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Amateur Radio

CQ

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DXING FROM THE SUDAN

With Marty Laine, OH2BH

page 6

THE RADIO AMATEUR'S JOURNAL

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Processor, N/W switch, IF shift, DFC option

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An incredibly compact, full-featured, all solid-state HF SSB/CW transceiver for both mobile and fixed operation. It covers 3.5 to 29.7 MHz (including the three new Amateur bands!) and is loaded with optimum operating features such as digital display, IF shift, speech processor, narrow/wide filter selection (on both SSB and CW), and optional DFC-230 digital frequency controller. The TS-130S runs high power and the TS-130V is a low-power version for QRP applications.

TS-130 SERIES FEATURES:

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  Covers all Amateur bands from 3.5 to 29.7 MHz, including the new 10, 18, and 24-MHz bands. Receives WWV on 10 MHz. VFO covers more than 50 kHz above and below each 500-kHz band.
- **Two power versions . . . easy operation**
  TS-130S runs 200 W PEP/160 W DC input on 180-15 meters and 160 W PEP/140 W DC on 12 and 10 meters. TS-130V runs 25 W PEP/20 W DC input on all bands. Solid-state, wideband final amplifier eliminates transmitter tuning, and receiver wideband RF amplifiers eliminate preselector peaking.
- **Built-in speech processor**
  Increases audio punch and average SSB output power, while suppressing sideband splatter.
- **CW narrow/wide selection**
  "N-W" switch allows selection of wide and narrow bandwidths. Wide CW and SSB bandwidths are the same. Optional YK-88C (500 Hz) or YK-88CN (270 Hz) filter may be installed for narrow CW.
- **SSB narrow selection**
  "N-W" switch allows selection of narrow SSB bandwidth to eliminate QRM, when optional YK-88SN (1.8 kHz) filter is installed. (CW filter may still be selected in CW mode.)
- **Sideband mode selected automatically**
  LSB is selected on 40 meters and below, and USB on 30 meters and above. SSB REVERSE position is provided on the MODE switch.
- **Built-in digital display**
  Six-digit green fluorescent tube display indicates actual operating frequency to 100 Hz. Also indicates external VFO or fixed-channel frequency, RIT shift, and CW transmit/receive shifts. Also analog subdial for backup frequency indication.
- **IF shift**
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- **Single-conversion PLL system**
  Improves stability as well as transmit and receive spurious characteristics.
- **Built-in RF attenuator**
  For optimum rejection of intermodulation distortion.
- **Built-in VOX**
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  Accurate frequency reference for calibration.
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Optional DFC-230 Digital Frequency Controller
Allows frequency control in 20-Hz steps with UP/DOWN microphone (supplied with DFC-230). Includes four memories (handy for split-frequency operation) and digital display. Covers 100 kHz above and below each 500-kHz band. Very compact.

Ask your Authorized Kenwood Dealer about the compact, full-featured, all solid-state TS-130 Series.

NOTE: Price, specifications subject to change without notice and obligation.

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- PS-30 base-station power supply (remotely switchable on and off with TS-130S power switch).
- SP-120 external speaker
- VFO-120 remote VFO
- MC-50 50kΩ/500Ω desk microphone

Other accessories not shown:

- YK-88C (500 Hz) and YK-88CN (270 Hz) CW filters
- YK-88SN (1.8 kHz) narrow SSB filter
- AT-130 compact antenna tuner (80-10 m, including 3 new bands)
- MB-100 mobile mounting bracket
- MC-30S and MC-35S noise cancelling hand microphones
- PC-1 phone patch
- TL-922A linear amplifier
- HS-5 and HS-4 headphones
- HC-10 world digital clock
- PS-20 base-station power supply for TS-130V

- SP-40 compact mobile speaker
- VFO-230 digital VFO with five memories

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R-1000 FEATURES:

