may still apply for a license with the FCC. Licenses, once issued, are now valid for five years.

Note that regardless of whether a TVRO is licensed, the interception of programming from private-network broadcasters (e.g., Home Box Office, Showtime, and others) should only be done with the permission of such broadcasters. Persons who intercept these programs without permission face civil procedures (usually accomplished under the "theft of service" rules which apply in some states).

New Radiation-Exposure Standard In Preparation

According to Werner *(Electronic Engineering Times,* 29 October 1979), three groups...the American National Standards Institute (ANSI), the National Institute of Occupational Safety and Health (NIOSH), and the Environmental Protection Agency (EPA)...are preparing a new standard for radiation exposure. Even if the new standard is adopted, however, it would only protect a very small part of the U.S. population. In fact, recently released data for 15 cities in the U.S. (representing 20% of the U.S. population) show that the inhabitants are exposed to significantly less radiation than that proposed as a limit in the new standard, or than that specified by the limits of the tougher Soviet radiation standards (the latter are 1000 times tougher than existing or proposed U.S. standards).

As noted by Werner, "The data fly in the face of much recent publicity concerning the possible hazards to humans exposed to rf and microwave fields."

Many concerns related to the biological effects of non-ionizing radiation, however, remain. Consequently, it seems likely that the new standard, if adopted, will not be permanent. Only in this way will it be possible to upgrade the standard so as to take account of adverse effects which may be uncovered by ongoing research.

For a general overview of the biological radiation question, interested readers are referred to M. Gold's article "The Radiowave Syndrome" (*Science 80,* Premier Issue, 1979).

FCC Allows Use Of ASCII

By the time this column appears in print, the Commission will have released an order which will allow the use of a standard version of the American Standard Code for Information Interchange (ASCII, an 8-bit code used in computer and data communications). The intent of the order is to permit Amateur operators to use equipment which generates ASCII, and which is in common use today.

The Commission will be considering the possibility of permitting Amateurs to use any data transmission code they prefer. The fundamental question here, however, is whether it is necessary for the Commission or even an Amateur to monitor another Amateur's transmissions.

If Amateurs are permitted, within limits, to use any code of their choosing, it seems likely that the use of esoteric codes (e.g., those which involve rotating coding schemes) will be prohibited. There is also the possibility that the FCC will require Amateurs to file samples of codes they intend to use with the Commission.

Proof-Of-License Petitions Rejected

Petitions requesting that the Commission adopt rules requiring sellers to obtain proof of a valid license from anyone seeking to purchase Amateur transmitting equipment have been denied. The purpose of such a regulation, of course, would have been to regulate the marketing of equipment to prevent improper use of such equipment by non-Amateur operators.

Upon consideration of the petitions submitted, the Commission found that a proof-of-license program was not feasible at this time. Specifically, it was felt that enforcement would tax the Commission's available resources of manpower and funding. Further, the requirements which would have to be imposed on the public run counter to the current trend against the proliferation of paperwork and government regulation.

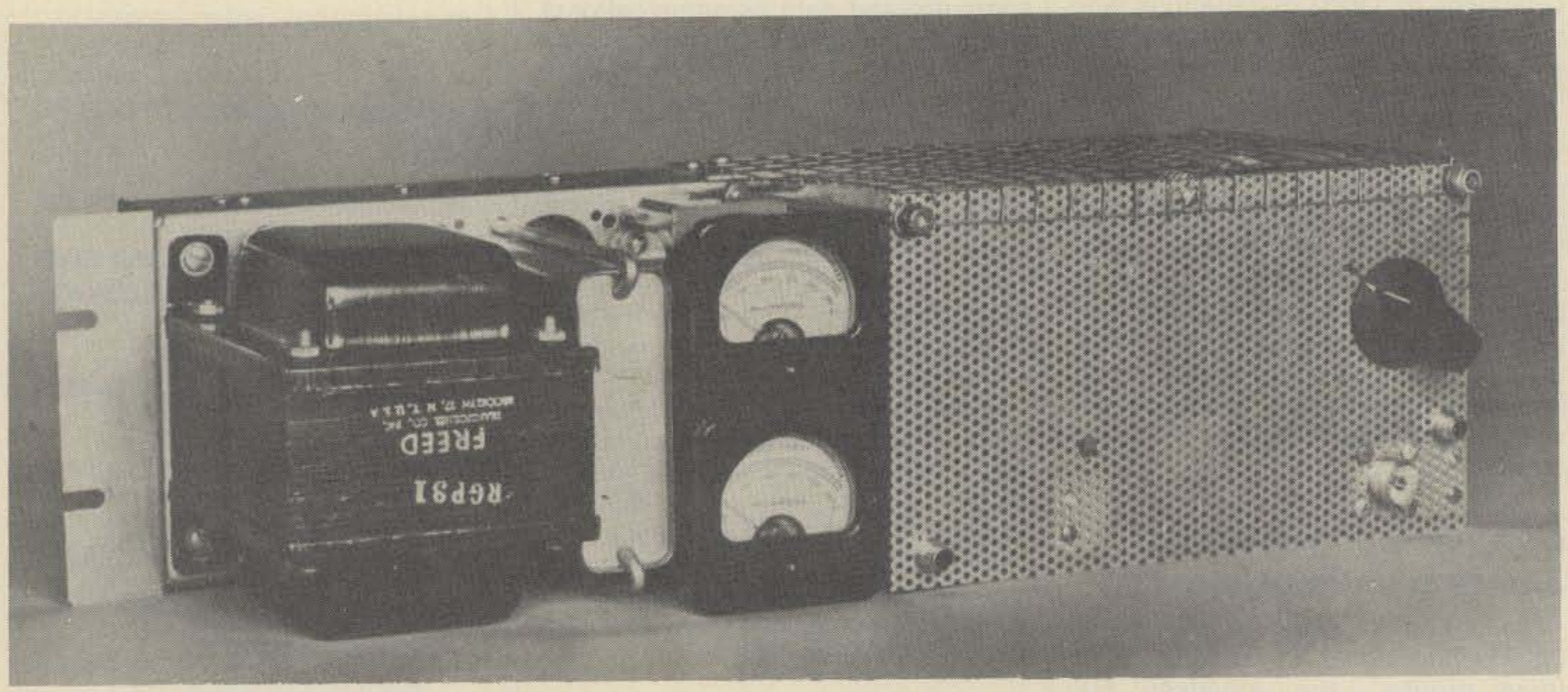
In spite of the denial, the Commission stated its intent to continue to study the problem of improper use of Amateur transmitting equipment.

Your Washington editor thanks Messrs. Carlos Roberts (Chief, Private Radio Bureau, FCC) and George R. Borsari, Jr. (WA3WRS) for their contributions to this month's column.

W2JTP takes us past the "junk box" and into the attic to come up with the parts for this amplifier. It's worth the trip there and probably to a hamfest fleamarket too.

A Power Amplifier for 10 Meter F.M.

BY BYRON KRETZMAN*, W2JTP



Front view of the buttoned-up Amplifier. Construction is "dish-mount" for relay rack mounting.

When commercial surplus two-way radio f.m. equipment started to become available to hams, about 20 years ago, 29.60 MHz was established by common agreement as the nation-wide f.m. channel on 10 meters, as was 52.525 for 6 meters and 146.94 for 2 meters. Specific frequencies were necessary because this f.m. equipment had crystal controlled receivers as well as transmitters.

The result was that 29.60 was monitored all across the country with receivers equipped with a "squelch" circuit which kept loudspeakers silent until a station came on the frequency. This was beautiful. Whenever 10 meters opened up, we all knew it —29.60 came alive. Sometimes we worked (from the east coast) the midwest, sometimes the Pacific northwest, and sometimes Texas. Mobiles riding around Milwaukee, Spokane and Dallas were worked as if they were in the back yard. Most of these surplus transmitters provided about 25 to 50 watts output. Now 100 watters are becoming more common and the frequency has become more crowded. The simple "J" antenna at W2JTP soon gave way to a Sterba curtain. The 25 watts output transmitter soon became "low power." How to increase power? An amplifier, for the existing transmitters strip, obviously, a Class "C" amplifier. *(Not* a "linear")

The "junk box" was investigated. A de-nuded Motorola power supply chassis, 5″ by 17″, 1″ deep, was selected as the basis for the amplifier. It would be nice (essential) to have the power supply on the same chassis, too, as only 5-1/4″ of rack space was available above the 10 meter f.m. equipment. Next we turned up a pair of Heintz and Kaufman HK-24 tantalum plate triodes that were bought about 1939 or 1940, used on 2-1/2 meters until December 7, 1941, then packed away in their original cartons, moved to several houses on Long Island, to several houses in Minnesota, then back to Long Island. For 37 years they had been unused. We also turned up a half-dozen WWII surplus 24-G tubes, similar to the HK-24 but with the grid out the side instead of out the base. An old Freed RGP31 power transformer with an 1100-volt secondary was also found. Around these prime components the 10 meter amplifier was designed.

This isn't a "how-to-build-it" article. It should, however, give the ingenious amateur, the amateur who doesn't hesitate to design and build, a few

*431 Woodbury Road, Huntington, N.Y. 11743

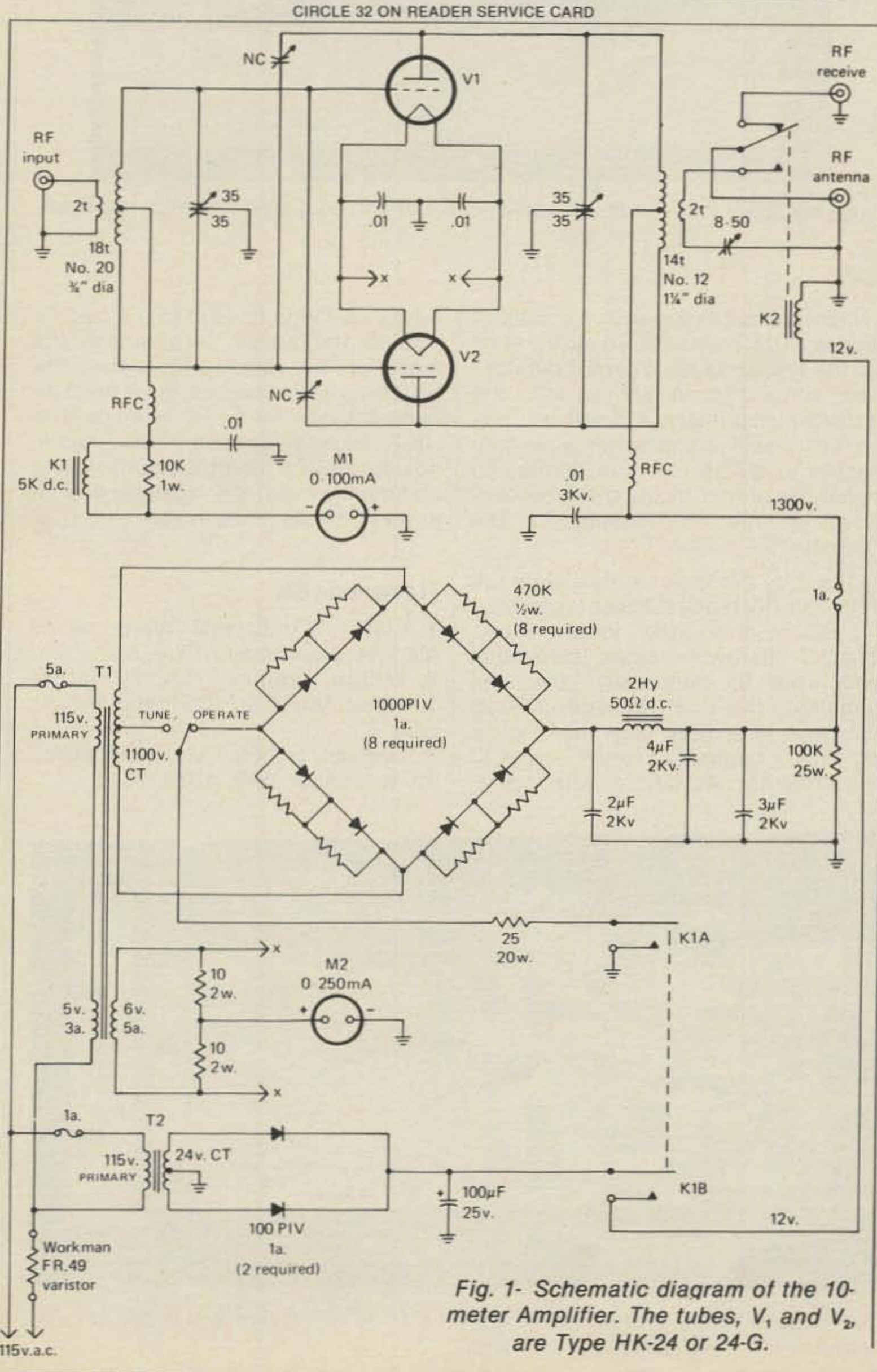
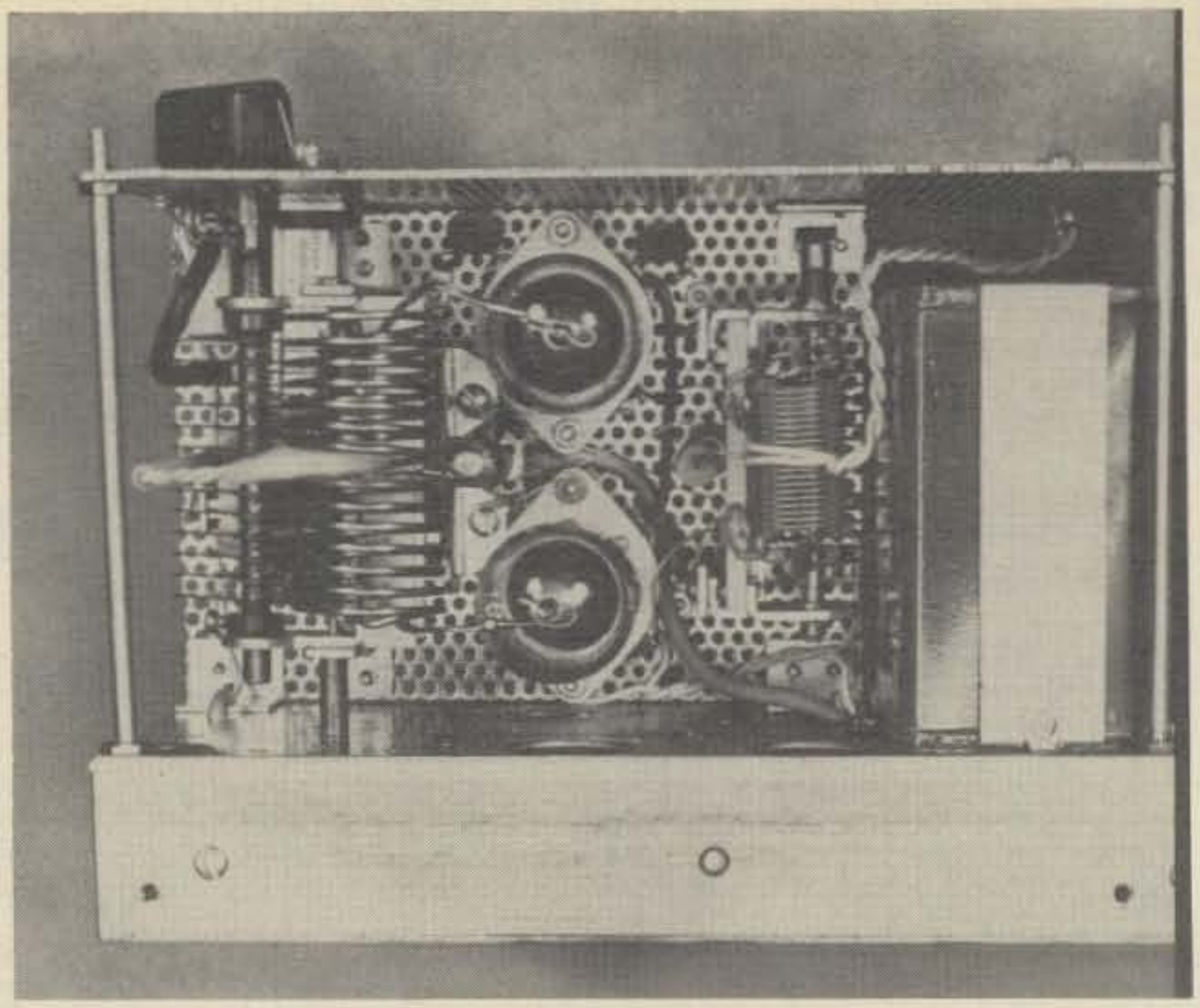


Fig. 1- Schematic diagram of the 10-meter Amplifier. The tubes, V_1 and V_2, are Type HK-24 or 24-G.



Looking down into the Pa compartment, top and side shield screen removed.

ideas. Fig. 1 is the schematic diagram. Simple, isn't it? It does provide over 150 watts *output,* a substantial improvement. A relay in the grid return circuit applies the high voltage, incidently protecting the amplifier should there be a loss of exitation, and also eliminating any connection to the control circuits of the transmitter, now the exciter. The coax relay on hand had a 12-volt d.c. coil, so a 12-volt supply was made from a little 24-volt center-tapped transformer, a couple of diodes and a capacitor. To slowly start up the filaments, a TV-type "varistor" was connected in series with the transformer primary. A 5-volt winding on the power transformer was connected in series with the primary to boost the output of the other secondaries and to compensate for the "varistor."

The only items purchased were the 1000-volt PIV diodes. These were three for $1.39 from the local "Radio Shack." Hardware cloth (screening) was used to electrically cover the amplifier. The E. F. Johnson #250-20 low-pass filter used with the original rig is now connected to the output of the amplifier. As before, with the 25 watts, no TVI is caused to the two TV sets in the house. Incidentally, the amplifier will work with either the HK-24 or the 24-G tubes, but it must be re-neutralized if a switch is made. The HK-24 tubes have been in use, again, now for several months, an interesting commentary on the agelessness of good tantalum plate triodes. ■

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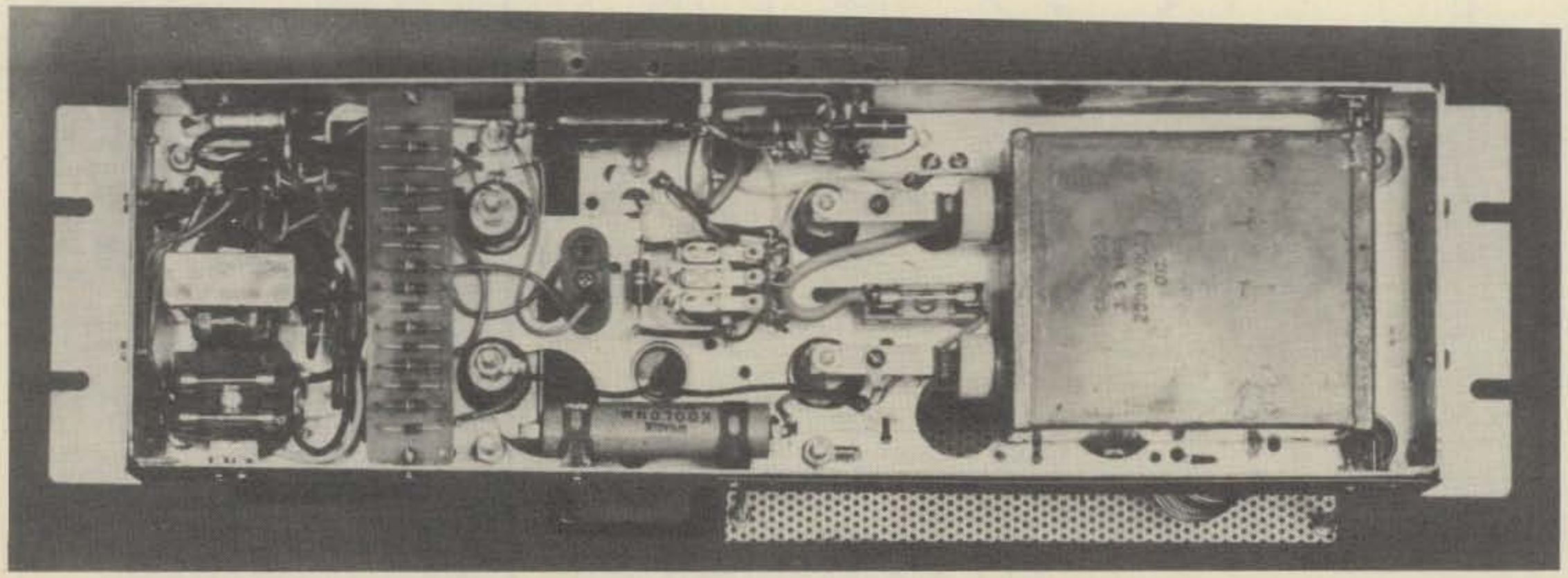
2. Millen, James, "A Miniature 100-Watt Amplifier," *QST,* March 1939, p.38.
3. Herman, S, "Try FM on 29.6 MHz," *73,* November 1978, p.184.



Underside of 5" × 17" Amplifier chassis. HV diode string, and resistors, are on a 1" × 5" PC board, without foil. Big capacitor is 2 mF 2000 volt, oil filled.

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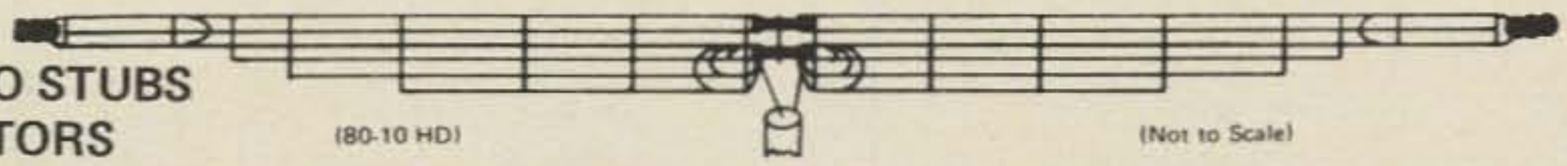

multi-band multi-frequency HF communications antennas
one half the length of conventional antennas
high performance and maximum efficiency
lowest cost/highest performance antenna available
fully assembled and pre-tuned ready for installation

★ ★ ★ NEW ★ ★ ★

Available Only from MOR-GAIN Two Models Specifically Designed for the Novice/Technician Operator. All of the Features and Performance of the Regular MOR-GAIN HD Dipoles but Optimized for the Operating Requirements of the Novice/Technician Licensee. See Below for Specifications and Prices.

- *There is no better antenna at any price . . . W9QIO* ● *I had a Mor-Gain antenna and liked it extremely well . . . K4JMR* ● *The antenna has worked out well with very good reports . . . W2TVK* ● *I can only give glowing reports about it . . . WA2IRN* ● *I have used these fine antennas before and see no reason to change now . . . W6BF* ● *It has given me excellent service and results . . . W6CZS* ● *I believe I have "sold" your antenna to almost every ham I have talked to . . . W4AHN* ● *Its performance here far surpasses any other antenna that I have had . . . WA5GGS* ● *For several years I have used the Mor-Gain and have been very satisfied . . . K2TSD* ● *Am letting everybody know that it has been doing a good job for me . . . VE2VW* ● *The antenna is performing just beautifully . . . W8WDZ/6* ● *My 75-40 has performed beautifully and I'm very happy with it . . . WB8DMB* ● *Another chap said he had also used it and that it was the greatest . . . W4NSP* ● *I do not hesitate to recommend the antennas to others . . . K0SPR* ● *I heard a ham extolling the virtues of your antenna . . . WB0PTM* ● *I worked a station last night and the Mor-Gain was doing quite a job for him . . . WA3TCV*

MOR-GAIN HD DIPOLES . . . ● One half the length of conventional half-wave dipoles. ● Multi-band, Multi-frequency ● Maximum efficiency - no traps, loading coils, or stubs. Fully assembled and pre-tuned - no measuring. no cutting. ● All weather rated - 1 KW AM, 2.5 KW CW or PEP SSB. ● Proven performance - more than 15,000 have been delivered. ● Permits use of the full capabilities of today's 5-band xcvrs. ● One feedline for operation on all bands. ● Lowest cost/benefit antenna on the market today. ● Fast QSY - no feedline switching. ● Highest performance for the Novice as well as the extra-class op. ● ST and HD models are furnished with crimp/solder lugs for transmission line connection. ● HD/A models are furnished with female coax connector which mates with standard PL-259 male cable connector. ● Designed for low height installation: 20-40 feet. ● 50 ohm feed point impedance on all bands. ● 75-(**) models are factory tuned for resonance at 3950 kHz; 75- (xx) HD (S/P) models - 3800 kHz., 80-(xx) models - 3650 kHz.

EXCLUSIVE 66 FOOT, 75-10 METER DIPOLES

- *May be installed as inverted vee with negligable effect on performance.* ● *Fabricated from high-strength 40% copperweld wire - over 500 pound breaking strength.* ● *Stainless steel hardware.* ● *Completely assembled and pre-tuned. No cutting or measuring necessary.* ● *1-year limited warranty.* ● *Patented linear phase loading principle eliminates need for traps, loading coils or stubs.* ● *Engineering design and manufacturing is backed by our more than 15 years experience.* ● *Professional grade design - Amateur models are identical to those we produce for commercial/industrial systems* ● *No antenna tuner required for operation within stated specifications.* ● *Re-tuneable by the user to accomodate site proximity effects.*

MODEL	BAND (Meters)	LENGTH (feet)	PRICE
40-20-HD	40/20	36	$58.25
40-20 HD/A	40/20	36	$63.50
75-10 HD	75/40/20/15/10	66	$94.25
75-10 HD/A	75/40/20/15/10	66	$99.50
75-10 HD(SP)	75/40/20/15/10	66	$94.25
75-10 HD(SP)A	75/40/20/15/10	66	$99.50
75-20 HD	75/40/20	66	$80.25
75-20 HD/A	75/40/20	66	$85.50
75-20 HD(SP)	75/40/20	66	$80.25
75-20 HD(SP)A	75/40/20	66	$85.50
75-40 HD	75/40	66	$68.00
75-40 HD/A	75/40	66	$73.25
75-40 HD(SP)	75/40	66	$68.00
75-40 HD(SP)A	75/40	66	$73.25
80-10 HD	80/40/20/15/10	69	$98.50
80-10 HD/A	80/40/20/15/10	69	$103.75
80-10 HD(NT)	80/40/20/15/10	69	$98.50
80-10 HD(NT)A	80/40/20/15/10	69	$103.75
80-40 HD	80/40/15	69	$72.00
80-40 HD/A	80/40/15	69	$77.25
80-40 HD(NT)	80/40/15	69	$72.00
80-40 HD(NT)A	80/40/15	69	$77.25

Please include $2.75 for shipping and insurance.

NOVICE LICENSE OPERATION. The MOR-GAIN HD Dipole is the ideal antenna for the new or Novice operator. As the Novice progresses to higher license classes, he can easily re-tune the HD Dipole to the new frequencies of his higher frequency privileges. The HD Dipole is thus a one-time investment. HD Dipoles are available for all Novice frequencies.

LEAST COST. Dollar for dollar, the HD dipoles are the highest performance, least cost multi-band antennas on the market today. For example: the 5-band 75-10 HD dipole costs less than $20.00 per band - an unbeatable low cost.

LIMITED REAL ESTATE. Where real estate for antenna installation is limited, the HD dipole is the ideal solution. Operation on 80/75/40 meters is now possible since the HD dipole is only half the length of a conventional half-wave dipole. For all around operation, the HD dipole will outperform any trap loaded horizontal or vertical dipole.

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CIRCLE 44 ON READER SERVICE CARD

Greatly Increased Bandwidth From Simple Modifications To Your Present Beam

The Broad-Minded Yagi

BY T. E. WHITE*, K3WBH

Yagi aerials have been the backbone of h.f./v.h.f. amateur communications for years. Yet their one most glaring deficiency is very restricted bandwidth. A properly designed and built Yagi is limited to 1 or 2 per cent of design frequency before s.w.r., gain and bandwidth degradation begin. And the longer the beam the narrower the coverage.

This is no problem for those who hang around only on a certain frequency. But to cover entire bands, such as 220 and 420, with a single beam, the traditional Yagi leaves much to be-desired. Those starting from scratch on v.-u.h.f. would do well to construct log periodics. But for established amateurs with existing Yagis, there is another solution: modify your present antenna.

Fig. 1 shows a twin-driven element Yagi with two folded dipoles, cross-connected and fed from the rear or larger DE, not the front, as in an LPY. Parasitic elements remain the same as with a single DE beam, except that spacing is somewhat closer than "normal." Note that each dipole is shorted a certain distance in from each end. And each is physically the same in top and bottom portions, i.e., they are not "ratio" dipoles and perform no large impedance transformation. Balanced line (300 ohm) is connected directly to DE-A. Matching transformers at the antenna are not recommended, as we are trying here to eliminate all bandwidth-restricting devices. Use balanced line all the way down to the shack and there insert a simple broad-response donut torroid balun to permit 50 ohm coax connection to the rig. Use the minimum run of coax you can.

Not only are we making the beam less frequency-selective but also less "impedance-selective." S.w.r. remains nearly constant, and below 2.25:1 max., across the entire 144 and 220 MHz bands, and almost all the 420 MHz band.

The beam in fig. 1 may be extended by adding directors (at same spacing as D4-5), each 1/4 in. progressively shorter for 144, and 1/8 at 220 and 420. But there is no point in adding fewer than 3 at once, as the gain increase is not worthwhile with only one or two. And to go beyond 8 directors total starts to negate the very broad-bandedness we are seeking. Better to stack two bays vertically, which will give 14 db with 5 directors and nearly 16.5 db with eight.

Since we are here supposedly modifying an existing Yagi using your present boom and even if possible some of your present parasitic elements, boom sizes are not given, but this configuration will work well with booms of 3/4 to 1 in. diameter (or square) on 144, and 1/2 to 3/4 on 220 and 420. However it is recommended that all elements, including the dipoles, be of uniform diameter, and the cross-connectors the same. This should be 1/4 in. tubing for 144, and 1/8 semi-hard drawn rod for 220 and 420.

* *c/o CQ Magazine*

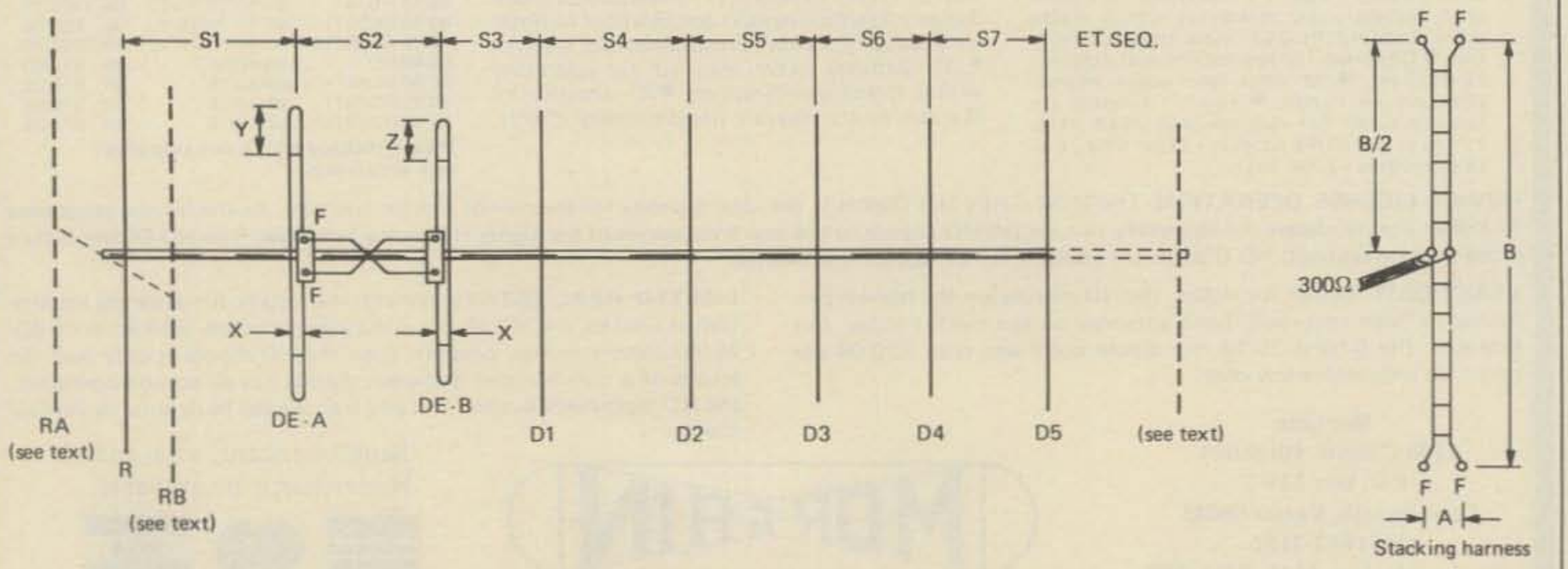

Fig. 1- A twin driven Yagi antenna.

KEY	144	220	420	KEY	144	220	420
R	47 1/4	31 1/2	15 3/4	S1	14 1/8	8 3/4	4 3/8
DE-A	41 7/8	28	14	S2	11 1/2	6 3/4	3 3/8
DE-B	31	20 3/4	10 3/8	S3	8 3/8	5 1/2	2 3/4
X	1 1/2	1 1/4	3/4	S4	14 1/8	8 3/4	4 3/8
Y	14 1/8	8 3/4	4 3/8	S5	14 1/8	8 3/4	4 3/8
Z	7 3/8	5	2 1/2	S6	14 1/8	8 3/4	4 3/8
D1	38 1/4	25 1/2	12 3/4	S7	14 1/8	8 3/4	4 3/8
D2	37 7/8	25	12 1/2	R-RA*	22	15	7 1/4
D3	34 3/4	22	11 1/2	R-RB*	22	15	7 1/4
D4	34 1/8	21 7/8	11 3/8	Stacking if used			
D5	33 7/8	21 3/4	11 1/4	A	2	1 3/4	1
NOTE:				B	82	82	28
* = If used.							

Fig. 2- Various dimensions for the twin driven Yagi antenna.

Dipole shorting straps for all bands are 1/16 aluminum sheet 3/8 in. wide, curled and press-fit around dipoles and cinched with 6-32 hardware. Clean connections are essential. Spray or brush Mosley Antenna Coat or similar over and around these wraps.

By the way, a tolerance of ± 1/4 in. at 144 and 1/8 at 220 and 420 in element lengths in perfectly ok, so don't throw away all your parasitics. You may have some already cut to size. And as to element spacing, ± 1¼ in. on 2m., 3/4 in. on 220 and 1/2 on 420 are also permissible, so check your existing spacings before ripping everything up. It may be possible to "drop in" the dual dipoles by simply relocating a director or two.

The 2 meter beam will perform well on adjacent MARS and CAP frequencies, and if mounted vertically will be an excellent receiving aerial for the 152-174 Public Service band, as well as satellites in the 136-142 band. The 200 model will receive TV channels 11-13 far better than a "consumer type" all-channel TV antenna, and will receive aviation, government, and aerospace signals in the 225-250 band. In fact, if mounted on an azimuth/elevation steerable mount, and additional reflectors RA and RB are installed, it makes an excellent receiving antenna for space shuttle eavesdropping. The 420 version will work well into the Public Service 450-470 band.

CQ World-Wide WPX/SSB Contest All-Time Records

By BERNIE WELCH, W8IMZ, Director, CQ WPX Contest

The contest is held each year on the last full weekend of March. The All-Time Records will be up-dated and published annually. The method of computing final scores changed several times since 1957. Data following the calls below are: year of operation, total score and number of prefix multipliers.

WORLD RECORD HOLDERS

Single Operator

1.8	XJ3FFA ('76)	31,416	77	AB	OI1VR ('79)	3,499,314	442
3.5	YY4YC ('76)	739,468	223				
7.0	CT4AT ('77)	1,212,070	305		**Multi-Operator Single Xmtr**		
14	VR3AH ('79)	3,526,153	437		UK9AAN ('79)	7,819,524	612
21	9L1CA ('79)	3,245,088	462		**Multi-Operator Multi-Xmtr**		
28	KH6XX ('79)	4,020,646	343		CK7WJ ('79)	16,545,370	590

AFRICA

1.8	No Entrant		
3.5	No Entrant		
7.0	ZD8CS ('72)	40,230	45
14	CQ6LF ('73)	1,138,047	309
21	9L1CA ('79)	3,245,088	462
28	EL2AV ('79)	1,874,140	415
AB	9L1CA ('78)	2,678,728	344

ASIA

1.8	No Entrant		
3.5	4X4DK ('71)	478,950	155
7.0	JA2BAY ('78)	238,700	154
14	UK9ABA ('71)	1,740,020	361
21	JH1BFF ('79)	1,454,520	391
28	4X4IL ('78)	993,616	281
AB	UA9ACN ('78)	3,319,488	459

EUROPE

1.8	YU3EF ('79)	17,136	56
3.5	DM2DUK ('76)	526,750	245
7.0	CT4AT ('77)	1,212,070	305
14	ON4UN ('78)	2,122,999	433
21	YU3ZV ('79)	3,225,380	415
28	SP3DOI ('79)	1,617,832	344
AB	OL1VR ('79)	3,499,314	442

Multi-Op Single Xmtr

AF	CT3/OH2BC ('78)	4,377,450	385
AS	UK9AAN ('79)	7,819,524	612
EU	EM6A ('79)	7,689,650	565
NA	KP4RF ('78)	6,113,910	485
O	5W1AZ ('76)	3,114,315	295
SA	PJ9JR ('74)	4,543,618	347

NORTH AMERICA

1.8	XJ3FFA ('76)	31,416	77
3.5	W1CF ('77)	460,908	186
7.0	W4BRB/C6A ('76)	911,302	213
14	KZ5FR ('78)	2,039,456	391
21	N7XX ('79)	2,862,488	376
28	VP5WW ('78)	2.043,486	321
AB	VC7BTV ('79)	3,140,786	367

OCEANIA

1.8	No Entrant		
3.5	KH6XX ('78)	305,080	115
7.0	ZL4BO ('73)	187,884	102
14	VR3AH ('79)	3,526,153	437
21	ZL2ACP ('78)	956,208	264
28	KH6XX ('79)	4,020,646	343
AB	KH6WF ('79)	2,612,602	302

SOUTH AMERICA

1.8	No Entrant		
3.5	YY4YC ('76)	739,468	223
7.0	YV5CVE ('76)	671,160	255
14	YY2AMM ('79)	2,751,776	452
21	YV5CVE ('78)	1,947,996	306
28	CW3BR ('78)	3,203,514	361
AB	PJ9JR ('70)	2,972,826	317

Multi-Op Multi-Xmtr

AF	9E3USA ('69)	2,398,192	296
AS	UK9AAN ('78)	10,702,776	532
EU	DFØDX ('79)	14,145,000	690
NA	CK7WJ ('79)	16,545,370	590
O	KG6FAE ('78)	1,483,398	193
SA	HD1A ('79)	11,001,027	573

CLUB RECORD
WESTERN WASHINGTON DX CLUB ('78) 13,256,472

WPX (Prefix) RECORD
DFØDX ('79) 690

QRPp RECORD
W8ILC ('79) 588,321

CQ WORLD-WIDE WPX/SSB CONTEST ALL-TIME U.S.A. RECORD HOLDERS

Single Operator

1.8	W8LRL ('79)	6,532	71	14	N4KE ('79)	1,194,390	414
3.5	W1CF ('77)	460,908	186	21	N7XX ('79)	2,862,488	376
7.0	K6JAN ('75)	270,972	117	28	K6SVL ('79)	1,457,184	344
AB	K7RI ('79)	2,608,148	346	QRPp	W8ILC ('79)	588,321	393

Multi-Op Single Xmtr

K4VX ('79) 4,344,340 572

Multi-Op Multi-Xmtr

K5JA ('79) 7,966,305 633

Drake R7 Synthesized General Coverage Receiver

Full 0-30 MHz coverage, with no gaps or range crystals required. Continuous tuning from vlf thru hf. State of the art a-m, ssb, RTTY, and cw. Transceives with Drake TR7.

★ Complete transceive/separate functions for use with TR7.
★ Multi-function antenna selector/50 ohm splitter for dual receive with the TR7.
• 100% solid state broadband design, synthesized with PTO.
• Covers range 0 to 30 MHz. Both digital and analog readout.
• Special front-end circuitry with high level mixer and 48 MHz 1st i-f.
• Complete front-end bandpass filters operate from hf thru vlf.
• 10 dB pushbutton-controlled broadband preamp for ranges above 1.5 MHz.
• Various front panel switch-selected optional selectivity filters.
• Low distortion "synchro-phase" a-m detector improves international SW.
• Tunable i-f notch filter reduces heterodyne interference.
• Full electronic passband tuning system.
• Digital readout may be used as a 150 MHz counter.
• Built-in power supply: 100, 120, 200, 240 V-ac, or 13.8 V-dc.
• Built-in speaker, or external Drake MS7 speaker may be used.
• Built-in 25 kHz calibrator for calibration of analog dial.
• Low level audio output for tape recorder.
• Select up to eight crystal-controlled fixed channels. (With Aux7).
• Optional Drake NB7A Noise Blanker available.

Accessories available for use with Drake R7:

• MS7 Speaker • SL300 Cw Filter, 300 Hz • SL500 Cw Filter, 500 Hz • SL1800 Ssb/RTTY Filter, 1800 Hz • SL6000 A-m Filter, 6.0 kHz • SL400 A-m Filter, 4.0 kHz • NB7A Noise Blanker • Aux7 Range Program/Fixed-Frequency Board • R7/TR7 Interface Cable Kit • R7 Service/Schematic Book.

Drake 7-Line Accessories

Drake L7
Continuous Duty
160-10 Meters
2kW Linear Amplifier

Temperature controlled for "key-down" operation covers any WARC expanded or new hf amateur bands, MARS, etc.

• 2 kW PEP, 1 kW cw, RTTY, SSTV full rated continuous duty • Covers 160-10* meter amateur band, plus future hf band WARC expansions and MARS, embassy, government, etc. • The Drake L7 includes a pair of rugged Eimac 3-500 Z triodes. • Accurate built-in rf wattmeter. • Temperature controlled two speed high volume fan. • Adjustable exciter agc feedback. • By-pass switching. • Bandpass tuned input circuitry. • 120/240 V ac, 50/60 Hz.

Drake MN2700
2 kW Matching Network

Manages rf radiation by impedance match to antenna, measurement of rf power and VSWR, reduction of harmonic radiation, and antenna selection.

• 160 thru 10 meters frequency coverage — plus MARS, future expansions, etc. • Matches antennas fed with coax, balanced line, or random wire. (Use Drake Balun for balanced line.) • Antenna by-pass switching also selects various antennas. • Extra harmonic reduction to help fight TVI — "pi-network" low-pass filter type circuitry is a Drake exclusive. • Accurate rf wattmeter/VSWR bridge. • 2000 watts PEP, 1000 watts average. Continuous duty.

Ask about the 250W Drake MN7 and Drake B1000 Balun

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RESULTS OF THE 1979 CQ WORLD WIDE WPX SSB CONTEST

BY BERNIE WELCH*, W8IMZ

This event will be remembered as **"THE YEAR OF THE PREFIX".** Thirty-four All-Time records were shattered and the greatest participation ever in this 23rd year of annual competition brought us the highest number of logs, for an s.s.b. weekend.

The 690 different prefixes accumulated by the DF0DX multi-multi group far exceeded one's expectations. The 1978 record of 532 was surpassed by 15 others, the top eight being: K5JA-633, UK9AAN-612, CK7WJ-590, YZ4Z-590, UK5MAF-574, HD1A-573, K4VX-572, and EM6A-565. Working 400 plus prefixes was common, yet just four or five years ago, that number was exceeded only by a few. More countries provided additional different prefixes than ever before, especially the U.S.A. The competition between the Yugoslavian super multi-single unique prefix giants YZ4Z, 4N4Y, and YT2D was extra excitement and is just one of the many reasons the WPX Contest continues to grow in popularity. Canada and Mexico again sported a generous prefix assortment. Spain's ED, EE, and EA0 were certainly welcome as was Portugal's CT1,4,5,6,& 7. Some unique prefixes confused not just the newcomer but also the old-timer. AZ8 was the most popular in this category, being mistaken for one of the new U.S.A. "A" prefixes, when in fact, it was Argentina. Here are some of the other unusual prefixes: CZ6, 6J1, VC7, ZZ2, HD1, IQ5, AX6, EM6, VC1, SQ5,6, 4C1, OI1,2, 4M3, ZX4, CK7, LJ2, JD1, RJ8, IN3, LX9, PI1, HG6,8,9, HB7, IP5, GB2, OS5, VX7, YY2, SJ9, 6D1, IV3, PP5, CO8, 4B7, RA3, OF1, PZ, LG5, HW6, RA9, PA1,2,3, RB5, HI7, ON8. Our available data indicates that the possibility existed for a station to have contacted over 800 prefixes this year.