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  Receives shortwave, medium-wave, and long-wave bands.
- **30 bands, each 1 MHz wide**
  Easy-to-use band switch with large knob.
- **Five-digit frequency display and analog dial**
  Accurate digital display with 1-kHz resolution and illuminated analog dial with precise gear dial mechanism.
- **Built-in quartz digital clock with timer**
  Precise 12-hour clock with AM and PM indicators. Timer turns on radio for scheduled listening, and even controls a recorder through remote terminal.
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- **Tone control**
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MATCHING ACCESSORIES

- SP-100 external speaker
- HS-5 deluxe headphones

Other accessories not shown:

- HS-4 headphones
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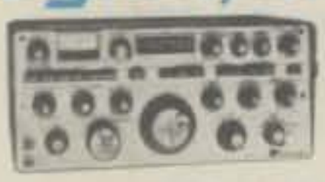

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CONTRIBUTING STAFF

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Contest Chairman
Hugh Cassidy, WA6AUD
DX Editor
Larry Brockman, N6AR
Robert Cox, K3EST
W.W. Contest Directors
Theodore J. Cohen, N4XX
Washington Commentary
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WAZ Awards Manager
A. Edward Hopper, W2GT
USA-CA Director
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WPX Award Manager
George Jacobs, W3ASK
Propagation Editor
Rod Linkous, W7OM
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160 M. Contest Director
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Math's Notes
Hugh R. Paul, W6POK
Technical Evaluations
Karl T. Thurber, Jr., W8FX
Antennas
Adrian Weiss, K8EEG/0
QRPp Editor
Bernie Welch, W8IMZ
WPX Contest Director
Bill Welsh, W6DDB
Novice Editor

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Richard A. Ross, K2MGA
Publisher
Dorothy Kehrweider
Assistant to Publisher
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Advertising Sales Manager
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Circulation Manager

PRODUCTION STAFF

Dorothy Kehrwieder
Production Manager
Elizabeth Ryan
Art Director
Hal Keith
Illustrations

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CQ The Radio Amateur's Journal

ON THE COVER: "I thought you had the line cord." Marty, OH2BH, and Ville, OH2MM, trudge the desert sands in search of adventure and the elusive a.c. outlet. Read their story on page 6.

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Zero Bias

AN EDITORIAL

For 35 years, *CQ* has fostered and nurtured Contest and Awards programs in amateur radio. Our DX Contest alone cost about $15,000 a year to run. It has a long proven history of trust, honor, and integrity. Almost everyone who enters the Contest knows they will not win, but they do know that they have a chance to complete, have fun, and outdo last year's score. Maybe if things go right—or more right than with someone else—they can pick up a certificate to hang on their wall to show their achievement. There's no prize to compete for in terms of dollars or a car or a trip to Disney World. It's skill and experience pitted against skill and experience. What's won is a place in a listing, a comparison between what you did and what someone else did. It's really only a mark to beat next year.

Recently we were drawn into a discussion of ethics regarding the administration of the *CQ* Contests. The question was asked: How ethical is it to have a Contest Committee member or *CQ* staff member participate in our contests if ultimately he would be involved with the scoring and handling of logs? What isn't being asked directly (although it's implied) is: Can we trust that the individual did not subvert, cheat, or give themself an unfair advantage at the expense of others? What is further implied is the belief that something dishonest was and is being done. The question asks and accuses at the same time while impuning the Committee's integrity.

"Ethics" is one of those simple sounding words that conveys tremendous meaning. For those fortunate enough to speak more than one language, explaining ethics is like trying to translate an idiomatic word in one language to another language using a single word translation. It can't be done, for ethics carries the weight of concept in its meaning. It has a general meaning—a conforming to a moral standard or precept—and implies an altruistic generalization of goodness. Whether we talk about a simple goodness (doing what's right) or the ultimate goodness (which somehow always implies some suffering), there is always the element of a positive, wholesome objective behind the behavior. *Un*ethical, therefore, becomes the introduction of the negative element and opens up the emotional side of the concept. Unethical behavior becomes a "betrayal" of the trust that something was ethical. To be "betrayed" is to have everything you've held sacred undermined and taken away. It's the ultimate injustice.

In pure terms, then, ethics is an emotionally charged concept dealing in extremes.

Amateur radio is also emotionally charged due to our ego involvement with the avocation. Our reputation and sometimes our "worth" hangs on our call letters and what people think of them. We tend to think of friends and acquaintances in terms of call letters rather than given names, and we've all been in groups where just the mention of two or three discrete letters is enough to tell anyone in the group who is being talked about, and why.

We all have certain expectations as to what is ethical and what isn't. We might have some vague mental image of the purest of the pure, the ideal situation that truly illustrates the highest form of ethical behavior, by someone else, of course. So now let's look at a situation that exists and has existed for some time and see how ethical it really is.

For over 30 years, *CQ* has had a standing DX Contest Committee charged with the administration and scoring of our Contests. Membership of this Committee changes from time to time, but the members themselves have much in common with each other and with those who preceded them.

To be on the Contest Committee means that an individual has been a very active Contester, a proven operator, and has spent considerable time perfecting his contesting abilities to the point where other Contesters would recognize that person as an authority. Well, now that we have this super Contester and operator, he decides he would like to be on the Committee. Why, you ask? Well, for the same 30 or so years, it has been a way of maintaining the high tradition of Contesting, while at the same time it is a prestigious recognition of accomplishment. These people are the best in their field and everyone knows it. There is *always* a list of people waiting to get on the Committee.

Do these people get paid for their extraordinary efforts? No. They not only do not get paid, but we guarantee them long hours of work as well. That's quite an inducement to work hard, but that's exactly what they all do. We do pay expenses and sundry costs for the Committee, but it almost boils down to slave labor. Almost all of the Committee people are still avid Contesters and do enter Contests, ours included. Ah! There's the rub. For over 30 years it never dawned on anyone that this might be a questionable practice. No one had ever questioned the integrity of the Committee or how ethical it was to have a Committee member enter our Contests. We assumed honesty and I believe we got honesty. Of course for the most part we never had "close" scores to contend with or the possibility of a single operator entrant from the Committee walking away with top honors. I suppose it's possible, but it hasn't happened.

No one at the helm of *CQ* has ever told a Committee member that he couldn't enter our Contest or that he shouldn't enter for ethical reasons. These people were picked for the Committee because of their qualifications as Contesters, not strictly for the honor and glory involved. To stay on top of things and keep that exciting edge I would expect that they *would* continue to enter and be aware of conditions and situations faced by everyone else. The laws of probability are such that if you take the top people in their field and put them in a Contest with a lot of other people of various talents and abilities, the top people will have to shine a little more than occasionally. Skill and experience will win out. I don't think that anyone could find too much fault with that logic.

I think, then, that most of our expectations were fulfilled in that we expected honesty and a fair chance at the goal and we got it. We accepted the fact that everyone knew that *CQ* Committee members went on DXpeditions for the Contest almost every year, and that various Columnists and staff members were in every *CQ* Contest from the first day.

Well, the inevitable did happen, or so it seems. A record was toppled, not by much, but broken nevertheless. The 1980 winning multi-multi team (of 17) did include a Committee member. The 1980 winning team also had top opera-

(continued on page 94)