High scores prevailed as never before with 165 stations in the 1-million plus group. QRPp stations also set new score and prefix records. W8ILC is the first U.S.A. station to become a World Champion in the All-Band category, followed closely by VE3KZ and N2AA. G4BUE is the European record holder. The high scoring single band station is JK1KBR.

We again had a pleasing number of around the clock pile-ups by rare and semi-rare DX stations such as: JT1, 9L2, CT3, HL9, VR3, 5Z4, 5T5, TF3, VK8, 6W8, VP1, PJ2, CE0, VK9N, DU2, KH2, IS0, 9H1, OY1, UI8, UJ8, OH0, UM8, 9M2, HS1, JD1, 9V1, UD6, 4Z4, VU2, ZS6, EL2, C5, OX3, CO8, FS7, CN8, SU, KX6, JY5, D2A, WH4/KH4, 9K2, H44, VQ9, FB8, 3D2.

It would seem that we experienced the ultimate in radio propagation, what with 165 stations scoring over 1 million each and the multitude of other new records already mentioned. However, the ten meter band failed us in several areas of the world, especially the North American east coast and part of midwest U.S.A. Can you imagine the even greater scores that might have been achieved if ten would have been fully productive?

Noticeably absent was the exotic Hawaiian call KH6IJ. Due to severe illness, Katashi Nose was unable to participate in this one, the first he has missed for as many years as I can recall. We all wish him a quick recovery and return to WPX contesting.

Would you believe we still do not have a 3.5 MHz log entrant to establish an All-Time record score for Africa? What say Marty, OH2BH, is that a challenge? We also continue to lack 1.8 MHz entries from Africa, Asia, Oceania and South America. Did you notice the increased participation on 160? FB!!

With the event of the c.w. weekend the World-Club Competition Trophy became a combined s.s.b. and c.w. award and the winner will be included with the c.w. results.

The next WPX-SSB contest is scheduled for the weekend of 29 - 30 March 1980 (GMT). Rules are in the Jan. '80 *CQ*. Log forms and summary sheets are available from the **new** *CQ* offices at 76 N. Broadway, Hicksville, NY, 11801, USA. SASE and/or IRC's are required.

If you missed the '79 Dayton Hamvention you also missed the World's Largest Contest Forum and probably the greatest such program ever brought together at one time for contesters. It was truly a pleasure to have been the organizer and moderator. Also, the DX Forum, moderated by Al

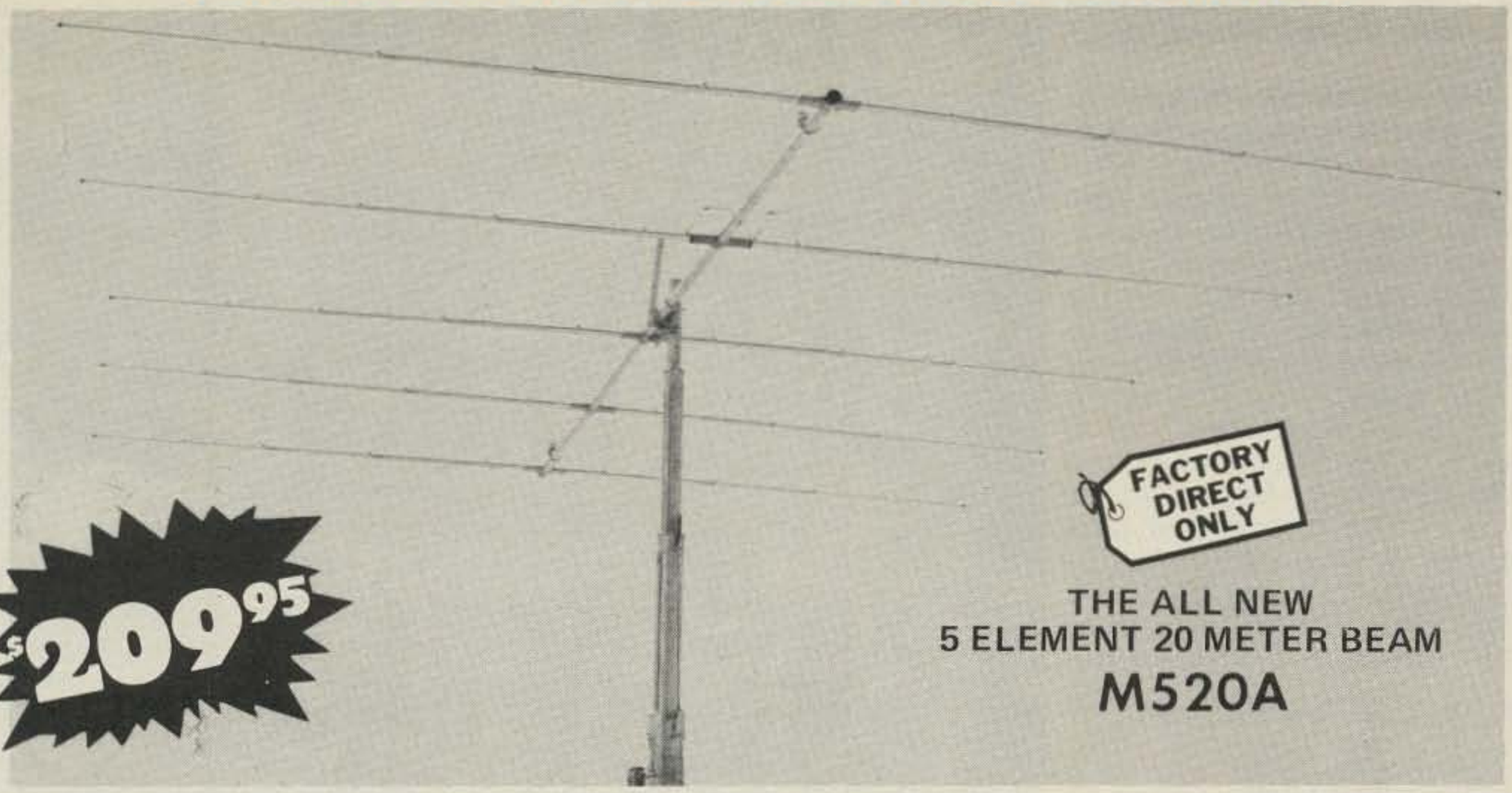
Highlights

CK7WJ - *All-Time Record Score*
UK9AAN - *Multi-Single Record Score*
KH6XX - *4-Million plus on 28 MHz*
DF0DX - *All-Time Prefix Record*
EM6A - *Top European Multi-Single*
VR3AH - *World, 14 MHz Record*
9L1CA - *World, 21 MHz Record*
HD1A - *Highest South American Score*

One of the original participants in the first SSB Contest in 1957. Rod, CO8RA continued to make his popular prefix available in this competition. His son, Ray, now KB8JF is his QSL route.

*c/o CQ Magazine

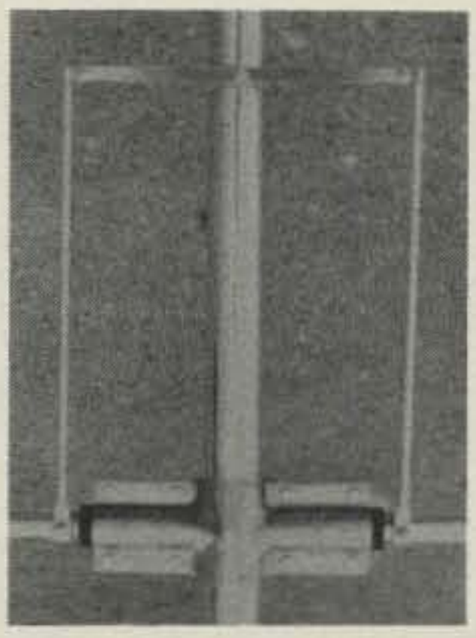
WILSON MONO-BAND BEAMS



At last, the antennas that you have been waiting for are here! The top quality, optimum spaced, and newest designed monobanders. The Wilson Systems' new Monoband beams are the latest in modern design and incorporate the latest in design principles utilizing some of the strongest materials available. Through the select use of the current production of aluminum and the new boom to element plates, the Wilson Systems' antennas will stay up when others are falling down due to heavy ice loading or strong winds. Note the following features:

1. Taper Swaged Elements – The taper swaged elements provide strength where it counts and lowers the wind loading more efficiently than the conventional method of telescoping elements of different sizes.
2. Mounting Plates – Element to Boom – The new formed aluminum plates provide the strongest method of mounting the elements to the boom that is available in the entire market today. No longer will the elements tilt out of line if a bird should land on one end of the element.
3. Mounting Plates – Boom to Mast – Rugged 1/4" thick aluminum plates are used in combination with sturdy U-bolts and saddles for superior clamping power.
4. Holes – There are no holes drilled in the elements of the Wilson HF Monobanders. The careful attention given to the design has made it possible to eliminate this requirement as the use of holes adds an unneccessary weak point to the antenna boom.

With the Wilson Beta-match method, it is a "set it and forget it" process. You can now assemble the antenna on the ground, and using the guidelines from the detailed instruction manual, adjust the tuning of the Beta-match so that it will remain set when raised to the top of the tower.



Wilson's Beta match offers maximum power transfer.

The Wilson Beta-match offers the ability to adjust the terminating impedance that is far superior to the other matching methods including the Gamma match and other Beta-matches. As this method of matching requires a balanced line it will be necessary to use a 1:1 balun, or RF choke, for the most efficient use of the HF Monobanders.

The Wilson Monobanders are the perfect answer to the Ham who wants to stack antennas for maximum utilization of space and gain. They offer the most economical method to have more antenna for less money with better gain and maximum strength. Order yours today and see why the serious DXers are running up that impressive score in contests and number of countries worked.

SPECIFICATIONS

Model	Band Mtrs	Gain dBd	F/B Ratio	Bandwidth @ Resonance 2:1 VSWR Limits	VSWR @ Resonance	Impedance	Matching	Elements	Longest Element	Boom O.D.	Boom Length	Turning Radius	Surface Area (Sq.Ft.)	Windload @ 80 mph (Lbs.)	Maximum Mast	Assembled Weight (Lbs.)
M520A	20	11.5	25 dB	500 KHz	1.1:1	50 Ω	Beta	5	36'6"	2"	34'2½"	25'1"	8.9	227	2"	68
M420A	20	10.0	25 dB	500 KHz	1.1:1	50 Ω	Beta	4	36'6"	2"	26'0"	22'6"	7.6	189	2"	50
M515A	15	12.0	25 dB	400 KHz	1.1:1	50 Ω	Beta	5	25'3"	2"	26'0"	17'6"	4.2	107	2"	41
M415A	15	10.0	25 dB	400 KHz	1.1:1	50 Ω	Beta	4	24'2½"	2"	17'0"	14'11"	3.1	54	2"	25
M510A	10	12.0	25 dB	1.5 MHz	1.1:1	50 Ω	Beta	5	18'6"	2"	26'0"	16'0"	2.8	72	2"	36
M410A	10	10.0	25 dB	1.5 MHz	1.1:1	50 Ω	Beta	4	18'3"	2"	12'11"	11'3"	1.4	36	2"	20

CALL FACTORY DIRECT 1-800-634-6898

WSI WILSON SYSTEMS, INC.

4286 S. Polaris Ave., Las Vegas, Nevada 89103

Prices and specifications subject to change without notice.

CIRCLE 87 ON READER SERVICE CARD

Taylor, WB8ZJW of the Northern Ohio DX Assn was the greatest ever. Over one thousand enjoyed this outstanding program.

Effective with the publishing of the WPX C.W. results in the April '80 *CQ*, I will no longer be actively involved in the management of the contest. I will assume the title of Honorary Director, and take an advisory position to the new WPX Contest Manager, who is now being selected. An announcement of the new Manager will be made in the April issue.

I've given a decade plus one of dedication to *CQ* Magazine and *CQ* Contests without regrets. It all started for me as a Contest Committee member, handling a large part of the '69 WW DX Phone, C.W. and WPX Contests logs. This workload continued until 1973 at which time I was ap-

Sergio, I5NSR and Lamberto, I5LXW preparing to sail to the Island of Montecristo for their first expedition as IP5CJA.

pointed the WPX Contest Manager/Director and became almost exclusively involved in the total WPX Contest operations. By my estimation, I probably have handled, checked, scored, listed, etc. at least 10,000 logs. A final would not be complete without expressing the thrill I experienced watching the WPX grow from just another contest to one of the world's top and most popular competitions.

A sincere thank you to each and every one. Contest Chairman, Frank Anzalone, W1WY has been a sustaining guide. Over the years, my XYL, Eleanor has contributed many long hours of clerical assistance and some deadlines would not have been met without her dedicated help and understanding. Hope to work ya in the next one...

73, Bernie, W8IMZ

RANDOM CONTEST COMMENTS—— "Hard on the lungs using QRP, but results very gratifying...VE3KZ. I got a few new countries and a lot of friends (QRPp)...YO4AUL. I thought some local was playing a joke when UK9AAN answered on the first call (QRPp)...KA5N. Conditions were

Number groups after call letter denotes: Band, Score, QSO's and Prefixes. Bold listings are certificate winners.

QRPp
—SECTION—
WORLD WIDE

W8ILC	**A**	**588,321**	**712**	**393**
VE3KZ	**A**	**507,210**	**579**	**318**
N2AA	**A**	**435,246**	**567**	**301**
G4BUE	**A**	**399,320**	**690**	**268**
W6PQZ	**A**	**225,036**	**467**	**228**
SK2KW	**A**	**175,244**	**432**	**227**
		(Opr. SM2DMU)		
YO4AUL	**A**	**143,533**	**371**	**181**
I3VFJ	**A**	**134,403**	**316**	**213**
ON6NL	**A**	**77,087**	**242**	**157**
GM4ELV	**A**	**73,164**	**286**	**156**
OK1DKS	**A**	**28,016**	**129**	**103**
G3FTQ	A	24,035	170	95
AB@X	**A**	**20,100**	**118**	**100**
DM2DTG	**A**	**12,768**	**120**	**76**
KA5N	**A**	**5,871**	**66**	**57**
OE1SBA	A	364	14	14
JK1KBR/1	**28**	**180,588**	**343**	**202**
LA9ZV	**28**	**82,665**	**207**	**167**
W6YVK	**28**	**53,352**	**205**	**117**
WA6POC	28	39,140	171	103
OK2BNG	**28**	**28,567**	**133**	**77**
N@AKJ	**28**	**25,944**	**151**	**92**
PA@DUO	**28**	**15,833**	**94**	**71**
VE5JQ	**28**	**15,376**	**116**	**62**
WB7SUZ	**28**	**12,180**	**107**	**84**
WA2ZWH	**28**	**9,600**	**82**	**64**
JK1LRH	28	8	2	2
SP9ATE	**21**	**100,048**	**271**	**169**
JA@BMS/1	**21**	**16,616**	**94**	**67**
JH8DEH	21	7,936	78	62
YO6AJI	**21**	**3,145**	**53**	**37**
OH2BLU	21	957	30	29
WA9KQM	21	18	4	3
TG9GI	**14**	**105,950**	**247**	**163**
KA4DSL	**14**	**36,624**	**129**	**112**
PA@NRD	**14**	**15,040**	**134**	**94**
OK2BBQ	3.5	12	3	3

SINGLE OPERATOR
NORTH AMERICA

UNITED STATES

N1GL	**A**	**2,112,484**	**1699**	**451**
K1KI	"	141,504	300	176
W1WY	"	71,977	208	167
KA1CHK	"	69,552	210	161
K1RB	"	34,736	130	104
N1XX	"	22,264	108	88
K1TO	"	12,462	76	62
W1PLJ	"	5,880	50	42
WA1UZH	**28**	**160,740**	**404**	**228**
K1TN	"	3,570	43	35
WB1DFV	"	3,239	44	41
W1PWK	"	2,325	33	31
K1VTM	**21**	**2,293,110**	**1942**	**447**
WB1ANT	**14**	**408,575**	**622**	**277**
W1BB	1.8	20	5	5
K2SS	**A**	**2,550,990**	**2095**	**422**
N2SS	"	642,411	775	309
KB2DE	"	75,831	209	161
WA2LJM	"	56,025	178	135
AB2W	"	52,125	164	125
W2FGY	"	46,848	158	122
W2HAZ	"	26,448	110	87
W2OKJ	"	26,112	110	96
WA2ZFW	"	18,870	97	85
K2MN	"	8,533	58	53
WA2UDT	"	8,023	106	71
W2CJX	"	1,350	33	25
WA2PFC	"	176	11	11
WB2QEU	**28**	**42,920**	**192**	**145**
W2PV	**21**	**1,767,558**	**1692**	**403**
		(Opr. K1OME)		
WB2VYA	**21**	**1,075,368**	**1132**	**346**
W2IQL	"	273,590	424	251
N2RM	**14**	**261,842**	**317**	**199**
WA2IFS	7	6,262	35	31
K2BQ	**1.8**	**5,320**	**151**	**70**
K3ZJ	**A**	**973,249**	**1024**	**359**
DK5AD/W3	**A**	**726,375**	**834**	**325**
N3RL	"	176,460	328	204
WA3FNK	"	44,506	185	119
AF3B	"	37,855	147	113
W3FQE	"	5,750	63	50
K3ND	**28**	**48,928**	**178**	**139**
WB3GXD	"	16,450	119	94
KB3CK	"	5,814	73	57
W3AU	**21**	**1,739,410**	**1704**	**362**
		(Opr. N3TR)		
WA3VUQ	"	596,994	812	282
WB3ICL	"	124,032	260	192
W3KHQ	"	30,396	121	102
W6AXX/3	**7**	**30,272**	**106**	**88**
KG4W	**A**	**1,462,400**	**1149**	**400**
KI4M	**A**	**533,000**	**833**	**260**
K4KZZ	"	352,704	506	264
KA4C	"	251,748	420	243
N4BAA	"	163,070	476	230
W4UYC	"	112,391	293	167
W4WEG	"	111,353	231	191
WD4RCO	"	68,400	200	152
W4KMS	"	48,909	158	119
VE3BTQ/W4	"	35,599	132	97
WA4QMQ	"	30,268	128	94
WD4MWJ	"	24,759	287	131
WA4OPV	"	8,904	58	56
WB4YEY	"	5,960	52	40
KI4Y	"	4,389	68	57
WD4PZN	"	3,116	50	41
N4BFX	"	3,103	40	29
WB4WHE	"	2,013	40	33
N4KG	**28**	**508,480**	**852**	**280**
KI4H	"	146,879	466	191
WA4YBV	"	84,564	304	162
WB4KRH	"	82,360	255	145
K4UTE	"	63,910	209	154
WB4VQO	"	51,972	194	142
N4MM	**21**	**1,453,208**	**1420**	**373**
G3WJN/W4	**21**	**540,330**	**682**	**310**
WB5YLT/4	"	5,243	56	49
WB4ZOG	"	660	15	15
N4KE	**14**	**1,194,390**	**1233**	**414**
WB4OZH	**14**	**613,079**	**755**	**307**
N4RJ	"	440,910	627	270
AC4X	"	146,970	345	207
W4EEO	"	2,670	30	30
N4NX	**7**	**26,084**	**160**	**118**
N4RA	**3.8**	**26,664**	**163**	**101**
AK4Q	"	15,168	100	79
AF5K	**A**	**1,769,904**	**1755**	**408**
AE5Y	"	307,326	613	262
WA5IYX	"	167,031	495	201
K5AQ	"	163,995	323	195
W5OB	"	102,483	261	193
KB5FI	"	76,038	402	174
K5DEC	"	68,400	206	150
W5RRR	"	31,104	121	108
		(Opr. W5LSZ)		
K2SCU/5	"	19,422	94	78
KA5CVC	"	4,554	57	46
W5EIJ	"	1,881	36	33
AA5B	**28**	**940,905**	**1584**	**315**
K5NW	**28**	**782,488**	**912**	**356**
N5UD	"	759,906	911	326
AD5W	"	263,590	543	215
K5RF	"	240,240	486	240
WD5GUP	"	25,608	127	97
W5OSJ	"	21,952	153	98
WA5SOG	"	20,076	108	84
W5JW	**21**	**1,133,808**	**1411**	**312**
WB5YEM	"	469,376	856	304
		(Opr. WB9RKS)		
WD5IOE	"	30	6	6
W5FO	**14**	**896,002**	**1028**	**361**
N5RR	**14**	**821,810**	**1018**	**341**
N5DY	"	6,670	65	58
K5UR	**1.8**	**552**	**63**	**46**
N6KT	**A**	**2,329,520**	**2343**	**370**
W6BJB	"	227,385	544	163
N6MB	"	143,100	342	180
WA6UFY	"	128,282	306	187
WB6JMS	"	106,225	335	175
K6XP	"	55,622	171	137
W6LC	"	44,770	188	121
WA6AYQ	"	17,670	122	95
N6UW	"	8,400	63	56
WD6FLB	"	7,260	61	55
N6HE	"	4,275	75	75
N6WR	"	1,680	26	24
K6SVL	**28**	**1,457,184**	**1710**	**344**
WA6OCV	**28**	**1,345,200**	**1747**	**304**
K6HNZ	"	1,170,900	1518	300
N6AW	"	524,630	889	230
WB6FCR	"	421,200	878	195
W6CN	"	317,604	634	228
W6YMH	"	80,388	231	154
AI6Z	"	42,598	195	118
N6BCY	"	23,808	132	93
W9UI/6	"	22,515	109	95
N6CW	**21**	**2,660,994**	**2322**	**431**
AI6V	**21**	**1,742,790**	**2191**	**301**
G5CQP/W6	"	13,082	88	62
N6AJA	14	168	8	7
AE6U	**1.8**	**1,440**	**123**	**48**
K7RI	**A**	**2,608,148**	**2630**	**346**
AF7X	**A**	**2,052,474**	**2448**	**321**
		(Opr. W7TDK)		
W7JYW	"	658,894	1059	241
N7DX	"	167,680	684	131
K7UR	"	133,984	360	158
WB7WEI	"	123,240	402	156
WB7SVQ	"	88,179	318	119
W7DOQ	"	66,802	249	127
N7AM	"	42,188	198	106
WB7UXK	"	41,080	154	130
K7GR	"	9,307	90	41
W7AYY	**28**	**210,900**	**434**	**190**
WB7ALT	"	9,720	73	60
N7XX	**21**	**2,862,488**	**2781**	**376**
		(Opr. WA1KKM)		
WB7BFK	**21**	**1,107,719**	**1466**	**337**
N7DF	"	947,700	1389	260
W7FP	**14**	**322,872**	**513**	**264**
W7MLJ	"	23,580	118	90
K7NF	"	11,115	66	65
K8LX	**A**	**1,644,138**	**1562**	**398**
		(Opr. WA8ZDT)		
KB8EC	**A**	**626,450**	**829**	**335**
WD8ALG	"	330,627	638	233
KA8BAC	"	288,405	510	261
W8IMZ	"	220,088	439	244
AE8B	"	129,747	293	183
WB8ZRL	"	111,550	243	194
WD8MOV	"	98,820	223	162
AC8C	"	60,032	185	134
K8CFU	"	47,936	157	112
WD8LVQ	"	24,846	150	101
KB8EZ	"	11,759	80	67
K8RD	"	6,594	56	42
W8LKG	"	6,314	52	41
WB8VPA	**28**	**29,116**	**156**	**116**
N8II	"	28,531	144	103
K8SMC	**21**	**1,084,281**	**1118**	**363**
K8NA	**14**	**982,368**	**1003**	**379**
WD8NJQ	"	119	7	7
K8XX	**3.8**	**140,280**	**363**	**167**
W8SQ	"	25,920	191	108
W8LRL	**1.8**	**6,532**	**163**	**71**
W9ZRX	**A**	**1,629,612**	**1533**	**382**
K9BG	**A**	**244,660**	**427**	**250**
WB9VJU	"	106,150	278	193
WB9EBO	"	84,937	226	157
K9UR	"	74,095	227	145
WB9TDR	"	47,520	156	120
W9QWM	"	27,360	137	114
W9OEJ	"	23,664	121	102
W9TNZ	"	22,784	101	89
AE9I	"	17,472	128	96
WA9GFR	"	10,912	64	62
WD9GRI	"	9,344	91	73
K1TH/9	"	6,328	98	56
N9AHY	"	2,000	45	40
WB9ZED	"	264	11	11
KA9COM	**28**	**38,512**	**180**	**116**
KB9AW	"	16,906	107	79
K9LVK	"	10,074	85	69
W9LF	**21**	**851,466**	**1040**	**291**
WD9IIX	"	191,061	373	213
W9RE	"	2,304	35	24
WA9NGP	**14**	**319,545**	**498**	**263**
WB9TIY	**3.8**	**22,080**	**146**	**92**
AB@I	**A**	**1,061,550**	**1452**	**337**
WA@TKJ	**A**	**500,044**	**701**	**298**
K@CS	"	339,714	693	243
AE@K	"	157,755	408	195
W@GNX	"	91,724	240	147
WA@DCB	"	53,795	189	145
W@TT	"	49,923	164	129
AF@D	"	44,928	236	144
WB@ISW	"	33,411	131	111
AG@J	"	23,580	99	90
KA@BCW	"	23,310	124	105
WB@MPH	"	20,916	122	84
K@LD	"	2,666	32	31
W7RIR/@	"	2,030	30	29
N@ADJ	"	1,564	24	23
W@YK	**28**	**814,536**	**1372**	**243**
N@ARN	"	113,040	311	180
WB@OTA	"	30,846	138	97
K@NN	"	25,284	146	86
WB@TNY	"	1,050	22	21
K@JN	**21**	**336,519**	**552**	**269**
KB@AQ	"	71,060	217	170
WD@AYT	"	16,571	80	73
W@UYL	**14**	**76,120**	**211**	**173**
W@MHK	**7**	**19,504**	**190**	**106**

ALASKA

KL7CQ	**A**	**462,480**	**1009**	**164**
KL7AF	**A**	**398,254**	**625**	**214**
KL7JER	"	24,704	137	78
AL7Y	**28**	**40,215**	**154**	**105**
AL7O	"	11,480	80	56

CANADA

VE1RY	**14**	**168,435**	**373**	**197**
VE1AJP	**14**	**167,000**	**344**	**200**
VO2CW	**A**	**686,622**	**804**	**317**
VE2FMH	**28**	**6,550**	**65**	**50**
VE3BMV	**A**	**2,813,211**	**2054**	**459**
VE3DLR	"	412,552	516	278
VE3FEA	"	129,600	261	180
VE3EZU	"	20,148	92	73
VE3IPR	"	672	16	16
VE3KQS	**28**	**79,728**	**288**	**132**
VE3FAC	**21**	**388,490**	**546**	**265**
VE3HHS	**14**	**484,980**	**808**	**274**
VE3FRA	"	147,834	281	191
VE3KIK	"	43,055	152	109
VE3BBN	**1.8**	**20,424**	**120**	**46**
VE4SW	**A**	**610,945**	**775**	**295**
VE4RP	"	112,008	295	156
VE5RA	**28**	**421,095**	**777**	**201**
CZ6MP	**A**	**966,730**	**1386**	**277**
VE6AGV	**A**	**789,360**	**1101**	**264**
CZ6LB	**28**	**444,528**	**1002**	**189**
VE6CGY	14	396	12	12
VC7BTV	**A**	**3,140,786**	**3236**	**367**
VE7CMK	**A**	**2,545,510**	**2540**	**365**
VE7TAR	"	22,650	112	75
		(Opr. VE7DQS)		
VE7CIB	**28**	**804,640**	**1658**	**214**
VE7AQF	**21**	**1,610,043**	**1853**	**317**
VE7IG	**14**	**1,788,825**	**1628**	**425**
VE7AQR	"	283,972	562	172

CANAL ZONE

KZ5OJ	**A**	**2,883,150**	**2654**	**447**

CUBA

CO8RA	**A**	**19,430**	**137**	**67**

DOMINICAN REPUBLIC

HI8MOG	**A**	**2,971,698**	**2602**	**446**
HI3XEA	"	255,341	1314	89
HI8LC	**28**	**365,673**	**622**	**231**
HI8XDJ	**21**	**1,600,942**	**2132**	**346**

HI8JAG	1.8	4,480	42	28
FRENCH ST. MARTIN				
FG@DYM/FS7	28	1,975,680	2078	392
		(Opr. W4GSM)		
GREENLAND				
OX3ZM	A	20,169	111	83
GUATELMALA				
TG4NX	3.5	83,160	167	108
JAMAICA				
W9VA/6Y5	A	8,211	75	51
MEXICO				
SJ1HR	A	1,540,474	1759	358
4C1VOZ	A	835,354	1473	247
4B7J	"	785,988	987	252
6J1MEX	"	771,975	1494	225
6D1LCH	28	1,380,165	1969	303
XE1LLS	28	479,808	1102	192
PUERTO RICO				
KP4DSD	A	2,193,425	2486	397
KP4WI	21	1,746,750	2018	375

AFRICA

GAMBIA

C5AAN	28	92,158	263	118
		(Opr DJ6QT)		
KENYA				
5Z4CW	A	188,200	319	200
LIBERIA				
EL2AV	28	1,874,140	1509	415
MADEIRA IS.				
CT3BZ	A	16,250	84	65
CT3BX	28	907,208	1007	302
CT3BD	14	254,800	430	208
SIERRA LEONE				
9L1CA	21	3,245,088	2347	462
REP. OF SOUTH AFRICA				
ZS6PI	A	340,670	550	209

ASIA

INDIA

VU2GO	28	137,410	362	151
VU2EA	"	61,047	207	119
ISRAEL				
4Z4TA	A	37,600	130	100
JAPAN				
JA6BSM	A	2,184,485	1934	433
JR1AIB	A	1,280,650	1244	350
JA6WSB	"	432,738	605	261
JF1SEK	"	393,918	557	249
JA6CNL	"	342,375	492	249
JE3SEN	"	317,460	501	220
JA2AYH	"	226,352	413	188
JA2FSM	"	205,996	399	196
JR3XEX	"	158,088	337	168
JA2BNN	"	118,658	282	158
JI1JPJ	"	102,336	233	156
JF2BUZ	"	88,044	235	138
JA@VHI	"	85,668	231	132
JI1TWZ	"	85,077	223	137
JA1EF	"	73,600	205	128
JA8SW	"	58,080	177	121
JA1PUK	"	53,848	174	106
JA1ALX	"	40,242	130	114
JA1BN	"	31,396	116	94
JA1GTF	"	31,347	114	97
JF3CEC	"	30,156	130	84
JA@FMB	"	29,488	109	97
JA6AKV	"	24,320	121	76
JA7BAL	"	20,064	92	76
JH1MTR	"	18,460	92	71
JE3MWB	"	7,904	54	52
JA@TVA	"	7,632	56	48
JA1JIX	"	6,216	46	42
JA6AQV	"	6,072	50	44
JK1PLJ	"	3,888	42	36
JA1GYQ	"	2,000	28	25
JH3BJN/4	"	1,420	25	20
JH6GHZ	"	952	20	17
JH7DNO	28	970,255	1174	295
JH1OJU	28	886,912	930	328
JF1EEK	28	814,275	913	315
JH3GRE	"	631,125	814	275
JA2JSF	"	578,760	823	265
JJ1NDZ	"	519,680	778	256
JF3BFS	"	506,750	732	250
JH1AGU	"	497,280	665	259
JH1VRQ	"	469,504	666	262
JA6YAI	"	439,586	670	238
		(Opr. JA6QXW)		
JA8ULV	"	222,780	408	188
JR6FTS	"	201,399	392	187
JH1ARC	"	183,092	365	182
JJ1WPU	"	153,282	310	177
JE1HOO	"	149,621	337	157
JH7JGG	"	139,308	320	156
JK1PZY	"	105,294	238	161
JL1EEF	"	94,146	245	142
JH1UUT	"	87,354	227	138
JA6PL	"	84,042	231	138
JA5PEE	"	74,100	215	130
JH@BDK	"	67,639	202	121
JA1AAT	"	50,398	159	113
JA1EHA	"	39,140	130	103
JR6DUL	"	37,917	136	99
JR6CMS	"	31,410	126	90
JH7BRG	"	28,220	119	83
JA9SV	"	25,596	110	81
JE1YLP	"	21,964	105	76
JR2MKV	"	15,820	76	70
JA@ZGA	"	5,421	48	39
JA3BBG	"	4,176	43	36
JR1OYL	"	686	17	14
JF2FWS	"	560	14	14
JH4KED	"	44	4	4
JH1BFF	21	1,454,520	1345	391
JA8FDA	21	518,560	677	280
JR6RWY	"	252,520	418	236
JK1PLZ	"	174,528	335	192
JK1HAM	"	124,425	267	175
JI1QLB	"	93,201	234	141
JE3UES	"	65,098	195	121
JG1KNJ	"	57,447	179	117
JF2DQJ	"	50,490	186	110
JE3UER	"	49,996	172	116
JH7KTI	"	24,735	104	85
JF1FTU	"	19,296	110	72
JA6XX	"	17,733	91	69
JH4PPQ	"	11,682	72	59
JA1HQS	"	11,000	71	55
JF2FLN	"	9,350	71	50
JA3FZI	"	6,840	59	40
JH7UWY	"	5,076	47	36
JA6PGL	"	4,797	47	41
JK1RJQ	"	4,716	50	36
JE2RDR	"	3,090	36	30
JE2JML	"	2,765	37	35
JI1SFC	"	1,968	30	24
JH@JLL	"	1,083	20	19
JH@DBD	"	686	17	14
JR3CVJ	"	147	7	7
JG1FZG	"	44	5	4
JL1MIQ	"	27	3	3
JA2IVK	14	398,151	575	249
JR1RCR	14	229,320	402	210
JA1GSK	"	176,407	333	203
JA6RTJ	"	119,448	300	158
JA2QVO	"	89,688	212	148
JA6CM	"	51,425	153	121
JI1PCN	"	47,840	158	115
JK1BRR	"	30,176	120	92
JA7BJL	"	29,165	114	95
JA7HYS/1	"	21,760	100	80
JA6YY	"	11,842	76	62
JR2BDG	"	2,728	34	31
JH4DRB	"	1,425	25	19
JR3JRI	"	726	22	11
JG1TIX	"	319	11	11
JA2BAY	7	231,504	355	168
JA1BTB	3.5	14,000	76	50
KOREA				
HL9KE	A	1,116,623	1423	293
MONGOLIA				
JT1BG	A	100,188	479	132
OGASAWARA IS.				
JG1IVI/JD1	28	385,518	702	201
THAILAND				
HS1ABD	A	1,781,333	2359	383
W. MALAYSIA				
9M2BZ	A	131,705	1205	101

U.S.S.R.

ASIATIC

UV9PP	A	734,986	915	329
UA9MR	A	728,051	1105	311
UA9ADF	"	123,384	310	159
UA9CBO	"	69,834	151	103
UW9DZ	"	45,750	173	122
UW9CL	"	43,878	147	103
UA9AED	"	31,062	133	93
UW9VH	"	15,833	87	71
UA9QAQ	"	3,466	35	26
RA9CIU	28	339,584	762	224
UA9FAT	"	182,629	402	181
RA9AKO	"	174,915	360	169
RA9OEU	"	150,176	586	152
UA9FDW	"	36,453	145	87
UA9YBY	"	21,465	118	81
UA9UTF	"	7,290	56	45
UA9MAR	21	708,384	876	314
UV9WF	"	88,815	223	155
UW9CR	"	867	17	17
UA9OS	14	1,320	24	22
UW9SG	7	7,006	42	31
UA9FCI	3.5	11,304	56	36
UA@SB	A	560,604	947	274
UA@AAK	"	122,553	274	153
UA@PJ	"	97,032	270	156
UA@CCW	"	45,194	133	118
UA@CAH	"	15,939	103	69
UW@NE	"	720	16	15
UA@SFN	"	72	26	24
UA@SGL	28	375,585	841	227
UA@KAJ	"	134,922	743	113
UA@UBG	"	77,056	500	112
UA@CDM	"	20,448	101	72
UK@SAX	"	19,434	155	79
UA@AGI	"	17,043	95	69
UA@SAU	14	562,233	807	287
UA@NH	"	9,184	65	56
UA@OC	"	1,560	25	24
AZERBAIJAN				
UD6DFD	A	1,465,214	1346	379
UD6DER	14	4,879	62	41
GEORGIA				
UF6QAC	A	505,223	693	263
UF6FCR	14	48,578	170	107
UF6RB	"	300	10	10
KAZAKH				
UL7IBC	A	540,274	705	259
UL7PBI	"	18,936	85	72
UL7GAA	"	12,342	80	66
UL7GBD	28	422,048	984	218
UL7QF	21	251,723	693	211
UL7JAW	14	156,114	381	189
UL7PQ	"	2,028	26	26
KIRGHIZ				
UM8NNN	A	157,040	417	151
UM8MAU	"	56,331	203	99
UM8MAO	28	18,550	94	70
TADJIK				
UJ8JCR	28	206,968	433	164
RJ8JCF	"	45,012	168	93
UJ8JCQ	14	13,167	96	63
UZBEK				
UI8LAG	A	2,588,096	2014	436

EUROPE

ALAND IS.

OH2BP/OH@	21	1,100,138	1511	324
AUSTRIA				
OE5CWL	A	1,316,844	1466	356
OE6EUG	"	67,962	254	141
OE1DSA/3	28	577,584	894	252
OE1LPW	14	29,328	147	104
BELGIUM				
ON4XG	A	298,080	516	270
ON8XU	14	3,024	55	48
ON6JG	3.5	205,800	455	196
BULGARIA				
LZ1KWS	A	28,017	166	99
		(Opr. DIMITAR)		
LZ2JF	"	25,230	112	87
LZ2KRR	"	22,932	122	78
		(Opr. LZ2-H-57)		
LZ2VP	3.5	24,455	159	73
CZECHOSLOVAKIA				
OK2RZ	A	2,248,558	1949	439
OK1MMW	A	871,416	1050	312
OK2TBC	"	388,811	648	293
OK1KZ	"	289,432	640	242
OK2BSA	"	223,440	500	228
OK3EA	"	192,920	390	212
OK2KET	"	131,516	407	196
		(Opr. OK2BHX)		
OK2BTI	"	106,577	306	197
OK1JST	"	80,460	280	180
OK2BJU	"	71,205	286	141
OK1XG	"	68,250	266	150
OK3KVE	"	53,975	274	127
		(Opr. OK3CMM)		
OK2JK	"	50,048	263	92
OK1AEZ	"	34,496	122	98
OK1EP	"	17,017	85	77
OK1MSP	"	15,246	87	77
OK1DA	"	7,693	56	49
OK2SWD	"	5,871	85	57
OK1FCA	"	2,730	35	35
OK3TCK	"	77	7	7
OK1FAR	28	1,064,000	1325	320
OK3KTY	"	185,592	525	132
		(Opr. OK3-26715)		
OK3PM	"	51,660	179	123
OK2BJR	"	16,320	89	64
OK1MPP	"	10,494	66	53
OK1HCH	"	8,050	78	46
OK1CIJ	"	5,460	49	42
OK1MSN	"	4,329	45	39
OK1KYS	"	950	20	19
		(Opr. OK1FRF)		
OK2SPS	"	75	5	5
OK3KGI	21	457,083	812	243
		(Opr. OK3TMK)		
OK2ABU	"	264,960	653	184
OK2SLS	"	54,825	191	129
OK1ASQ	"	29,800	131	100
OK3CPY	"	9,027	85	51
OK1FV	14	343,345	567	299
OK1AOJ	"	44,251	210	134
OK1AJY	"	28,865	192	115
OK1PFJ	"	26,768	163	112
OK1AJJ	"	9,588	84	68
OK3CFS	"	6,678	69	63
OK1AYX	"	6,464	87	64
OK2BPK	"	6,028	49	44
OK1AOU	"	4,872	79	56
OK3ZFB	"	4,266	70	54
OK1AYQ	"	3,120	62	48
OK2KVI	"	2,301	51	39
OK2BNK	"	1,755	29	27
OK1AGN	7	49,056	205	112
OK2HI	3.5	83,720	299	140
OK3YCL	3.5	71,788	293	131
OK1AZR	"	52,392	234	118
OK2SRA	"	43,036	203	106
OK1MNV	"	16,848	124	72
OK3CFP	"	7,540	79	51
OK1AIJ	"	3,432	48	39
OK1MIZ	"	3,182	51	34
OK3TAJ	"	1,320	32	22

great. Worked a YB2 and UK7 adding to my DX countries...K1RB. Very strange to work more JA's than EU from east coast...K1VTM. Yech! This is too much like work this year, but had fun anyway...WB2VYA. 160 meter hams very considerate and friendly...K2BQ. Roof repairman wanted to repair roof weekend of contest, told him we had to wait, it rained. Still glad to work such a great contest...WA3FNK. Was not planning to operate the entire contest but once I got started there was no turning back ...KG4W. Found that KI4 was in high demand!..KI4M. Biggest thrill working VK9N - Norfolk Island... W4WEG. 1st single band effort, had great time...N4KE. Most enjoyable - 1st hour 79 QSO's...AF5K. Never worked a YO on 10 meters, called CQ and got 4 of them in 46 minutes... K5RF. Talk about tired; ever try to work a contest without a rotor!!... WD5GUP. The WPX is a fun contest. CU next yr....N6KT. Great openings to Europe without competition from east coast & mid west for a welcome change...K6SVL. Keep the present format, its fun not to have to operate 48 hours....WB6FCR. Best (thrill) was to be called by SU station - 1st Egypt...W6CN. Having 3D2MD call me for new multiplier and country with only 5 minutes left in the contest... WB7SVQ. Completed 15 meter WAZ and 15 meter DXCC...WB7BFK. More rare stuff than usual for a contest, FB8, VQ9, 9V1, HS1, YB, 4Z4, UJ8, VR3, ZK1, DU, etc. .. W7FP. Went to Dayton Hamvention - thought you guys gave an excellent presentation at the Contest Forum...K8LX op WA8ZDT. 10 meters stone dead here ...KB8EC. Having a pile up of Japanese stations calling me - new

Terry, W4GSM at the top of the antenna tower he used at FG@DYM/FS7.

KENWOOD
...pacesetter in amateur radio

...for the discerning Amateur who demands quality.

TS-180S *with* DFC

The TS-180S with DFC (Digital Frequency Control) is Kenwood's top-of-the-line all solid-state HF SSB/CW/FSK transceiver covering 160 through 10 meters, with outstanding performance and many advanced functions, including four tunable memories to provide more operating flexibility than any other rig!

TS-180S FEATURES:

- Digital Frequency Control (DFC), including four memories and digital up/down paddle-switch tuning. Memories are usable in transceiver or split modes, and can be tuned in 20-Hz steps up or down, slow or fast, with recall of the original stored frequency. (Also available without DFC.)
- All solid-state; 200 W PEP/160 W DC input on 160-15 meters, and 160 W PEP/140 W DC on 10 meters.
- Improved dynamic range, with improved circuit design and RF AGC ("RGC"), which activates as an automatic RF attenuator to prevent receiver overload.
- Adaptable to three new bands, and VFO covers more than 50 kHz and DFC 100 kHz above and below each band.
- Built-in microprocessor-controlled digital display. Shows actual frequency and switches to show the difference between the VFO and "M1" memory frequencies. Blinking decimal points indicate "out of band." (An analog monoscale dial is also included.)
- IF shift (passband dialing to eliminate QRM).
- Dual SSB filter system (second filter is optional) to provide very sharp receiver selectivity, improved S/N, and 30 dB compression with RF speech processor on transmit.
- Tunable noise blanker, to eliminate cross modulation from strong signals when noise blanker is on.
- Selectable wide and narrow CW bandwidth on receive (500-Hz CW filter is optional).
- SSB normal/reverse switch (proper sideband is automatically selected with band switch).
- Dual RIT (VFO and memory/fix).
- Available without DFC. Digital frequency display still included, with differential function showing difference between VFO and "digital hold" frequencies.

OPTIONAL ACCESSORIES:

- DF-180 digital frequency control (for TS-180S without DFC).
- YK-88CW 500-Hz CW filter.
- YK-88SSB second filter for dual-filter system.

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TS-120S

(MC-35S MIKE OPTIONAL)

Truly a "big little rig," the TS-120S has created a new excitement in HF communications for highly versatile Amateur operation. The compact, all solid-state 80-10 meter transceiver, with up to 200 watts PEP input, requires no tuning and includes a large digital readout, making it ideal for mobile operation. IF shift and other important features make it a high-quality rig for the ham shack as well.

TS-120S FEATURES:

- All solid-state with wideband amplifier stages. No final dipping or loading, no transmit drive peaking, and no receive preselector tuning.
- Transceives on 80 through all of 10 meters, and receives WWV on 15 MHz.
- 200 W PEP/160 W DC input on 160-15 meters, and 160 W PEP/140 W DC on 10 meters. LSB, USB, and CW.
- Digital frequency display (standard) shows actual frequency. Backup analog subdial also included.
- IF shift (passband tuning) to eliminate QRM.
- Advanced PLL circuit, with improved stability and spurious characteristics on transmit and receive.
- Effective noise blanker.
- Built-in cooling fan, which activates automatically when final-amplifier heatsink temperature rises to 90° C.
- Protection circuit for final transistors.
- VOX.

OPTIONAL ACCESSORIES:

- YK-88CW 500-Hz filter.
- MB-100 mobile mount.

PS-30 SP-120 TS-120S VFO-120 MC-50

AT-120

AT-120 antenna tuner with mobile mounting bracket included. Features SWR meter and matches 50-ohm input to 20-300 ohms unbalanced output. Handles 150 watts (120 watts on 80 meters).

SP-520 TS-520SE W/DG-5 VFO-520S

TS-520SE

The TS-520SE is an economical version of the TS-520S...the world's most popular 160-10 meter Amateur transceiver. Now, any Amateur can afford a high-quality HF transceiver for his ham shack.

TS-520SE FEATURES:

- Covers 160-10 meters and receives WWV on 15 MHz.
- 200 W PEP input on SSB and 160 W DC on CW.
- CW WIDE/NARROW bandwidth switch, for use with the optional CW-520 500-Hz CW filter.
- Digital display with optional DG-5, showing actual frequency.
- Speech processor, effective in DX pileups.
- VOX and semi-break-in CW with sidetone.
- Built-in 25-kHz calibrator.

The TS-520S is still available, with DC (mobile) operating capability (with the optional DS-1A DC-DC converter) and transverter terminals, which were eliminated from the TS-520SE.

OPTIONAL ACCESSORIES:

- CW-520 500-Hz CW filter.
- AT-200 antenna tuner.

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TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT/COMPTON, CA 90220

The top African multi-single score was from Senegal: N6VR/6W8 assisted by WA6VNR/6W8 gave many a new country and prefix.

prefix for JA's...KA8BAC. Nice to hear new U.S. prefixes...WB9VJU. 4 new countries, first time WAC in one band in one day...W9TNZ. Contest provided a crash course on 10 meter propagation, best contact was CE0AE ...KB9AW. JA's really are super ops ...WA9NGP. The flu bug did me in ...K0CS. Strange occurrence - when I and K0MPH were both calling 6D1LCH ... WB0MPH. While trying to contest, my Arabian mare foaled a beautiful colt...KB0AQ. What happened to the KP4's??...W0MHK. Shouldn't have been any shortage of KL7's this year ...KL7AF. Hope I make Top Ten... KZ5OJ. Biggest thrill was working HS1ABD to finish WAZ...VE1AJP. Thanks to Razor's (antennas) for whatever I managed to work...VE3BMV. Congratulations to the FCC for making possible all the American prefixes ...VE3HHS. Special prefix for 75th Anniversary of Edmonton...CZ6LB. Only time I get to work CE0AE is during WPX...VE7CIB. Surprise! only 13 duplicates in 1000 QSO's...4B7J. Special prefix for contest only... 6D1LCH/XE1LCH. First WPX-SSB Contest. Age 16 years old, 1 year of amateur radio...CT3BX. Propagation at certain times was rather poor... ZS6PI. Conditions on 10 meters very wonderful indeed...JA6WSB. Very glad to contact TF3CW, it is my first in zone 40...JF2BUZ. VK, ZL was rare

VP2MBU, Multi-Single expedition by Vance, W5IJU and William, K4TVE/ VP2MEC. Vance says only the TR4CW and RV4C were used during the contest.

DENMARK

OZ5EV	**A**	**1,259,541**	**1351**	**349**
OZ3SK	**A**	**520,010**	**729**	**298**
OZ4HW	A	72,563	296	149
OZ6OG	"	28,288	140	104
OZ7OP	"	9,976	65	58
OZ7XU	"	7,056	59	49
OZ5VT	"	6,192	57	43
OZ5JR	"	2,730	37	30
OZ8T	"	2,016	31	28
OZ1LO	28	135	9	9
OZ2BM	**21**	**86,130**	**249**	**135**
OZ8VO	"	14,464	100	64
OZ9FM	14	896	32	28
OZ2DM	**7**	**12,716**	**88**	**58**
OZ6IC	3.5	2,340	39	30
OZ3ZK	"	760	20	20

ENGLAND

G3FXB	**A**	**2,441,392**	**2086**	**424**
G4CNY	**A**	**2,206,908**	**2040**	**396**
G3TKR	"	102,608	287	176
G3NT	"	90,922	304	169
G2AJB	"	70,308	256	162
G3JKY	"	52,716	210	138
G3XBY	**28**	**551,551**	**840**	**247**
G4DKT	"	132,125	328	175
G3XFW	"	37,050	171	95
G4CVZ	**14**	**216,513**	**700**	**243**
G4DBW	"	128,156	505	199
G4HLN	"	82,544	342	176
G4AHO	"	76,820	359	167
G3RAM	"	63,070	276	170
G5CMX	**7**	**108,680**	**248**	**143**
		(Opr. N8ET)		

FARDE IS.

OY1A	**A**	**10,550**	**123**	**80**

FINLAND

OI1VR	**A**	**3,499,314**	**3156**	**442**
OF1IG	**A**	**2,296,800**	**2204**	**400**
OH1LW	"	1,930,780	2000	380
OH2IO	"	308,560	720	266
OH2KP	"	163,212	442	201
OH2VZ	"	81,838	216	166
OH6PA	"	31,993	142	107
OH6GO	"	27,573	144	101
OH1FS	"	6,136	64	52
OH3FW	"	6,042	70	57
OH2BSS	"	4,165	43	35
OH2BAC	"	1,870	31	22
OH1EB	"	962	28	26
OH2DN	"	121	11	11
OI2YY	**28**	**671,347**	**1029**	**289**
OH1HS	"	27,192	137	103
OH7NW	"	20,768	139	88
OH1TD	"	8,646	84	66
OH3CN	"	7,176	81	52
OH3HY	"	2,673	49	27
OH6JW	**21**	**2,404,044**	**2481**	**387**
OH3PB	**21**	**675,636**	**956**	**284**
OH5LP	"	410,040	770	268
OH2JQ	"	43,977	197	137
OH1LU	"	27,608	151	116
OH2BAW	"	15,480	125	90
OH2PQ	"	4,551	51	37
OH1PU	"	560	16	16
OH1RV	"	25	5	5
OH1ZT	**14**	**313,408**	**645**	**236**
OH5BB	"	13,052	130	52
OH5PA	"	968	22	22
OI1IJ	**7**	**343,745**	**694**	**226**

FRANCE

F6DZU	**A**	**474,953**	**610**	**293**
F6ENT	**A**	**319,194**	**558**	**257**
F6KBK	"	303,600	647	230
		(Opr. F6COE)		
F6EXQ	"	270,725	542	245
F8WE	"	262,904	630	236
F2RO	"	209,287	409	221
F6BVB	"	204,527	463	227
F5IN	"	120,682	410	166
F6DRP	"	20,608	130	92
F6ECI	**28**	**643,179**	**997**	**269**
F6API	**21**	**72,542**	**229**	**166**
F6BRK	**14**	**15,488**	**130**	**88**
F6CCI	"	2,150	30	25
F6EPH	"	832	30	26

GERMANY (FRG)

DK8FZ	**A**	**2,282,600**	**2183**	**404**
DL7EN	"	206,283	441	231
DL6QX	"	160,792	325	202
DJ0UP	"	94,689	260	189
DK8AX	"	90,125	312	175
DF2RG	"	88,810	279	166
DK5DS	"	65,462	303	142
DL7YS	"	38,860	165	116
DK8KC	"	34,568	181	116
DL7PD	"	17,533	107	89
DK5KJ	"	3,311	50	43
DL8PC	**28**	**1,050,543**	**1183**	**351**
DJ4TR	"	273,030	562	190
DJ6TK	"	141,225	342	175
DL7SP	"	119,647	292	149
DK7DN	"	71,442	239	147
DK4IO	"	30,591	155	99
DF9YY	**21**	**1,251,855**	**1540**	**297**
DL8RH	"	181,227	387	193
DF4NP	"	100,464	259	161
DK1QH	**3.5**	**108,240**	**358**	**165**
DK3FB	**1.8**	**4,360**	**67**	**40**
DA2QE	**A**	**161,586**	**395**	**191**
DA1GF	**7**	**119,340**	**372**	**170**

GERMANY (GDR)

DM2CUO	**A**	**778,710**	**1106**	**303**
DM2BJJ	**A**	**447,302**	**707**	**278**
DM4SDA	"	353,493	645	279
DM3MMO	"	345,534	660	266
DM4UCO	"	308,987	600	259
DM4WZA	"	298,592	579	248
DM3BE	"	276,272	494	248
DM4WFF	"	200,232	501	216
DM4PSN	"	190,968	530	219
DM4REE	"	171,768	487	204
DM3VVF	"	163,944	402	216
DM3FZN	"	116,564	369	181
DM3UPL	"	86,520	294	168
DM4TBK	"	81,238	313	151
DM4VNJ	"	72,750	333	150
DM2BRK	"	58,092	292	141
DM3UH	"	56,515	206	142
DM3BF	"	36,966	186	101
DM3VMJ	"	28,700	117	100
DM2DEO	"	27,440	110	84
DM3BGM	"	20,672	113	76
DM3ZNN	"	17,010	128	81
DM3XLG	"	15,996	121	86
DM4NJJ	"	15,120	120	70
DM3VBK	"	9,150	71	61
DM4ZKF	"	6,875	64	55
DM2BFK	"	6,811	61	49
DM3UNL	"	6,264	80	58
DM2DYI	"	6,110	57	47
DM4SF	"	5,350	71	50
DM3WBI	"	4,004	52	44
DM4PDA	"	3,570	40	34
DM4UVL	"	2,418	53	39
DM4YDN	"	2,208	35	32
DM2DSG	"	1,943	30	29
DM2FBN	"	1,922	34	31
DM4VPN	"	1,748	26	23
DM2CPD	"	1,512	32	24
DM2BSA	"	760	24	20
DM4OM	"	722	20	19
DM2DGG	"	696	26	24
DM2CTF	"	465	15	15
DM5JL	**28**	**748,293**	**1142**	**273**
DM5EL	**28**	**538,650**	**900**	**225**
DM3HF	"	99,385	280	139
DM3WMJ	"	98,020	295	130
DM3RBM	"	42,402	160	111
DM3NME	"	29,400	145	84
DM3LF	"	25,970	142	70
DM3EA	"	21,584	106	71
DM3UA	"	16,896	102	66
DM2EFG	"	8,967	81	49
DM4XHJ	"	6,579	72	43
DM3SCG	"	4,141	44	41
DM4YUL	"	2,116	34	23
DM3OG/ DM4WGG	"	1,140	22	19
DM3UE	"	120	9	8
DM5VNH	"	102	7	6
DM3TNA	"	75	5	5
DM3ZKL	**21**	**48,433**	**187**	**119**
DM2CXE	"	24,552	140	88
DM2FHO	"	17,724	121	84
DM2AJH	"	6,344	56	52
DM2GGL	"	2,030	41	29
DM3NKF	**14**	**87,291**	**381**	**183**
DM2EHL	"	34,970	242	130
DM2FLN	"	17,019	151	93
DM2AHI	"	9,648	88	72
DM2CJJ	"	4,620	69	55
DM2FGN	"	893	19	19
DM3EH	"	255	17	15
DM3YQO	**7**	**486,720**	**601**	**260**
DM5JBN	"	920	26	20
DM3VGC	**3.5**	**195,700**	**513**	**190**
DM4WPF	"	76,680	295	135
DM4YSL	"	68,376	286	132
DM3ZEN	"	58,750	252	125
DM2DOO	"	33,264	194	88
DM2FJM	"	2,016	33	28
DM2CRB	"	240	14	12

GUERNSEY (C.I.)

GU3MBS	**28**	**21,825**	**141**	**75**
GU3YIZ	**7**	**189,128**	**380**	**188**

HUNGARY

HA5NP	**A**	**1,454,648**	**1550**	**394**
HA1ZD	"	135,240	352	196
HA5LZ	"	74,221	252	161
HA5KF	"	40,368	194	116
HA7PQ	"	28,231	144	109
HA0IG	"	17,622	135	89
HG0DU/9	**28**	**42,837**	**157**	**109**
		(Opr. HA0DU)		
HA6NP	"	34,236	140	108
HG8UT	"	31,110	138	102
HG5EA	"	1,003	21	17
HA9PN	**14**	**611,832**	**1007**	**296**
HA5OC	"	123,552	508	208
HA3GO	"	13,448	129	82
HA9RU	**3.5**	**256,676**	**567**	**206**
HA4KYB	"	126,882	404	159
		(Opr. K. NYEMCSEK)		
HA7LR	**3.5**	**106,684**	**319**	**149**
HA5KKO	"	65,688	301	119
		(Opr. I. FULOP)		

ITALY

IV3PRK	**A**	**2,537,420**	**2098**	**439**
I6PLN	**28**	**612,447**	**932**	**277**
I0WKS	**28**	**454,512**	**691**	**272**
IQ5VXG	"	439,043	761	239
		(Opr. I5VXG)		
I4YNO	"	397,936	738	209
I4JMY	"	295,431	562	213
I8KPV	"	228,646	485	209
IN3XUG	"	181,818	386	222
IV3HSN	**14**	**1,614,384**	**1802**	**404**
I5JHW	"	148,954	422	221
I3MAU	**7**	**904,536**	**821**	**306**

LUXEMBOURG

LX9KS	**A**	**59,943**	**233**	**159**
		(Opr. LX1MK)		

MALTA

9H1EL	**A**	**3,010,922**	**2768**	**478**

NETHERLANDS

PA3ALD	**A**	**76,859**	**272**	**151**
PA0FAW	**A**	**73,312**	**258**	**158**
PI1GOE	"	65,484	250	153
PA3AEB	"	51,680	260	136
PA0CLC	"	13,464	97	72
PA0SMS	"	9,558	71	54
PA0LIE	"	2,835	53	45
PA0CF	"	1,650	31	30
PA3AAV	"	384	12	12
PA3AES	**28**	**17,982**	**93**	**81**
PA1GRE	"	3,312	48	36
PA0RRS	**21**	**83,840**	**240**	**160**
PI1PT	"	21,271	98	89

NORTHERN IRELAND

GI4FUM	**A**	**107,598**	**310**	**158**

NORWAY

LA2AD	A	42,625	194	125
LA9CQ	**A**	**31,458**	**200**	**107**
LA2GN	"	21,976	128	82
LA4HW	"	14,480	86	80
LH2A	"	9,867	106	69
		(Opr. LA2AD)		
LA6TP	"	6,812	81	52
LA7QI	"	5,243	58	49
LA4HH	"	4,773	45	37
LA9ML	"	1,881	42	33
LA9GJ	"	1,508	31	29
LA2GV	**21**	**327,875**	**600**	**215**
LA9MW	**21**	**221,998**	**525**	**202**
LA0AR	"	175,958	453	194
LA7ZN	"	15,483	105	83
LA5KW	"	7,896	74	47
LA6XI	"	1,566	30	27
LA1KQ	14	2,016	40	36
LG5LG	7	870	15	15
LA5QK	**3.6**	**55,596**	**221**	**123**

POLAND

SP1QT	**A**	**460,944**	**851**	**291**
SP5XM	**A**	**329,659**	**541**	**253**
SP3ADZ	"	85,956	300	114
SP9HXK	"	59,727	222	129
SP6DYD	"	36,297	155	109
SP9CTW	"	22,446	104	86
SP3DOI	**28**	**1,617,832**	**1718**	**344**
SP9KBY	"	165,648	360	168
		(Opr. SP5GRM)		
SP9ADU	"	3,441	53	37
SP2JUU	"	1,488	27	24
SP9BDQ	"	918	18	17
SP5BR	**21**	**95,030**	**296**	**170**
SP6AGD	"	40,003	182	109
SP6DNS	"	28,035	138	89
SP4DGN	**14**	**359,454**	**777**	**278**
SP2FAP	**14**	**224,190**	**545**	**265**
SP8HXN	"	190,509	645	251
SP5EAQ	"	150,381	430	231
SP5ENA	"	117,008	375	206
SP9PEZ	"	88,854	330	177
		(Opr. SP9-2962)		
SP2ZFJ	"	53,136	266	162
		(Opr. SP2ASJ)		
SP6IHE	"	45,210	241	137
SP6GBE	"	13,137	100	87
SP6IXF	"	5,588	71	44
SP6JZL	"	4,794	62	51
SP6GYS/6	"	3,311	51	43
SP9CXM	"	2,490	32	30
SP4DC	"	1,728	27	24
SP7HOV	"	1,364	24	22
SP3IBS	**7**	**173,314**	**420**	**193**
SP3BIP/3	"	7,238	73	47
SP6DVP	**3.5**	**43,400**	**248**	**100**
SP6UK	"	36,842	182	109
SP3ADZ	**1.8**	**3,000**	**61**	**25**

PORTUGAL

CT6DW	**A**	**520,612**	**1021**	**314**
CT7UA	"	31,488	139	82
CT4NH	**28**	**117,992**	**407**	**196**
CT1TM	"	12,792	99	78
CT5OF	**14**	**873,964**	**1253**	**364**

ROMANIA

YO6KNL	**A**	**701,481**	**947**	**319**
		(Opr. YO6AWR)		
YO8FZ	**A**	**138,537**	**302**	**189**
YO6MD	"	79,180	289	148
YO6KEB	"	78,338	294	131
		(Opr. YO6VZ)		
YO3JW	"	74,500	281	149
YO6KAF	"	63,778	291	143
		(Opr. YO6AW)		
YO8KOB	"	24,236	160	83
		(Opr. YO8BGY)		
YO9APJ/3	"	23,157	109	83
YO6AVB	"	9,577	100	61
YO2BEH	"	8,003	100	53
YO3AC	"	2,380	33	28
YO5BQ	**28**	**45,312**	**178**	**96**
YO9HP	"	1,134	21	18
YO4AYE	**14**	**23,744**	**156**	**112**
YO2AXG	7	2,752	41	32

YO8BDQ	"	18	4	3
YO6LV	3.5	15,336	113	71
SARDINIA				
IS0MVE	**28**	**29,896**	**190**	**101**
SCOTLAND				
GM4CHX	**21**	**51,788**	**220**	**121**
GM4FSA	"	8,190	89	63
SHETLAND IS.				
GM4GPN	**A**	**549,840**	**968**	**348**
SICILY IS.				
IT9RYJ	**28**	**93,790**	**323**	**166**
SPAIN				
ED4LH	**A**	**2,779,452**	**2373**	**468**
EA2IA	**A**	**2,389,849**	**2020**	**451**
EA3AIN	"	873,120	1322	340
EA1QH	"	340,218	577	246
EA3NA	"	332,384	569	272
EA1ABT	"	322,889	893	239
ED5ADO	"	148,296	528	222
EA1TA	"	89,658	240	179
EA0QF	"	64,160	266	160
		(Opr. EA1QF)		
ED1SQ	**28**	**19,635**	**190**	**85**
ED2OJ	**21**	**44,774**	**201**	**122**
EA4QR	**14**	**46,464**	**197**	**132**
ED4VD	"	6,384	67	57
EA4WC	**3.5**	**25,632**	**143**	**89**
SWEDEN				
SM5CSS	**A**	**897,375**	**1087**	**375**
SM5DSF	**A**	**431,860**	**628**	**286**
SM5RE	"	33,674	197	113
SM0BDS	"	33,390	140	105
SM5BDV	"	13,026	101	78
SM7AIO	"	12,859	93	77
SM7TV	"	11,100	100	74
SM0CGO	"	4,250	58	50
SM5CLE	"	3,072	34	32
SM1CXE	"	2,187	29	27
SM7FSV	"	2,048	34	32
SM4DQE	"	207	9	9
SM6FAX	**28**	**100,521**	**274**	**153**
SM5EMR	**28**	**51,076**	**181**	**113**
SM5DYC	"	25,456	132	86
SM2BUW	"	19,065	131	93
SM5AZU	"	18,648	99	84
SM6IBF/7	"	3,182	48	37
SM3DNI	"	3,108	54	42
SM0JOQ	"	1,700	28	25
SM4BTF	"	1,404	33	27
SM0HJV	"	27	3	3
SM2HZQ	**21**	**775,137**	**1223**	**283**
SM5ERK	"	71,760	245	156
SM5ARR	**7**	**19,750**	**121**	**79**
SM6BXV	**3.5**	**21,976**	**130**	**82**
SWITZERLAND				
HB7UD	14	5,130	63	54
YUGOSLAVIA				
YU2HJ	**A**	**779,766**	**985**	**338**
YU1NZW	**A**	**154,068**	**373**	**222**
YU2OB	"	138,844	304	206
YU3FO	"	98,150	348	151
YU2RAW	"	38,532	167	114
YU5XAF	"	37,990	165	145
YU1NZR	"	26,598	117	93
YU3TRI	"	2,952	36	36
YU3DM	**28**	**1,485,876**	**1605**	**343**
YU1BCD	"	565,455	872	253
		(Opr. YU10QZ)		
YU10BA	"	407,490	670	235
YU3ZV	**21**	**3,225,380**	**2789**	**415**
YU2RGN	"	263,250	570	234
YU10FT	**14**	**622,700**	**950**	**325**
YU3TOJ	"	14,013	125	81
YU3DBC	**3.5**	**212,800**	**442**	**200**
		(Opr. YU3TPZ)		
YU3FK	"	100,562	333	154
YU3DCK	"	41,472	204	108
YU3EF	**1.8**	**17,136**	**141**	**56**
WALES				
GW4HBK	**A**	**67,716**	**270**	**171**
GW4GXR	**14**	**92,254**	**355**	**193**
GW3SLA	3.5	21,472	111	84

U.S.S.R.

EUROPEAN				
UA1DZ	**A**	**1,905,120**	**1882**	**392**
UA6LXZ	**A**	**1,017,423**	**1417**	**387**
UA3TN	"	129,165	301	237
UA3DDF	"	124,341	361	191
UA3VFI	"	80,808	289	182
UA6AJG	"	79,794	231	186
UA4ZA	"	74,880	251	180
UK3R	"	54,954	250	129
		(Opr. UA3-170320)		
UA6APP	"	25,016	141	106
UA1AET	"	18,430	153	97
UW4NH	"	15,480	94	72
UA3ACD	"	8,968	106	76
UA3PDA	"	6,820	75	55
UW1AE	"	3,094	37	34
UA3TBK	"	1,134	33	27
UA3DKF	"	54	6	6
UV3GZ	**28**	**562,718**	**915**	**299**
UA4CAK	**28**	**527,592**	**896**	**267**
UA1AWO	"	115,570	368	182
UA6ACK	"	99,306	340	162
UA4CZ	"	68,474	276	146
UA3PAZ	"	62,906	232	142
UA6LEV	"	48,374	235	134
UA6AKB	"	45,347	212	137
UA4CDC	"	25,704	175	102
UW6CA	"	25,132	202	103
UA3TAG	"	19,908	172	79
UA4HAD	"	16,884	100	84
UA3TAM	"	14,863	136	89
UV3AP	"	10,354	79	62
UA3AGL	"	7,257	79	59
RA3ACQ	"	7,139	96	59
UA3PFZ	"	3,198	52	39
UA3MBQ	"	2,673	39	33
UA3DAT	"	2,331	45	37
UA3ECF	"	2,046	36	31
UA4HFR	"	1,908	45	36
UA3DGI	"	1,372	33	28
UA3PBE	"	1,224	31	24
UA6AKT	"	798	22	21
UA6LMT	"	494	24	19
UV3DN	**21**	**601,090**	**913**	**277**
UA1MU	**21**	**163,152**	**437**	**198**
UW3RR	"	145,644	431	212
UA3ZBZ	"	71,280	249	162
UA6BV	"	40,896	199	144
UW3EQ	"	32,552	131	104
UV3MM	"	27,492	155	116
UA4CO	"	21,204	112	93
UA4ACD	"	19,153	133	107
UA4ACP	"	17,248	131	88
UA3XP	"	540	23	20
UA6HAC	**14**	**697,288**	**1037**	**344**
UA3QAQ	**14**	**308,525**	**601**	**287**
UV3CS	"	20,882	136	106
UA3DKT	"	9,920	106	62
UA3AH	"	6,901	73	67
UA3DEA	"	3,395	41	35
UV3FD	3.5	7,800	86	50
ESTONIA				
UR2MG	**A**	**1,313,415**	**1504**	**405**
UR2QD	"	811,512	1061	351
UR2RL	"	7,560	56	54
UR2RAM	**28**	**308,910**	**558**	**210**
UR2FQ	**14**	**1,405,944**	**1609**	**414**
UR2RCN	**3.5**	**74,880**	**303**	**120**
KALININGRAD				
UA2FCW	**A**	**80,640**	**307**	**140**
UA2WJ	**3.5**	**14,720**	**107**	**64**
LATVIA				
UQ2GDQ	**A**	**811,300**	**1000**	**305**
UQ2MU	"	1,800	28	25
UQ2GCN	**14**	**1,481,736**	**1637**	**425**
UQ2PF	"	18,392	102	76
UK2GAA	"	1,107	35	27
		(Opr. GRIBOV)		
LITHUANIA				
UP2BAE	**A**	**1,163,880**	**1498**	**366**
UP2CY	"	955,318	1196	362
UP2BBF	"	113,643	428	183
UP2BAO	"	93,328	250	152
UP2PAD	**28**	**130,093**	**322**	**167**
UP2PAQ	"	99,760	269	145
UP2BGB	"	1,488	32	24
UP2OM	**21**	**268,163**	**510**	**203**
UP2AV	"	23,904	165	96
UP2PCW	**7**	**17,780**	**121**	**70**
UP2PBW	**3.5**	**102,816**	**341**	**144**
UKRAINE				
UB5WE	**A**	**2,710,920**	**2286**	**456**
UB5EC	**A**	**1,619,340**	**1780**	**411**
UY5EG	**A**	**1,589,809**	**1801**	**377**
UB5EAX	"	38,991	225	123
UT5BN	"	9,975	103	75
UT5OV	"	6,644	57	44
UB5HBT	"	1,166	23	22
UB5EES	"	741	19	19
UB5ILD	**28**	**929,829**	**1419**	**281**
UB5LAW	**28**	**598,784**	**934**	**256**
UB5ILL	"	520,168	917	257
UB5VAZ	"	476,890	885	206
RB5IXX	"	376,272	849	208
UB5EDU	"	350,385	608	235
UB5ABJ	"	319,152	647	218
UB5CDF	"	263,961	561	211
RB5IOV	"	195,382	446	166
RB5IWF	"	37,375	162	115
UB5VCD	"	22,713	121	67
UB5MDP	"	20,330	125	95
UB5AAL	"	15,642	116	79
UB5IIA	"	8,673	64	59
UB5ABK	**21**	**639,625**	**917**	**301**
UB5VBY	**21**	**430,137**	**710**	**267**
UB5XBU	"	318,765	601	269
UB5HDX	"	51,888	227	141
UB5AAQ	"	27,328	122	112
UT5HP	**14**	**34,438**	**191**	**134**
UY5YB	"	14,697	91	69
UB5IJK	**7**	**100,520**	**269**	**140**
UB5EGB	**3.5**	**21,804**	**140**	**69**
UB5UWB	"	3,498	49	33
WHITE RUSSIA				
UC2WAZ	**A**	**3,240**	**48**	**36**
UC2ACA	"	171	10	9

OCEANIA

AUSTRALIA				
VK1BC	**A**	**43,000**	**151**	**100**
VK2BQS	**A**	**51,840**	**194**	**90**
VK2XT	**21**	**113,338**	**313**	**122**
VK3NFV	**28**	**87,120**	**240**	**121**
VK3SM	**21**	**159,808**	**312**	**175**
VK4VU	**A**	**2,125,900**	**2047**	**350**
VK4ADC	**A**	**1,095,888**	**1264**	**289**
VK4NJQ	**28**	**52,780**	**158**	**116**
VK5MF	**A**	**402,804**	**686**	**201**
VK5OU	"	165,822	343	174
VK5NKP	**28**	**150,625**	**417**	**125**
AX6NE	**A**	**963,585**	**1172**	**285**
AX6NBU	**A**	**695,456**	**1175**	**206**
AX6NAG	"	12,702	81	58
AX6VG	**28**	**120,018**	**251**	**166**
AX6NAT	"	8,528	60	52
VK8BE	**A**	**8,037**	**59**	**47**
GUAM				
AC4Y/KH2	**A**	**396,180**	**721**	**186**
KA1BRH/KG6	"	71,797	232	107
KG6JKS	**28**	**978,996**	**1617**	**204**
HAWAII				
KH6WF	**A**	**2,612,602**	**2901**	**302**
KH6GMP	**A**	**884,520**	**1159**	**260**
KH6XX	**28**	**4,020,646**	**3970**	**343**
MIDWAY IS.				
WH4AAA	**A**	**435,456**	**895**	**168**
KH6JHJ/KH4	**28**	**386,448**	**784**	**165**
N. LINE IS.				
VR3AH	**14**	**3,526,153**	**2777**	**437**
NEW ZEALAND				
ZL1AJU	**A**	**2,174,270**	**2142**	**349**
ZL1BCG	**A**	**980,350**	**1110**	**296**
ZL4BO	**14**	**1,017,253**	**1106**	**317**
ZL1AAS	**14**	**792,085**	**869**	**305**
NORFOLK IS.				
VK2DCA/VK9N	**A**	**1,365,536**	**1540**	**307**
		(Opr. HB9AAA)		
PHILIPPINES				
DU1GF	**21**	**464,868**	**1452**	**111**
		(Opr. JA7SGV)		
WB8VLG/DU2	**21**	**197,178**	**561**	**118**

SOUTH AMERICA

ARGENTINA				
AZ8CW	**A**	**1,377,918**	**1389**	**342**
BRAZIL				
PY1ZBJ/8	**A**	**995,247**	**1074**	**297**
PY1NEZ	**A**	**149,211**	**285**	**177**
PY8HP	"	62,504	193	111
PT7WA	"	52,633	156	103
PT2TF	"	30,060	117	90
PY2FND	"	13,987	77	71
PP5JD	"	7,252	59	49
PT7AW	"	3,060	34	30
PY1BPE	"	2,656	36	32
PY5CA	**21**	**342,228**	**500**	**237**
PY4KL	**21**	**258,060**	**382**	**230**
PY5PW	"	1,495	24	23
ZZ2FBI	**14**	**8,364**	**65**	**51**
PY1BKA	"	6,048	51	42
PT7TP	**7**	**61,380**	**112**	**93**
CHILE				
CE3NT	28	969	19	19
COLUMBIA				
HK4BKB	**7**	**24,278**	**73**	**61**
EASTER IS.				
CE0AE	**A**	**649,029**	**1077**	**201**
ECUADOR				
HC1FM	**A**	**958,750**	**996**	**325**
HC1BU	**A**	**376,650**	**528**	**243**
HC1EE	"	262,384	416	186
HC6FC	"	220,584	410	182
N1DX/HC2	"	78,309	237	113
HC1AK	"	47,250	150	105
HC1HV	"	14,288	54	47
HC1HC	**21**	**751,180**	**887**	**284**
NETH. ANTILLES				
W1BIH/PJ2	**28**	**2,280,096**	**2173**	**351**
PERU				
OA4SS	**28**	**1,262,378**	**1429**	**299**
SURINAM				
JA1PIG/PZ	**A**	**291,927**	**440**	**219**
URUGUAY				
CX9CO	**A**	**1,627,540**	**1447**	**380**
VENEZUELA				
YV1AVO	**A**	**2,348,961**	**1698**	**393**
YV1BCH	"	353,202	538	222
4M3AZC	**28**	**1,663,146**	**1627**	**342**
YY2AMM	**14**	**2,751,776**	**2044**	**452**

MULTI-OPERATOR SINGLE TRANSMITTER

UNITED STATES				
K4VX		**4,344,340**	**2692**	**572**
AC7U		**2,568,820**	**2607**	**430**
WB4SKI		2,355,903	2075	449
W6YRA		**2,115,608**	**2406**	**319**
W1YK		**1,649,970**	**1453**	**405**

Some thought AZ8CW was a USA 8th district call - no way - it was Joe, LU8CW with a special prefix from Argentina.

on 40 meters...JA2BAY. I operated top of the mountain about 1000 ft. above sea level, Ogasawara Is... JG1IVI/JD1. JA1VDJ is my QSL mgr ...9M2BZ. Biggest thrills: to be called by HS1ABD on 20, VR6HI on 10, & to work DF0DX & DJ4PT on 40...CE0AE. The new prefixes kept me going but where were the W9's and JA9's?... VK3SM. Stateside stations ignored 3 point DX-ers to run up lots of U.S.A. multipliers...VK5OU. AX6 call sign was to end on Saturday, however with cooperation of Reg. Auth. it was extended...AX6NE. Trying to break 6D1LCH thru U.S. QRM then having him call for outside U.S. - Got him quick...AC4Y/KH2. Glad to see all those new prefixes...KH6WF. Africans pretty scarce...ZL4BO. Watching my quad ride out a tropical thunderstorm, it's still up, so I guess

This 40 meter quad at I3MAU is one of the reasons Renzo is the world's top scoring 7 MHz station.

WB@BMB	**1,245,888**	**1245**	**448**
W3LH	**1,037,136**	**1036**	**408**
AF2I	**955,700**	**1075**	**380**
KD4M	947,638	1017	398
KC4B	744,705	1032	335
K3WW	646,311	886	291
K3UC	643,524	764	326
N5JB	**629,552**	**851**	**308**
N3GB	492,354	645	306
K6YRA	397,164	611	276
AD8R	**344,520**	**589**	**270**
W3GG	290,483	489	249
W4SME	267,995	413	247
WB5NXH	267,216	560	228
N4UF	229,620	390	215
K3EA	225,687	408	231
AE8P	115,292	280	164
AG5B	93,400	393	200
AE8W	69,160	223	152
K3SY	63,900	191	142
NORTH AMERICA			
VX7UBC	**5,136,950**	**4338**	**455**
CZ6WQ	**4,543,641**	**3751**	**459**
VE3AKG	**3,428,465**	**2352**	**485**
VE1DXA	**3,242,295**	**2221**	**511**
VP1KG	**2,806,544**	**2709**	**412**
VP2MBU	**1,287,399**	**1729**	**327**
VC1CCC	**823,431**	**990**	**347**
KL7HET	**84,048**	**285**	**102**
VE3FYO	3,096	38	36
AFRICA			
N6VR/5W8	**1,097,152**	**1077**	**316**
ASIA			
JA8YXI	**243,382**	**431**	**203**
JA6YCC	180,268	368	187
JA@ZAW	93,976	241	136
EUROPE			
YZ4Z	**6,668,770**	**4401**	**590**
4N4Y	**6,560,500**	**4408**	**549**
YT2D	**6,208,879**	**4309**	**557**
SJ9WL	**5,321,862**	**3851**	**546**
OI2AA	**4,109,693**	**3252**	**497**
DM2AYK	**4,043,520**	**3209**	**468**
PA2TMS	**4,008,969**	**2812**	**543**
G8JC	**3,401,514**	**2688**	**486**
G6UW	3,371,888	2690	464
HA5KFL	**2,781,213**	**2507**	**461**
HG6V	2,665,221	2603	481
SK7HW	2,504,025	2234	465
SK6CM	2,344,356	2021	443
IP5CJA	**2,205,990**	**2367**	**386**
GB2FJE	2,122,281	1984	399
DL@UE	**2,012,188**	**1742**	**466**
SP5PWK	**1,984,983**	**1663**	**429**
TF3CW	**1,877,526**	**2508**	**439**
OK2KWI	**1,585,434**	**1779**	**417**
F6KAW	**1,574,625**	**1708**	**375**
SK4DM	1,561,539	1510	427
OK3VSZ	1,487,533	1645	409
DM3LI	1,394,470	1769	385
DL@RCA	1,320,057	1382	379
DM2CDL	1,219,523	1350	359
HA7KSV	1,076,148	1405	358
YU2CQ	1,030,080	1135	370
HA4KYH	992,728	1197	389
OK1KCU	653,562	889	294
SP3KEY	622,790	890	310
PA@NYM	564,339	887	313
HA@KLU	533,862	808	342
HA5KKB	527,244	874	318
LZ2KKZ	**520,500**	**856**	**300**
HA7KLC	509,076	804	316
SP9KOT	419,594	646	287
OK1KTW	375,505	734	265
LJ2Z	**326,781**	**823**	**273**
DM4IH	301,093	749	247
SP9PDF	287,028	678	252
HA3KHC	277,680	718	240
OK1KQJ	265,224	520	257
DM4CN	239,540	662	236
HA6KVD	238,510	545	230
LZ1KWZ	198,320	415	268
SP9KMM	196,620	543	226
SP1PBW	195,447	542	227
LZ2KPB	167,580	401	252
YO6KBM	**158,692**	**451**	**194**
SP2KAZ	113,220	370	153
OK1KPU	100,215	303	131
SP@ZHQ	83,589	287	149
LZ1KDP	79,625	364	175
HA5KBM	76,822	313	142
OH3KL	61,152	293	156
OK1KUO	60,858	313	138
SP6PAZ	51,960	232	120
OK3KAP	48,806	231	144
OK1KIR	45,890	199	130
OK2KJT	39,162	201	122
SK7GC	36,736	180	112
SK1AQ	35,880	176	120
OK1KDK	26,300	184	100
LA7V	24,415	167	95
F6KLN	19,412	148	92
OK1KCF/p	16,272	124	72
DM3LB	14,640	146	80
OK3KFO	8,624	98	56
YO8KAN	3,864	60	46
YO9KAG	3,100	44	31
YO9KPF	820	29	20
OK3RMW	285	16	15
OCEANIA			
VK8BG	**2,503,754**	**2180**	**388**
ZL2AH	**1,563,720**	**1748**	**314**
KH6JUU	**280,865**	**531**	**149**
VK4NPX	**277,965**	**435**	**213**
SOUTH AMERICA			
HK3AXT	**4,140,549**	**3095**	**441**
YV3IUP	**2,470,784**	**2113**	**388**
PP5CIT	**740,922**	**850**	**299**
U.S.S.R. CLUB STATIONS			
ASIA			
UK9AAN	**7,819,524**	**3943**	**612**
UK7LAH	**2,625,015**	**2747**	**417**
UK9UAO	2,159,640	2366	420
UK9CAE	1,857,261	1995	413
UK9OBI	522,720	902	264
UK9CCC	355,644	638	222
UK@SAV	**318,120**	**694**	**241**
UK9HAD	213,954	557	209
UK9CBD	212,211	340	219
UK@AAC	183,093	335	221
UK@SAW	46,842	202	126
UK9OAD	32,390	331	79
UK9HAC	7,592	54	52
EUROPE			
EM6A	**7,689,650**	**5265**	**565**
UK2GKW	**5,127,948**	**3684**	**513**
UK6LAZ	**5,040,560**	**3696**	**560**
UK5MAF	**4,854,318**	**3618**	**574**
UK2PAP	**4,006,088**	**3004**	**508**
UK3AAC	2,813,921	2425	491
UK4WAR	2,426,544	2329	432
UK4WAB	2,361,504	2394	406
UK6LKP	1,472,472	1523	408
UK3QBM	1,412,496	1685	408
UK3DAU	943,770	1144	386
UK3YAB	885,195	1015	415
UK5IBB	767,808	1132	344
UK5IFM	719,436	992	334
UK2RAQ	**590,409**	**854**	**333**
UK5QAV	571,482	939	342
UK5MBP	474,195	706	313
UK1NAD	462,966	1013	302
UK1QAP	434,176	786	256
UK4UAC	331,010	560	270
UK4WAC	326,370	662	230
UK2FAD	**286,896**	**550**	**258**
UK2RDA	274,014	482	234
UK5QBE	250,614	545	221
UK2GAZ	243,410	538	241
UK3AAH	224,472	403	199
UK5CAH	209,070	531	207
UK5EAQ	185,047	502	211
UK2IAJ	**180,810**	**575**	**210**
UK4LAZ	159,144	491	228
UK1AAE	135,040	559	211
UK3DBV	120,132	443	188
UK4ABW	111,361	343	193
UK3XAM	37,875	167	125
UK4FAV	36,701	153	107
UK2PCR	12,012	96	66
UK5UBB	10,200	80	68
UK3QAA	10,010	96	55

MULTI-OPERATOR MULTI-TRANSMITTER

WORLD WIDE			
CK7WJ	**16,545,370**	**10468**	**590**
DF@DX	**14,145,000**	**8023**	**690**
HD1A	**11,001,027**	**6353**	**573**
KL7IRT	**10,707,712**	**7785**	**554**
AL7J	9,208,047	6452	499
KL7HR	8,871,786	6454	518
K5JA	**7,966,305**	**4790**	**633**
W9LT	**3,302,296**	**2558**	**536**
JA3YKC	**2,728,768**	**2080**	**448**
!!K2WY	**1,816,611**	**1969**	**309**
JA4YFH	**1,798,986**	**1506**	**422**
KG6FAE	**1,326,221**	**2046**	**221**
JA7YAA	1,092,754	1086	338

CHECK LOGS: The following station logs were used for cross-checking. Check logs are always appreciated. Thank you.... AF2S, CT5ZG, DM2BTO, DM2CZM, DM2YLO, DM3XD, DM3XM, DM4ONL, DM4TEK, DM4YEL, HI7XWL, K6FM, KV4AA, OH2MM, OH5TS, OK3TOA, SP3ZAC, SP4JDA, UA3DFK, UA3ST, UK2AAB, UK3ABB, UK5ICD, UK5JAO, W1PM, WA2AUB, YO6ADM, AND SWL STATIONS: GERMANY (GDR) -DM7684/E, DM8700/N: NETHERLANDS - NL-5288: FRANCE - FE-8957.

The CK7WJ Multi-Multi World Champions: Top (L to R) Al, K7TI; Stu, N7ZZ; Henry, VE7WY; Big Jim, W7EJ; Gordon, VE7AVA; Andrew, VE7CGY; John, AH6Z; Dave, VE7AZG; Danny, K7SS; Don, W7WA. Op. K7TU absent from photo. Their score was the highest ever achieved in a WPX Contest.

it's not high enough...WB8VLG/DU2. Conditions were so good that it was difficult to decide when to take a rest period...G4CNY. Having to use frozen tomatoes from the freezer to keep the rig cool...G3RAM. No Aurora this year, so was happy about that...OH6-JW. I worked on a very little island named Kuppis with batteries and 2KVA generator...OH1ZT. I hope for a single band for multi operators ...F6ECI. One of the most popular contests...DL7EN. KH6WF and KH6XX were the first Hawaiian stations for me on ten. QSO's with HS1ABD and C5AAN were real fine... DJ6TK. Worked enough new prefixes to make WPX Award if they all QSL... DA2QE. Good condx to the east, but very bad to North America on ten... DM3HF. Glad to give the HG9 multiplier...HG0DU/9. Worked more than 60 Californians, beaming over the North pole!...I0WKS. WAC on 10 meters in 7 minutes...9H1EL. Is it not time to divide contests into two parts: one for beams, quads, etc. and one for dipoles, W3DZZ, etc...PA0FAW. Spent 30 minutes waiting to work HS1ABD, the only HS I've ever heard. ...GI4FUM. Excellent conditions on 80 meters, lots of W & VE signals heard, but no answers!...LA5QK. Propagation good...SP5BR. XYL birthday in contest weekend means poor score...CT7UA. Call sign was especially assigned to CT1OF... CT5OF. Many stations in contest, now many QSL in return...YO3JW. Enjoyed the first Spanish new prefix in the contest...ED4LH/EA4LH. Collins S-line running barefoot to a TA33 Jr. beam both born in 1963 and the operator born in 1908...SM5AZU. Worked ten new countries plus W6 & 7 for 1st time...GW4HBK. I recommend to guys from States to listen more split frequency on 40 meter band... YU2HJ. Many thanks to all participants in this contest. We had many FB QSO for our WPX Award...UK6LKP. We never did such a good score before...UK5MAF.