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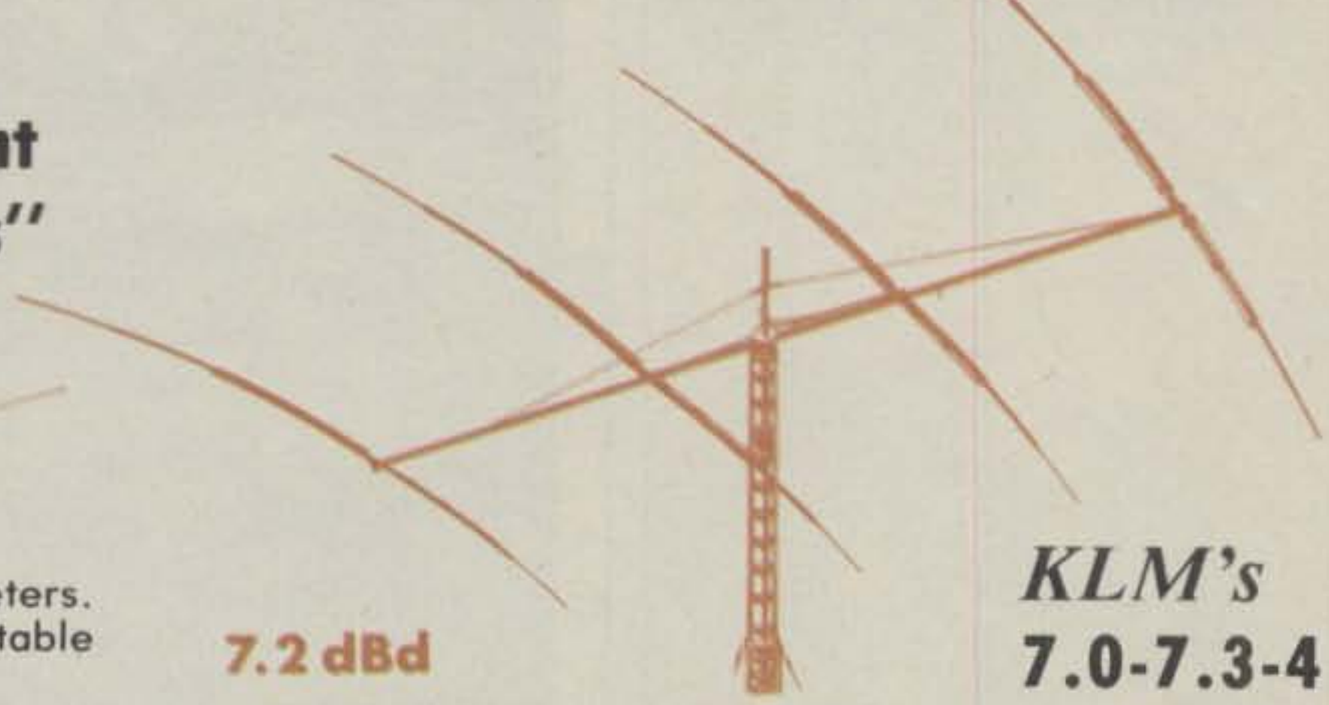

7.2 dBd

KLM's
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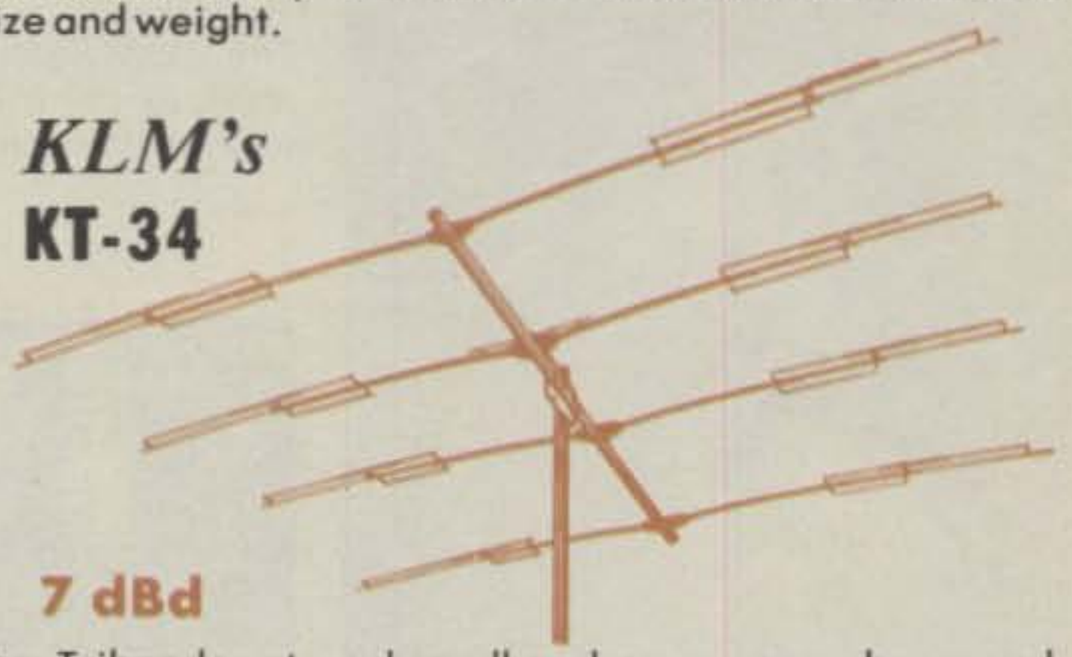