The Shefford Radio Society Group found the special prefix call GB2FJE very popular. Ops: (L to R) G4GIR, G4DRS, G4BWP. (Photo by WB8YRF/G5BQR)

WORLD WIDE TOP SCORES
SINGLE OPERATOR

ALL BAND

OI1VR	**3,499,314**	UB5WE	2,710,920
VC7BTV	**3,140,786**	KH6WF	2,612,602
9H1EL	3,010,922	**K7RI**	**2,608,148**
HI8MOG	2,971,698	UI8LAG	2,588,096
KZ5OJ	2,883,150	K2SS	2,550,990
VE3BMV	2,813,211	VE7CMK	2,545,510
ED4LH	2,779,452	IV3PRK	2,537,420

SINGLE BAND

28 MHz		21 MHz	
KH6XX	**4,020,646**	**9L1CA**	**3,245,088**
W1BIH/PJ2	2,280,096	**YU3ZV**	**3,225,380**
FG@DYM/FS7	1,975,680	**N7XX**	**2,862,488**
EL2AV	1,874,140	N6CW	2,660,994
4M3AZC	1,663,146	OH6JW	2,404,044
SP3DOI	1,617,832	K1VTM	2,293,110
YU3DM	1,485,876	W2PV	1,767,558
14 MHz		**7 MHz**	
VR3AH	3,526,153	I3MAU	904,536
YY2AMM	2,751,776	DM3YQO	486,720
VE7IG	**1,788,825**	OI1IJ	343,746
IV3HSN	1,614,384	JA2BAY	231,504
UQ2GCN	1,481,736	GU3YIZ	189,128
UR2FQ	1,405,944	SP3IBS	173,314
N4KE	1,194,390	DA1GF	119,340
3.5 MHz		**1.8 MHz**	
HA9RU	256,676	VE3BBN	20,424
YU3DBC	212,800	YU3EF	17,136
ON6JG	205,800	W8LRL	6,532
DM3VGC	195,700	K2BQ	5,320
K8XX	140,280	HI8JAG	4,480
HA4KYB	126,882	DK3FB	4,360
DK1QH	108,240	SP3ADZ	3,000

QRPp

W8ILC	**588,321**	G4BUE	399,320
VE3KZ	507,210	W6PQZ	225,036
N2AA	435,246	SK2KW	175,244

MULTI OPERATOR

Single Transmitter

UK9AAN	**7,819,524**	UK2GKW	5,127,948
EM6A	7,689,650	UK6LAZ	5,040,560
YZ4Z	6,668,770	UK5MAF	4,854,318
4N4Y	6,560,500	CZ6WQ	4,543,641
YT2D	6,208,879	K4VX	4,344,340
SJ9WL	5,321,862	HK3AXT	4,140,549
VX7UBC	5,136,950	OI2AA	4,109,693

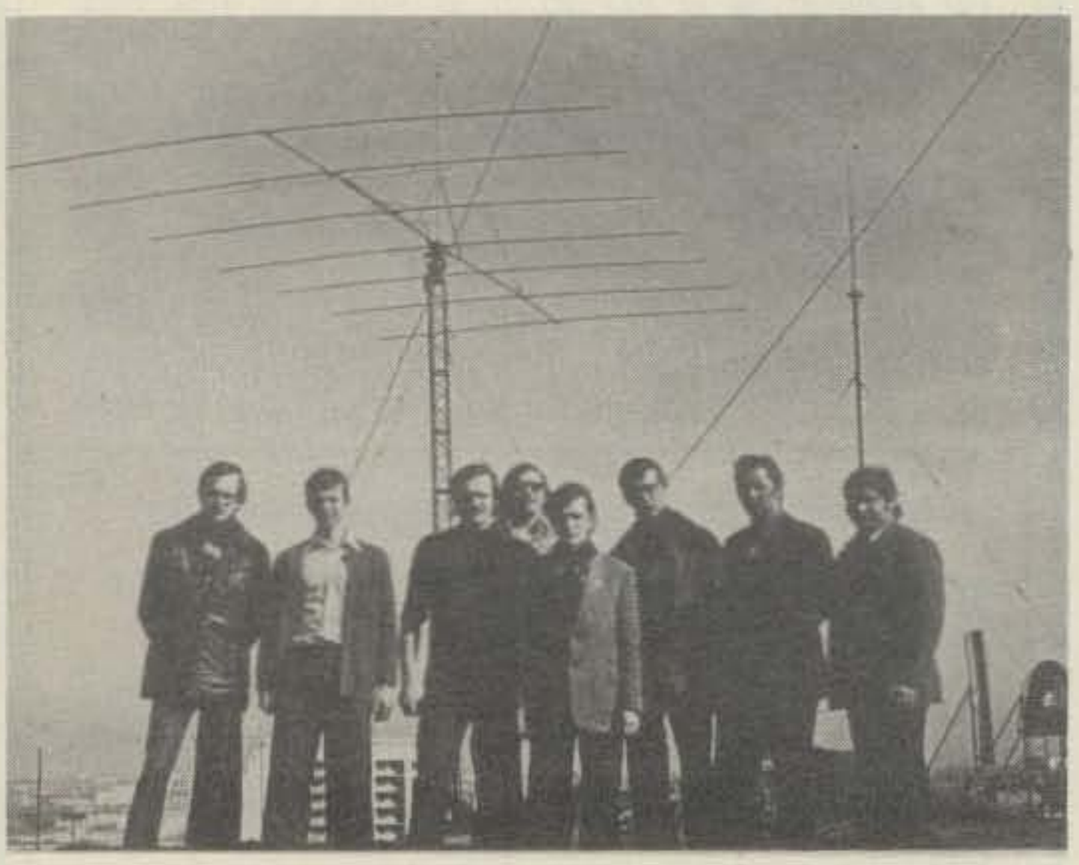
Multi Transmitter

CK7WJ	**16,545,370**	KL7IRT	10,707,712
DF@DX	**14,145,000**	AL7J	9,208,047
HD1A	11,001,027	KL7HR	8,871,786

Carl, AI6V was one of the many new USA prefix stations that proved to be so popular.

SJ9WL in '79 and LG5LG in '78, both from the fictitious country of Morokulien by ops Lars, SM0GMG and Ulf, SM0GNU. Lars presented an excellent insight to their contest operations on the program at the world's largest Contest Forum, '79 Dayton Hamvention.

The 2nd op Michael with his father, Gus HI8MOG. Maybe they should have been a multi-operator station?? Hi Hi Always a top contender - HI8MOG was 4th World High All-Band. FB



The record breaking Multi-Single Radiosport Champions -the Asiatic USSR Club Station UK9AAN. Ops: (L to R) George, UA9ACZ; Willy, UA9AIS; Mike, UA9AIT; Walt, UA9AGR; Sam, UA9AN; Victor, UA9165965; Vitaly, UL7LEZ; Victor, UW9BY. Jerry, UA9AEN not shown.

STATION OPERATORS

Multi-Operator, Single-Transmitter

K4VX & K3EST, CX1EK/W4. **AC7U** & K7CI, W7MAP, WB7OUW. **WB4SKI** & WB4QBB. **W6YRA:** AI6K, N6KN, WA6DPQ, WB6LHO, WD6BAY & D. CAFARO. **W1YK:** K1IR, K1TK, K1UR. **WB0BMB, WB0TNY, WB0LFY, WA0SLL, K0RWL. W3LH:** W3AS, K3UA, WA3JFW. **AF2I** & AF2J. **KD4M** & KD4S, K9IJ, W4GKF, W4WWW, WD4CNO. **KC4B** & AA4M. **K3WW** & K3WJV. **K3UC** & K3VDU, WA3VQK. **N5JB** & W5FO, W5YKJ. **N3GB** & WA3ZAS, WB3JRU. **K6YRA** & K6OKW. **AD8R** & WA8TBQ, WB8WGN, WD8AXZ. **W3GG** & WA3ZAS. **W4SME &** W4BSO, WD4MSR, KB4CD. **WB5NXH** & K5ZD. **N4UF** & WA4PVT. **K3EA** & WB3DNA. **AE8P** & AE8Q, W8TN. **AG5B** & WB5OFB. **AE8W** & WD8RIN. **K3SY** & WA3MAG. **VX7UBC:** VE7COR, VE7BBQ, VE7BGK, VE7CML, VE7DTB, VE7DES, VE7CNY, VE7CMN, VE7CXC. **CZ6WQ:** VE6WQ, VE6KW. **VE3AKG** & VE3BVD. **VE1DXA:** VE1AIH, VE1BNN, VE1BXC, WB2RLK/VE1. **VP1KG:** W6KG, W6QL. **VP2MBU:** W5IJU, K4TVE/VP2MEC. **VC1CCC:** VE1CCC & VE1RY. **KL7HET** & 3 Ops. **VE3FYO:** VE3BTJ, VE3KMQ. **N6VR/6W8** & WA6VNR. **JA8YXI:** JA8ERG, JA8JCR, JA8OYC, JA8QCB. **JA6YCC:** JH6THS, JR6EQA, JR6KYF, JE6HKZ, JA6-9330. **JA0ZAW:** JA0JQQ, JA0OSV, JA0TEN. **VK8BG** & VK3XX, VK8NCT, VK8NTG. **ZL2AH** & WN2241. **KH6JUU** & KH6HGL. **VK4NPX** & VK4ADG, VK4NLN, VK4NQD, VK4NRD, VK4NTF, VK4NUE, & 1 Op. **HK3AXT** & HK3TF, HK3AFD, HK3BED. **YV3IUP:** SP3GEM, YV1BJP, YV3APN, YV3BEU, YV3DD, YV3ZB, YV5GPU. **PP5CIT:** PP5AIM, PP5MQ, PP5WB, PP5AJ, PP5NS, PP5WBW, PP5AD, PP5WAQ, PP5CAD, PP5AIW. **YZ4Z:** YU1OIF, YU1OIQ, YU4VEU, YU4VPA. **4N4Y:** YU4FRS, YU4VAG, YU4VKW, YU4VNO. **YT2D:** YU2CT, YU2RQX, YU2RTM, YU2RUX. **SJ9WL:** SM0DJZ, SM0GMG, SM0GNU. **OI2AA:** OH2BAQ, OH2BNP, OH2BQB, OH2BQS, OH2BQZ, OH2BRW, DM2AYK & DM2DTK, DM2DUK. **PA2TMS** & PA2161, PA3347. **G8JC:** G3TQD, G3TQZ, G3UDR, G3UMV, G4BYB, G4FWR, G8ASO, G8NSL. **G6UW:** G3ZAY, G3ZHL, G4BAH, G4FAM, BRS32525. **HA5KFL:** CLUB - 6 Ops., **HG6V:** CLUB Gp. **SK7HW:** SM7BUR, SM7DBD, SM7EKU, SM7IFK. **SK6CM:** SM6CJK, SM6EOI, SM6EPA, SM6FFK. **IP5CJA:** I5LXW, I5NSR. **GB2FJE:** G4BWP, G4DRS, G4GIR. DL0UE: DF2OK, DF3AV, DJ7MG, DL3LU, DL7BI, DL8RL, & 1 SWL. **SP5PWK:** SP5AWV, SP5BB, SP5BSV, SP5CLK, SP5DZI, SP5DZJ. **TF3CW** & TF3JB. **OK2KWI:** CLUB Gp. **F6KAW:** CLUB Gp. **SK4DM:** SM4CLR, SM4CNN, SM4DQE, SM4-3958. **OK3VSZ:** OK3ZAF, OK3-26928. **DM3LI** & DM2DQI, DM2FWI. **DL0RCA:** DF2KO, DF3KJ, DF3KR, DJ1GX, DL2QB, DL4KE. **DM2CDL** & DM2CCL. **HA7KSV:** 6 Ops. YU2CQ & YU2BHI & 2 Ops. **HA4KYH** & HA4YQ & 4 Ops. **OK1KCU:** CLUB Gp. **SP3KEY** & SP3DWQ & CLUB Gp. **PA0NYM:** PA3ABA, PA3ADJ, PA0TP, PA0DIN, PA0INE, PA0JWR, PA0KHS, W6GET/PA. **HA0KLU:** 6 Ops. **HA5KKB:** HA5KB & 6 Ops. **LZ2KKZ:** 4 Ops. **HA7KLC:** CLUB Gp. **SP9KOT** & SP9FKQ & CLUB. **OK1KTW:** OK1AAE & CLUB Gp. **LJ2Z:** LA2JJ, LA5OD, LA5XW, LA6ZW, LA8IF, LA9YO. **DM4IH:** DM2AUH, DM2GLH, DM4OIH. **SP9PDF:** CLUB. **HA3KHC:** 3 Ops. **OK1KQJ:** OK1AYP & CLUB. **DM4CN** & DM2GEN, DM4DCN, DM4UCN. **HA6KVD:** 5 Ops. **LZ1KW:** 2 Ops. **SP9KMM:** SP9IJX & CLUB Gp. **SP1PBW:** SP1AMU, SP1JPQ. **LZ2KPB:** 3 Ops. **YO6KBM:** YO6DB, YO6OO. **SP2KAZ:** SP2FAS & CLUB. **OK1KPU:** CLUB. **SP0ZHQ:** SP9BGS & CLUB. **LZ1KDP:** LZ1ZF & 1 Op. **HA5KBM:** HA5LE & CLUB. **OH3KL** & GROUP. **OK1KUO:** CLUB. **SP6PAZ:** SP6BXZ, SP6JZD. **OK3KAP:** OK3CGI & CLUB. **OK1KIR:** CLUB. **OK2KJT:** 2 Ops. **SK7GC:** SM7IDF, SM7KAQ. **SK1AQ:** SM1CJV, SM1CXE, SM1IED. **OK1KOK:** CLUB. **LA7V:** LA1RN, LB1YA. **F6KLN:** F6ENV & Gp. **OK1KCF/p:** 2 Ops. **DM3LB:** DM2ANB, DM2DLB. **OK3KFO:** OK3CXW & Gp. **YO8KAN:** YO8ME, YO8QH. **YO9KAG:** YO9ASS, YO9HP. **YO9KPF:** YO9AYM, YO9ASS. **OK3RMW:** OK3YCM, OK3ZTW. **UK9AAN:** UA9AN, UA9ACZ, UA9AEN, UA9AIS, UA9AAM, UA9AJD, UW9BY, UA9-1651288, 1289, 1290, 1382, 1383. **UK7LAH:** UL7LEZ, UL7026133, 26267, 26304. **UK9UAO:** UA9UGS, UA9UOB, RA8UDB, UA9-130177, 130192. **UK9CAE:** UA9CJK, UA9CKC, UA9-1541099. **UK9OBI:** UA9OD, UA9-145217, 536. **UK9CCC:** UV9CI, RA9CMV, UA9-154309, 841, 1275, 1408. **UK0SAV,** 3 Ops. UK9HAD: 4 Ops. **UK9CBD:** UA9-154940, 957, 1162. **UK0AAC:** 2 Ops. **UK0SAW:** UA0-124191, 303, 304. **UK9OAD: UK9HAC:** UA9-158249, 377, 401. **EM6A:** UV3CC, UW3BO, UK6APA, UA6APR, UA6APW, UA6ATE. **UK2GKW:** UQ2ON, UQ2-03783. **UK6LAZ:** UB5-073103, 470, UB5-060650, 901, UA6-101, 152, UA4-156366. **UK5MAF:** UY5LK, UB5MDC, UB5-0592, 22, 200, 577. **UK2PAP:** UP2OX, UP2BCI, UP2NV, UP2PAE, UP2PAX. **UK3AAC:** RA3ACE, UA3AGX, UL7-03115. **UK4WAR:** UA4WAF, UA4WPX, UA4WWA, UA9FAJ, UA9FAR, UA9FGJ, UA4-095303, 316, 390. **UK4WAB:** 3 Ops. **UK6LKP:** UA6LLT, UA6-150330, 331, **UK3QBM:** UA3QCU, UA3-QDR, UA3QDW, UA3QGX, UV3QK, UA3-1211518. **UK3DAU:** 3 Ops. **UK3YAB:** UA3YBL, RA3YAA, RA3YCR, UA3-11884, 101, 152. **UK5IBB:** 5 Ops. **UK5IFM:** UB5IHO, UB5-073837, UA6-150737. **UK2RAQ:** 6 Ops. **UK5-QAV:** 6 Ops. **UK5MBP:** 3 Ops. **UK1NAD:** UN1CC, UA1NAV, UA1NBF. **UK1OAP:** 3 Ops. **UK4UAC:** 3 Ops. **UK4WAC:** CLUB Gp. **UK2FAD:** UA2-125206, 411, 465. **UK2RDA:** UR2NK, UR2RQJ. **UK5QBE:** CLUB Gp. **UK2GAZ:** UQ2MW, UQ2-03781. **UK3AAH:** UA3DNK, UA3-142958. **UK5CAH:** UB5CAO, UB5CAT, UB5-080108, 70, 84. **UK5EAQ:** 5 Ops. **UK2IAJ:** UC2ICK, UC2-00850, 52. **UK4LAZ:** UA4LAJ, UA4LBQ, UA4-164270. **UK1AAE:** 3 Ops. **UK3DBV:** 3 Ops. **UK4ABW:** UA4-156589, 590, 591. **UK3XAM:** UA3XBY, UA3-127363, 370, 376. **UK4FAV:** UA4FBL, UA4-148273. **UK2PCR:** UP2BCR, UP2BDF, RP2BET. **UK5UBB:** UB5-065 271, 512. **UK3QAA:** 2 Ops.

Multi-Operator Multi-Transmitter

CK7WJ: VE7AVA, VE7AZA, VE7CGY, VE7WJ, K7SS, K7TI, K7TU, N7ZZ, W7EJ, W7WA. **DF0DX:** DF1QQ, DF6BX, DF8XC, DJ1FC, DJ4AX, DJ4PT, DJ8SW, DJ9TE, DK1FW, DK3BJ, DK4QT, DK5EZ, DK5JI. **HD1A:** K4ERO/HC1, K7CA/HC1, KA6CNS/HC1, WA4UAZ/HC1. **KL7IRT:** AL7AK, AL7Z, KL7AZJ, KL7ENY, KL7IKP, KL7IRT, KL7IWM, KL7JAR, KL7JEH, KL7JET, KL7JHK, KL7JHN, WL7ACY, WL7AGG, WD0FIR. **AL7J:** AL7D, AL7H, AL7J, KL7D, KL7H, KL7HDS, KL7ITW, KL7IYH, KL7JHD, KL7NA, WA9IXF, WB6FZN. **KL7HR;** AL7AF, KL7FAP, KL7HR, KL7IVE, KL7IXZ, KL7RA, & 2CPTR TECHS. **K5JA:** N5AU, N5AUI, N5TR, K5FUV, K5JA, K5MR, KA5COH. **W9LT:** K9JS, K9TUS, K9UWA, W9LT, WB9UJP, WB9UYY, WD9DSU. **JA3YKC:** CLUB Gp. **VK2WY:** VK2ADS, VK2ASQ, VK2BUO, VK2BXT, VK2DAU, VK2NMB, VK2NRW, VK2NSE, VK2NVB, VK2VDQ, VK2YCJ, VK2YGV/VBE, VK2YHA/NDX, VK2ZAY, VK2ZOX, VK2ZUZ/NJW. **JA4YFH:** JA4UDP, JA4XKL, JH4CQQ, JH4DIT. **KG6FAE:** KG6JCW, KG6JHN, N4ACX, N4ADU, WB5MNB, WB5PMQ, KA6ANL, KA6BCQ, KA6DKT, KA7BBB, WD8OUZ. **JA7YAA:** JA7AEF, JA7DAG, JA7IMN, JA7RVD, JA7SFC, JA7SFY, JA7WBW, JA7WTC.

U.S.A. TOP SCORES

SINGLE OPERATOR

All Band	K7RI	2,608,148
All Band	K2SS	2,550,990
28 MHz	K6SVL	1,457,184
28 MHz	WA6OCV	1,345,200
21 MHz	N7XX	2,862,488
21 MHz	N6CW	2,660,994
14 MHz	N4KE	1,194,390
14 MHz	K8NA	982,368
7 MHz	W6AXX/3	30,272
7 MHz	N4NX	28,084
3.8 MHz	K8XX	140,280
3.8 MHz	N4RA	26,664
1.8 MHz	W8LRL	6,532
1.8 MHz	K2BQ	5,320
QRPp	W8ILC	588,321
QRPp	N2AA	435,246

MULTI-OPERATOR

Single Xmtr	K4VX	4,344,340
Single Xmtr	AC7U	2,568,820
Multi-Xmtr	K5JA	7,966,305
Multi-Xmtr	W9LT	3,302,296

TROPHY WINNERS

Single Operator-All Band

WORLD - North Florida DX Assn. Trophy. Won by: **Seppo Sisatto, OI1VR.**
U.S.A. - Bob Epstein, K8IA Trophy. Won by: **Thomas J. Owens, K7RI.**
CANADA - Garth Hamilton, VE2VY Trophy. Won by: **Hal D. Hickey, VC7BTV.**
JAPAN - Palm Garden Radio Club Trophy. Won by: **Masaru Cho, JA6BSM.**
WORLD - QRPp - Dayton Amateur Radio Assn. Trophy. Won by: **Ronald L. Moorefield, W8ILC.**

Single Operator-Single Band

WORLD - John N. Reichert, N4RV Trophy. Won by: **Randall F. Sobol, KH6XX.** (28MHz)
U.S.A. - Richardson Wireless Klub Trophy, Joe Johnson, W5QBM Memorial. Won by: **Station N7XX: Opr. Walter J. Legowski, WA1KKM.** (21 MHz)
CANADA - Gene Krehbiel, VE7KB Trophy. Won by: **R. J. Beck, VE7IG.** (14 MHz)
EUROPE - Myron E. Crofoot, WB4VQO Trophy. Won by: **Drago Turin, Jr., YU3ZV.** (21 MHz)
WORLD - 21 MHz - Lee Wical, KH6BZF Trophy. Won by: **Charles A. Jones, 9L1CA.**

Multi-Operator Single Transmitter

WORLD - Mike Badolato, W5MYA Trophy. Won by: **Club Station UK9AAN: Oprs: UA9AN, UA9ACZ, UA9AEN, UA9AIS, UA9AAM, UA9AJD, UW9BY, UA9-165-1288, 1289, 1290, 1382, 1383.**

Multi-Operator Multi Transmitter

WORLD - Henry Thel, VE7WJ Trophy. Won by **Station CK7WJ; Oprs: VE7CGY, VE7AZA, VE7AVA, K7SS, K7TI, K7TU, N7ZZ, W7EJ, W7WA, VE7WJ.**

Contest Expedition

WORLD - Northern Ohio DX Assn. Trophy. Won by: **Station VK2DCA/VK9N** (Norfolk Island) **Opr: Al F. Egli, HB9AAA.**

SPECIAL CQ AWARD - Station DF0DX: Prefix Record - 690.

(Note: The WORLD-Club Competition Trophy is now a combined SSB and C.W. Award. Winner will be announced with the C.W. Results.)

In Part II, K8BG takes us from the realm of mathematical statements to the world of decision statements . . . the IF, THEN and ELSE statements.

Introduction To Basic

Part II, Decision Making Statements

BY BUZZ GORSKY*, K8BG

In the first article of the series we saw how the computer executes mathematical statements. The ability to do mathematics rapidly is one of the computer's major assets. For example a program which calculates on which orbits communication will be possible between two points on earth via a particular satellite may have to perform tens of millions of computations in order to come up with the desired answer. If the machine did arithmetic as slowly as you or I, such programs would be of little use. However, in spite of this speed, the computer's major power comes from it's ability to make decisions. I make that statement even though the machine can in fact make very few types of decisions.

In this segment of our exploration of BASIC we will consider the most common of these "decision" statements—the IF statement. IF statements may employ three separate special words—IF, THEN, and ELSE. An expression always follows the IF and program statements or statement numbers may follow the THEN and ELSE. Implementation of these statements will differ among various computers and you should see what your system allows. For example some may only permit line numbers to follow the THEN and ELSE, while others are more general. In fact in some systems (including the TRS-80 level II) THEN and ELSE are not even mandatory in some situations.

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Let's look at what the computer does with an IF statement. First it evaluates the expression following the word IF to see if it is true. If it is true, the computer will do whatever follows the THEN. If a program statement number follows the THEN, the computer will jump to that statement and resume execution there. If program statements follow the THEN, these will be executed and the program will continue with the next line of statements. However, if the expression following the IF is not true, then the machine skips whatever follows the THEN and looks for the ELSE part of the statement. If a statement number occurs there then execution will resume with that statement. If the ELSE is followed by program material then that material is executed and then the program continues with the next line. If there is no ELSE present as a part of the IF statement and the expression following the IF is not true, then the program will continue with the next line of programming. If this seems a bit confusing, don't despair—the examples below should help. As you look through the examples, you may want to reread these descriptions.

Suppose that we have a part of a program where we wish to go to one part of a program if A = B but to another part if A≠B [≠ means not equal]. Let's say that when A = B, we want to set C = D, but if A≠B then we want to set E = F. In either case we then want to continue execution regardless of the relationship of A to B. We could implement this in a variety of ways, as follows:

```
100 If A = B THEN 120
110 LET E = F
115 GO TO 130
120 C = D
130 remaining part of program
      beings here.
```

When the computer comes to line 100 it looks to see if the value stored for A is the same as that stored for B. IF they are the same then the computer goes to line 120 which sets C = D (remember in the level II machine LET is optional so I left it out of this line), and then the program continues with line 130. On the other hand, if in line 100 A was not equal to B then the program would continue with line 110 (since no ELSE is present) and would set E equal to F. Then since line 115 says go to 130, the program would do that, skipping line 120. This GOTO statement can be put in programs to skip over statements that you do not want executed at that time.

Now that seems a bit complicated for so simple a task, and in fact we can simplify it in various ways. For example we could write line 100 as:

```
100 IF A = B THEN 120 ELSE 110.
```

That makes the branching obvious, but it really doesn't add anything since the program would have gone to line 110 even in the absence of the ELSE if A did not equal B. The following, though, *is* simpler:

```
100 IF A = B THEN LET C = D
      ELSE LET E = F
130 remaining program
```

Here we've done the entire job in one line. If A = B then we execute the program statement following the THEN,

but if A≠B then we execute the statement following the ELSE. In either case we pick up with the next statement.

Suppose we wanted to take one branch if A = B, a second branch if A is less than B, and a third branch if A is greater than B. Let's say in the first case we want to go to line 150, in the second we go to line 160, and in the third we go to line 170. We can do this branch with two IF statements:

```
50 IF A<B then 160
55 IF A = B then 150 ELSE 170.
```

When the program comes to line 50, the machine will consider whether A is less than B. If so it will go to 160. If not it will go to the next statement, which is 55. There it will consider whether A equals B. If so it will go to 150. If not it will GOTO 170. Since A must be either smaller than, equal to, or larger than B, we do not need an IF statement for the final possibility. We could shorten these two IF statements to one, which would be more complex:

```
50 IF A<B THEN 160 ELSE IF A = B
   THEN 150 ELSE 160
```

This is exactly the same sequence as before but everything is in one program line. In a later article we'll talk about why a programmer might chose one option over the other in a program. For now let's say that the first representation uses a bit more memory than the second, but the first may be simpler for a human reader to follow since the lines are shorter.

Let's consider how we could use the IF statements to keep track of something going on in the program. Suppose that there is a set of computations that we wish to do 10 times. After the tenth time we wish to branch to line 1000. The following will do just that:

```
100 LET N = 10
110 (110-150 have the computations
    we want done 10 times)
    •
    •
150
160 LET N = N –1
170 IF N<0 THEN 1000 ELSE 110
```

The first time through N = 10 at line 160. The in line 160 N is reset to N –1, that is 10 –1, or 9. Line 170 then asks, is N less than 0? It is not, so the ELSE branch to 110 is executed. This will continue until the tenth time through. On that run N will be 0 going into line 160 and N will be –1 going into line 170, so the THEN branch to line 1000 will be executed. We can consider lines 110 to 170 a loop which is run through 10 times. Of course in order for this loop to run there must not be any change in N in lines 110-150. For example, if line 125 said N = 60, then at line 160 N would be changed to 59,

Table I

IF	FOR
THEN	NEXT
ELSE	GO TO
< (less than)	> (more than)

which would always be greater than zero, and the program would keep running back to 110. Such "infinite loops" are common programming errors. When you have a loop in a program, look to see if you've done something to the variable that is supposed to keep track of the loop within the loop.

Looping is so common that there are special BASIC statements for loops. They are the FOR and NEXT statements. Again, consider that we have some statements (110-150) that we want run 10 times. Instead of using the IF routine, we can do the same thing with FOR/NEXT like this:

```
100 FOR N = 1 to 10
110
    •
    •
150
160 NEXT
1000
```

Isn't that easy? The program will set N equal to 1 when it reads the FOR statement. It will also remember that it is

supposed to stop after N is 10. It then goes on doing statements until it hits a NEXT. At that point it looks up what it has stored for N, adds one to it and then looks to see if that is bigger than 10. If not it goes back to the statement just after the FOR statement and runs through the loop again. When a NEXT is encountered and reevaluation of N is a number greater than 10, then execution will continue with the next statement in the program, 1000 in this case.

While FOR/NEXT seems pretty easy there are some twists. The word STEP can be used with a FOR statement. In the example just above the step was +1. That is 1 was added to N each time through. When the step is +1 we can leave the word STEP out. However, suppose we had a routine that did something with even integers between 2 and 100, we would begin our loop with:

100 FOR I = 2 to 100 STEP 2

In this case I would first be set to 2. Then when the NEXT was encountered I would be increased by 2 from 2 to 4. Next time it would go to 6 and so on up to 100. STEPs can also be negative. If we want to run from 100 down to 5 by fives we would write:

100 FOR I = 100 to 5 STEP 5

and that would do it for us.

Another thing about loops is that they can be nested, that is one can be placed inside another. Supose we have one set of instructions we want done 50 times. Within that set is another set that must be done 35 times each time through. We would say:

```
100 FOR I = 1 to 50
 •
 •
150 FOR J = 1 to 35
 •
 •
175 NEXT J
 •
 •
200 NEXT I
```

This would do the big loop 50 times, including 35 executions of the little loop each time. Notice that a different index letter must be used for each loop, or things will go wrong. Also, the NEXT J statement MUST occur before the NEXT I statement. That is one loop can be completely inside of another, but two loops cannot partially overlap.

Well, now that we have these fancy new tools, what can we do with them? In our next installment, we will be able to write some really useful programs, which will rely on the IF and FOR/NEXT statements. For now, take a look at the short programs shown in Table 2. If you play with those on your machine, you will begin to get an idea of what these statements really do. ▣

(to be continued)

Table II

PROGRAM #1

```
10  FOR I = 1 to 10
20  PRINT I
30  NEXT I
```

(After you have run the program as is add STEP 2, then STEP 3, then STEP 4 all the way up to STEP 10 to the first line and see what happens.)

PROGRAM #2

```
10  LET N = 0
20  FOR I = 1 to 10
30  LET N = N + I
40  NEXT I
50  PRINT N
```

(After you have run the program change line 10 to N = 1 and change line 30 to LET N = N*I.)

PROGRAM #3

```
10  LET N = 0
20  LET M = 0
30  FOR I = 1 to 20
40  LET M = M + I
50  LET N = N + 1
60  IF N = 2 THEN PRINT I,
      "EVEN" ELSE 80
70  LET N = 0
80  NEXT I
90  PRINT M
```

(See if you can determine what this program will do before you run it, then let it run to see what happens.)

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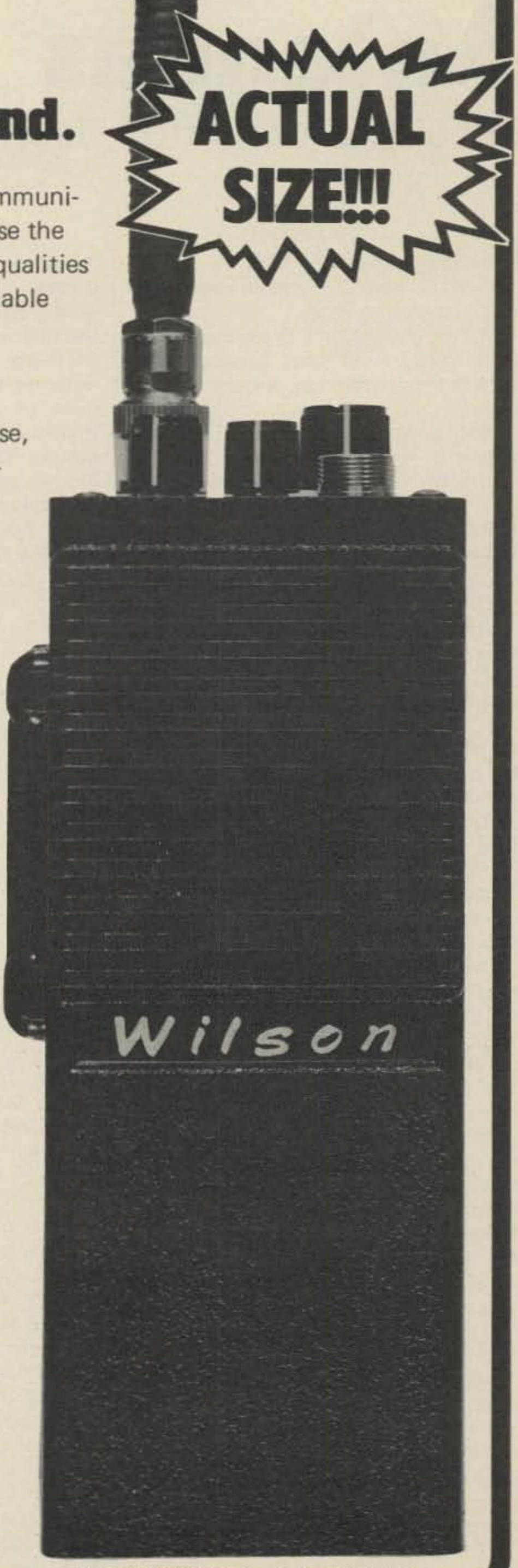

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CIRCLE 53 ON READER SERVICE CARD

a monthly feature by

WILLIAM I. ORR, W6SAI

Antennas

Design, construction, fact, and even some fiction

I couldn't believe my ears.

"Tell me again," I said as I sat down in the operating chair.

Doctor Livingston I. Presume smiled broadly as he sat down beside me. "I wouldn't put you on, would I?" he asked.

"Pendergast *married*? I can't believe it!"

Doc Liv was grinning from ear to ear. "He is. And you won't guess who he married. I would imagine all his old flames are in tears." The good Doctor leaned over and whispered in my ear.

"Well, I'll be darned," I said. "I didn't even know he was going with *her*. This is all very sudden."

My friend pulled a note out of his pocket. "Well, Pendergast remained a true ham to the last. He wants a schedule with you on 14,235 kHz each day on his honeymoon, starting tomorrow evening."

This was too much. "A true-blue ham," I shouted. "Taking a rig along on his honeymoon. Three cheers for Pendergast. I wonder what his bride will say finding a transceiver in bed with them?"

The good Doctor smiled. "All you have to do is wait until tomorrow evening and you'll find out."

I'll be there," I replied. "But I must admit your news has had a jarring effect. It's hard to come down to earth after that block-buster."

Doctor Liv agreed. But he thought that our mutual DX-friend would still have an avid interest in amateur radio in the years to come. He also thought that even if Pendergast dropped out of the ranks of active amateurs, sooner or later he'd be back on the air once again.

"They always come back," Doc Liv said firmly.

"Meanwhile, what about antennas?" I asked no one in particular.

"Here's a note in the mail from Tim, N4UM. He's had a lot of luck with multiple inverted-V antennas on 80 meters. The old bug-a-boo bandwidth is of great importance these days with the new sold-state transceivers. Many of them don't like to work into an antenna having an s.w.r. much in excess of 1.5-to-1. And they just turn themselves off! This is tough on 80 meters as it is very difficult to build a simple antenna that will maintain a low value of s.w.r. across the whole band. So most fellows cut their antennas for one end of the band or the other and let it go at that.

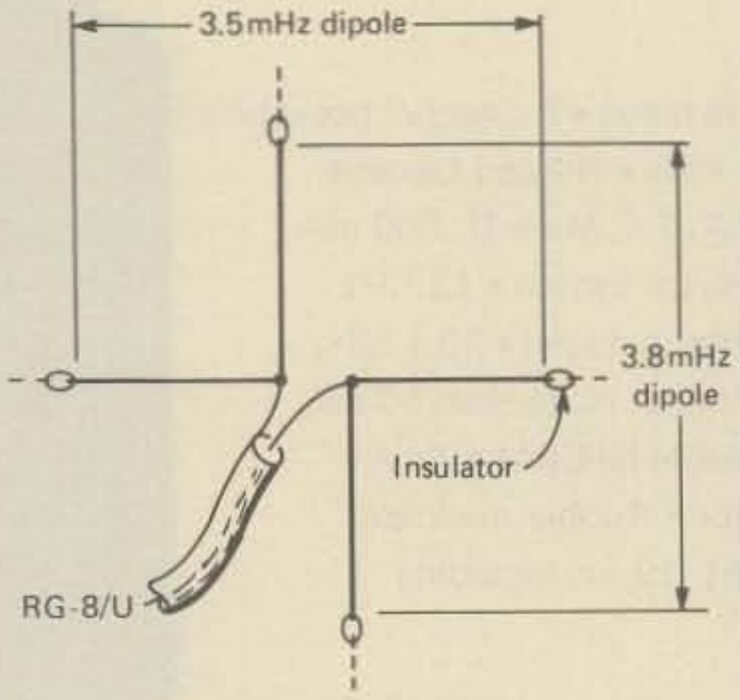

Fig. 1- The multiple inverted-V antenna for 80 meters at N4UM (top view). The feed point is at the apex of the array.

"Tim connected two inverted-V antennas in parallel at the feed point. One is cut for 3500 kHz and the other one for 3800 kHz (fig. 1). The inverted-V's are strung up at right angles from a single 70 foot tower. He cut the elements longer than called for by formula and pruned them back to the point where he wanted the lowest value of s.w.r. to fall. Results? Look at the s.w.r. curve of fig. 2.

"Tim says the antenna is virtually omnidirectional and the whole set-up was a lot cheaper than trying to "pull" a dipole from one end of the band to the other with an antenna tuner. And I agree.

"This is a simple antenna to get working and it should be a good one for this winter DX season on 80 meters."

I reached into the desk drawer and handed a thick manila envelope to Doc Liv. "Here's an interesting letter from Dick, WB6OHK, that might interest you. Most DXers know of his block-busting signal on 20 meters. He's been working on various antenna designs for television, f.m. and amateur radio since the early 'fifties'.

"In 1965 Dick designed a boomless Quad that would provide either horizontal or vertical polarization on 10 through 40 meters. It was a two element design and the Quad support arms were only 15 feet long each. The design functioned as a 40 meter dipole and as Quad on 20 meters and as an expanded Quad on 15 and 10 meters. The largest loop was 18 feet on a side and element spacing was 9 feet. The array was originally designed for broadband f.m. reception in the 88-108 MHz band.

"In 1978, after being off the air for a few years, Dick went to work on his original design and has come up with a 40 through 10 meter "Monster Quad" on a 35 foot boom (fig. 3). Basically, it is a six element Quad on 10 and 15 meters, a two element Quad on 20

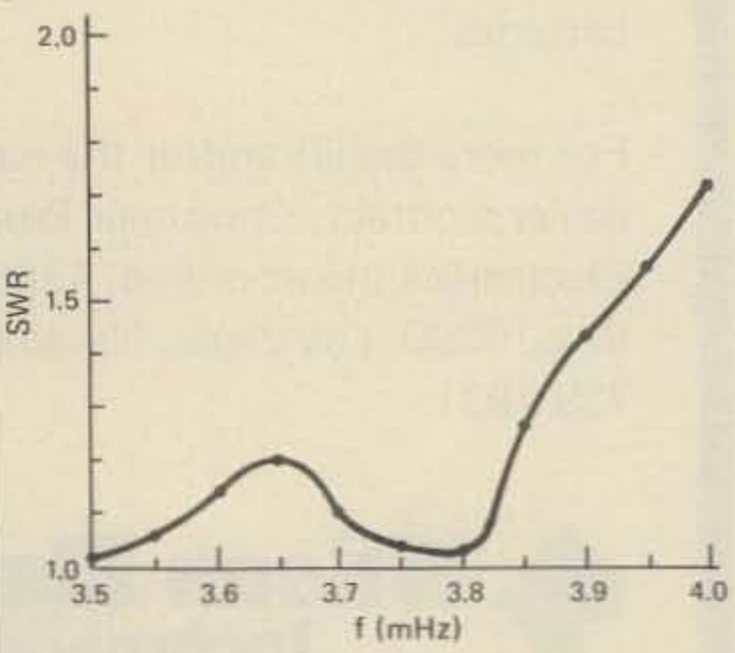

Fig. 2- The s.w.r. curve of the N4UM multiple inverted-V antenna.

48 Campbell Ln., Menlo Park, CA 94025

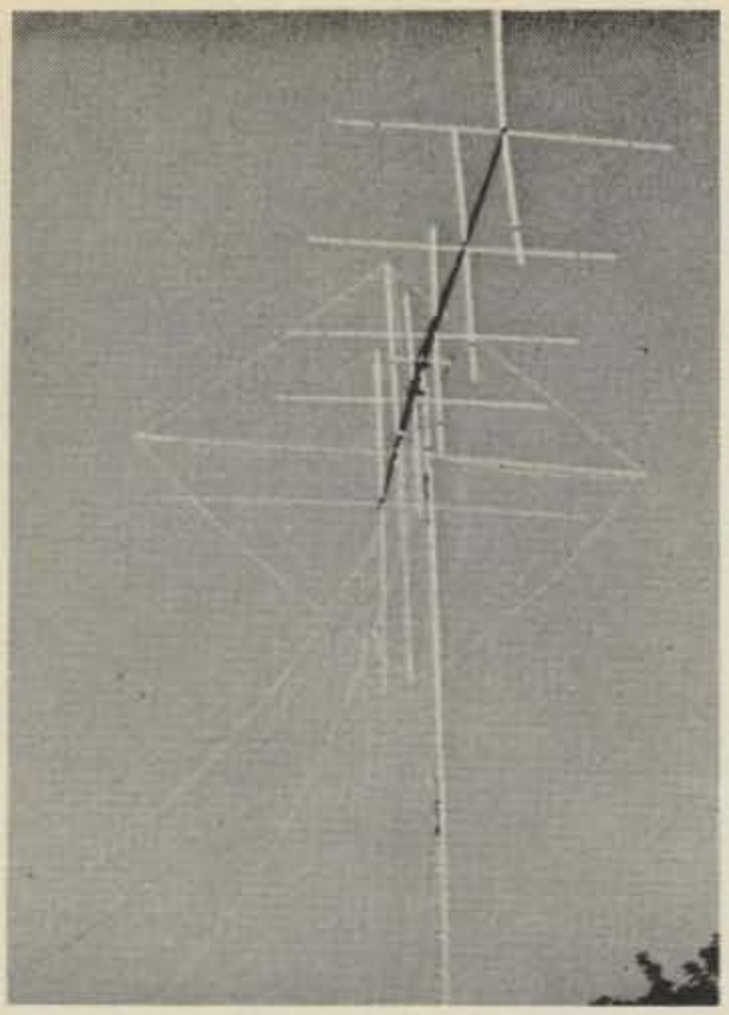

Fig. 3- The multi-band "Monster Quad" at WB6OHK. See text for details.

meters and a compact dipole on 40 meters. The biggest element—the driven element—is only 20 feet on a side and it's spreaders are 15 feet long. The whole array weighs about 65 pounds.

"The antenna is fed with RG-8/U coax line and an antenna tuner at the shack. This particular version is designed for horizontal polarization and the driven element is shown in fig. 4. It might be considered a fan dipole with the ends folded in, clockwise.

"A side view of the WB6OHK four band array is shown in fig. 5. The reflector has 20, 15 and 10 meter elements made of aluminum wire, which is also used on the driven element. The four 10 and 15 meter directors use #20 copper wire elements.

"Note that aluminum spreaders are used on the driven element. These are not broken up, and serve to act as reactance which cancels the radiation from the X-portion of the driven element. You'll note that the spreader length is just about a quarter-wave on 20 meters. On 15 and 10 meters there is little or no cancellation and the inner portion of the Quad loop radiates, providing some additional signal gain.

"The reason an antenna tuner is required is that the big loop is voltage-fed on 20 and 10 meters and current-fed on 40 and 15 meters. Loop Q is low and the s.w.r. on the coaxial line is not extreme, but a tuner is required at the bottom end of the line to provide a nonreactive match to the transmitter."

"Very interesting," said the Doc. "It looks as if this is an excellent antenna to play around with. Not many antennas that cover four bands and provide good gain on three of them!"

"Yes," I replied. "But not all amateur antennas are this complex. Many fellows are severely limited in antenna choice. Take Bill, AA4M, for example. He wanted a good, "invisible" antenna for 40 and 80 meter operation. His only chance was to erect something in a tall tree in his backyard. So he had a tree servicing company hang a pulley on a branch of the tree, about 70 feet up in the air. He then hung a length of #12 stranded, insulated wire secured to a nylon rope at the top.

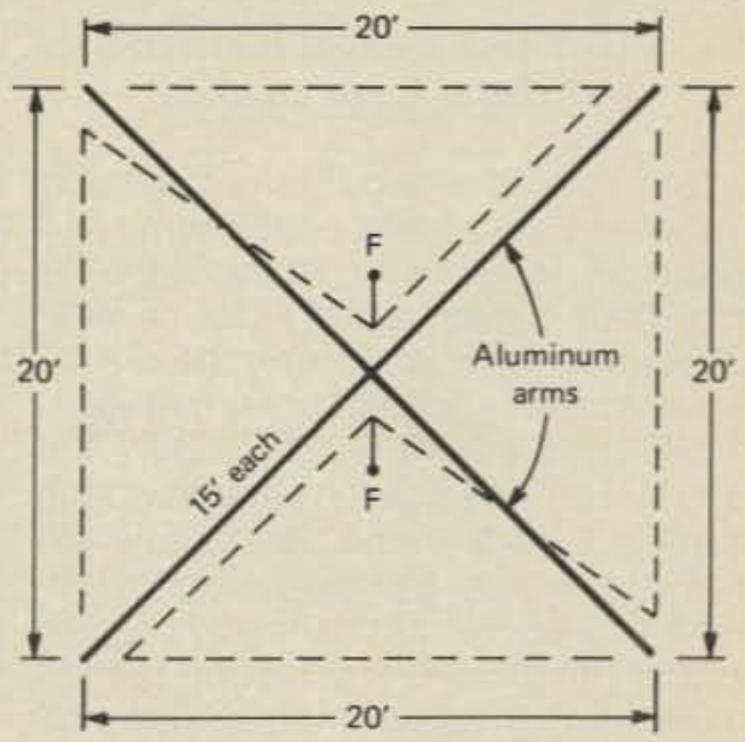

Fig. 4- The driven element of the WB6OHK Quad. The dashed lines indicate the wire element. F-F is the feedpoint.

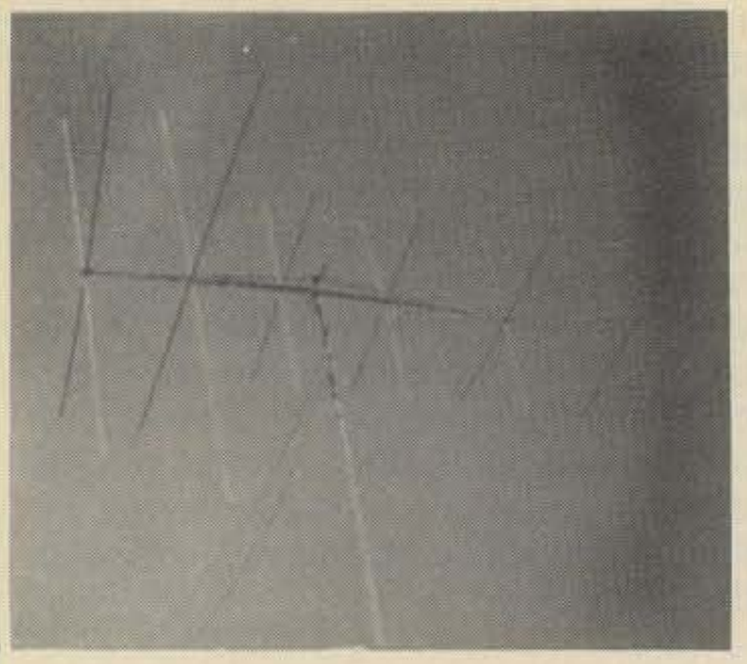

Fig. 5- The side view of the WB6OHK multi-band Quad antenna.

"Bill wanted a good ground system for his vertical so he bought some #17 electrical fence wire from Sears at less than eleven dollars for a half-mile! Over a period of time he put 16 radials down, each about 65 feet long.

"He tried several ways to bury the radials and finally evolved a workable scheme with a friend. A shallow slit was cut in the ground using a flat-head turf shovel and a friend put the wire in the ground and tapped the slit closed with a rubber mallet. Two people can put down 16 radials this way in about three hours.

"The only damage to the lawn was yellowed grass along the slits, but this turned green again in about 10 days."

Doctor Liv looked at a photo of the installation (fig. 6) which showed the base of the antenna (surrounded by a neat wire fence) and the cement counterweight block on the nylon rope which kept tension on the antenna. "Very nice," he pronounced.

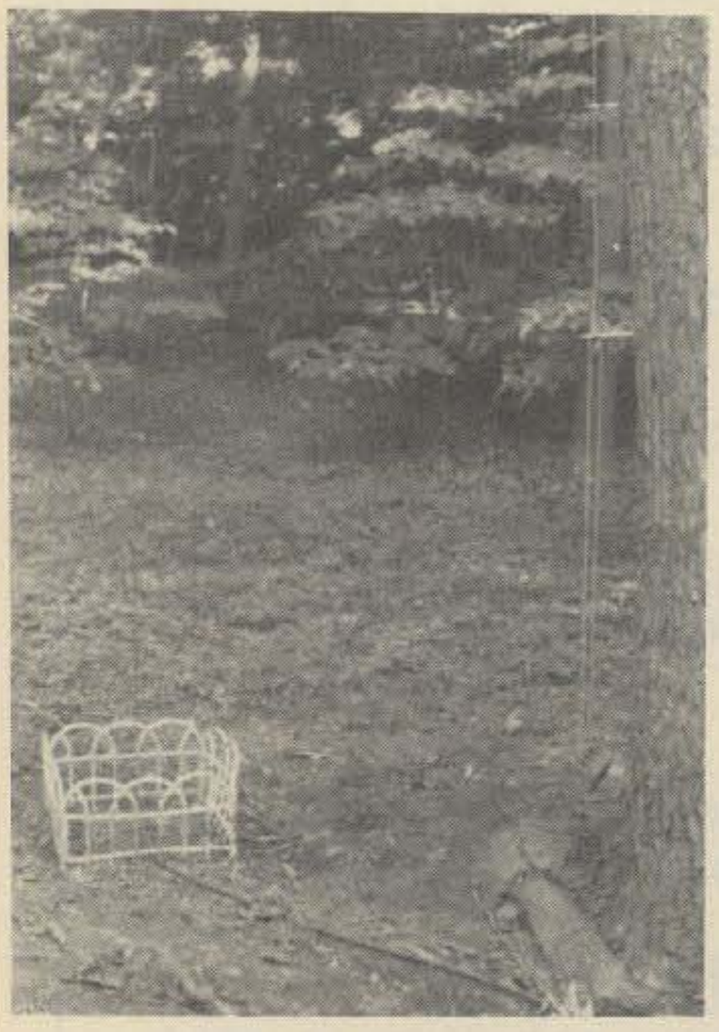

Fig. 6- The base view of AA4M's vertical antenna showing the counterweight (right) and the feedpoint.

"Bill says the antenna really works on 80 meters. He points out his 5 band DXCC in one winter season, with a 579 report from HS1ABD in Thailand—a long, long way from Virginia. Just recently he added a *Unadilla* 40-meter trap. Antenna length was reduced to 55 feet to make up for the trap inductance. He pruned the antenna for resonance at 7.0 MHz and 3.5 MHz and was pleasantly surprised to see that he could cover the whole 40 meter band with a reasonable s.w.r. value and could work as high as 3.85 MHz on 80 meters without the s.w.r. getting out of hand.

"Bill sent me a picture of the antenna, but its nearly invisible, so no use showing it. As he says, its very difficult to take a picture of a nearly invisible antenna!"

"I've heard AA4M on 80 meters," said Doctor Liv. "He's one of the best signals in here from the east coast."

I tossed a short note over to my friend. "Remember Pendergast wouldn't tell us where he went on his honeymoon? But Paul, VE3KOI, knows."

Doc Liv raised his eyebrows. "How did he find out Pendergast's little secret?" he asked.

"Very simply," I replied. "Look at this map that Paul sent me. It shows a section of Scott Passage, on the northern reaches of Lake Huron. Just off the Canadian coast, near Algoma, is Pendergast Island at 82°43' West latitude and 46°10' North longitude. Deduction tells us that is where our friend and his new bride are spending their honeymoon!"

The two friends continued in easy conversation as the day waned and evening came on. A cold bottle of California Chablis sat on the table and the setting sun made the glasses glow with a robust color. In the background an observer could note the station receiver running at low volume. Radio conditions were excellent and DX from all over the world was pouring in. But there was no hurry. Tomorrow would be another day. CQ

Here's a three-in-one construction project.

A Matching Circuit

But Not For Antennas

BY JOHN J. SCHULTZ*, W4FA

Modern RC type audio filters together with integrated circuit amplifiers can provide the circuit performance that years ago could only have been achieved with the use of expensive and bulky inductors. Many such RC filter circuits as well as filters using LC circuits with the popular 88 mH surplus toroid inductors have appeared in magazines in the last few years. Not all amateurs, however, have been successful in using such circuits. Although the circuits may use relatively few inexpensive components, such circuits usually require that certain key components be closely matched. If the key components are not closely matched, the circuit performance can be very disappointing. In reality, most of the problem revolves about closely matching R and C type components since the commerically wound toroid inductors are usually held to sufficiently close tolerances.

If one has a good R/C bridge there is no problem. But most amateurs do not have good bridges and even if one knows a friend who does have one, it is not always convenient to sit and use it for an hour while trying to sort out and match a bunch of components. Hence, the evolution of the simple test circuit described in this article. The test circuit will allow anyone to closely *match* garden variety R or C components. It also can have a number of ancillary uses as a test oscillator and secondary R or C *measuring* circuit. The latter requires some known, calibrated components as described later. But, even if one cannot calibrate the circuit, it can still be used for its prime function of *matching* components. When building a filter the exact value of the components used is usually not as important as having the components matched. For instance, the circuit of fig. 1 shows an active RC filter which has a 300 Hz bandwidth for c.w. centered on 750 Hz. The critical components are the two 1.5 megohm resistors and the four 1000 pF capacitors. Even if one didn't obtain exactly 1000 pF capacitors but, say, matched three of the capacitors against one which was 10% higher in value, no great harm would be done in this case. The center frequency would be shifted slightly higher (perhaps to around 800 Hz) but the bandwidth (300 Hz) of the filter would be retained. The same holds true for a great variety of active low-pass, high-pass and band-pass filters. The prime exception would be encoder or decoder circuits where no great change in frequency can be tolerated. But, in these cases, if one has at least one component of the known, correct value the other components can be easily matched to it.

The test circuit is shown is fig. 2. It consists of a standard multivibrator circuit. The two capacitors, the 1.2k resistor and the series 330 ohm and 1k variable resistor control the frequency of oscillation. Normally, the two capacitors and the two resistor legs have equal values. Then, the square produced has equal *on* and *off* times or a so-called *duty cycle* of 50%. If the two RC products are not the same, the duty cycle will be greater or less than 50%. In the case when the on/off times of the square wave are equal, the collector current flow through the 330 ohm resistor, between the two collectors, is balanced out. That is, during one half of the oscillation cycle current flows through the resistor in one direction and then during the other half of the cycle an equal magnitude current

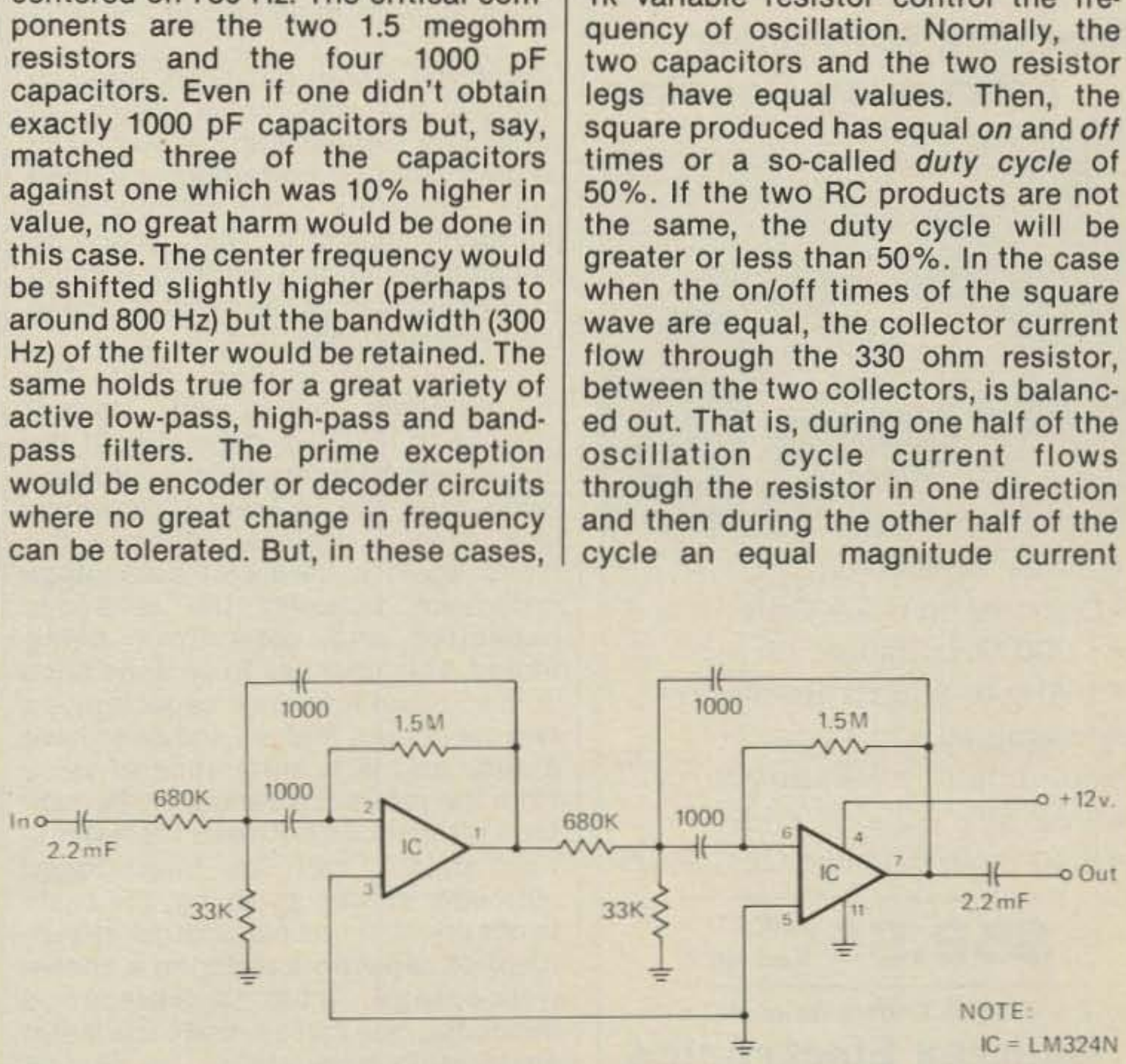

Fig. 1 - A typical type of active RC filter where key components (four 1000 pF capacitors and the two 1.5M resistors) have to be fairly closely matched if good circuit performance is to be obtained.

*c/o CQ

flows in the other direction. A zero center microampere meter placed across the resistor would read zero. However, if any one of the two capacitors or two resistor legs is changed in value, the on/off times will change and there will be a net positive or negative current flow and the microampere meter will deflect accordingly. One can also place a frequency counter across the 330 ohm collector-to-collector resistor and note that the frequency read will be higher or lower than the reference frequency when all the components were balanced. Either microampere meter or frequency meter readout provides a quite sensitive indication of the difference in value between components. Differences in value less than 1% can be easily detected in most cases!

If one uses the circuit to match capacitors, one capacitor is left in the circuit as a reference and the other capacitors are inserted in the circuit to be matched against it. In this case, one has to first set the circuit for a balanced condition. Two capacitors known to be of the same value within a few percent are inserted in the circuit and the 1k variable resistor adjusted for zero reading on the microampere meter. Alternatively, the 1.2k collector resistor and the combination 330 ohm/1k variable resistor can be replaced by two 1.2k carbon film resistors of the 1% tolerance variety. The circuit only has to be balanced once. That is, if one balances it with two known .01 μf capacitors, it doesn't have to be balanced when matching other value capacitors. The circuit as shown worked with capacitor values ranging from 500 pF to 50 μf,

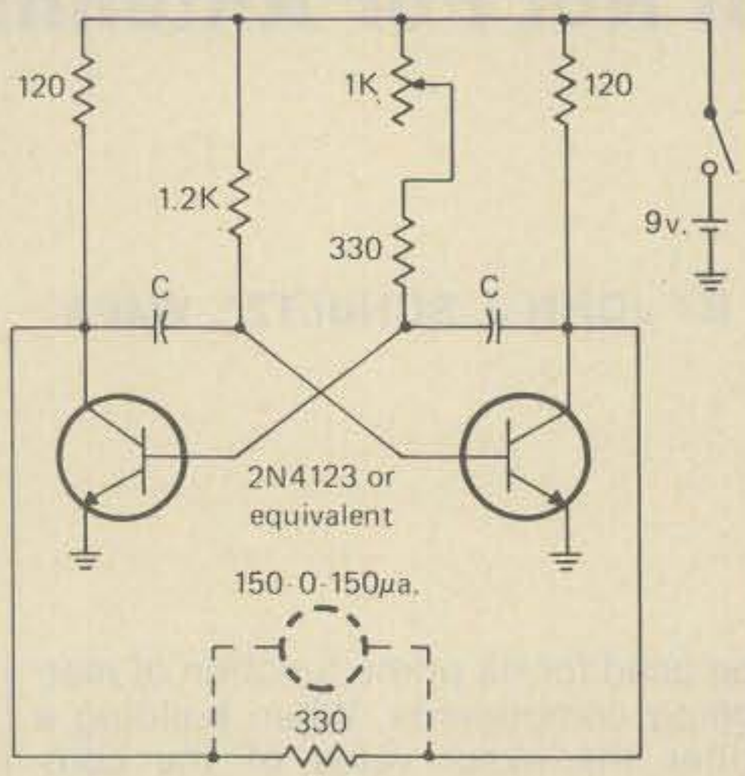

Fig. 2 - The circuit for capacitor and/or resistor matching. The only difference between the circuit and the usual multivibrator circuit is the 330 ohm resistor between the collectors. Its function is explained in the text.

With the circuit balanced, one can choose any one of a batch of capacitors marked with the *nominally* desired value as a reference and then start comparing other capacitors in the batch against it. Test capacitors can be made up in a series or parallel as necessary to get an exact match to the reference capacitor.

It will be noted that the microampere meter will deflect positive or negative depending if the tested capacitor has a higher or lower value than the reference capacitor. One can, if desired, calibrate the meter scale in terms of percentage difference between the reference capacitor and capacitors being tested. This only has to be done once with a known reference capacitor and two capacitors that are known to have a 10% and 20% difference in value from the reference capacitor. Percentage differences between the calibration points can be interpolated although, strictly speaking, the scale is not linear. If one has a larger assortment of capacitors differing a known percentage from a reference capacitor, one can calibrate the meter scale quite accurately. The percentage difference calibration will hold closely true throughout the capacitance range of the circuit although the circuit was only calibrated with one set of known capacitors.

One can carry the above calibration a bit further if one has a variety of capacitors of known value. The circuit can then be used to measure unknown capacitances by noting the percentage difference reading from a reference capacitor. It would require too many known capacitors to use the circuit in this manner throughout the 500 pF to 50 μF range but it can be used to advantage in some μF ranges.

If the cicuit is used to measure absolute resistances instead of capacitor values, all of the foregoing apply except, of course, that a reference resistor is used and other resistors compared to it. To initially balance the circuit two known 10,000 pF capacitors can be used. Or one can purchase known cpacitors with a 5% or less tolerance such as some dipped mica or polystyrene types. In any case, temperature stable capacitors should be used such as dipped mica, polystyrene or specially temperature stabilized disc ceramic (Centrab X5F series). Ordinary disc ceramics should be avoided as their capacitance can change quite a bit with temperature over a short period of time and make resistor matching in the circuit very difficult. Resistances from about 470 to 1M ohm were tried in the circuit. Probably an even greater resistance could be accommodated if different capacitors were used but the 470 to 1M range satisfies most requirements. Again, the circuit is quite sensitive and components could be matched to less than 1%.

The circuit can be constructed in a variety of fashions. One version was constructed in a 4 x 4 x 2 utility cabinet (Bud AU-1083) with the meter on the 4 x 4″ side. Two binding posts on the top of the enclosure held the reference capacitor and another two binding posts (with alligator clips inserted) held the capacitor being checked. The circuit was powered by a 9 volt transistor battery and the circuit itself constructed on a piece of perforated board stock placed on the meter terminals. This version provided only for matching capacitors but, of course, a switching scheme could be used to change the circuit for either R or C matching as desired. Unless one intends to actually calibrate the meter in terms of percentage difference, there is no need to use an expensive meter. Any one of the large variety of zero-counter f.m. tuning meters which cost only a few dollars and which have a basic range of ±100 to 250 microamperes will provide excellent results.

This month by

ROD LINKOUS, W7OM

DX

News of communications around the world

Just took off the headsets from a long stint in the *CQ* World Wide DX phone contest. Tired, yet pleased after a good weekend. Finished up DXCC plus on 10 meters. Thought I might share a DXer's assessment of the complex world of DX contests.

DX Contest Contribution to DX

To many the DX contest is a wasted weekend where QRM is rampant. To some it constitutes a real high. Some say that those speed demons must be high on something. Yet it has something for everybody.

It is now possible to work a hundred or more countries on a single weekend. With a tri-band beam and a kilowatt it is easy at the high of point of the sun spot cycle.

With the widespread availability of modern transceivers, many once rare countries are well represented. For the rarer DX stations, the DX contest provides a means to satisfy some of the constant demand in a very short period. To those needing the country it provides a concentration of available new ones. The contest weekend provides a newcomer to DX, probably the greatest single opportunity to work lots of DX in the shortest possible time. DXCC in a single weekend for the dedicated.

Those new transceivers coupled with economy jet travel gives us the contest DXpeditions. If you took the time you would find that more than half of the DXpeditions put on annually coincide with a contest weekend. Many DX clubs sponsor the DXpeditions just for the points to boost the club score. (I bet they have more fun than they admit.) The club competition poineered by the *CQ* DX contests generates several trips that would not otherwise happen. Matter of fact, the club winner is usually determined by the effectiveness of the club DXpeditions.

The club competition has another great side effect - it gets more DXers involved. Local clubs generate a lot of interest. It also creates a media of rivalry. The competition between DXers and clubs benefits us all.

The number of Alaska stations in the World Wide DX phone 1979 session was due in part to the Anchorage DX Club. The rivalry between the Frankford DX Club and the Potomac Valley Radio Club has sent more DXers to the Caribbean than you would ever imagine.

Looking back over my first VP2 cards indicates about half came from the two club's DXpeditions. Next time you visit a friend's shack where he proudly displays his QSL cards on the wall, check two things: how many were worked in a contest and how many show club affiliation?

Back to the hardware. Did you ever stop to think how much of the gear you have was developed at least in part for the competitive DX wars? How to build and erect beams (big big beams) comes from the demand of the big contest stations. Some of the big linear amplifier design efforts came originally from the contesters.

Rush Drake, W7RM, and Dale Hoppe, K6UA, are locals and long time friends. Over the years I never cease to be amazed at how many new calls try to work them. Not because they QSL, but to tap their knowledge. These two DXers are typical of the DX contesting clan. They know what it takes to get out and work them first. These two gentlemen have schooled many on big antennas and linears. Also where and when to be there to find the rare one.

Rush is always called on for amateur convention programs. He is

*5632 47th Ave. SW, Seattle, Washington 98136

Germano Bezzina, TG9GI, is not only one of Guatemala's most active DXers, he is also one of their better QSLers. He was responsible for that DXpedition to Tikal as T75AA. Active on all bands, he has helped many of us with 5BDXCC.

Andi Glaeser is typical of many European Dxers. He holds the call DM4WPF and the shortwave listener DM-6992/F. Among his interests, other than DXing, is the hobby of stamp collecting. Unfortunately they do not have IRCs in DM-land, so he relies on the incoming IRCs to seek QSL returns direct. Most of the time he has to use the bureau system and a lot of patience.

L to R: Julius, ZS6AF, Gerry, 7P8BC, Jerri, WA6QFO, Abe, ZS6ZS, Tony, ZS6AEC. The group that put Venda on the amateur map, on Venda's Independence Day 13th September 1979. Pic. taken at Sibasa, the capital, the name of which has been changed to THOHO-YA-NDOU meaning "the head of the elephant." Sid ZS4MG is the QSL Manager. (Photo via W2LZX)

the center of attention at those rare club meetings he attends. Many reap the benefits from knowing and associating with the master of a winning contest station.

Getting the most out of everything goes without saying. Not only antennas, transceivers and linears, but other gear too. Many accessories were developed and perfected for the avid contesters: speech processors, filters, memory keyers, just to name a few.

DX contest stations are perfected the year around. They put out good signals for obvious reasons. The operators are skilled. The combination makes working them easier. MOST QSL.

So if you have been DXing for a long time or just starting, DX contests do contribute to your DX hobby. If you need some of the lesser rare ones, it gives a great chance to work them. It brings on the DXpeditions. (Many DXpeditions stay on longer than the weekend.) Contests give many clubs a viable program or two. Remember the PJ9GIW slide show? It is a QSL card collectors dream. He can work more DX and get more cards in a shorter time than by any other means.

Yet the coin has another side. It wipes out the band for the purist and the rag chewer. There is more QRM than most can take. But when they sit back and realize the contribution DX contests make, even the purists agree the good far out weighs the lost weekend. Especially when he checks back through his QSLs and sees how many were made possible by a DX contest. Besides it eliminates the list operations too.

Awards Checkpoint Change

The *CQ* DX Awards programs utilize local checkpoints throughout the world for the convience of the DXers. Occasionally new checkpoints are added, usually at the request of local DX organizations. Likewise, with time and circumstances checkpoints are changed. With this announcement OH2TM will no longer be the Finnish checkpoint. We thank Tauno Marvala OH2TM for his efforts on behalf of the *CQ* Awards programs. Our new checkpoint in Finland is:

Kari-Pekka Aho OH2PQ
Osuuskunnantie 33 B 22
SF-0060 Helsinki 66

DX Extras

DE K9LSA BT Just returned from a one man DXpedition to Tonga and the island of Niue. Made approximately 1,800 contacts and card should be out by the time you read this. The self sponsored DXpedition ot A35PF and ZK2PF can be QSLed via my home QTH. AR

DE OZ8AE BT I am the radio operator on the Danish Polar vessel "Nella Dan". I will be making several DXpeditions to the Antartica this season. I'll use my call VKØJC from Macquaire. For the latest info look for me as OZ8AE/mm on 14035 and 21035. I mail logs to my YL each time we are in Melbourne. AR ed - Jorgen made about 1,400 contacts as VKØJC last season. He gets from the ship to land via the shipborne helicopters. Interesting way to spend a cold summer. Hi.

DE Radio Club De Concepcion BT The Radio Club de Concepcion (Chile) will do, with the cooperation of the Chilean Navy, a DXpedition to Juan Fernandez Island in January. Phone 80 thru 10; CW on 20 and 10 only. They will use zone call system. The club is requesting a CEØZ call, if not issued will use CE5CJA/CEØ. QSL cards via Box 2545, Concepcion, Chile with SAE and 3 IRCs. Roberto Ibieta, professor of electrical engineering at the University of Concepcion, is organizing the project. The island is perhaps best known to English-speaking people as the locale of Daniel Defoe's novel, *Robinson Crusoe*. AR ed - Hope the column gets to you in time.

DE GU5CIA BT GU5CIA went QRT on 27 September 1979 after 42,000 contacts and 238 countries. I am being transferred back to my company's

DXpedition to Andorra, 1979. The above view shows the operating site, 8300 feet above sea level, for C31MS and C31MK. QSL via EA3MS. (Photo via Jack, W2LZX)

The WAZ Program

Single Band Worked All Zones

15 Meter Phone

30...OK3EA
31...JA6AS
32...W6NZX

20 Meter Phone

262...WB9ZBE
263...WA4LBJ
264...VE7VT
265...VE3IKN
266...W3AP
267...K1GSK

20 Meter C.W.

88...JG1WSC

40 Meter C.W.

14...JR1AOQ

All Band Worked All Zones

S.S.B.

1772...JH7DFZ
1773...K1KNM
1774...W6CN
1775...K2POA
1776...JA4FM
1777...F6EXV
1778...WDØBNC
1779...KB4IT
1780...WD8MGQ
1781...KC4B
1782...WD9CUP
1783...W5LDH

C.W. and Phone

4658...WA6BTX
4659...JA7AS
4660...WD9CUP
4661...W5IB
4662...W4JTL
4663...N6ANN
4664...JA2QCX
4665...VE7DTS
4666...W9NSO
4667...AA4A
4668...JA5ANP
4669...JR6BU
4670...VE4EW
4671...KØYST
4672...SM6DYK
4673...LA2KD

All Phone

566...N4MM

The complete rules for WAZ are found in the May 1976 issue of *CQ* Magazine. Application blanks and reprints of the rules may be obtained by sending a self addressed stamped envelope, size 4½ x 9½ to the WAZ Manager, Leo Haijsman, 1044 S.E. 43 Street, Cape Coral, Florida, 33904. Applicants forwarding QSL cards direct to the WAZ Manager or a check point, should include sufficient postage for the safe return of their QSL cards. Please note that effective June 1, 1979 the processing fee for all *CQ* certificates was raised to $5.00. This fee must accompany all applications

Zbyszek Oltarzewski, SP7HOV, is an avid c.w. DXer. From his Poland QTH, he contests and chases the rare ones.

headquarters in Beaverton, Oregon. Prior to coming to Guernsey, I spent 2½ years out in Tehran as EP2SV along with the chief op- K6KM.

It has been a lot of fun from Guernsey during the past year and a half. But all good things usually come to an end. So, I'll be on the air for awhile as K5MM/7 or W7NQ - both my calls -from Oregon. At least until I wrangle another International assignment out of my present employer. AR

From the Pileups

This item started out as a joke from the XYL who remarked about the pileup of incoming news items. Unfortunately, lately they have dropped off some so a lot come from the real thing. The source is noted in parentheses.

Report on new DXpedition to PY0 Trindade Island in February and March; the call sign will be PY0MAG. All bands 160 through 10 meters. (*PY1MAG via KA3BOD*) I have on hand adequate cards and complete logs of ZD8JC for the peroid of July 1968 through July 1972. (*W5VD*) PY1RO, Rolf, made the FIRST EVER DXCC on 160 meters by a foreign station - DXCC #14. (*W1BB*) First LEGAL 160 meter QSO from Saipan, in the Northern Marianas made with JA1CUW by KG6SW. (*K7JA*) J73A was a special call used by John Ackley KV4KV during the disastrous typhoon David. A special QSL is available denoting the event. (*K2TJ*) KS6DV/KH1 will sign VR1PJ upon request. (*Geoff*) VQ9KK operates week days 3517/18 at 1300 and 2300 UTC; and 7007 at 1330 and 2330 UTC. Also Saturday on the same meter frequency from 1300 to 0100 UTC. Bill checks the low c.w.-end of 160 meters frequently around 0200 UTC. (*LIDXA*) USSR 160 meter activity is building, with UT5AB reporting a number of Ukraine stations active. They regularly work Brazil and the U.S. on 1852 an hour or so before their sunrise, often with PA0HIP helping. (*K3KWJ*) Another 160 meter DXCC by N4EA, Don McDoniel. (*WA4OUF*) NOTED from Stew W1BB's 160 meter bulletin, it is free for the price of an SASE. Also noted is Stew's comment that he is slacking back on the 160 DXing at 148 confirmed. At 75 Stew is using his "Pep, Vim and Vigor" for the "Joy of Living". WHat he likes about 160 is *The Challenge, The Thrill* and *The Satisfaction* of working a new one. (*ed*) We are off on another six months of DXpeditions with YASME. Starting with J2ABV in November. (*W6KG and W6QL*) Among the DX speakers slated for the 1978 National ARRL Convention is Chip Margelli K7JA/JR1ZZC et al. (*N7CY*) W7FR/7 (The Western Washington DX Club) was the leader in class 4-A of the 1979 Field Day effort. Going with less than 10 watts per station was a real challenge for a DX and contest club who normally run a kilowatt. (*Totem Tabloid*) Before leaving on current DXpedition through Africa and the Near East, many sent donations to the Indian Ocean DXpedition Trust Fund, Box 34349, Dallas, TX 75234; many THANKS!! (*N2KK*) M1J appears to be Slim. (*LIDXA*) Tim, BV2B is authorized to operate on the following frequencies *only*: 14025, 14218, 14225 (*ed - Bill did you arrange that?*), 21320, 28030 and 28530. One sure time to catch him is Wednesdays on 14218 from 1200. At 1400 that day, he generally joins W7PHO's Family Hour on 14225. (*Long Skip*) Slim is apparently having a great time using Torres old call of CR9AJ. Torres left Macau last June and is now very active from Portugal as CT1ADP. (*ed*) Ken Stone, VE3HRS, has been working out of Brazzaville since early last September and there have been reports of him signing /TZ on a few occasions. However, our sources very close to the situation, say he has been unable to come up with permission to operate from TN8. If he does get on, please remember that his prime concern is to communicate with Canadians, and that he will put in only a little bit of operating time to try to satisfy some of the masses waiting to pounce on him for DXCC credit. He is not on a DXpedition. (*Long Skip*) Effective 1 January

John Brunner, F5VU, is a Dxer of note. While not chasing the new ones, John fills out lots of QSL cards for DX stations like FB8XV. His call is readily recognized as he has handled the QSLing chores for a lot of FB8 stations over the years. (Photo via W7PHO)

The WPX Program

Mixed

785 .....JA1EN
786 .....UA2FBG
787 .....UA3ABD
788 .....JH7DFZ
789 .....JA1VDJ
790 .....WA2MUA
791 .....WB8JDA
792 .....IS0MVE
793 .....K5PR
794 .....WA6BTX
795 .....XE1FX
796 .....I2BUH
797 .....WB8YQX
798 .....I2DMK

S.S.B.

1203 .....XE1OX
1204 ....WB9ZBE
1205 ....UA6HAC
1206.....UA9ADF
1207 .....UI8AAY
1208 .....W6YMH
1209 .....JA1VDJ
1210 .....TF3AC
1211 .....W7KEU
1212 ....WB3HPJ
1213 .....XE1FX
1214 ....XF4MDX
1215 ....WB9RJQ
1216 .....IV3YRN

C.W.

1871 ....UA3ABD
1872 .....UA3AEZ
1873 ....UA3DGO
1874 .....UA3DIW
1875 .....UA3IAK
1876.....UA3VDS
1877....UA4WWS
1878 ....UA0CBW
1879.....UA0OV
1880 ....UK1ADK
1881 ....UK3XAM
1882.....UK4SAF
1883 ....UK4WAA
1884.....UK0LAD
1885.....UB5HQ
1886 ....UB5KAM
1887.....UB5LDA
1888.....UB5RAF
1889.....UB5ZBG
1890 .....UF6FDL
1891 .....UI8OK
1892.....UR2RSA
1893.....UT5HN
1894 .....JA1VDJ
1895.....N9ACZ
1896 .....DK9MB
1897 ....SM6DEC
1898 .....ZL2UK

VPX

167 ....UA1-143-1
168..UA3-142-1169
169...UA3-170-483
170...UA3-170-709
171....UA4-095-43
172....UA6-096-11
173...UB5-071-346
174...UB5-081-202
175...UP2-038-657
176 .....HE9OZH
177 .....I2-20046

WPNX

164.....WD8RIN

Endorsements

Mixed: 400 JA1EN, UA2FBG, JH7DFZ, WA2MUA, K5PR, WA6BTX, I2BUH, WB8YQX, I2DMK. 450 XE1FX. 500 UW9SG, WD8JDA, AE1T. 550 UA3ABD, IS0MVE. 600 LA7JO. 700 JA1VDJ. 750 UV3GW. 850 SM3EVR. 900 UK3AAC. 1000 JH1VRQ, PA2TMS. 1100 K5DB. 1200 VE7WJ.

SSB: 300 UA9ADF, UI8AAY, WD4ABN, TF3AC, W7KEU, XF4MDX, WB9RJQ, WB3HPJ. 350 XE1OX, WB8YQX, WA2SRM, W3GXK. 400 G3TZM/m, XE1FX, W4MNZ, K3IXD. 500 I8KCI. 550 IS0MVE. 600 JA1VDJ. 650 OE1KW, KL7AF. 700 UK3AAC, UV3GW. 750 W1DYH. 850 I8YZP, WA1JMP, JH1VRQ. 950 DJ7CX, PA2TMS. 1400 I8KDB, K2POA.

CW: 300 SM6DEC, ZL2UK, UB5ZBG, UB5RAF, WB9ZBE, W6YMH, UA3AEZ, UA3DGO, UA3IAK, UA3VDS, N9ACZ, UA4WWS, DK9MB, UA0CBW, UA0OV, UK3XAM, UK0LAD, UK4WAA, UB5HQ, UB5LDA, UF6FDL, UI8OK, UT5HN. 350 WB3JUK, UA3DIW, UB6KAM, UR2RSA, JA1VDJ. 400 WB2FFY. 500 UK1ADK, N6FX. 550 UA3ABD. 600 UB5VK, K6YK, DK7XX. 650 N6UH. 700 UW3UO, W1WLW, WA1JMP. 750 LZ1XL, UA4LM. 800 UA3GO. 850 UB5WK, UK4WAB. 950 YU7SF. 1050 DJ7CX. 1200 W3ARK, G2GM. 1400 W2NC.

10 meters: DJ7CX, OE1KW, W6YMH, JH1VRQ.
15 meters: WB2FFY, UA3GO, UK5MAG, JH1VRQ.
20 meters: XE1OX.
80 meters: OE1KW, SM6AYM, K3IXD.
160 Meters: OE1KW.
Africa: UK3AAC, UK5WAZ.
Asia: UV3GW, UA9CGL.
Europe: WA4OIB, UV3GW, UA9CGL, UC2CX, UA3PAW, UB5KAM, TF3AC, WB3JUK.
No. America: UK3AAC, UK4WAB, UK5WAZ, EP2TY, OE1KW, W6YMH, W3GXK, WB3JUK, WB9RJQ, XF4MDX.
Oceania: DJ7CX
So. America: UK3AAC.

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, 5014 Mindora Dr., Torrance, Calif. 90505. U.S.A.

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.

Mixed

1805 ..... W4WV
1786 ..... K6JG
1779 ..... K6XP
1751 ..... F9RM
1703 ..... YU2DX
1610 ..... ON4QX
1609 ..... VE3GCO
1577 ..... W3PVZ
1561 ..... W2NC
1536 ..... N4UU
1536 ..... W7LLC
1525 ..... W2NUT

1500 ..... K2VV
1477 ..... YU1BCD
1475 ..... N4MM
1462 ..... DJ7CX
1455 ..... W4BQY
1411 ..... K5UR
1401 ..... PA0SNG
1350 ..... KE4I
1343 ..... N6CW
1307 ..... N9AF
1286 ..... AA4A
1254 ..... W9FD

1245 ..... N2AC
1236 ..... N6JV
1150 ..... W0AUB
1149 ..... YU1AG
1146 ..... DL1MD
1126 ..... K5DB
1120 ..... N4NO
1112 ..... K6ZDL
1109 ..... I6SF
1095 ..... I0JX
1066 ..... WA1JMP
1063 ..... W8CNL

1023 ..... YU1ODS
1016 ..... SM7TV
1015 ..... W0SFU
1002 ..... PA2TMS
1000 ..... SM6DHU
1000 ..... JH1VRQ
980 ..... IN3ANE
952 ..... WA2AUB
938 ..... W0SD
909 ..... PY4OD
902 ..... K6DT
900 ..... K8LJG

873 ..... N6JM
852 ..... SM3EVR
848 ..... W6ANB
844 ..... K8CH
830 ..... W0IUB
811 ..... YU3EY
782 ..... YU4EBL
755 ..... YU2CBK
749 ..... CT1LN
668 ..... N8II
605 ..... I4BFY
600 ..... I2MQP

S.S.B.

1650 ..... F9RM
1621 ..... I0AMU
1600 ..... W4UG
1547 ..... K5XP
1530 ..... I0ZV
1520 ..... K6JG
1402 ..... K2POA
1400 ..... I8YRK
1400 ..... I8KDB

1303 ..... N4MM
1200 ..... I4ZSQ
1200 ..... K2VV
1193 ..... PA0SNG
1182 ..... YU1BCD
1181 ..... K5UR
1170 ..... ZL3NS
1136 ..... HP1JC
1102 ..... AA4A

1054 ..... N4UU
1051 ..... WB2NYM
1017 ..... F2MO
1017 ..... DL1MD
1000 ..... N2SS
989 ..... DJ7CX
967 ..... PA2TMS
957 ..... W6RKP
938 ..... OE2EGL

932 ..... W6YMV
909 ..... PY3BXW
908 ..... I0MBX
850 ..... JH1VRQ
825 ..... YU1ODS
816 ..... YU1AG
816 ..... W2NC
808 ..... OZ5EV
805 ..... W4BQY

730 ..... N2AC
722 ..... WA2AUB
709 ..... ZP5RS
706 ..... WA2FKF
702 ..... N4NO
600 ..... I2MQP

C.W.

1482 ..... W8KPL
1432 ..... ON4QX
1382 ..... DL1QT
1371 ..... W2NC
1368 ..... K6JG
1302 ..... K6XP
1264 ..... N4UU
1202 ..... YU1BCD

1201 ..... N6JV
1158 ..... W9FD
1150 ..... W3ARK
1145 ..... G2GM
1124 ..... DJ7CX
1100 ..... K2VV
1087 ..... W4BQY
1086 ..... N2AC

1086 ..... K5UR
1056 ..... WA2HZR
989 ..... K6ZDL
986 ..... N4NO
941 ..... YU1AG
936 ..... IT9AGA
877 ..... I6SF
802 ..... KH6HC

788 ..... YU1ODS
773 ..... LZ1XL
768 ..... PY4OD
756 ..... SM0GMG
728 ..... I5IZ
709 ..... DL1MD
658 ..... EA2OP
650 ..... JH1VRQ

650 ..... K8LJG
647 ..... W9OYZ
628 ..... W1WLW
623 ..... JE1JKL
612 ..... WA2AUB
607 ..... I1TLA

Käz Okamoto, JA8ISU, operates this extremely tidy station in northern Japan. Active on both s.s.b. and c.w., Kaz is often found on the top bands.

weekends. (*LIDXA*) Making excellent recovery and progress and getting back into swing of things. Due in no small part to TLC given by faithful XYL Matneyo. Hope to bcnu soon. (*KH6IJ*) Word of caution on 160 low noise antennas. put them as far away from your vertical or semi-vertical transmitting antenna as possible - at least one wavelength - otherwise you'll pick up the same noise and crud, re-radiated from the transmitting antenna. (*W1BB; ed - you non-city dwellers take heed. Hi.*) LU3ZY is now active with two operators. Being worked on 40 and 10. (*Long Skip*) QSLing via K2FV for M1C is good *only* for the operation by N2KY

1980, the Northern Marianas will use the prefixs AH0, KH0, NH0 and WH0. Some of the current KG6R and KG6S stations have elected to keep their old call. The FCC notified us that they will commence to issue KG6 to California stations when they come up in sequence. So listen when you work that KG6; he may be in downtown Los Angeles. See you as KH0AC. (*KG6SW*) The fact that there is a Naval base on Andaman Island is one of the reasons why permission isn't being given to tourists to visit the islands. So it appears that VU7 will be on many wanted lists for a long time. (*Long Skip*) The TH8 prefix used by Jim Montague -TH8JM - was issued when the French were still in the country. The DXCC desk thinks the license expired when the French left, so TH8JM QSLs apparently won't be accepted for DXCC. Also, the TL8AZ operation was a pirate. However, fear not, Jim will be in TL8 until 1982. His new rig arrived damaged and he is expected to bring it back to the states on his vacation -November thru January - so he will be back on soon. (*The DX Bulletin*) UA1PAL -Franz Josef Land - is active on 20 meter c.w. An s.s.b. rig is on the way. (*Long Skip*) Some new call signs from East Germany will appear in 1980. The block is Y21A to Y99Z. For example, DM2AJD will become Y21JD. (*DM2BJD*) Mail received here is often open day and night, but never on opened enroute to Reunion Island, somewhere in Africa. IRCs, photos and green stamps are removed. That is why your direct cards are being returned via the bureau. (*FR7BP*) Don't count on any activity from VE3FXT in Burma, at least any activity sanctioned by the Burmese government. The word is that no licenses will be issued and that comes both from residents (who still renew their licenses annually and are allowed to listen on the amateur bands) and from foreigners stationed in the country. (*Long Skip*) Jim is now doing the whole thing - editing, typing, printing and mailing of *The DX Bulletin.* Bought printing press to cut down on the flow time to give the most up-to-date DX info possible. Another Cass operation. (*W1NG*) Speaking of Cass WA6AUD of *West Coast DX Bulletin* fame, he is on the roast beef circuit as a dinner speaker. He is spreading the word of those wonderful years of Red Eye Louie and company. (*ed*) This year's Fresno bash will be at the Holiday not the Hilton as in the past. (*The DX Bulletin*) TN0HL says he will be there until July except for brief trips to his headquarters in East Germany. He is staying close to 21,329, frequently in the company of WD9TTM. Seems the band there is

CQ DX Awards Program

S.S.B.

764 ..... W4PTT
765 ..... WB3ICM
766 ..... AI9F
767 ..... WD0BFT
768 ..... WA6BTX
769 ..... IT9KMU
770 ..... TF3AC
771 ..... XE1FX
772 ..... YV5AIP
773 ..... WA2VUY

774 ..... YV5GMN
775 ..... I8EWM
776 ..... I8XTX
777 ..... RA3AKX
778 ..... UA4QX
779 ..... UV3GW
780 ..... UA2FBZ
781 ..... UA9FU
782 ..... N8ARQ
783 ..... LA2KD

C.W.