KLM's
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7 dBd

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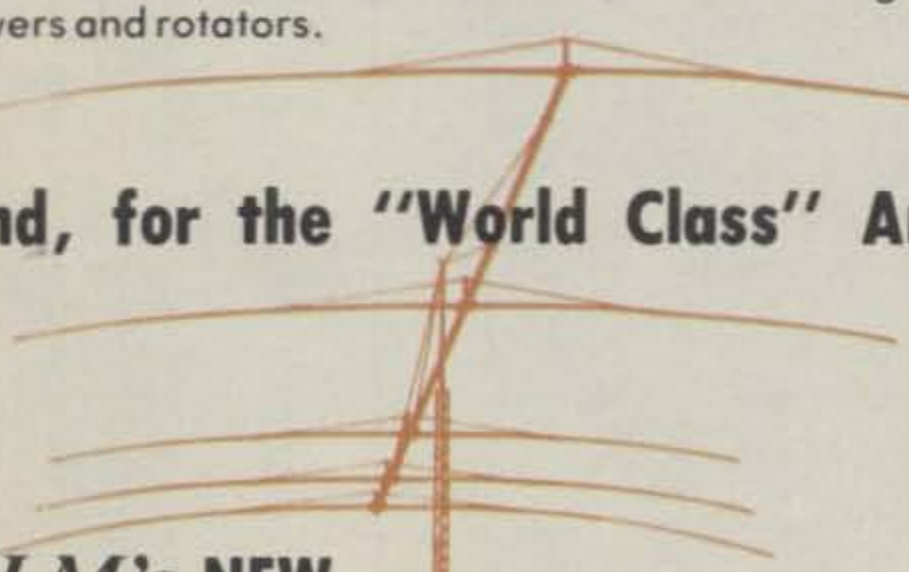

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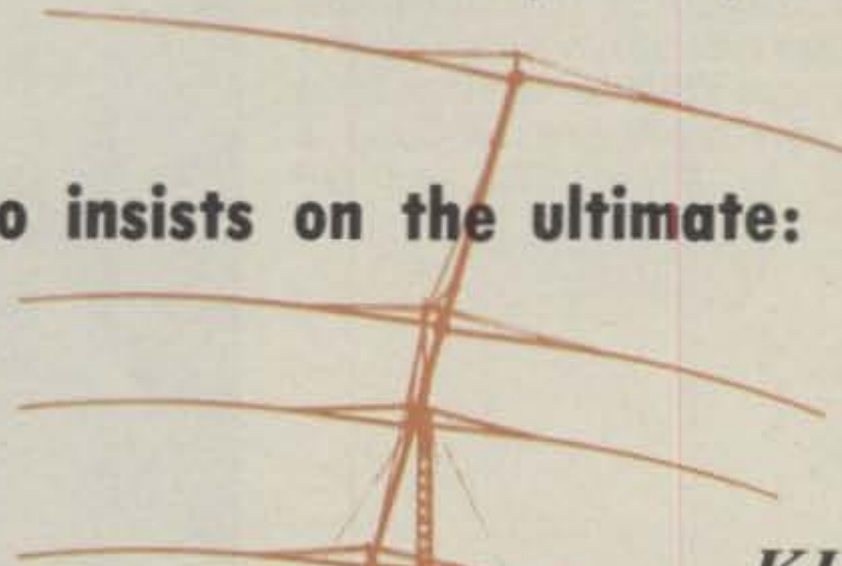