392 ..... HA1ZH
393 ..... UC2CB
394 ..... UA6AAQ
395 ..... UT5RH
396 ..... UB5ZBG

397 ..... UB5HQ
398 ..... UB5ICS
399 ..... UA9CGL
400 ..... UK9ACP
401 ..... UP2PBZ

SSTV

3 ..... G3WW

S.S.B. Endorsements

310 ..... K8DYZ/319
310 ..... W3NKM/319
310 ..... K6WR/317
310 ..... I8KDB/317
310 ..... K9LKA/316
310 ..... OZ3SK/315
310 ..... I0ZV/315
310 ..... ZS6LW/315
310 ..... N4WF/314
310 ..... YV1KZ/313
310 ..... W6REH/310
300 ..... N4MM/309
275 ..... JH1VRQ/294
275 ..... N6AW/293

275 ..... I0MBX/280
250 ..... W0KU/269
200 ..... WD8MGQ/238
200 ..... I8IGS/234
200 ..... ZL1BOQ/203
200 ..... W4PTT/201
200 ..... XE1FX/201
150 ..... AI9F/184
150 ..... WA6BTX/187
150 ..... I8KCI/150
3.5/7 MHz UV3GW
28 MHz UV3GW
28 MHz RA3AKX
28 MHz WA2VUY

C.W. Endorsements

310 ..... W3GRS/313
275 ..... N4MM/280

150 ..... UA6AAP/151

Complete rules and application forms for the CQ DX Awards Program can be obtained by sending a business size, No. 10, envelope . . . self-addressed and stamped to: CQ DX Awards; 911 Rio St. Johns Dr.; Jacksonville, Fla. 32211 U.S.A.

on March 4, 10, 11, 12, and 13 1979. All others go direct. (*W8DVY*) Did you ever hear profanity ever stop a jammer? Or where did that Asian jammer get the tin pan alley records? Or who was the nice guy who reminded you that you were out of the band when you did something stupid? Couldn't be the same guy. (*ed*) A51PN, Bhutan has been in the W7PHO gathering several times weekly at 0100 or earlier on 21320. Pradhan is also active on 20 and 10 s.s.b. and c.w. Note: direct QSLs to him should bear absolutely no mention of radio, callsigns, etc. on the envelope. Use the kind that cannot be seen through in case valuables are enclosed. Do not use your rubber stamp. (*The DX Bulletin*) I have tried many avenues without success for a log, letter or some sort or correspondence from Tops, ZS3TP. Nothing for a year now. (*WB9MFC*) Why will the DXCC desk accept deleted countries for the DXCC award but not for 5BDXCC? (*many*) N2KK visit to Mauritius may be the last time for a DXpedition to the island as one year residency becomes new licensing requirement. (*Long Skip*)

Thanks to the many for their DX tidbits.

Proud but tired. Chip Margelli, K7JA, just finished up after the 1979 WPX C.W. Contest weekend as a guest operator of Len Kaufer, KG6SW. Chip's great showing will probably be the last big operation from KG6SW. The call, KG6SW, active since January 1971 was retired on 1 January 1980 after several thousand contacts. KH0AC is the new call. (Photo by JR1ZZC)

DX Club News

The Eastern Iowa DX Association (EIDXA) elected new officers for 1980:

President - K0JSY Keith Erickson
VP - W0WP Tom Lindgren
Sec/Trea - K0LUG Gary Letchford

Those Dxers in eastern Iowa or vicinity should contact Gary at: 3808 Laurinda Drive, Cedar Falls, IA 50613; for information on club activities.

The National Capitol DX Association officers for 1980:

President - N4MM John Kanode
VP Activities - N4RA Dick Allardee
Secretary - W3GG Burt Cohen
Treasurer - AA4M Bill Mullin

A Closing Thought

As Geoff Watt has noted so many times - without readers' information there would be no DX bulletins or DX columns. To the many of you who have shared your DX info and photos, our thanks. Without you, this column is but one DXer's perception of the best part of our great hobby.

73 and the very best of DX,
Rod, W7OM

QSL Information

A2CDK to VK3ATQ
A6XJA to I8YCP
A9XBS to G4GOH
A22BW to DK3KD
A22DW to VK7CH
A35PF to K9LSA
A35WL to ZL2BBW
A35YL to ZL1ALE
AH8A to WD5EKM
AJ60/KH0 to W6TAG
AP2MF to W8QFR
C5AAS to G3LQP
C31BO to W3SAD
C31CD to DL5NJ
C31FS to EA3QS
C31GF to F9RF
C31JS to F2VO
C31MK to EA3WZ
C3IMU to EA3ANB
C31NR to DL5KX
C31RZ to VE3JSO
EA6ET to LA5NM
EA9TC to DK9TU
EL0NA to CO2DC
FK8CW to F6CNI
FX0XN to DX7XN
FP8AA to K2RW
FP0KH to W2KHQ
FP0PV to WA2PVV
FR7BU to F6EQN
FW0XN to DK7XN
FW0XR to DK6XR
HM1MV to WB7RFA
HM1QD to W7RQ
HS1ABD to K3EST
HZ1AB to K8PYD
J6LGT to WB4SXX
J6LIR to WB7FCR
J6LIY to WA1IOB
J7DAY to N2OO
J7DD to W2OB
J73A to K2TJ
JA7JT/JD1 to JH7BRG
JE3YAJ/JD1 to JE3SEN
JR1ZZC to K7JA
JY5ZM to WB4RRJ
KH6WF/KH8 to WD5EKM
KH0AC to K7ZA
KL7H to W3HNK
KP2A to WB2VFT
KS6DV/KH1 to WB6FBN
KV4AA to K6PBT
KZ5GM to N2NA
M1B to WB9AUK
M1Y to I0MWI
N0TG/KP1 to N0TG
OD5MR to HB9ABV
OY5J to WA3HUP
P29DP to W7OQ
P29GL to VK2BSM
P29GT to K8BTH
P29JA to WA7OPZ
P29JN to W8HWN
P29PN to VK3BIF
PJ2FR to K2TJ
PY2XB/PY0 to PY2GWF
S8AYL to K9KXA
S79MC to N4WW
ST2MR to W5RBO
SV0AB to K2TJ
T4A to ZS6AK
T4VEN to ZS6RS
UA0CCW to W7PHO
UA0FDA to WB7RFA
UI8LAG to WB8ZJW
VK7AE to W5ACE
VK9YN to WA3HUP
VK9YR to K9IL
VK0JC to OZ8AE
VK0PK to VK3OT
VP2KAA to N4PN
VP2KAD to K1PBW
VP2KC to N4RJ
VP2KJ to WB2TSL
VP2MM to W1CDC
VP2VEQ to N6ZZ
VP8QG to WA4JQS
VP8SO to G3KTJ
VP8QI to G4CHD
VQ9JC to WB7DOZ
VQ9JJ to W5RU
VQ9WJ to K4NYK
VR1BD to W5RBO
VR1PJ to WB6FBN
VR1PK to W5RBO
VS5DD to G4EXY
W0RJU/KP1 to N0TG
WA6QFO/T4 to K9KXA
WB4LRB/8R1 to N4PP
WB5LBJ/DU6 to W7HPI
WD8QGQ/KH8 to KH6JEB
XT2AV to VE2DFR
YJ8XN to DK7KN
YJ8XR to DX6XR
ZD8JC to W5VD
ZF2CV to AI5I
ZK2PF to K9LSA
ZS2AK to HB9OP
ZS3LK to DJ4PI
ZS6AF/T4 to ZS4MG
3C1AA to EA4LH
3C0AB to EA4LH
3D2WP to G5RP
3D6AD to K9KXA
3D6AG to K9KXA
3V8AA to IS0LYN
4S7EA to WB9OQU
5N0EE to DJ0VT
5R8TV to HB9OP
5T5AY to W4LZZ
5V7GE to VE2AS
5W1CF to N6DX
7P8BL to K5PMF
9J2BO to W6ORD
9Q5GS to DK4MC
9V0NR to 9V1NR
9V0TK to JA6RIL
9X5OM to DK3OM

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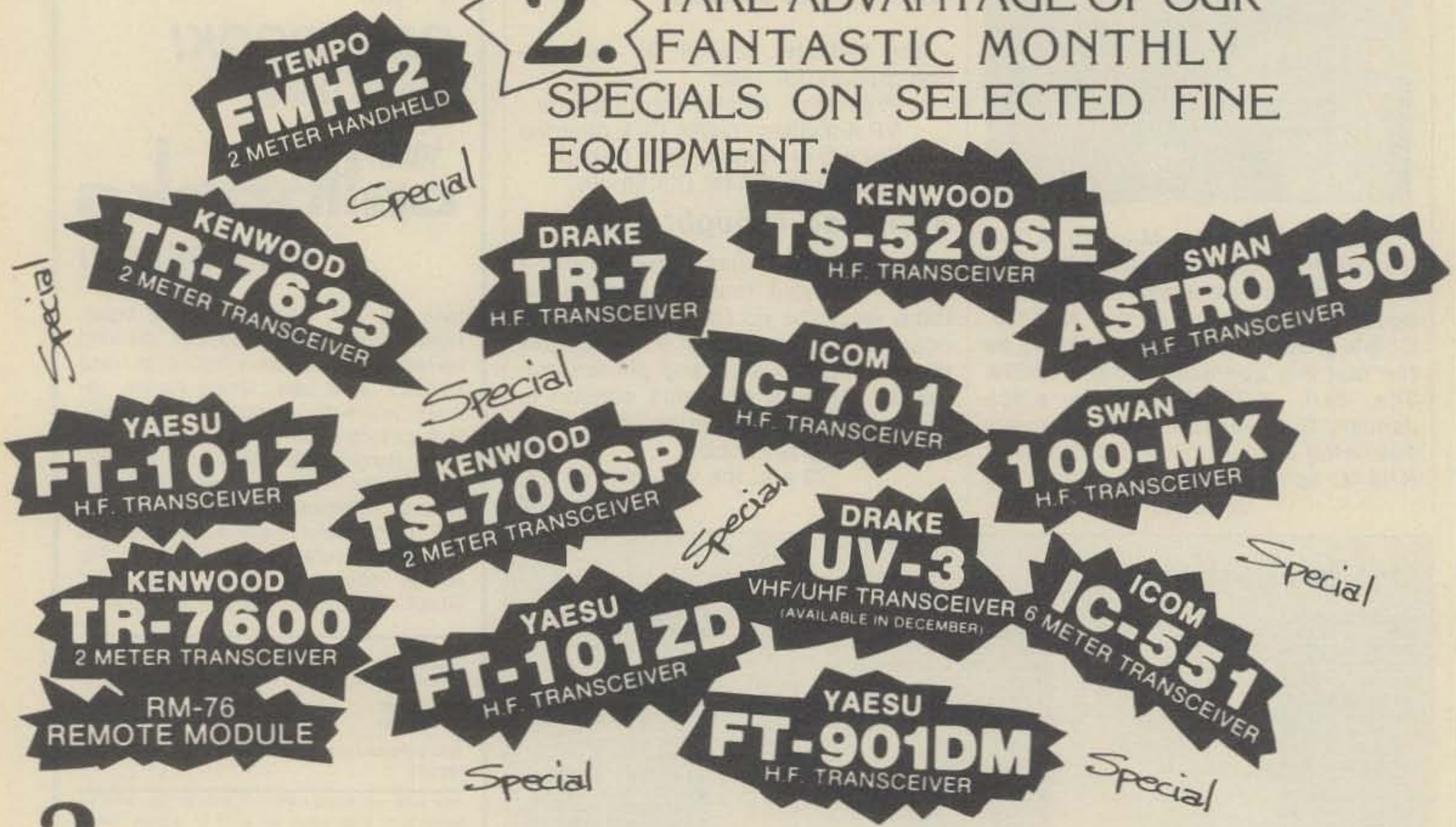

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Butler, Missouri 64730 816/679-3127

Henry Radio

CIRCLE 31 ON READER SERVICE CARD

No need to check your DXCC list for Yurt. Yurts can be in any zone and have any prefix. Lastly, yurt is definitely not a dairy product flavored with blueberries.

QRP Operating — Yurt Style

BY HUNT TURNER*, KØHT

It certainly is not another Malpelo expedition, I thought, or even an original idea. QRP has been around a long time. The old SAAB cut easily through the frozen wastes of Interstate 70. The middle of Kansas is a two meter wasteland, lack of crystals. I smiled. My mind was fixed upon our destination a thousand miles east. Sandy Mush is an isolated spot neatly tucked away in the Smokey Mountains not far from the Appalachian Trail. I was anxiously anticipating my first experience with QRP from my favorite QTH, a Mongolian yurt (a yurt is a hut or tent like structure used by natives of Northern Asia and Siberia) located in the North Carolina back country.

The chain of events leading to the yurt QRP operation began in 1969 when my wife and I decided to build a remote retreat using a simple yet unusual design. Bill Copperthwaite's wooden adaptation of the Mongolian tent was chosen.[1] A local sawmill supplied the rough cut lumber. Each piece had to be hand carried to its place of final assembly. At the end of a long rainy summer, our Walden was complete with wood stove and kerosene lamps. There was no phone, no electricity, and no access to wheeled vehicles. Occasionally, a visitor would wander up the mountain to see the folks who lived in the little "cupcake" but mostly there was solitude.

One snowy evening in January 1970, I was in the yurt reading *Kon-Tiki* and felt a strange kindred spirit with the men on that little wooden raft. The lamp flickered as I read the account of LI2B's six watt 20 meter QSO with Norway on the other side of the globe.[2,3] I read that paragraph over and over. It was the romantic burgeoning of an interest in QRP.

Since that time, numerous articles in *CQ* and other magazines have drawn my attention, particularly one cover depicting a geodesic dome powered by a wind generator.[4,5,6,7] Radio columns in *Mother Earth News* have shown that the experimental and cooperative spirit is still very much alive among the QRP buffs and this often spills over into wind, solar power and architecture.[8,9,10] The readings took their toll and after a 15 meter QSO with OA8V running 5 watts s.s.b. in the Peruvian jungles, my indoctrination was complete. I was compelled to try QRP from the yurt. It would be fun, but what if anything could be learned from the experience? The results were surprising.

We arrived in Sandy Mush on January 26, 1977, and were greeted by my brother-in-law, Jonathan Hearne, WA4NQE. Jonathan and I used to sked from YN9-land QRO style. He was home from his travels as an itinerate sheep shearer and as anxious as I to start the operation.

I had noticed during our final approach into Sandy Mush that all two meter reception was lost. I pondered for the first time the steep terrain that was so obviously adverse to the propagation of v.h.f. signals. My father-in-law had tried for years, unsuccessfully, to receive TV signals from WLOS, a station only 18 miles away to the south. What a test for QRP! Maybe we could collect some worthwhile data. The mountain slopes appeared deceptively gentle under a fresh snowfall as we unloaded the car in the late evening twilight.

The following morning we began taking angular elevation measurements of the peaks surrounding the yurt (fig. 1). These were made in major compass directions including two additional directions in which lay the two tallest ridges. The elevation of the yurt is 3300 feet. There is a slow 1036-foot climb to the southwest from the valley floor at Sandy Mush Creek. These mountains are thickly populated with locust and walnut trees 40-60 feet in height and often entangled with heavy vines among the upper branches. Later in the day a few preliminary tests were begun from a log house located near the yurt. Commercial power was available for the HW-7. A makeshift twin lead dipole was used. The output of the rig was estimated at 1.5 watts

FIG. 1 - Data measurements from yurt operation.

AZIMUTH/RIDGE ELEVATION° ABOVE HORIZON	N 6°	NE 0°	E 12°	SE 19°	SSE 21°	S 16°	SW 15°	W 17°	WNW 25°	NW 20°	QSOs TOTAL
QSOs 40m	4	11	3	1	0	2	3	1	0	6	31
QSOs 20m	6	39	0	1	3	4	4	0	6	7	70

MEAN SOLAR FLUX DURING OPERATING PERIOD — 126.2
MEAN K INDEX DURING OPERATING PERIOD — 10.2

*Box 101, Berthoud, CO 80513

Willow Cove, Sandy Mush, North Carolina looking Southwest. The yurt is located near the dark center portion where the mountains converge. It looks as bleak and desolate as one imagines Mongolia to be.

The operating position within the yurt. WA4NQE is on the left with KØHT on the right warming his feet on the soapstone.

on 40 meters and 1.3 watts on 20 meters. The rig refused to load on 15 meters but we felt sure this problem would be solved with the trap dipole which was to be erected at the yurt. These first tests were very encouraging since the temporary location was 220 feet lower than the yurt and the antenna was only 20 feet high. Seven states in 5 call areas and 2 Canadian call areas were working on 40 and 20 meters.

Actual operation of W4ONA/QRP YURT began on February 18 after returning from a trip to New York. During the morning, some clearing of smaller trees and vines had to be done before the antenna could be erected and rotated. The trap inverted vee was suspended 35 feet at the apex in the branches of a tall locust tree and tied off 5 feet above the ground. It was rotated 45 degrees daily until all compass directions were favored. The antenna was fed with 45 feet of RG-8U. Previous s.w.r. measurements of the system showed that it presented 2.8/1 in the 40 meter band, 3.2/1 in the 20 meter band and 4/1 in the 15 meter band. We were very disappointed to learn that the rig would not radiate on 15 meters, especially since strong DX stations were heard on this band. This dealt a severe blow to our goal of WAS. We still hoped that a goal of 100 QSOs and all U.S. call areas could be realized on the two remaining bands. We felt this was possible because the preliminary work from the log house had taught us that the number of QRP contacts is closely related to operating technique and we had learned quite a few tricks rather quickly. Later that day after lunch, the SAAB reluctantly donated its battery and the rest of the station was hauled on foot up the mountain.

The five days that followed were exquisitely satisfying. The pure d.c. powered receiver in a noise free environment was a sound for sore ears. The crackle of the wood fire and the hot soapstone beneath wool stockings perfectly complimented a KP4 QSO. His 599 may have been generous but I beamed with pride and gave the HW-7 a loving pat. The snow piled deeper and deeper around the yurt. The isolation was consumate. I might as well have been on Kingman Reef. DX seemed more a state of mind in which the barriers of space, time and isolation were broken only by the magic electromagnetic thread that extends the human spirit across mountains and valleys and seas. I thought once again upon *Kon-Tiki* with a greater understanding. A philosophical conversion had taken place. I was hooked on QRP.

The QSOs came fast and steady and

The author, K@HT, leaning against one of nature's towers, a tall Locust tree which supported the inverted vee.

on February 22 we passed our goal of 100 contacts. The following day I intended to nail the sixth and seventh U.S. call areas and wrap up the operation. It was snowing hard as I went outside to get some firewood. While dragging a large tree branch to the chopping block, I slipped and heard something crack. A call on the CB walkie-talkie brought help from the cabin below. X-rays from the VA hospital in Asheville showed that nothing was broken but the climbing was over for awhile; the operation was ended prematurely. Three days later we were on our way back to Colorado. The two meter rig was surprisingly quiet as I mused upon the marvels of QRP.

What did it all prove? Specifics are in fig. 1. Simply stated, the audacity of low power was rewarded for its bravery. In 32 hours of total operating time, 101 QSOs were held with 30 states and 5 Canadian provinces. The most distant QSO was with VE7ARQ 2500 miles away in Prince George, British Columbia, off the end of the vee into a 25 degree mountain ridge. The reliability of these h.f. communications was amazing. With mountains all around, a high s.w.r. and low power, we had gotten most stations we worked with a single call. Never again would a kw in a pileup be of great importance to me. In a world that squanders energy at an alarming rate, the efficiency was marvellous. The emergency implications were clear. No survival kit should be without a "tuna-tin."

I would like to thank Tony Gayler (K4NVH) for the use of his rig and constant urging to use QRP and Jonathan Hearne (WA4NQE) for his help and encouragement.

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[1]Copperthwaite, Bill, *Yurt Plans,* Bucks Harbor, Maine 04618
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[3]*QST* for December, 1947 p. 69.
[4]*QST* for February, 1974, cover.
[5]Simpson and Grebenkemper, "QRP-Mountaineering Style," *QST* for July, 1976.
[6]DeMau, "The QRP Challenge-Barbados Style," *QST* for July, 1973.
[7]Mattox, "QRPp and the Backpacker," *THe Milliwatt.* August, 1972.
[8]Macdonald, "New Directions Radio," *Mother Earth News,* No. 47, p. 40.
[9]Macdonald, "New Directions Radio," *Mother Earth News,* No. 48, p. 42.
[10]Macdonald, "New Directions Radio," *Mother Earth News,* No. 49, p. 42.

a monthly feature by

IRWIN MATH, WA2NDM

Math's Notes

A look at the technical side of things

Last month, you will recall, we spoke about solid state lasers and some circuitry to use with them. This month we will continue the discussion with a couple of additional ideas on the topic of optical communications.

As you will recall from our previous discussion, or your own experiments if you are actually using a laser diode, the output beam diverges at a rather large angle. This results in a rapid reduction in power as you move away from the laser and severely limits the range that can be achieved. What is

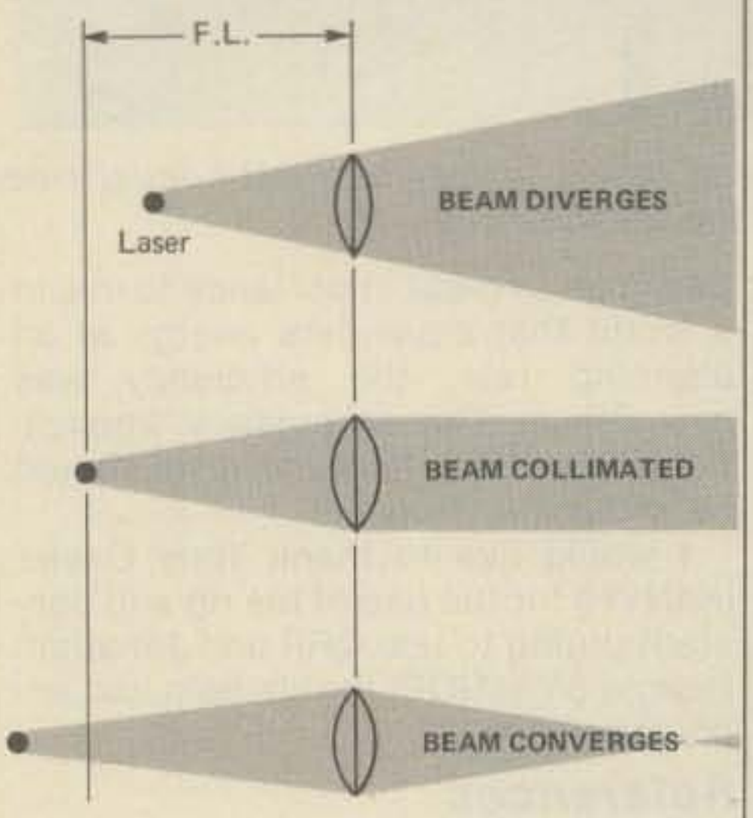
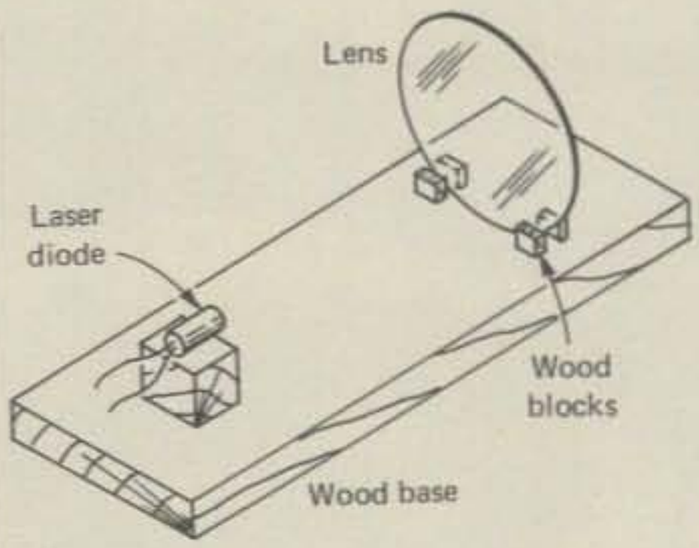


Fig. 1- The effect of placing a laser diode at various points before or after a len's focal point.

necessary is a method of producing a collimated beam in the desired direction. Although mirrors can be used for this, the simplest way is with a common plano or double convex lens of the "magnifying glass" variety.

Fig. 1 shows the operation of such a lens when a laser diode is placed at various distances from its focal length. It is obvious at once that if the diode is placed at the focal length of such a lens, a collimated beam is produced. Furthermore, the longer the focal length of the lens, the more collimated the beam. The lens has to be large enough in diameter, though, to capture all of the light from the laser diode.

5 Melville Lane, Great Neck, N.Y. 11023



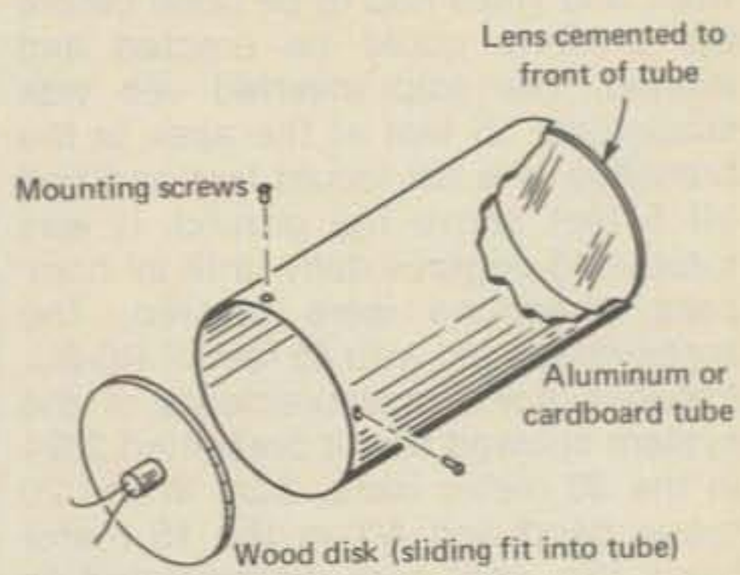


Fig. 2- Two methods for mounting lenses and laser diodes.

Building and aligning such a lens system is not too difficult. Fig. 2 shows two simple ways to do the job. Whichever you choose, you will still be faced with the task of aligning the lens. There are two ways to do this.

The first is to temporarily replace the laser diode with a small flashlight lamp and bring the assembly into a dark room. Then by moving the lens-lamp spacing a point can be found where an image of the lamp is produced on a wall 10-20 feet away. This spacing is very close to optimum and the laser diode can now be replaced. A second method is to use the actual diode together with an infra-red viewer or IR conversion screen that converts the invisible laser radiation to visible light. Such a viewer can cost several hundred dollars. The IR screen is less expensive but not absolutely necessary as the lamp method works quite well.

Once everything is finally aligned, the receiver may be optimally placed in the collimated beam and communications achieved. For best results, one should consider placing a lens in front of the photodetector in a similar manner to the laser. This will allow the detector to "capture" more of the incoming light and will extend the range

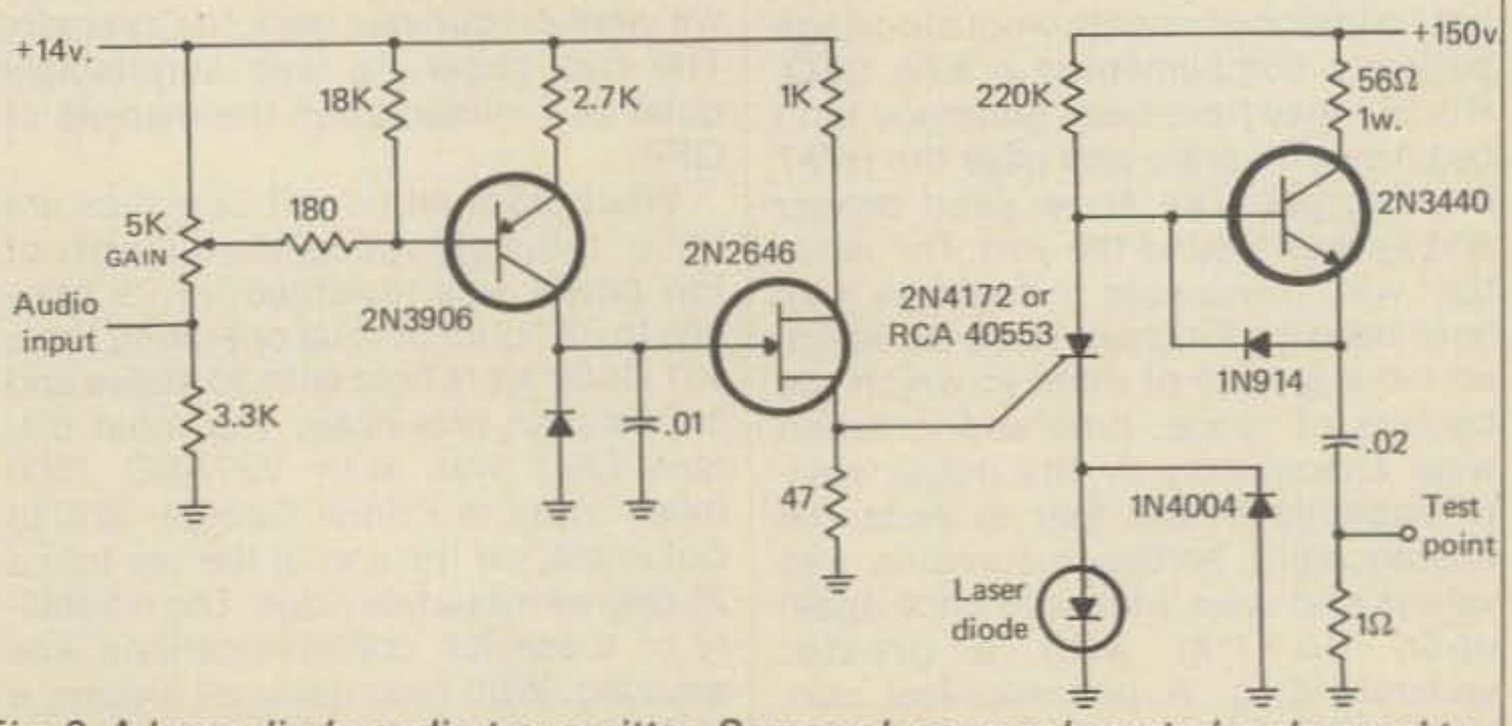


Fig. 3- A laser diode audio transmitter. Some values may have to be changed to suit the laser diode you use. It is best to do all experiments with an LED, then when all is working, the LED can be replaced with the laser.

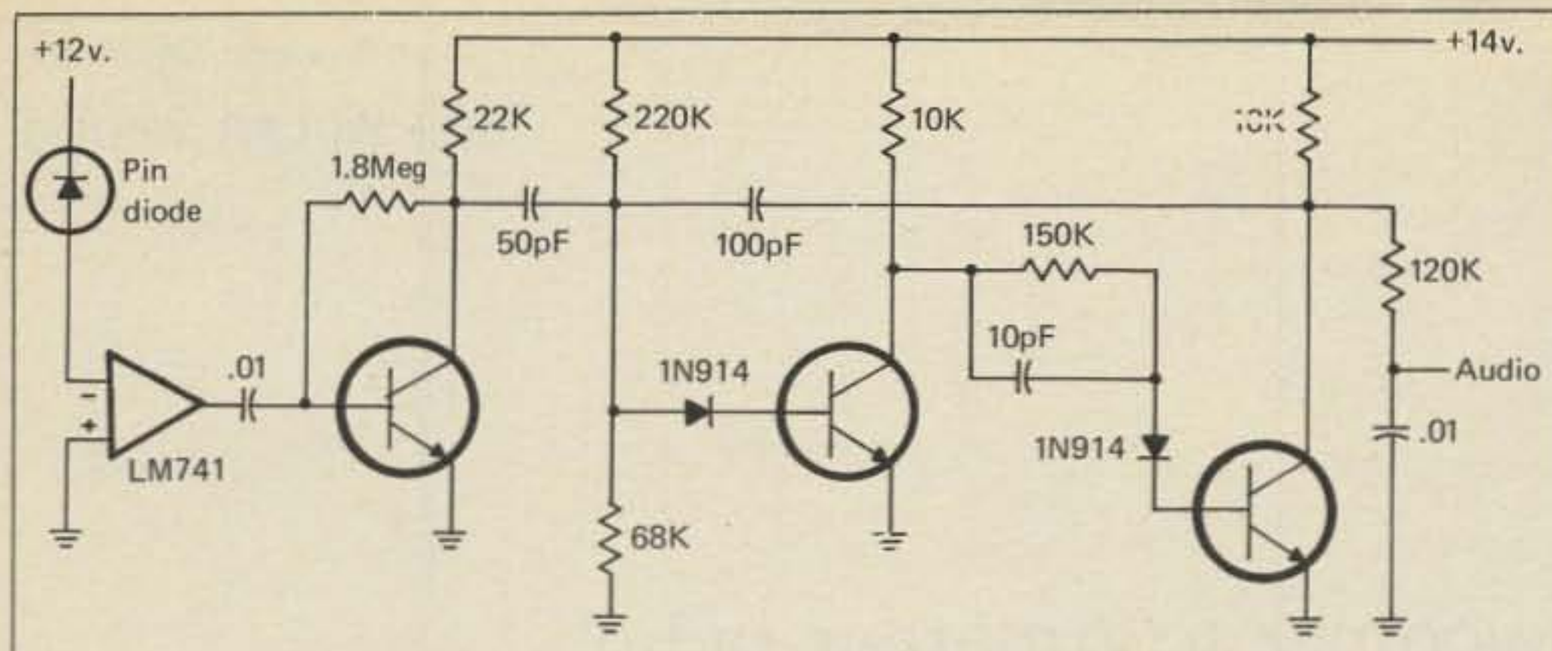


Fig. 4- A laser diode receiver. Again, refer to the text and be prepared to vary the values for optimal results.

further. For the absolute ultimate in range, small telescopes can be used on each end. With proper alignment, distances of miles can be covered. Again, be certain the proper precautions are observed with the laser diode. DO NOT LOOK DIRECTLY AT THE OUTPUT OF THE DEVICE OR AT A MIRROR REFLECTION OF THE BEAM. Although the average power is probably too small to harm you, it does not pay to take chances.

Last month, we gave a circuit for a unijunction pulser that could be used with a laser diode. This month we would like to give a circuit that can be actually modulated to transmit voice. This circuit is shown in fig. 3. Derived from the *General Electric Solid State Lamp Manual*, published in 1970 by GE, the circuit is a simple unijunction modulator. Incoming audio varies the time for the unijunction changing circuit and this varies the oscillating frequency—at the incoming audio rate. The pulses then modulate the laser diode whose driving circuit is a slightly modified version of last month's.

At the receiver, fig. 4, the demodulated pulses are fed to a monostable circuit that reconverts their average repetition rate back into audio. Both circuits are experimental and may require some component variations to achieve best results. They are indicative of the methods employed to achieve information transfer optically and should serve as "jumping off places" for the serious optical communications enthusiast.

See you next month.

73, Irwin, WA2NDM

a monthly feature by

BILL WELSH, W6DDB

Novice

"How to" for the newcomer to Amateur radio

Q Signals For Amateur Radio Use

As you may have noticed when reading last month's Novice column on worldwide amateur radio callsign prefixes, the letter Q is not used as the first letter in any country's callsign prefix because Q is reserved for international Q signal use.

The QN series of signals are specially established by the American Radio Relay League only for use in code nets. These Q signals are not intended to be used during casual on-the-air conversations, as other Q signals are used. Do not use these special Q signals in voice nets or during voice conversations. Unlike the regular Q signals, these code net Q signals do not need to be followed by a question mark, even when a question is being asked. The special ARRL code net Q signals are:

QNA* Answer in prearranged order.

QNB* Act as relay Between.....and.....

QNC All net stations Copy.
I have a message for all net stations.

QND* Net is Directed (controlled by net control station).

QNE* Entire net stand by.

QNF Net is Free (not controlled).

QNG Take over as net control station.

QNH Your net frequency is High.

QNI Net stations report In*
I am reporting into the net. (Follow with a list of traffic or QRU.)

QNJ Can you copy me?
Can you copy....?

QNK* Transmit messages for....to....

QNL Your net frequency is Low.

QNM* You are QRMing the net. Stand by.

QNN Net control station is....
What station has net control?

QNO Station is leaving the net.

QNP Unable to copy you.
Unable to copy ....

QNQ* Move frequency to....and wait for....to finish handling traffic. Then send him traffic for....

QNR* Answer....and Receive traffic.

QNS Following Stations are in the net.* (Follow with list.)
Request list of stations in the net.

QNT I request permission to leave the net for....minutes.

QNU* The net has traffic for you. Stand by.

QNV* Establish contact with....on this frequency. If successful, move to....and send him traffic for....

QNW How do I route messages for....?

QNX You are excused from the net.*
Request to be excused from the net.

QNY* Shift to another frequency (or to....kHz) to clear traffic with....

QNZ Zero beat your signal with mine.

*For use only by the Net Control Station.

The QOA thru QQZ series is actually intended only for commercial maritime mobile use. We slightly alter most Q Signal meanings to make them useful in amateur radio applications.

Q Signals are used to ask questions and to make statements. Statements are made by just sending the Q Signal. Questions are asked by sending a question mark after the Q Signal.

Here is 29-year-old Russ Hofman (KAØCGC) of St. Louis, Missouri. He thanks Gene Bell (KØBYM) for helping him prepare to pass the Novice exam. Russ runs a Tempo One Transceiver with indoor 40 and 15 meter dipole antennas in his apartment. He has 44 states confirmed and he has also contacted 7 countries.

Here is a list of Q Signals that are most likely to be heard on the amateur bands during casual conversations:

QOD? Can you speak with me in?:
1 English
2 French
3 German
4 Greek
5 Italian
6 Japanese
7 Norwegian
8 Russian
9 Spanish
Ø Other (state which language)

QOD I can speak with you in:

QOI? Shall I send my tape?

QOI Send your tape

QRA? What is the name of your station?

QRA The name of my station is .....

QRB? How many miles are there between our two stations?

QRB There are about.....miles between our two stations.

QRD? Where are you travelling to and from?

**2814 Empire Ave., Burbank, CA 91504*

QRD	I am travelling to.....from .....
QRE?	When will you arrive?
QRE	I will arrive.....at.....
QRF?	Where are you returning?
QRF	I am returning to.....
QRG?	What is my exact frequency?
QRG	Your exact frequency is.... kilohertz.
QRH?	Does my frequency vary?
QRH	Your frequency varies.
QRI?	How is my signal tone?
QRI	Your signal tone is: 1 Good 2 Variable 3 Bad
QRK?	What is my signal intelligibility?
QRK	Your signal intelligibility is: 1 Bad 2 Poor 3 Fair 4 Good 5 Excellent
QRL?	Are you busy?
QRL	I am busy; please do not interfere.
QRM?	Is my transmission being interfered with by man-made interference?
QRM	Your signal is being interfered with by man-made interference, or the man-made interference to your transmission was: 1 Nil 2 Slight 3 Moderate 4 Severe 5 Extreme
QRN?	Are you being bothered by static (atmospheric noise)?
QRN	I am being bothered by static, or the static interference to your transmission was: 1 Nil 2 Slight 3 Moderate 4 Severe 5 Extreme
QRO?	Shall I increase my transmitter output power?
QRO	If possible, increase your transmitter output power.
QRP?	Shall I decrease my transmitter output power?
QRP	If possible, decrease your transmitter output power.
QRQ?	Shall I send faster?
QRQ	Send faster
QRRR	ARRL land distress signal
QRS?	Shall I send slower?
QRS	Send slower
QRT?	Shall I stop sending?
QRT	Stop sending
QRU?	Do you have anything for me?
QRU	I have nothing for you.
QRV?	Are you ready? (for test, traffic, etc.)
QRV	I am ready
QRW?	Shall I tell....you are calling him on....kiloHertz?
QRW	Tell....I am calling him on....kiloHertz
QRX?	When will you call me again and on what frequency?
QRX	I will call you again at....on ....kiloHertz.
QRY?	What is my turn?
QRY	Your turn is number....
QRZ?	Who is calling me?
QRZ	You are being called by.... on....kiloHertz
QSA?	What is my signal strength?
QSA	Your signal strength is: 1 Scarcely Perceptible 2 Weak 3 Fairly Good 4 Good 5 Very Good
QSB?	Do my signals fade at times?
QSB	Your signals fade at times
QSC?	Are you a low traffic station?
QSC	I am a low traffic station.
QSD?	Are my transmissions mutilated?
QSD	Your transmissions are mutilated.

Here is Bill McDonald (KA0ATL) of Brainerd, Minnesota. Bill got his Novice ticket in May 1978 but it took him until September 1978 to get his first station on the air. His rig is a Tempo One Transceiver which he uses with a dipole and a homebrew 3-element beam. He has had 378 contacts, including one with W6DDB. He has worked 41 states and 29 countries at a total station investment of less than $600. Bill thanks George Carleton (AD0S) and Dale Teeuwen (KB0EJ) for the help they gave him when he was getting started in amateur radio.

QSG?	Shall I send....messages at a time?
QSG	Send....messages at a time.
QSI?	Can you break in on my transmissions?
QSI	I cannot break in on your transmissions.
QSK?	Can you work break-in?
QSK	I can hear you between my transmissions; break in if you want to do so.
QSL?	Can you acknowledge receipt of....?
QSL	I acknowledge receipt of....
QSM?	Shall I repeat the last message I sent?
QSM	Repeat your last message.
QSN?	Did you hear me on.... kiloHertz?
QSN	I heard you on....kiloHertz?
QSO?	Can you directly communicate with....?
QSO	I can directly communicate with....
QSP?	Will you relay to....?
QSP	I will relay to....
QSR?	Shall I repeat my callsign on the calling frequency?
QSR	Repeat your callsign on the calling frequency.
QSS?	What will you use for a working frequency?
QSS	I will use....kiloHertz for a working frequency.
QST	Call to all amateur radio enthusiasts (ARRL General Call)
QSU?	Shall I reply on this frequency or some other frequency?
QSU	Reply on this frequency or on....kiloHertz.
QSV?	Shall I send a series of V's?
QSV	Send a series of V's on.... kiloHertz.
QSW?	Will you transmit on.... kiloHertz.
QSW	I will transmit on.... kiloHertz.
QSX?	Are you listening to....on.... kiloHertz?
QSX	I am listening to....on.... kiloHertz.
QSY?	Shall I change frequency?
QSY	Shift your transmission to....kiloHertz.
QSZ?	Shall I send each word or group of words more than one time?
QSZ	Send each word or group of words twice (or state how many times).
QTA?	Shall I cancel message number....?
QTA	Cancel message number....
QTB?	Do you agree with my word count?
QTB	I do not agree with your message word count.
QTC?	How many messages do you have for me?
QTC	I have....messages for you.
QTE?	What is my antenna heading from your location?
QTE	The antenna heading to your location is....degrees short/long (state which) path.
QTH?	What is your location?
QTH	My location is....(city and state).
QTN?	When did you leave?
QTN	I left....at....
QTP?	When will you arrive?
QTP	I will arrive....at....
QTR?	What is your time?
QTR	The time here is....
QTU?	When are you usually on the air?
QTU	I am usually on the air from ....to....
QTV?	Shall I listen for you?
QTV	Listen for me on....kiloHertz at....
QTX?	Will you stay on the air?
QTX	I will stay on the air until....
QTY?	Where are you going?
QTY	I am proceeding to....
QUA?	Do you have news about....?
QUA	I have news about....
QUB?	Do you have the requested information?
QUB	I have the requested information.
QUC?	What is the number of the last message you received from me?
QUC	The last message I received from you is number....
QUE?	Can you speak in....on ....kiloHertz?
QUE	I can speak in....(language) on....kiloHertz.
QUM?	Shall I resume normal communications?
QUM	Resume normal communications.

There are many other three letter Q signals but they do not have direct applicability to our amateur radio service and they have not been included in the preceding list. It is important to use these Q signals properly. They are intended to provide a fast way to make statements and ask questions; they are not intended to be a weapon to use against inexperienced operators. These Q signals eliminate language barriers because they have the same meanings to amateurs in all countries. My course aid on Q signals advises students to use them without abusing them, and I think this is good advice.

As always, your suggestions, corrections, additions, and comments are welcome. You will notice that amateurs often use Q signals slightly out of context. As an example, if not handling traffic, QSL? means will you send a card and QSL means I will send a card. These slight variances are easily understood.

Editor's Notes

Roger Williams (KA7EOG) suggests that new amateurs, who are members of amateur radio clubs, can have QSL cards sent to them via those clubs. If one is not yet in the callbook or its supplements, it is easier to advise the other amateur to QSL via one's club than it is to struggle through a name and address. Simply state the club's callsign (assuming it has one) and tell other amateurs to QSL via it. Similarly, if someone else is licensed at your home, you can advise contacts to QSL via that person's address.

If you write to the FCC, include the telephone number where you can be reached during the working day. The FCC sometimes expedites replies by using the telephone.

If you need service for Atlas Radio equipment, contact Steve Crossman at Specialty Communications, 2523 Peach Street, Erie, Pennsylvania 16503. His telephone number is 814-455-7674.

Novices are urged to submit good black-and-white pictures of themselves at their operating positions. If your photograph is printed in a future Novice column, you will receive a one year subscriptin (or renewal) to *CQ*. A brief description of operating activities and some personal background information are needed with your picture.

73, Bill, W6DDB

a monthly feature by

ADRIAN WEISS, K8EEG

QRP

The art of very low power operating

QRPp Clubs and Awards

It has been about a year-and-a-half since we've run a list of QRPp clubs and awards and activities open to the QRPp operator. It seems about time to do the list again, judging from the many queries received here. The following collection, to the best of my knowledge, represents a complete rundown of what is going on at present. Let's begin with the QRPp clubs, and then get into awards and activities.

QRPp Clubs

1. **Michigan QRP Club**. The Michigan QRP Club is a genuine QRPp organization, limited to amateurs interested in under-five-watt OUTPUT operation. Founded in January of 1978, the club promotes QRPp operation with emphasis upon members' attempts to improve their skills and abilities through skeds, nets, and tests, always working for the mutual interest of each other and the benefit of the club. Monthly meetings are held at homes of various members, and the club has prospered through its active sense of fellowship. While designated the "Michigan QRP Club," membership is open to amateurs all over the world. Ralph Burch, W8LCU, longtime QRPp advocate and originator and guiding spirit of the club, envisions the formation of local chapters throughout this country and others, where QRPp operators can meet personally and share their expertise and experiences to their mutual benefit. The Club publishes a bi-monthly newsletter for members, covered by the initial membership fee of $5, $3 renewal annually thereafter. Included as part of a new membership is a beautiful tricolor shoulder patch with the club's logo, subscription to the newsletter, and opportunity to purchase the club's QSL design. At present, two awards are offered, the Worked All States, and the DXCC Award (see below). Activity is the key to the Club's thrust, and it sponsors QRPp Nets in three sessions: 1.) Tuesday, 1900 EST/EDT, 3535 kHz; 2.) Sunday, 0830 EST/EDT, 7260 kHz; 3.) Saturday, 1300EST/EDT, 7040 khz. QNI's are welcome not only from Club members, but all QRPp operators. An annual Field Day outing is included in the activities. Contact Ralph Burch, W8LCU, Chairman/Steering Committee, 281 Crescent Drive, Portland, MI 48875.

83 Suburban Estates, Vermillion, SD 57069

2. **G-QRP-C.** The G-QRP-Club likewise is a genuine QRPp outfit, based in England, but with members world-wide. At present, the club roll shows several hundred G's, plus about 100 foreign members totalling about 600, so, one can say that it is a thriving organization five years after its inception. Unfortunately, the G-QRP-C defines QRP as "under five watts *INPUT*" and hence bears a dead horse into the 1980's. Perhaps this will change! The Club publishes a truly excellent quarterly newsletter/journal which includes not only Club news, but detailed technical articles and construction projects as well. It is an echo of *The Milliwatt* in terms of conception and quality. The Club also sponsors several awards (see below) as well as several on-the-air activities. Unfortunately, we have not received notification of these in time for publication, but will attempt to slip them in in the future. The weekly "activity periods" (something like a NET) include Sunday, 1400-1500Z on 3560 kHz and 1100-1230Z on 7030 kHz. For SSB, Sunday 1600-1700Z on 3690 kHz and 7090 kHz. New sessions are possible to move activity up on to 20-10 meters where DX contacts will be possible. For membership in the U.S., write to Robert E. Molle, WB9QPS, 624 Lawndale Drive, Greenwood, IN 46142.

3. **QRP ARC I.** The QRP ARC I has done much for over 15 years to popularize the idea that high power is not necessary to maintain effective communications. However, the QRP ARC I defines QRP as under 100 watts input, a classification which, in terms of popular understanding, is as extinct as the dinosaur. Even so, the club's roll includes many genuine under-five-watt QRPp types, and a good deal of friction has arisen in the ranks due to the difference of interpretation as to what QRP means. As yet, the QRO types who are in control of the power structure have maintained the 100 watt level despite periodic attempts to bring it down to the modern 5 watt level. The club publishes a quarterly newsletter which has reached a new high quality level under the editorship of WA2JOC, himself a very active QRPp operator and holder of the coveted *DXCC QRPp #10* trophy offered by *The Milliwatt* (see below). The club sponsors an annual Spring and Fall QRP contest which has gained in popularity in the last few years, despite unfortunate scheduling on the same weekend as QRO CD and CA QSO parties. This scheduling could change also and make the contest more interesting. Several awards of interest to the QRPp (under-five-watt) operator are also offered (see below). The NET initiated and operated by K8IF, who was one of the most enthusiastic QNI's in the old *Milliwatt* NETS, has finally taken-off with an incredible amount of activity. K8IF, new President of the club, must be commended for persevering during the lean years. NET times: Saturday, 1700Z, 7060 kHz, Thursday, 0100Z (Wednesday evening, U.S. time), 3560 kHz. In addition, monthly "club QSO parties" are held on the first Sunday of each month, beginning 1500Z on the club's QRP frequencies of: CW, 3560, 7060, 14060, 21060, and 28060; SSB, 3985, 7285, 14285, 21385, and 28885 kHz. Membership is $3.00, to: Joseph Szemplas W8JKB, 2359 Woodford St., Toledo, OH 43605.

QRPp Awards

Various organizations offer awards to the QRPp operator. These are listed below.

1. **DXCC QRPp.** Initiated by *The Milliwatt: National Journal of QRPp*, and offered in its memory. Begun in

1970, eleven trophies have been awarded to date. A difficult award—the tops! To qualify, an operator must submit QSL proof of two-way contacts with stations in 100 ARRL DXCC list countries, a list of those contacts in alphabetical order listing all pertinent data, description of station and method of measuring power output, and signed affidavit that all contacts were initiated and completed with under five watts r.f. *OUTPUT*. A $15.00 fee must accompany the application to defray the cost of the handsome 30 inch trophy that is awarded. DX QSL's need not have any indication that applicant was running QRPp. To: Adrian Weiss K8EEG/W0RSP.

2. **DXCC Milliwatt.** Perhaps the most difficult award in existence. Initiated along with *DXCC QRPp* in 1970 by *The Milliwatt,* only two operators—W8ILC and GM3OXX—have qualified in the award's 10 year existence. The same application rules apply as with *DXCC QRPp,* except that all contacts must be initiated and completed with under ONE watt r.f. OUTPUT. Special endorsements for particular cases, *i.e.,* all-SSB, etc.

3. **200 DXCC QRPp** and **200 DXCC Milliwatt,** and **300 DXCC QRPp** and **300 DXCC Milliwatt** provide increments of additional 100 countries beyond the initial 100. A handsome plaque constitutes the award. To date, N2AA is the sole recipient of the *200 DXCC QRPp*, although W8ILC has passed the 200 mark with one watt output, and is approaching the 300 mark!!

4. **QRP DX Award.** Michigan QRP Club (see above for QTH) award. To qualify, you must send in a copy of your log indicating 25 QSL'd contacts with 25 DX countries for the initial certificate, and blocks of 25 additional countries at the 50, 75, and 100 levels. The log must be signed by two other licensed radio amateurs verifying that contacts were initiated and completed with under five (5) watts r.f. OUTPUT and that QSL's verify the contacts. $1 to cover postage should accompany application. First ten certificates to be awarded are gold embossed special paper.

5. **QRP Countries Award.** Offered by the G-QRP-C (see above for QTH), for members only. Basic award for contacts with 25 ARRL DXCC countries while using an INPUT not exceeding 5 watts. Written and signed statement to this effect must accompany each application. Endorsements will be issued for each additional 25 countries worked. 3 IRC's must accompany applications.

6.**WAC QRP.** The ARRL *Worked All Continents Award* can be obtained with a QRPp endorsement. Application must include QSL's from all continents, and these QSL's must indicate that the applicant was running QRPp during the contact. This seems to be an inverted version of the scientific method of proof, since the DX station has no method of determining whether the applicant is running QRPp, except for the applicant claiming that he is! But, that is how the ARRL is doing it. To ARRL, Newington, CT 06111.

7. **WAS QRP.** Michigan QRP Club requires a copy of your log indicating QRP contacts with all states of the U.S., signed by two other licensed amateurs, with $1 to cover postage. Initial ten certificates are gold embossed special paper. Contacts must be with less than five watt OUTPUT.

8. **WAS QRPp.** Offered by the QRP ARC I for confirmed contacts with 20 states, and then increments of 10 additional at 30, 40, and 50 states, while not exceeding five watts INPUT. Basic certificate awarded at 20 states, with endorsements at each additional level. Special endorsements include two-way QRPp, with both stations running under five watts, and under-one watt for applicable stations. Apply with full log data, including powers used on both sides, signal reports, band and mode, and QTH's on both sides. $1 or 10 IRC's.

9. **KM/W Award.** Offered by QRP ARC I. Issued to any amateur transmitting from, or receiving the transmissions of, a low power station such that the great circle distance between both sides, divided by the power input of the low power station, equals or exceeds 1000 miles per watt. Apply with full log data and $1/10 IRC's. Additional may be earned on different bands and modes. (The current all-time record belongs to KL7YU and W7BVV across a 1650 mile path with 1 microwatt (that's *one*!!) on January 21, 1970 on 28760 kHz for a KM/W of 1.6 billion miles per watt (story in *The Milliwatt,* June, 1970).

10. **QRP-CW-250 Award.** Offered by the AGCW DL, the German Amateur Radio CW Action Group, the award recognizes that an applicant has worked 250 CW QSO's on any bands 160-10 meters during one calendar year while not exceeding 10 watts INPUT. The year runs January 1-December 31. Application accompanied by list showing breakdown of claimed c.w. QSO's by month, and a declaration signed by the operator: "I hereby certify that all the QSO's contained in this claim have been made using a transmitter input of less than 10 watts," and an additional two signatures by two licensed amateurs verifying the veracity of the claim. $2 or equivalent IRC's to: Atto Wiesner, DJ5QK, Freudenheimer Str. 14, D-6900 Heidelberg 1. Federal German Republic.

11. **Worked G QRP Club Award.** Offered by G QRP C to members and non-members who work 20 members of the G QRP C who are running less than five watts input. Increments in blocks of 20.

12. **Two-Way QRP Award.** G QRP Club award to any member for contacts with 10 different DXCC countries when both the member and the station worked were using an input not exceeding five watts. Endorsements for each additional 10 countries. Same application rules as above. Input must appear on all QSL cards. (NOTE: All G-QRP-C applications must be accompanied by QSL's or by a signed affidavit by two licensed amateurs certifying that they have inspected these QSL's and found them to be bonafide. Also, if the applicant goes by output power, 3.6 watts r.f. OUTPUT will be considered equal to 5 watts INPUT. Five watts d.c. shall be taken to equal five watts PEP when SSB is used.)

13. **Milliwatt Field Day Trophy.** Offered by *The Milliwatt* to highest scoring participant in ARRL Field Day who submits his results in competition for the trophy. Limited to single transmitter, maximum two operators, category. Scoring: QSO's × PWR MULT (×4 for 1-5 watts OUTPUT, ×5 for under one watt output) ×1.5 (full battery, solar power for complete setup) +150 bonus for full portable setup away from home shack. Entry can consist of duplicate copy of ARRL Summary Sheet with signed statement verifying power level, location, battery power. Applicant must either submit a band-by-band checklist of stations, or indicate in his statement that he has double-checked his list for duplicate contacts. The right is reserved to require copy of FD log in the case of close scores or tie. This and other *Milliwatt* awards to: Adrian Weiss K8EEG/W0RSP, 83 Suburban Estates, Vermillion, SD 57069.

14. A New QRPp Feature—**Totally Unique Records** or **TURS AWARD.** Seems like QRPp guys have an eye for real achievements. Unfortunately, only a few bonafide actual awards exist to recognize the many astounding achievements racked up by QRPp operators here and around the world. For one, I feel that genuine achievements ought to be recognized for what they are—whatever! Oftentimes, some loner out there is into some particular aspect of QRPp operating that no one else is into, and manages to accomplish something worthy of note. For instance, W9PNE was hacking away at working WAC with milliwatt power levels back in the early '70's before anyone thought it possible to

work out of the backyard with 50 milliwatts!! So, W9PNE managed to do the WAC at various levels, and although he merited a sense of accomplishment for his efforts, which, of course, is the primary thing, he didn't have a piece of paper to hang on the wall and no one officially rewarded him for his achievement. Others have followed the same lonely unheralded path of lack of official recognition. So, every now and then, I'm talking to someone and we agree that there ought to be some kind of award these guys can qualify for. Well, taking the bull by the horns is the only way to address such a situation, and that is what I am doing by establishing the unprecedented and soon-to-be-coveted *Totally Unique Records Award*. It is the award designed to recognize every and any achievement—so long as the achievement seems worthy of recognition. I can think of a lot of unique achievements that could qualify—like using the worst antenna imaginable to work a long distance, operating from the most worthless locations, etc., on down the line. Each individual who applies for the *TURS Award* will define his own achievement. Application is simple—just drop a letter with the details and we'll make a judgment. At first, the award will consist of the addition of your record to the TURS Award box in this column. Maybe we can come up with a certificate—if someone wants to foot the bill, etc., and do the work of getting one made. What say gang?! Anyone out there with a recognizable achievement, join the fun and drop us a line about it! First off, we'll grant an award to WA2JOC for a QRPp WAC completed in ten minutes, twenty seconds. See WA2JOC's communication of the same elsewhere in this column. For Award #2, I hereby bequeath it to myself for the astounding "K8EEG World Record R.F. Probe," completed in 24 minutes from the time I walked into the shop and the time I took the first measurement. This unit was described in a previous article.

The TURS Award #3 goes to WA6VNR, who claims the lowest power SSB (3 watts) QSO with the shortest antenna (Hustler whip) at the highest speed (90 m.p.h.) at the highest altitude (6500 ft) for the longest distance (worked VE7DLY). As time goes on, I'm sure we'll add to this list as I check out back columns and letters and issues of *The Milliwatt* for possible *TURS Awards*. Now that I think of it, TURS Award #4 goes to VR3AH and W0RSP (me) for the longest QRPp-QRPp QSO (4 watts-7 watts) over the longest period of 100% solid copy (42 minutes) over the longest distance (SD to Christmas Island) using the most efficient antenna (VR3AH—TR33Jr at 117 ft) and the least efficent antenna (W0RSP-vertical with no radial system) and solid state homebrew transceivers on both ends. That's a good one to beat. Then, while I'm at it, TURS Award #5 goes to KH6GB for racking up 1150 QSO's in 35 countries during 25 hours of operation from Canton Island. Well, that ought to prime the pump. Let's see what you guys have been doing out there!

Activities/Contests

1. **QRP ARC I** Spring and Fall QRP QSO Parties.
2. **CQ WW and WPX Contests** include a QRPp section, Fall and Spring.
3. **Field Day**—ARRL.
4. **AGCW-DL** Summer and Winter Sports are held the third complete weekend in January and July. QRPp CW. Logs to Siegried Hari, DK9FN, Spessartstrass 80, D-6453 Seligenstadt, Fed. Rep. of Germany.
5. **R.S.G.B. 21 MHz Contest** initiated 1979 (21 October, 1979) includes a QRPp category for stations using less than five watts OUTPUT. (Anticipate continuation of QRPp section in 1980.)
6. **G-QRP-C Winter Sports** scheduled December 26-31, 1979. Also sponsors Activity Weekends for transatlantic QRPp work. (NOTE: Dates and rules are not provided for the above contests. These may be found in *CQ* "Contest Calendar" two-four months in advance of the contest, provided the organizations send in the info in time. Be alerted by the above list for general seasonal period for which the activities are usually scheduled.)

Wrap-Up

Well gang, I hope the above information answers all of the questions that I constantly receive in letters. Mark this issue for ready reference during the year. Remember also that the upcoming *CQ* DX contest this Spring will include a special QRPp section, with a separate list of QRPp results, and awards for the QRPp winners. The first QRPp section ever sponsored in a big DX contest occurred in the *1978 CQ WW DX Contest*, and over 30 s.s.b. operators took part and submitted their results. This was a very surprising showing for a "first time" in view of the lack of advance publicity. Foreign amateurs, in many cases, were unaware of the existence of the QRPp section until too late. Let's get the participation up even higher—say at least 75 this year in each contest! This year's results produced an interesting conclusion if we compare the top scores in the QRPp Section and the Single-Op All Band Section, which were 582,255 and 8,281,800 respectively. Consider the ratios. The score reflects a ratio of 14.23:1. But, then compare the power ratios. If the full KW was used in the Single Op, and output was on the order of 600 watts, the ratio of powers is then 120:1! What this means, then, is that the QRO operator used a power advantage of 120:1 and only gained a score advantage of 14.23:1 over the QRPp operator! Say something about the need for high power, doesn't it? Another way of looking at it is: the QRO top op had a 24dB power advantage, and only produced a 14.23:1 score advantage. If we were to "make all things equal" the QRO op should have only been using about 160 watts output (a 15dB ratio) to achieve the 14.23 score ratio. Right? I wonder why guys run QRO and embarrass themselves with the meager results they obtain in competition with puny five watt output stations? Maybe I shouldn't look at it this way. Doesn't make much sense to me. But then, I run QRPp. So it wouldn't make sense to me. 73's till next month! Keep the letters and photos coming!

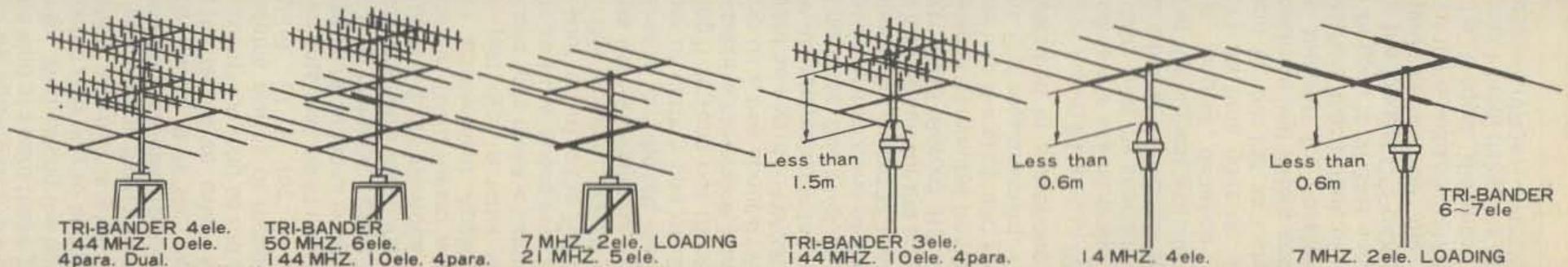
73, Ade, K8EEG/K0RSP

TET ANTENNA SYSTEMS Powerful Rotors

Inside Tower Installation — Mast-Top Installation

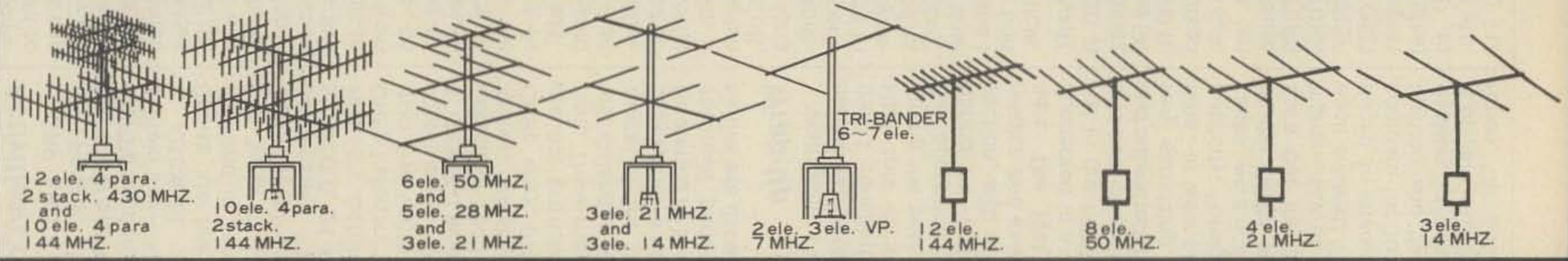
KR-2000

WT. 25.5 LBS



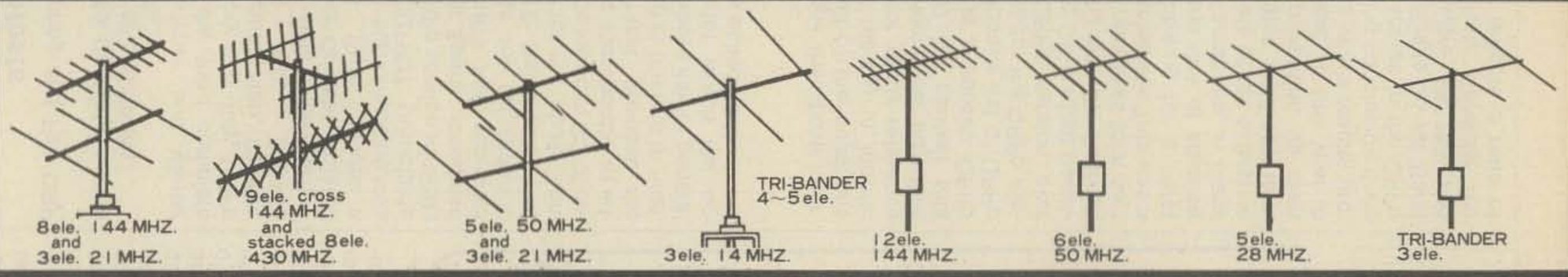
KR-600

WT. 15.5 LBS



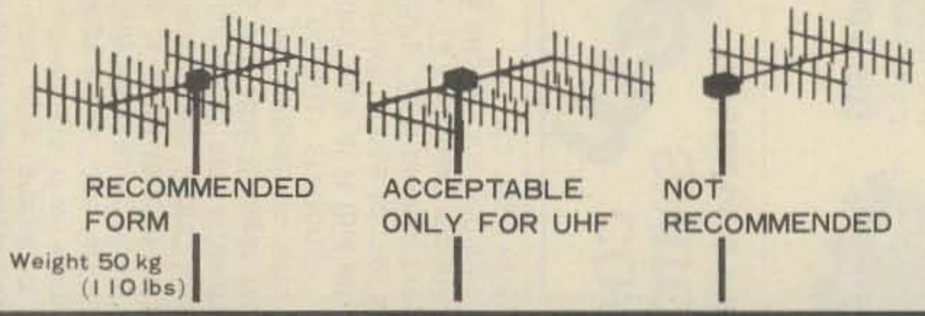
KR-400

WT. 15.5 LBS



KR-500

WT. 11.0 LBS



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CIRCLE 51 ON READER SERVICE CARD

a monthly feature by

GEORGE JACOBS, W3ASK

Propagation

The science of predicting radio conditions

The highest monthly mean level of sunspot activity recorded so far during the present solar cycle was reported for September by the Swiss Federal Solar Observatory. The mean level was 189. Daily values ranged from a low of 139 on September 5th and 6th to a high of 261 on the 26th. This is the highest daily level of solar activity observed in more than 20 years. The monthly mean for September results in a 12-month running smoothed sunspot number, upon which the solar cycle is based, of 136 centered on March, 1979. It is almost certain now that the present cycle climbed above the 150 mark during the fall of 1979, probably reaching peak intensity during October or November. We'll have a better reading, with a bit more fine tuning for the date of maximum activity, later this year. A smoothed sunspot number in the mid-140s is forecast for February, 1980.

DX propagation conditions will continue to be excellent on *three* bands during the *daylight* hours of February. *Fifteen* meters is likely to be the best band from shortly after sunrise until just after sunset, with *10* and *20* meters not far behind. The *6* meter band should be an extra DX bonus this month during the hours of daylight. Be sure to check this band for unusual DX openings, particularly when conditions are expected to be HIGH NORMAL, or better. 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 throughout 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 should hold up well past sundown for DX openings towards Central and South America, the Pacific area, and the Far East and Asia. *Twenty* meters should remain open 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 also be possible on both *40* and *80* meters, with some openings in the same directions also possible on *160* meters.

Between Midnight and the sunrise period it should be a tossup between *20* and *40* meters for worldwide DX honors. Good DX openings to most areas of the world should also be possible on *80* meters. Be sure to also check *160* meters for some unusual DX openings during this period.

Beginning late in February and continuing through March and early April, expect considerable improvement in DX conditions between the northern and southern hemispheres. This will result from the effects of the spring equinox period, as the sun crosses the equator in its apparent travels towards northern skies. These improved inter-hemispheric conditions should be noticeable on all bands *6* through *160* meters, and on circuits mainly between the United States and South America, southern and central Africa, Australasia, Antarctica, and parts of Asia. Equinoctial propagation conditions tend 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, 1980. A short-skip propagation forecast for February appeared in last month's column.

11307 Clara St., Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for February 1980

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 16, 22	A	A	B	C
High Normal: 1, 7, 12, 15, 19-20, 23, 28	A	B	C	C-D
Low Normal: 4, 6, 8-9, 11, 13-14, 17-18, 21, 24-27	A-B	B-C	C-D	D-E
Below Normal: 2-3, 5, 10,	B-C	C-D	D-E	E
Disturbed: None	C-E	D-E	E	E

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

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

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

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

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good (B) on Feb. 1, fair to poor (C-D) on the 2nd and 3rd, fair (C) on the 4th etc. Conditions during the CQ WW DX Contest should be high normal on the 24th and above normal on the 25th.

For updated information, subscribe to bi-weekly MAIL-A-PROP, P.O. Box 1714, Silver Spring, MD 20902.

V.H.F. Ionospheric Openings

As mentioned earlier in this column, expect unusually good DX conditions on the *6* meter band during the hours of daylight, with F-layer openings to many areas of the world from the United States. Another form of *6* meter propagation, *trans-equatorial scatter* (TE), usually peaks during the equinoctial period. Some TE openings should be possible during February between the southern tier states and South America. The best time to check for such openings is between 7 and 10 p.m., local time. Some TE openings may also be possible on *2* meters at the same time.

No signficant meteor showers are expected during February. Radio storminess expected during the month should produce some widespread auroral activity, with increased chances for short-skip openings on both *6* and *2* meters, for distances up to approximately 1300 miles. Check the "Last Minute Forecast" at the beginning of this column for those days during February that are expected to be DISTURBED or BELOW NORMAL. These are the days on which unusual ionospheric short-skip openings on the v.h.f. bands are most likely to occur.

73, George, W3ASK

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be use 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 (15 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An * indicates the best time to listen for 160 meter openings.

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

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

5. The charts are based upon a transmitter 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-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level; for each 10 db loss, it will lower by one level.

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

February 15 - April 15, 1980
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)	05-08 (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)**	06-08 (1) 08-09 (2) 09-11 (3) 11-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-21 (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)*
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	07-08 (1) 08-09 (2) 09-11 (1) 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)	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)*
Southeast Asia	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	07-08 (1) 08-09 (2) 09-16 (4) 16-18 (3) 18-19 (2) 19-20 (1) 09-11 (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)	05-08 (1)
South Pacific & New Zealand	07-08 (1) 08-10 (2) 10-13 (1) 13-16 (2) 16-19 (3) 19-21 (2) 21-22 (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)	11-19 (1) 19-21 (2) 22-00 (3) 00-02 (2) 02-03 (1)	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	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) 10-12 (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)	05-06 (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.

a monthly feature by

A. EDWARD HOPPER, W2GT

Awards

News of certificate and award collecting

Here is the February, "Story of the Month" as told by Ken:

Kenneth C. Johnson, K9DZG
All Counties-#218, 3-19-79

"I was born here in Dane County, Wisconsin August 25, 1945 and have spent nearly all my life here. Went to grade school and high school in Sun Prairie, Wisconsin. Sometime around 1959/1960 Bill, K9YJD (now W0OWY) moved into town and started generating a lot of interest in amateur radio and ended up being an "Elmer" to me and about 30 others in the small town of about 2,000.

"I received the call of KN9DZG in March of 1961. I passed the General exam in the fall of 1961 and became K9DZG on November 16, 1961. My first equipment consisted of an ARC-5 receiver on 40 meters and a borrowed DX-20 transmitter. I was reasonably active at that time, mostly c.w., and got my Worked All States in October 1962.

"I graduated from Sun Prairie High School in 1963, and went to an Electronics Technician School for two years. After graduating from there in June 1965, I started working for the Enzyme Institute at the University of Wisconsin as an electronic technician working on the equipment used in biochemical research, where I still work.

"My amateur radio activity fell off after high school and my interests moved to, among other things, girls. In January of 1971 I married Dixie. I passed the Advanced Class examination in April of 1971, although my activity was still very low.

"In August of 1976, I bought a d.c. supply for the HW-101 that I had at the time. Arnie, K9DCJ stimulated my interest in the County Hunting Nets; at that time he was a salesman at the local radio emporium. I started out with the intent of giving out some counties, with no interest in collecting. In October of 1976 I took a vacation through northern Wisconsin and gave out some counties, and by the end of the first week I was hooked and started collecting them. The following two and one half years were the most enjoyable that I have had since I was licensed. I ment some of the nicest people on the nets and "eyeballed" them at the conventions at Rochester, St. Louis and Atlanta. It was way too much fun not to try again, and I made too many nice friends to leave now.

"My wife, Dixie, even decided that it was fun and started on her ticket also, and received her Novice call of WD9ITF and then passed her General in May of 1979. Her trying also helped me; that is how I got my Extra. So from here on, most of the mobile trips will be Dixie operating the radio and me being chauffeur.

"I also want to use a little space to pass along *THANKS* again to all the mobiles and net controls. Special thanks to Arnie, K9DCJ and Lorraine for the last county and the many phone calls and general help, also to Robie, WD9ITQ and June for all the miles they totaled for me and others. Yes, I realize that I left some out, but thanks again to *ALL* and see you on the Net."

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

The Johnson Family and Residence. L to R: Dixie, WD9ITF, Dog Charlie, Ken, K9DZG. Tower on left is 40 feet and supports a Hy-Gain 204BA and the telephone pole has an old Hy-Gain TH-3 at 25 feet.

Special Honor Roll (All Counties)

#252 Robert S. Rennie, VE3IR 10-25-79

Four Members of the Tokyo Old Timers Club - L to R: Mas, JH1WDN ex J2GY; Suzy, JH1WKS ex J2IX; Yoshi, JH1XEO ex J2IS and JH1WIX ex J2GX. Missing is Kojiro, JH1VOE silent key 1976.

Awards Issued

Bob Rennie, VE3IR added All Counties to his fine collection. This #8 to Canada. Others were: VE1DI #202, VE1RQ #190, VE3CBY #83, VE4EL #157, VE4QZ #143, VE4XN #224, and VE6ABP/VE7ATI #133.

Tom Duderstadt, W0LRH collected USA-CA-3000 endorsed Mixed.

Don Ronk, WA6WCG applied for USA-CA-3000 endorsed All S.S.B., All Mobiles.

Arthur Nelsen, WA0BMO was issued USA-CA-2500 endorsed All 80 S.S.B.

Bob Craig, K6XZ (ex WA2GMD) collected USA-CA-2500 endorsed Mixed.

Jim Elwell, Sr., W1VJ requested USA-CA-500 through USA-CA-2500, Mixed.

Robert Garceau, K1YRP sent for USA-CA-1500 endorsed Mixed.

David Allen was sent USA-CA-500 and 1000 endorsed All S.S.B.

Taroh Yagi, JH1WIX (ex J1ZB, AJ4ZZ, J1DO, J2GX licensed since 1924- old timers would enjoy fotos of him and rig page 49 of December 1934 *QST*) had me send him USA-CA-1000 endorsed All A-1, #1 to Japan.

USA-CA-500 Certificates, endorsed All A-1, went to:

Masanobu Tada, JH1WDN (ex J2GY).
Stevan Anusic, YU2RDW, #5 to YU.
Edward Palagyi, KN4Y (WB4QVK).
Fred Van Aalst, WD4RAF.
"Ace" Burdett, KA9AHH.

USA-CA Honor Roll

3000		1500		500	
WØIRH	281	K1YRP	445	WA2JFL	1393
WA6WCG	282	W1VJ	446	WA5KOS	1394
2500		1000		JH1WDN	1395
WAØBMO	345	WA2JFL	563	YU2RDW	1396
K6XZ	346	JH1WIX	564	N4CD	1397
W1VJ	347	W1VJ	565	KN4Y	1398
2000				WD4RAF	1399
W1VJ	390			KA9AHH	1400
				F5FJ	1401
				W1VJ	1402

USA-CA-500 Certificates, endorsed Mixed, were claimed by:

Donnie Brewer, WA5KOS.

Bob Voss, N4CD.

Jean Louis Fis, F5FJ, #6 to France. His QSL manager for USA-CA is Tom, W9GTQ.

Awards

Armstrong Pioneer Award: I am personally happy to hear that in memory of the inventor of f.m. radio, The Major Armstrong Memorial Amateur Radio Club, Inc., P.O. Box 1234, Englewood Cliffs, New Jersey 07632 has instituted this Award to be bestowed annually on the amateur who has, in the opinion of the voting members, done outstanding service to the amateur community. Any amateur operator, or group of amateurs, may nominate an amateur whom they feel meets the proper criteria. Nominations opened in November 1979 and will be accepted thereafter for as long as the award program exists. Club members will review each year's nominations every spring, determining by vote the amateur who has contributed substantially to amateur radio through pioneering efforts in the spirit of Major Edwin H. Armstrong, inventor of Frequency Modulation.

All amateurs are invited to send their nominations to Awards Committee, Major Armstrong Memorial Amateur Radio Club, Inc., P.O. Box 1234, Englewood Cliffs, N.J. 07632. Amateurs in the New York Metro area can discuss nominations with club members on their repeaters on 441.525/6.525 and 222.080/3.680.

Goose Pimple Junction Certificate: The Bristol Amateur Radio Club sponsored an expedition to Goose Pimple Junction, Virginia February 2, 1980 from 7 AM to Midnight local time (1200Z to 0500Z). Phone operation will be 10 kHz up from the bottom of the general band on 10, 15, 20, 40 and 80. C.W. operation will be 35 kHz up from the bottom of the bands. The club call, WB4DKI, will be used and the station will be manned by the BARC members. For a certificate, send s.a.s.e. to Tony Stitt, WA4KYS, Box 3643, Bristol, Tennessee 37620. The certificate will feature a picture of participating members in front of Goose Pimple Junction sign with "Kermit" the infamous weather predicting ground hog.

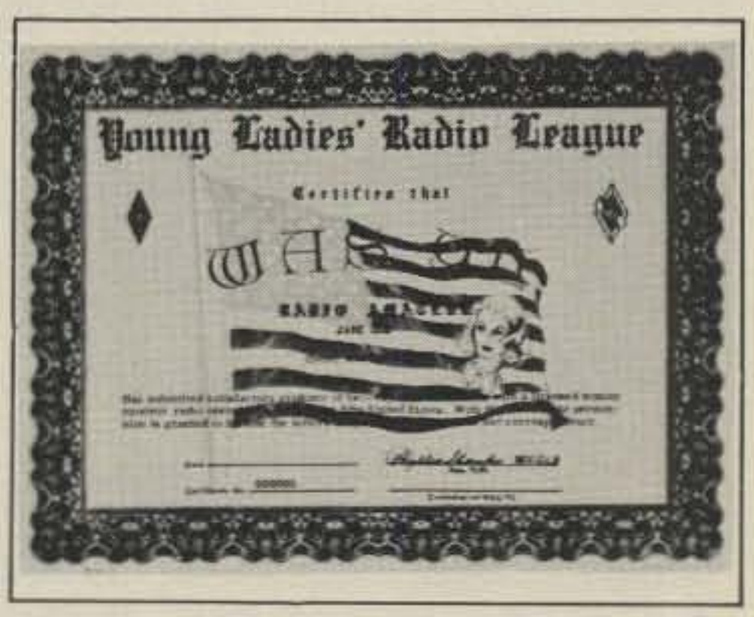
The Iowa Counties Award: This Award is issued by the Mississippi Valley Radio Club for achievements in working Iowa Counties.

To obtain the basic award, an operator must work stations in 20 different Iowa Counties. Endorsements are issued for each additional 20 Counties worked. Submit a list of stations worked, time, date, signal report and county along with $1.00 to: Mississippi Valley Radio Club, 3518 W. Columbia, Davenport, Iowa 52804. No QSLs are necessary. Endorsements are issued for 50 cents for each 20 counties submitted. Thanks to Mike, WØSI for the data.

Iowa Counties Award

Worked All States - YL(WAS-YL): This Award is available to all amateurs, U.S. or foreign. Contact must be made with a duly licensed YL in each State. The District of Columbia may be counted for Maryland. Contacts must all be made from the same location, or from locations not two of which are more than 25 miles apart, provided this rule is observed; the call used is immaterial provided it is licensed to the applicant. Contacts made through "repeater" devices or any other power relay method cannot be used. Written confirmations or photocopies must be submitted. Contacts may be made over any period of years. Confirmations must show your call and definitely indicate that two-way communications were established. There are no band limitations. Place cards in alphabetical order by State, with list indicating Call, Date, Band, Mode, RST and YL's First name. All applications and QSL cards must be accompanied with sufficient postage on an 8½ × 11½ envelope for their return or $2.00. Mail all WAS-YL applications to: WA4WPN, Stella McPherson, 2029 Elbow Road, Chesapeake, Virginia 23320. Requests for application forms can also be directed to her. Please include self-addressed stamped envelope with request for application. "Thought you might be interested in some data on Stella, WA4WPN. She became interested in amateur radio upon visiting a young friend who was an amateur. He had QSL cards displayed from Russia and she could not believe that he actually talked to people from the Soviet Union. So she and OM decided it would be a very interesting hobby and they both got licenses. He is AF4C. Stella received her Novice ticket in September 1976 and WAS on c.w., really enjoying being a Novice. She became a General in December 1977 and particularly enjoyed phone patching for deploying military personnel and had many hours of pleasure reuniting family and friends through amateur radio. Stella upgraded to Advanced last summer and now likes DX and ragchewing. She thinks it is a fantastic hobby - what a grand way to meet wonderful people all over the world. Other hobbies include photography and home decorating. They have two children, 7 and 4 - Ed." Thanks to Frank, W1WY for this data.

Stella L. McPherson, WA4WPN, Custodian of WAS-YL Award.



WAS-YL Award

Worked All Transkei Award: The Transkei Amateur Radio League has recently introduced this Award. Stations in Zone 38 must have logged four (4) S8 stations since 26 October 1976. DX stations must have logged two (2). All modes or a combination of modes and all bands as well as cross band operation is OK. Send applications to: The Transkei Amateur Radio League,

P.O. Box 750, *UMTATA,* Republic of Transkei (Africa). QSL cards are not required. The application must, however, be accompanied by a certified extract of your log, verified by two other licensed amateurs. Cost of the Award is: Zone 38 applicants: 50c RSA or 5 IRCs. Other applicants $1.00 US or 10 IRCs. Thanks to Bill Welsh, W6DDB for this data.

Notes

Sad to report the loss of two friends: M.A. McIntire, W2BO who worked with me for many years at WHN in New York City and he used to help with the CQ DX Contest logs.

Bill Schaffer, W2IZF one time President of the Clifton, N.J. Radio Club and more recently manager of Nidisco Electronics in Hackensack, N.J.

Have to give credit where it is due. There is a fine list of QSL Bureaus (foreign) on pages 87 and 88 of November '79 *QST.* I note that under LU the QTH of the Argentine Radio Club is different than usually listed for their Awards and that could be the reason applications have been returned unopened.

I have been extremely lucky in that I have had the pleasure of reading *MANY* Tab Books. They have some 650 current titles in print to cover just about any problem you might have or a book about any subject you could pick. Write for the latest catalog to TAB BOOKS, Summit, PA. 17214.

NOT to pick on the mobiles, they do a *great* job, BUT complaints keep coming in that some claim to be on a County Line that really does NOT exist (unless they are at times in a boat). Counties that do NOT touch (being separated by a river or other land masses) can NOT possibly be a County Line. Also some U.S. amateur whose license in the U.S. had expired was heard using his XE call in Texas, which apparently is not legal. Let us NOT take such liberties and thus devalue Awards. How way your month? (Mine was better as the complaints about plaque delays subsided.)

73, Ed., W2GT.

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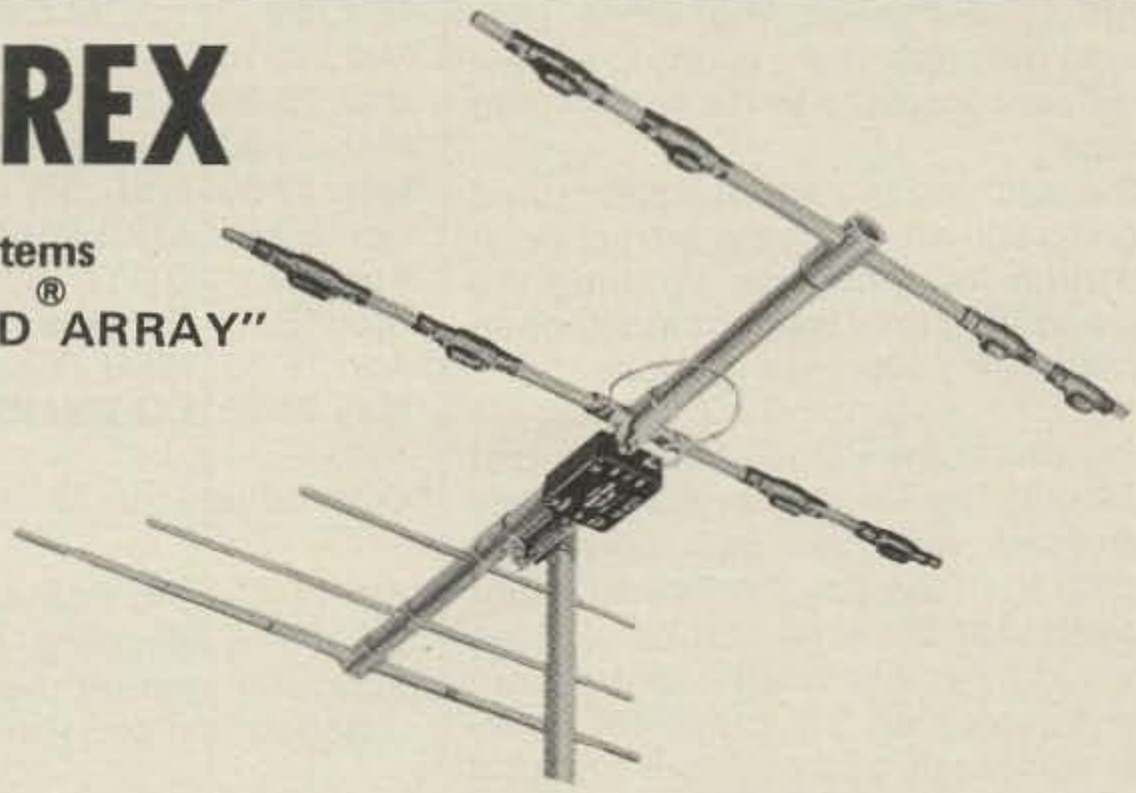

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a monthly feature by

FRANK ANZALONE, W1WY

Contest Calendar

News/views of on-the-air competition

Although I had heard rumors of possible changes in the rules of the ARRL DX Contest, I had not expected the drastic change for this year's contest.

As you will see in the brief description, the format is similar to that used in our World Wide Contest for the past 30 years. This should be an advantage as the DX fraternity is familiar with this format which has made our contest the world's largest DX competition. Over 5000 entries in 1978, possibly more in 1979.

Over the years the title International DX Competition hardly seemed appropriate for this activity. However now it can be truly called an International Contest, and once the word gets around overseas there is going to be a significant increase in DX activity and returns.

The addition of all those sponsored trophies will also be a big attraction. It was time for a change. Working the U.S. and VE's only was not much of an attraction for overseas stations.

Reviewing the *CQ* 160 Meter contest results in the December issue I was impressed with the unusually high returns from the Czechs. Actual count showed that the total number of logs received from this small country more than equaled all the other DX countries combined, and over half the total received from stateside stations. A remarkable achievement when you consider there must have been ten times as many stations active on 160 in the U.S. as there were in Czechoslovakia.

The answer is quite obvious; the OK boys are dedicated contesters and submit their logs regardless of their score. With a few exceptions the fellows over here will not submit their logs unless they have competitive scores.

You should be reading this before this year's 160 contest. Let's have a better U.S. showing. It's no disgrace being low man on the totem pole.

Good luck, see you on 160.

73, Frank, W1WY

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

Feb. 2-3	RSGB 7 MHz Phone
Feb. 2-3	So. Carolina QSO Party
Feb. 2-3	10-10 Net QSO Party
Feb. 2-3	CWSP DX Contest
Feb. 9-10	QCWA CW QSO Party
Feb. 9-10	Dutch "PACC" Contest
Feb. 9-10	TWO Land QSO Party
Feb. 12-14	OOTC CW QSO Party
Feb. 16-17	ARRL DX CW Contest
Feb. 16-17	YL-OM Phone Contest
Feb. 22-24	OOTC Phone QSO Party
*Feb. 23-24	French Phone Contest
Feb. 23-24	RSGB 7 MHz CW Contest
Mar. 1-2	ARRL DX Phone Contest
Mar. 8-9	QCWA Phone QSO Party
Mar. 8-9	YL-OM CW Contest
Mar. 15-16	Bermuda Contest
Mar. 22-23	BARTG RTTY Contest
Mar. 29-30	**CQ WW WPX SSB Contest**
Mar. 29-30	ISSB CW QSO Party
Apr. 5-7	ARCI QRP QSO Party
Apr. 8-9	DX YL to W/VE YL Phone
Apr. 15-16	DX YL to W/VE YL CW
Apr. 19-20	ISSB Phone QSO Party
May 24-25	**CQ WW WPX CW Contest**

*Covered last month.

RSGB 7 MHz Contest

Phone: Feb. 2-3 C.W.: Feb. 23-24
Starts: 1200 GMT Saturday
Ends: 1200 GMT Sunday

As reported back in the November Calendar this contest was postponed from the usual October and November dates and rescheduled to February. There has also been a second change in the c.w. dates.

The scoring system is different from that used in previous years, with a multiplier now being used. Hope the following rules will hold up at least for this year.

Bands: Phone - 7.04 to 7.10 MHz. (This will require split frequency operation for the U.S.) C.W. - 7.00 to 7.04 MHz.

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

Scoring: Stations in Europe score 5 points for each QSO with a British Isle station. Those outside Europe score 15 points.

Multiplier: One for each different British Isle country prefix worked. (G2, GC3, GD4, GW4, etc., a max. of 42 possible. No credit for GB prefix.)

Final Score: Total QSO points times the multiplier prefixes worked.

There is also an s.w.l. section with the scoring same as above. Overseas listeners to log British Isle stations only.

Awards: Certificates to 1st, 2nd and 3rd place scores in the British Isles, Europe and non-Europeans.

The phone entries must be received no later than March 29th, the c.w. April 12th. They go to: The RSGB HF Contest Committee, c/o P.A. Miles, 28 Scotch Orchard, Lichfield, Staffs. WS13 6DE ENGLAND.

South Carolina QSO Party

Starts: 1800Z Sat. February 2
Ends: 2400Z Sun. February 3

This is the first effort by WA4SJS, N4AKO and WA4YUU in organizing a QSO Party for South Carolina.

The same station may be worked on each band and each mode, and S.C. stations may work other in-state stations for QSO and multiplier credit.

Exchange: RS(T) and QTH. County for S.C., state, province or DX country for others.

Scoring: One point per QSO, 2 points for Novice and Techs. (Novice and Techs must sign /N or /T to identify their class.)

Final Score: For S.C. - QSO points

times the sum of S.C. counties, states, provinces and DX countries worked.

For all others - QSO points times the sum of S.C. counties worked. (max. of 46)

Frequencies: C.W. - 3550, 3710, 7050, 7110, 14050, 21050, 21110, 28050, 28110. S.S.B. - 3980, 7280, 14280, 21380, 28580. (no repeater contacts)

Awards: Certificates to top scoring stations in each S.C. county, each state, province and DX country. Also to Novice and Tech winners.

Include a summary sheet with your entry showing the scoring and other information.

Mailing deadline for logs is March 8th to: South Carolina QSO Party, c/o Elliot Farrell, Jr. WA4YUU, P.O. Box 994, Walterboro, S.C. 29488. Include a s.a.s.e. for copy of results.

10 - Ten Net QSO Party

Starts: 0000 GMT Sat., February 2
Ends: 2400 GMT Sun., February 3

This is the winter edition of the Ten-Ten International Net QSO Party. It's open to all amateurs but only members are eligible for awards.

Activity of course is on 10 meters only, any mode but one contact only with the same station. You may work 24 out of the 48 hours available period, and they need not be consecutive.

Exchange: Call, name, city, state and 10-10 membership number. Include Chapter name if you wish your score to be credited to your chapter.

Classes: Single operator and QRP. (max. of 20 watts p.e.p.)

Scoring: Each contact counts one point, add an additional point if it's with a 10-10 member.

Awards: Certificates to winners in following areas: U.S. call areas, KL7, KH6 and other Pacific U.S. Islands, VE call areas, Central America, Caribbean Islands, So. America, Europe, Africa, Asia, Australia, New Zealand, So. Atlantic and So. Pacific.

Stations with new calls should list their old call. QRP stations list type of equipment used.

Members only send logs to: Contest Chairman, Charles Elliott, W8URK, 4308 Princeton Road, Hamilton, Ohio 45011. They should arrive no later than March 5th.

CWSP DX Contest

Starts: 0000 UTC Sat. February 2
Ends: 2400 UTC Sun. February 3

This is the 1st contest organized by the CWSP, "Grupo de CW de Sao Paulo."

All Bands, 3.5 thru 28 MHz, CW only. Single and multi-operator, all band scoring only.

Exchange: RST plus QSO number starting with 001. CWSP members will add CWSP to report.

Points: (a) Same country 0 point, multiplier credit only. (b) Other countries, same continent, 1 point. (c) Other continents, 3 points.

Multiplier: Each DXCC country and each Brazilian prefix. (PY1, PT7, PS8, etc.) Counted once only regardless of band.

Final Score: QSO points from all bands × the final multiplier.

Awards: Cup to world winner, medals for each continent and certificates for each country. Also special awards for CWSP members, Brazil and Clubs.

Mailing deadline is March 15th to: CWSP Contest Committee, Caixa Postal 15098, Sao Paulo, Brasil.

QCWA QSO Party

CW: Feb. 9-10 SSB: March 8-9
Starts: 0001 GMT Saturday
Ends: 2400 GMT Sunday

The 23rd annual QSO party is sponsored by the Yankee Chapter this year. It will be strictly a QSO party only, no multiplier, no scoring, except for adding up the total number of members contacted.

The theme is to renew old acquaintances and meet new members. Also offers an excellent opportunity to build up your totals for the many QCWA awards. Worked 50 states, 60 Chapters, 100 members, 500 members, etc.

There will also be certificates for the top 5 scorers in the party, both phone and c.w. And Plaques to the top "Bananas."

The same station may be worked only once on each weekend regardless of the band. Separate logs must be submitted for c.w. and phone.

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

Frequencies: C.W. - 3545, 7045, 14045, 21055, 28055. S.S.B. - 3915, 7245, 14295, 21365, 28615. Plus or minus 15 kHz. (A suggestion to DX members, try the lower edge of each section.)

The QCWA newsletter will give more detailed information and have a sample log form. Since this activity is for members only all members should be well informed via the newsletter.

Mailing deadline for your logs is March 31st. (I would suggest however that you submit your c.w. entry by February 29th so that the Committee will not be swamped.)

This year they go to: Yankee Chapter QCWA, Att: Walter Woodward, W1RCJ, 14 Emmett Street, Marlboro, Mass. 01752

Dutch "PACC" Contest

Starts: 1400Z Sat., February 9
Ends: 1700Z Sun., February 10

The PACC contest dates have been changed to the second full weekend in February and will remain on that weekend in the future.

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

Exchange: RS(T) plus a QSO number starting with 001. PA/PI/PE stations will also include two letters indicating their province. (579001/GR)

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

Scoring: Each QSO with a PA/PE/PI 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 QSOs 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.

Indicate the multiplier 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.

Contacts made in the contest may be credited for the PACC 100 Awards in lieu of QSL cards providing that the station claimed has submitted a log. Write to the Contest Mgr. for details.

Mailing deadline for logs is March 30th to: Contest Mgr. D. J. Hoogma, PA0DIN, Schoutstraat 15, 6525 XR NYMEGEN, Netherlands.

Two Land QSO Party

Two Periods (GMT)
2100 Sat. Feb. 9 to 0800 Sun. Feb. 10
1300 Sun. Feb. 10 to 0300 Mon. Feb. 11

This is the 2nd time around for the South Jersey Contest Coalition. The states of N.J. and N.Y. will be working the rest of the world.

There is no time limit within the time periods listed above but there is

a mandatory rest period from 0800 to 1300 on Sunday.

The same station may be worked once per band and mode, and mobile and portables each time they change counties.

Exchange: RS(T) and QTH. County and state for Two Land stations. State, province or country for others.

Scoring: Each QSO is worth 2 points. Two landers multiply total QSO points by the number of states + VE provinces + DX countries + Two land counties worked. (N.J. & N.Y. & the U.S. included)

All others multiply total QSO points by the number of Two Land counties worked per band. (possible 83 per band, max. total 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 scoring stations in each Two Land county, and each state, province and DX country. Also for top mobiles, portable, novice, multi-operator and club.

Logs with over 200 contacts should include a dupe sheet. Indicate each new multiplier 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.

Logs go to: South Jersey Contest Coalition, c/o Mark Wilson, AA2Z, 10 Adams Avenue, Pitman, N.J. 08071.

OOTC QSO Party

CW: Feb. 12-14 Phone: Feb. 22-24
CW: 2300 UTC Tuesday to 2300 Thursday
Phone: 2300 UTC Friday to 2300 Sunday

This the 13th annual QSO party held by the Old Old Timers. It is under the sponsorship of the Florida Chapter.

CW and Phone are treated as separate entries and require separate logs. You are limited to 24 hours total operating time in each 48 hour period.

Exchange: QSO no., QTH (state, province or country) name and OOTC number.

Scoring: 1. Between N. American stations, 1 point.

2. Between N.A. and others, 3 points. (inc. KL7, KP4, KV4 and etc.)

3. DX stations, within own country 1 point, with other countries 5 points.

The multiplier is determined by the total number of states, VE provinces and countries worked.

A member may be worked once only in each party for QSO and multiplier credit.

Frequencies: C.W. - 1810-1820, 3700-3730, 7090-7110, 14050-14075, 21020-21040, 28090-28110.

Phone - 3900-3920, 7220-7240, 14270-14290, 21350-21370, 28860-28900.

Awards: Besides certificates to the party winners awards will also be made in three classes to those contacting 50, 75, and 100 members. (Totals from both C.W. and Phone.)

Sample log forms are available by sending a large s.a.s.e. to: Old Old Timers Club, P.O. Box AA, Mamaroneck, N.Y. 10543.

Mail your logs within 5 days after end of each party. C.W. goes to: Lew Sieck, K4NE, 12270 4th St. East, Treasurer Island, FL 33706. And Phone to: Herb Spitz, WA4UOA, 340 SW 64th Way, Pembroke Pines, FL 33062.

ARRL International DX Contest

C.W.: Feb. 16-17 Phone: March 1-2
Starts: 0000 UTC Saturday
Ends: 2400 UTC Sunday

A significant change has been made in the format of this granddaddy of all DX contests. Now it really qualifies as an International contest.

It is now a worldwide contest; DX to DX contacts are now permitted, and single band entries will be recognized. There will also be a large selection of sponsored plaques.

In fact the format is almost a carbon copy of our own CQ World Wide DX Contest. Only two notable differences are in the exchange and the scoring system which offers an incentive for DX to work U.S. and VEs.

Briefly this is what it boils down to:

Categories: Single operator, single and all band, Multi-operator, single and multi transmitter, and QRP.

Exchange: RS(T) and state or province for W/VE. RS(T) and power input for DX stations.

QSO Points: W/VE earn 3 points for DX contacts. DX gets 3 points for W/VE contacts, 2 points for other contacts.

Multiplier: Each DXCC country worked on each band. (Own country may be worked for multiplier credit only)

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

Awards: Certificates in each category to each country and each ARRL section, plus a wide selection of Plaques. Also certificates to DX stations making over 1000 QSOs.

Detailed rules were published in the January QST. It is recommended you use the ARRL official log forms available on request and a large s.a.s.e.

Mailing deadline for all entries is April 2nd and of course go to: ARRL DX Contest, 225 Main Street, Newington, CT 06111.

YL - OM Contest

Phone: Feb. 16-17 C.W.: Mar. 8-9
Starts: 1800 GMT Saturday
Ends: 1800 GMT Sunday

It's the YLs working the OMs 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.

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

Scoring: Each QSO counts one point. Multiply total by number of ARRL sections and DX countries worked. The same station may be worked once only regardless of band.

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. if on s.s.b. Multiply your score by the above factor for your final score.

Phone and c.w. are separate contests and require separate logs. Dupe sheets are required for stations making 100 or more contacts.

Awards: Certificates to the highest scoring YL and OM, both phone and c.w., in the U.S. and VE call areas, and each DX country. There are also 8 Cups to the top scoring YL and OM, both phone and c.w., in North America and DX countries.

Logs must be mailed by March 15th and received no later than April 3rd to be eligible. They go to the V.P. of the YLRL but at this writing the new V.P. had not been elected therefore I cannot give you a mailing address. Hopefully I will have it for the next issue in time to meet the mailing deadline. (Seems to me I have this problem every year)

HAM SHOP

FREE TO CQ SUBSCRIBERS

Advertising Rates: Non-commercial ads are 10 cents per word including abbreviations and addresses. Commercial and organization ads are 35 cents per word. Minimum charge $1.00. No ad (non subscriber) will be printed unless accompanied by full remittance. Free to CQ subscribers (maximum 3 lines per month). All ads must be typewritten, double spaced. Recent CQ mailing label must accompany ad.

Closing Date: The 10th day in the third month preceding date of publication. Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of CQ cannot vouch for the merchandise listed therein. Direct all correspondence and ad copy to: CQ Ham Shop, 76 N. Broadway, Hicksville, NY 11801.

FREQUENCY ALLOCATION CHART. See how the entire radio spectrum is used. 2 Khz to 200 Ghz. Send $3.00 to Collins Chart Co., Box 935, Coronado, CA 92118.

FREE ELECTRONICS SURPLUS CATALOG Bargain Packed. Fascinating items. Many never before advertised. ETCO-003, Box 762, Plattsburgh, NY 12901. SURPLUS WANTED

QSL CARDS: 500/$10. 400 illustrations. Free Catalogue. Bowman Printing, Dept. CQ, 743 Harvard, St. Louis, MO 63130.

WISH TO CONTACT a former employee of Wireless Specialty Co. from 1920's. Kreuzer, 1428 Main Rd., Corfu, NY 14036.

WANTED: Pre-1925 Wireless Gear, books, magazines, spark transmitters, and tubes. Jim Kreuzer, 1428 Main Rd., Corfu, NY 14036.

CLUB CALL PINS 3 lines 1¼ x 3¼ $1.55 each call, first name and club. Colors blue black or red with white letters. (CATALOG) Arnold Linzner, 2041 Linden Street, Ridgewood, NY 11227.

ROHN TOWER - Buy Wholesale from Worldwide distributor. 20G-$27.06 section. 25G-$37.62 section, 45G-$67.76 section, 48 ft. foldover tower - $605.00, 48 ft. BX free standing $2. 13.40.

LOOK buying or selling ham gear? Next five issues plus your ad printed in our publication only $3.00. Press Exchange Dept. C, 60 Brookfield Lane, Ramsey, NJ 07446.

TRS-80 HAM PROGRAMS Dup search and log contests... DXCC, WAS tracking, Antenna Math, much more. $1.00 brings list, refundable. WA4PYF; Box 145-C, Lithonia, GA 30058.

MOBILE IGNITION SHIELDING provides more range with no noise. Available most USA engines, some imports. Free literature. Bonding straps on sale now. ESTES ENGINEERING, 930 Marine Drive, Port Angeles, WA 98362.

WANTED: Hallicrafter S-1 through S-7, DD-1, 8HPA, SX-10, SX-12, and other early Hallicrafter gear, parts, manuals, and accessories. Any condition. For my collection, please write, even if in doubt on Model No. Chuck Dachis, WD5EDG, 4500 Russell Dr., Austin, TX 78745.

QSLFILE is the ONLY way to protect and display your QSLs. Working on DXCC or 5BWAS? QSLFILE shows the countries/states you still need, too. For details, write: QSLFILE, 1472 SW 13th St., Boca Raton, FL 33432.

QSLs with Class! Unbeatable quality, reasonable price. Samples: 50 cents, refundable. QSLs UNLIMITED, 1472 SW 13th St., Boca Raton, FL 33432.

TRAVEL-PAK QSL KIT-- Converts postcards, photos, to QSLs. Stamp brings circular. SAMCO, Box 203, Wynantskill, NY 12198.

LOOKING FOR old Lionel Trains. Interested only in "0" gauge, excellent to like-new condition. Primary interest is locomotives prior to 1952, but will consider complete sets or more recent models. Am willing to buy outright for cash or swap radio gear to meet your needs. Dick Cowan, WA2LRO, c/o CQ Magazine, or call 516/883-6200.

FOR SALE: Old issues of Ham Radio, 73, CQ, QST. Some complete runs. Send SASE for lists and prices. A. Dorhoffer, K2EEK, CQ Magazine, 76 N. Broadway, Hicksville, New York 11801.

WANTED: Extra coils for SW-3 receiver. I have odd-ball coils and need your single extras to make up complete set. Buy or trade. Bill Orr, W6SAI, c/o Eimac, 301 Industrial Way, San Carlos, CA 94070.

SALE: Sony ICF-5900W multi-band receiver. Designed for SWL's. Like new condition w/ manuals. $100. Schultz, W4FA, Box "L", FPO New York 09544.

BE FIRST TO KNOW precisely when and where to work all the choice DX. Bi-weekly LI DX Bulletin has: Hot DX News - Time and Frequency of each goodie - QSL info - Propagation Forecast - and more... Send business size SASE for free sample or $10 for 1-year domestic subscription to: LONG ISLAND DX BULLETIN, P. O. Box 173, Huntington, NY 11743.

SCANNER OWNERS! IT'S HERE! THE "TOP SECRET" REGISTRY OF U.S. GOVERNMENT RADIO FREQUENCIES 25 to 470 MHz, by K2AES. First and only book of its kind ever published! Lists 2,250-plus freqs. of Military, FBI, Treasury, FCC, Border Patrol, Customs, Secret Service, NASA, FAA, CIA, Federal Prisons, U.S. Marshals, satellites, National Park Service, Fish/Wildlife, and much more! Only $4.95 postpaid (U.S.A., APO, FPO orders only, please); from CRB Research, P.O. Box 56-CQ, Commack, NY 11725.

CQ AND QST 1950-1975 ISSUES FOR SALE. Send SASE if ordering 73, Ham Radio, or other CQ and QST issues. One dollar minimum order and all issues cost 25 cents each, including USA shipping. Send chronological list and full payment to W6LS, 2814 Empire, Burbank, CA 91504. Available issues and refund sent within one month.

CERTIFICATE FOR PROVEN TWO-WAY RADIO CONTACTS with Amateurs in all ten (10) USA call areas. Award suitable to frame and proven achievements added on request. SASE brings TAD data sheet from W6-LS, 2814 Empire, Burbank, CA 91504.

FOR SALE: Complete set of Time-Life camera books, 17 volumes plus master index and Photographers Handbook, $125. A. Dorhoffer, K2EEK, CQ Magazine, 76 N. Broadway, Hicksville, NY 11801.

Q.S.L. — Q.S.L. — Q.S.L. — Q.S.L. Please send Q.S.L. Cards to: Philip Steven Kurland, Post Office Box 1686, New Haven, CT 06507.

WANTED: Pre-War issues of Short Wave Craft magazine. Bill Orr, W6SAI. Eimac, 301 Industrial Way, San Carlos, CA 94070.

WANTED: Collins 51-R receiver (VHF). Bill Orr, W6SAI. Eimac, 301 Industrial Way, San Carlos, CA 94070.

WANTED: Antique Glass. Looking for old milkglass - Purple, slag, carmel, and Greentown. Tell me what you have. I pay the highest prices. Write to: Jack Schneider, c/o Cowan Publishing Corp., 14 Vanderventer Ave., Port Washington, NY 11050.

SALE: Heath IM-28 VTVM Kit. New, perfect. Ordered by mistake. $40. Schultz, Box "L", FPO New York 09544.

MEDICAL: Any licensed amateur radio operator in the medical or paramedical field should join MARCO (Medical Radio Council). Contact Stan Carp, M.D., K1EEG, 44 Main St., Saugus, MA 01906. 617/233-1234.

FOR SALE: DRAKE C4 Console - Brand New Cond. $485. Incl. Postge UPS 215-271-8898

HYBRID TEES 10, 6, 2, 1¼ Meters. BROADBAND DIRECTIONAL COUPLERS $1.00 (Refunded with first order) brings catalog. L&M Microwave Products Co. P.O. Box 223C High Bridge, N.J. 08829

SCRAMBLER! EASY TO BUILD voice scrambler. Suitable for radio or telephone use. Complete schematic and parts list $3.00 ppd. John Dunaj, Box 424, Wallingford, Conn. 06492

WANTED—old radio transcription discs; any size, speed. Larry W7FIZ, Box 724, Redmond, WA 98052

ROHN TOWER—Buy wholesale from worldwide distributor. 20G $27.06 section, 25G $37.62 section, 45G $67.76 section, 48 ft. foldover tower $605.00, 48 ft. BX free standing $213.40. Hill Radio, 2503 GE Road, Bloomington, IL 61701, 309-663-2141.

NEW FALL 1979 Test Equipment Catalog available. 108 pages of quality used equipment. Write for free copy. Tucker Electronics Co., Box 401060, Garland, TX 75040.

EQUIPMENT WANTED: We buy late model test equipment and microwave components. Contact Tucker Electronics Company, Box 401060, Garland, TX 75040, 214-348-8800.

AIRCRAFT RADIO FREQUENCIES and assigned uses. List for scanner enthusiast. Send $3.00 Box 835-A, Wewoka Okla. 74884

RTTY! ST-5X TERMINAL UNIT—AFSK—POWER SUPPLY. WRU. RTTY SCOPE AMPLIFIER. Boards and Kits. BOMARK, INC. P.O. Box 7116, Hollywood, FL 33021, 305-962-7219.

COLLINS: 51S1F $2050, 55G1 $325, 30LI $995, 32S3A/516F2 $1775, 312B4 $425, All Round Emblem, immaculate with Manuals. Two HyGain HT-18 10-80mtr Vertical Antennas $195 each (harness for phasing available), Two Murch Ultimate Transmatch UT-2000A $125 each, Dentron Antenna Tuner 3000A $230, KLM Multi-2700 144MHz Transceiver $575, KLM PA 10-140BL Linear Amplifier $175, VISTA 120VAV/13.8VDC Power Supply for above $136. Excellent condition with Manuals. Ralph Thomas, 9 Emmons Ave., Farmingdale, NJ 07727 201/938-5623

REPLACE RUSTED ANTENNA bolts with stainless steel bolts. Small quantities, Free Catalog. Elwick Dept. 362, 230 Woods Lane, Somerdale, N.J. 08083

WANTED—Good used ham transceiver, cheap. Write Matt Foster, Route 2, Pittsburg, KS 66762.

FOR SALE—Heath SB-220 Factory sealed carton. $625.00 plus shipping & ins. Collins Mech. Filter's F455B-31, F455B-08 best offer. Jim Rupert W8KDI 31819 Lynne Dr., Rockwood, Mich. 48173

R39OA-Mint-$350, HQ180C - Mint - $200, SP600JX17 Excellent-$225, Anthony Koclanes, 1437 Land O'Lakes, St. Louis, MO. 63141, 314-567-1852.

"ATLAS 215X with power consul and remote VFP one year old $1,000.00 U.S. or $1,200.00 Canadian. Steve Roberts' 3664 Autumn Harvest Drive Mississauga, Ontario L4Y 3S3 or phone: 416-279-4388.

TUBES—Many real old radio tubes & German WWII Transmitting Tubes, big ones. s.a.s.e. for list K8CV, 4612 Woodland, Royal Oak, Mich. 48073

WANTED—Johnson 6&2 Thunderbod amplifier in any condition, or a six meter amplifier with low drive requirements. Dentron 160-10L linear amplifier.
SELL—Drake R4B-$335. T4XB $375. AC-4 & MS-4$100. F. Kauppi Rt. 2 Gilbert, Minnesota 218-865-6541

WANTED—Hallicrafters SX-43 and S-76 Receivers. State price and condition. C. Klawitter, 4627 N. Bartlett, Milwaukee, WI 53211.

FOR SALE—CQ 160 issues 1946-1972, QST 400 issues 1940-1974, some missing issues - $85.00 for all. Al Hines W5LWQ 820 South Magnolia St. Laurel, MS 39440.

SELL—Heathkit SB401 SSB & c.w. transmitter $235.00 HR-1680 receiver with speaker HS1681 $210.00. Brian Shiptosk, WA3NGU, 204 Hill St., Trucksville, PA 18708.

SELL—Realistic DX-160 rcvr. $100. Lafayette BCR-101 rcvr. $175 M. Eckhart RD#2 Bender Mill Rd. Lancaster, PA 17603

WANTED—Back issues of DXers Magazine. WB80WM, 1309 24th St. NW, Canton, Ohio 44709.

WANTED—Kenwood TS700 or Yaesu FT225 working or not. James Smith Rt10. Box 216B Columbia MO.

SALE OR TRADE—Collins R-390 for $325 or Drake R4B. Dave, WA7ZYQ, 208-245-2070.

WANTED—Schematic for Hewlett-Packard generator, model 400C, serial 8168. W3GOG, 2507 SE 20th Pl, Cape Coral, FL 33904.

WANTED-Telrex TC-99 Tribander; parts list, assembly & tuning instructions. A. McGinnis, WA2DTQ 55 Patton St., Iselin, NJ 08830

COLLINS SALE: KWM-2 $450, PM-2 w/samsonite carrying case $175; Mobile Rack w/2 mobile power supplies $125; Take All $650 firm. S-LINE: 75S3 $450; 32S3 $525; 516F2 $125; 312B4 $200; DX Eng. Processor for 32S3 (unused) $70; Tall All (S-Line) $1265 firm. CURTIS Deluxe Keyer EK-404 $70. ALL OF THE ABOVE for $1900 firm. Jack M. Gutzeit, W2LZX, c/o CQ Magazine, 76 N. Broadway, Hicksville, NY 11801.

The book, "CQ YL", has been updated again with a new supplement bringing the YLRL Officers section up to date through 1977, plus a report on the 7th International YLRL Convention held in Houston in June, 1976. If you have a copy of "CQ YL" and would like to add the new supplement (the pages are "slotted" so they can be inserted directly into the book's spiral backbone), drop a note with your request to author/publisher, W5 RZJ, Louisa Sando, 9412 Rio Grande Blvd. NW, Albuquerque, NM 87114. Please enclose $1.00 to cover cost of printing and mailing. The one and only book about YLs in ham radio, "CQ YL" contains 23 chapters, over 600 photographs. Order your autographed copy from W5 RZJ, $3.50 postpaid.

SALE—Drake SSR-1 general coverage receiver, $200, 1 year old, Craig Eichelkraut KA9EDO; 623 Marcy, Ottawa, IL 815-433-5260.

WANT TO SELL—HQ 170A 2M-160M mint cond. Receiver $150.00. Will buy Swan 350 or 500 with power supply, also Electronic Keyer. A. Jones, S-16 R Mendez pidal El Senovial, Rio Piedras, PR 00926.

WANTED—6 Meter SSB transceiver, or transverter compatible to Collins KWM-2. K1IKE RFD2 Box 9, East Haddam, CT 06423.

WANTED—AFSAV-39C rekeyer, TD-687 Demux, and bulkhead lighting arrestors W/"N" conn. C.T. Huth, 146 Schonhardt S1, Tiffin, OH 44883.

20M CLASSIC—HW-32A, HP-23C, Shure 444, fan, spares, mint; $200. Heath Keyer HD-1410; $39. MFJ CW filter; $22. MFJ speech processor, Tentec Case; $49. WA2OVG, 212-796-8617.

WANTED—2 Ux4 ceramic valve holders, and 6BA7 valve. Baker, Bontnewydd Aberystwyth Wales.

WANTED—Hammarlund SP-600 receiver. State price and condition. C. Klawitter 4627 N. Bartlett, Milwaukee, WI 53211.

SALE—HW101, SRA-301, PS-23, HM102. Expert tuned. 2 hrs. time. $475 or offer. KA9DQQ, 6110 Lawndale St, Schofield, WI 54476.

QSL — QSL — QSL: Please send QSL Cards to: Philip Steven Kurland, Centuck Post Office Post Office Box 407 Yonkers, NY 10710.

TWO ANTIQUE WALL TELEPHONES. One 33 inches and one 24 inches tall. $500. WA9IYF. 812-273-5379.

COLLINS MECH. FILTERS: F455H31 and F455Y31, $25 each. Matching Collins 456.350 Xtal, $750. F455N20 for R390A, $35. J. Hoffer, W1DL, 24 Cherry Road, Framingham, MA 01701 617-872-5084.

WANTED—Pair of WE 701-A tube sockets. Mart Grace 4 Autum St. Norwalk, CT 06850.

NAVY—Electrostatic Device 2 6 A 7 demonstrates SPARKS. 281lb. case. Sell Cheap. S.A.S.E. D. Testa, Box 906 4-CQ, Newark NJ 07104.

HP400D AC VTVM, exc. cond. with manual, $45. Vac. var. caps, Jennings UCS-375, 19 to 375 PF, 14,000 V, complete with head, shaft, flange mount, $55 ea. J. Hoffer, W1DL, 24 Cherry Raod, Framingham, MA 01701 617-872-5084.

NEW RCA 7360 FOR HT-32B, NCX5, etc $7.00 ea. 6370, $4.00 ea. Also new 829B, $5.00 each. 6CW4, 6DS4 Nuvistor, $4.50. Shipping included. J. Hoffer, W1DL, 24 Cherry Road, Framingham, Mass 01701 617-872-5084.

FREE! EINSTEIN REFORMED! Superior, C+, Unified Field, Trajectory Relativity! W.T. Thomas, Jr. 408 Vermont, Daytona 32018.

WANTED CALL BOOKS: 1935 tp 1945 and other books. W9CJW 707 S. James Carbondale, IL 62901.

YAESU FT-221R all mode two-meter transceiver with microphone and manual, in mint condition, $425. G. Alfred Dodds, 874 Pepperwood Lane, Brunswick, Ohio 44212.

WANTED: DRAKE SW-4 rcvr also MN-4c. Sell/Trade: SB-303 Manual WA4TKG Inquire via Amateur radio.

FOR SALE: RCA-Brand New Dynamic Transistor/FET Tester, type WT-524A, $80.00 HEATHKIT-Model HM-102, High Frequency RF power & VSWR meter, $30.00. RCA-Constant voltage DC-Power supply type WP-704A $60.00. W.D. Shvtchuk, 1 Lois Avenue, Clifton, NJ 07014, 201-471-3798.

WANTED: Drake T4, T4X, T4XB, T4XC. Joe Bedlovies, 30 Ridge St., Milford CT 06460.

WANTED: AFSAV-133C demod, TD-687/URR Demux, AN/ARC-27 xceiver, and type 'N' transfer relays/switches; C.T. Huth, 146 Schonhardt, Tiffin, OH 44883.

2M FM HEATHKIT AMP 15W $30, Allied or We headphones $10, 2 Hifi Box Spkrs $10. W9DI 13 E. Hickory St., Hinsdale, IL 60521.

WANTED: 34PNB for Drake TR4-C Must be in mint condition. WA4TKG Please inquire via Amateur raido.

WANTED: Any national receiver, working or not.
SELL: 4KW Commercal Generator 120-240V Electric start 10 hrs actual use. T.N. Golbert 1800 Rhodes Rd 612, Kent, OH 44240.

SEND SASE FOR LIST OF 4-1000A Ampl. parts. Also X/mrs, Rtty, tubes, misc. L. Basham, Cave Junction, OR 97523.

CALL LETTER LICENSE PLATES wanted for collection. Will pay shipping. Art Phillips WA7NXL, Route 4 Box 720, Flagstaff, AZ 86001.

COLLINS 75A-2 Receiver, beautiful condition, $150. (local pickup preferred). Att: Drake TR-4C owners: Complete new set of matched tubes, (2) ten-meter accessory crystals, and new 34—PNB Noise Blanker, package $95. I ship. DS, Box 48, Ballardvale, Mass. 01810.

SIX METER TRANSVERTER FOR SALE. Hallicrafter HA-6 and matching power supply. A-1 condition, Manual $125-Shull W7FIM, 12349-36 N.E., Seattle, WA 98125.

FOR SALE: TS-120S with extras TS-700 SP, S-1 H.T., FM-DX 2-meter rig, send s.a.s.e. for info: J.P. Johnson. 7602 Timberwood Dr. Jacksonville, FLA 32224.

WANTED: any national receiver, working or not
SELL: 4KW commercial duty electric start gen. 120-240 volt. T.N. Colbert 1800 Rhodes #612 KENT, OH 44240.

ANTENNA—Multi-band dipole mor-gain Model 75-40 HD (SP) 75 and 40 meters. New -$25. Art Johnson K2POA, 29 Bone St. Bethpage, NY 11714.

TRADE HEATH HR-10B rcvr for Heath DX-20 or DX-40 transmitter - WD5IMA, Box 483, CARTHAGE, TX, 75633.

CARTHAGE HIGH SCHOOL NEEDS your junk and spare parts. Will gladly reimburse shipping. Jerry Reeves, Carthage High School, Drawer D, Carthage, TX 75633.

MC-50 KENWOOD NEW $33, Ray Track Compressor $35, Heath HM-102 $30; PPD, W8FDN, 371 Claymore, Cleveland, OH 44143.

FOR SALE: Kenwood TS 700 SP. Like new less than 1 year old. Would possibly trade on Kenwood HF Rig: Call Ken nights 606-986-8849, Days till 8:00 pm 606-878-8851.

GR1001A sig. gen., exc. cond. with GR874 - to-PL259 cable and manual. $250 FOB UPS. PhD, 5220 Carlingford, Riverside, CA 92504.

WANT—Factory made one KW Transmatch/Ant. Tuner. W4PRX, 840 Tarawitt Dr., Longboat Key, FL 33548.

WANTED: To borrow & Xerox, Manual for Yaesu FL-101 Xmtr. Stu Ballinger WA2BSS, 57 S. Clinton St. Poughkeepsie NY 12601.

GLOBE SCOTT XMTR w/Heathkit VFI & old National NC 290 rcvr Swap for XCVR?? WA0LV6, 1266 Lafond Ave., St. Paul, MN 55104.

TAYLOR-HOBSON 405mm f-4.0 lens with iris control to f-22, with carrying case, no camera mount supplied. $100. G. Alfred Dodds, 874 Pepperwood Lane, Brunswick, Ohio 44212.

HEATH SB-104A output power amplifier module, new. Spare unit for system, $90. G. Alfred Dodds, 874 Pepperwood Lane, Brunswck, Ohio 44212.

FOR SALE: Teknik Mod. FC-106 combination digital clock and freq. counter, needs repair, $35. Gilfer Mod. A-20 pre-selector, solid state w/AC sup., 4-22 MHz, good condx, $20. High-gain G.A.M. collinear 2-mtr ant., works, local pickup only, $10. Karl Thurber, W8FX, 631 N. Overbrook Dr., Ft. Walton Beach, FL 32548.

HAVE DISPOSED MOST OF LIFETIME COLLECTION. Still have some F.D. covers and Philatelic autographs to sell or trade. L.B. Fuqua, W4WBD, Maple St., Box 6, Eddyville, KY 42038.

WANT: Back issues of The DXers Magazine. Skip - WB8OWN.

WANT: Panasonic RF-4800 in good condx or other digital readout shortwave rcvr. Troy Hollan, Box 464, Fowlerton, TX 78021.

ADVERTISER'S INDEX

For additional information on a particular ad in this issue, tear out the Reader Service postcard bound in this issue and circle the numbers on the card which correspond with the Reader Service numbers listed on the INDIVIDUAL ADS.

FT-707 is shown with optional FV-707DM VFO & Scanning Microphone

THE FT-707 "WAYFARER"

The introduction of the "WAYFARER" by Yaesu is the beginning of a new era in compact solid state transceivers. The FT-707 "WAYFARER" offers you a full 100 watts output on 80-10 meters and operates SSB, CW, and AM modes. Don't let the small size fool you! Though it is not much larger than a book, this is a full-featured transceiver which is ideally suited for your home station or as a traveling companion for mobile or portable operation.

The receiver offers sensitivity of .25 uV/10 dB SN as well as a degree of selectivity previously unavailable in a package this small. The "WAYFARER" comes equipped with 16 poles of IF filtering, variable bandwidth and optional crystal filters for 600 Hz or 350 Hz. Just look at these additional features:

FT-707 with Standard Features

- Fast/slow AGC selection
- Advanced noise blanker
- Built-in calibrator
- WWV/JJY Band
- Bright Digital Readout
- Fixed crystal position
- 2 auxiliary bands for future expansion
- Unique multi-color bar metering—monitors signal strength, power output, and ALC voltage.

FT-707 with Optional FV-707DM & Scanning Microphone

- Choice of 2 rates of scan
- Remote scanning from microphone
- Scans in 10 cycle steps
- Synthesized VFO
- Selection of receiver/transmitter functions from either front panel or external VFO
- "DMS" (Digital Memory Shift)

Impressive as the "WAYFARER" is its versatility can be greatly increased by the addition of the FV-707DM (optional). The FV-707DM, though only one inch high, allows the storage of 13 discrete frequencies and with the use of "DMS" (Digital Memory Shift) each memory can be band-spread 500 KHz. These 500 KHz bands may be remotely scanned from the microphone at the very smooth rate of 10 Hz steps.

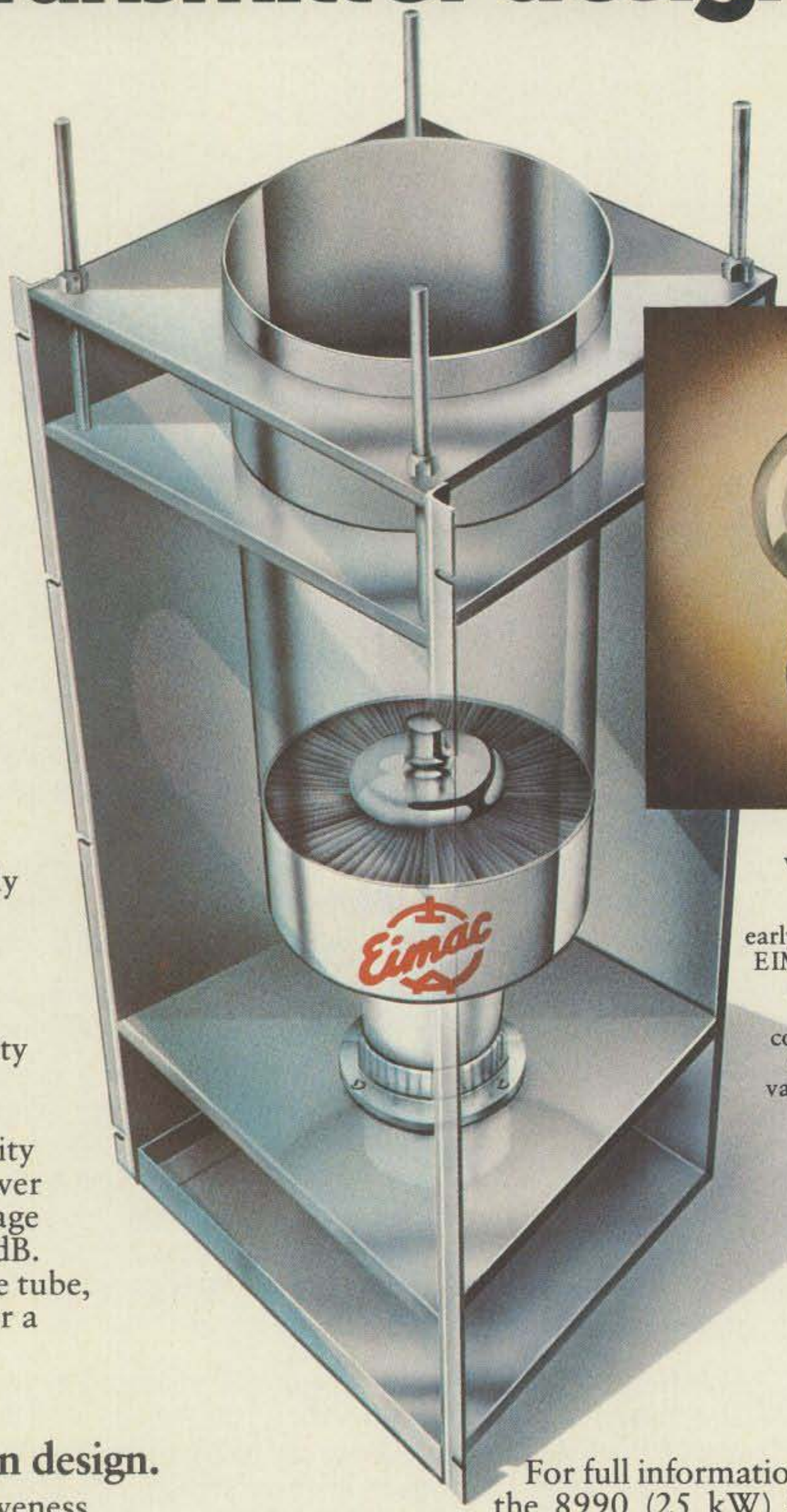
The FT-707 "WAYFARER" is a truly unique rig.
See it today at your authorized Yaesu Dealer.

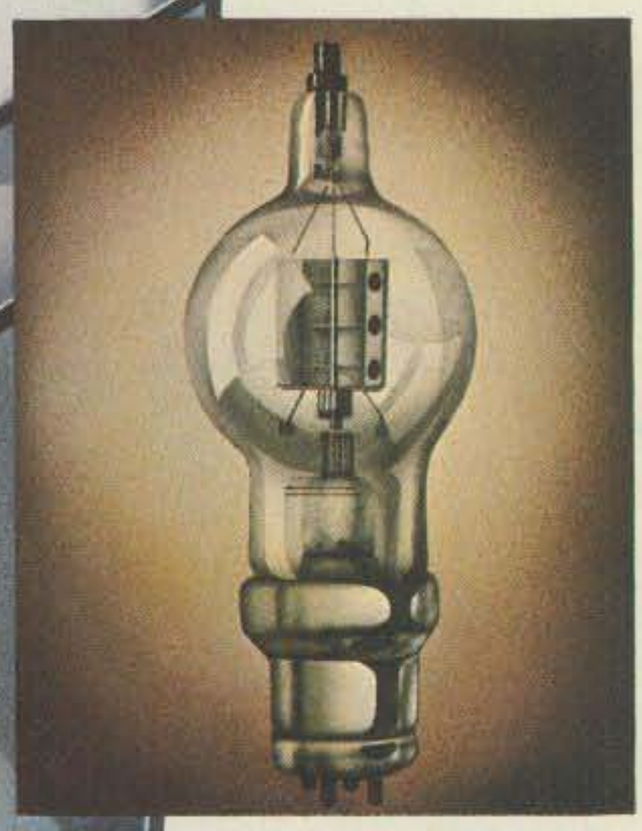
YAESU
The radio.

CIRCLE 48 ON READER SERVICE CARD

YAESU ELECTRONICS CORP., 6851 Walthall Way, Paramount, CA 90723 ● (213) 633-4007
YAESU ELECTRONICS Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246

EIMAC takes the work out of 25 kW FM transmitter design.





1935, EIMAC was present at the birth of FM broadcasting. Major Armstrong's early transmitter used four EIMAC 150T tubes in the amplifier stages. And EIMAC still retains its commanding position in continuing high power vacuum tube technology.

New cavity amplifier and tetrode combo.

The new EIMAC CV-2200 power amplifier cavity assembly and companion 8990 tetrode is ready for use in next generation FM transmitters in the 88–108 MHz band.

EIMAC engineered interface provides capability between tube and cavity design and the result is an amplifier of classic simplicity that combines a useful power output of 25 kW with a stage gain of approximately 20 dB. These numbers make a one tube, high power FM transmitter a reality today.

Cost effective modern design.

EIMAC's cost-effectiveness and modern design are yours in the new cavity and tube combo. Anticipate reduced transmitter down-time and higher revenues with this new amplifier concept. Make sure your new transmitter is EIMAC equipped.

varian

For full information on the CV-2200, the 8990 (25 kW) and the 8989 (15 kW) write EIMAC, Division of Varian, 301 Industrial Way, San Carlos, California 94070. Telephone (415) 592-1221. Or contact any of the more than 30 Varian Electron Device Group sales offices throughout the world.

CIRCLE 22 ON READER SERVICE CARD