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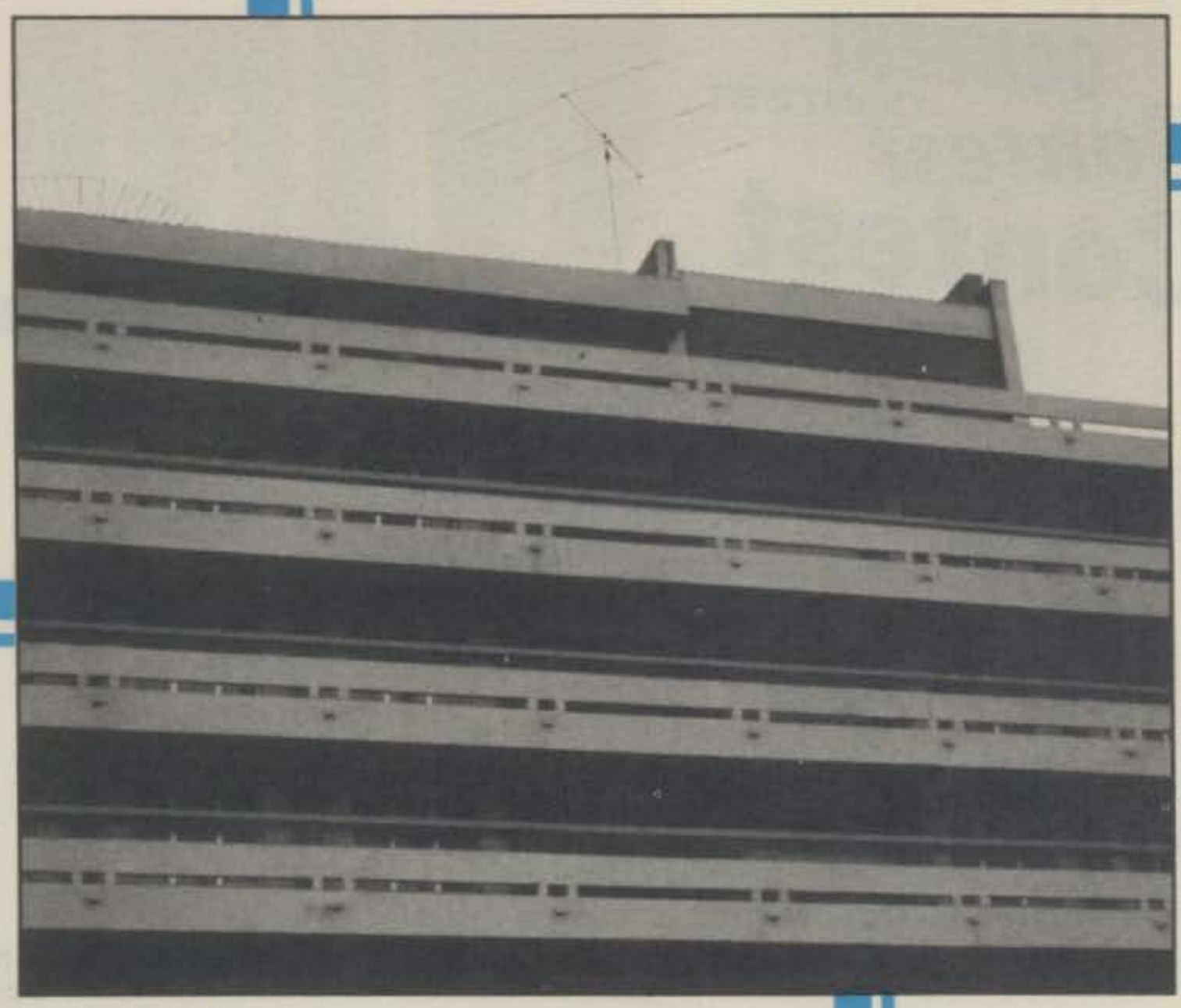
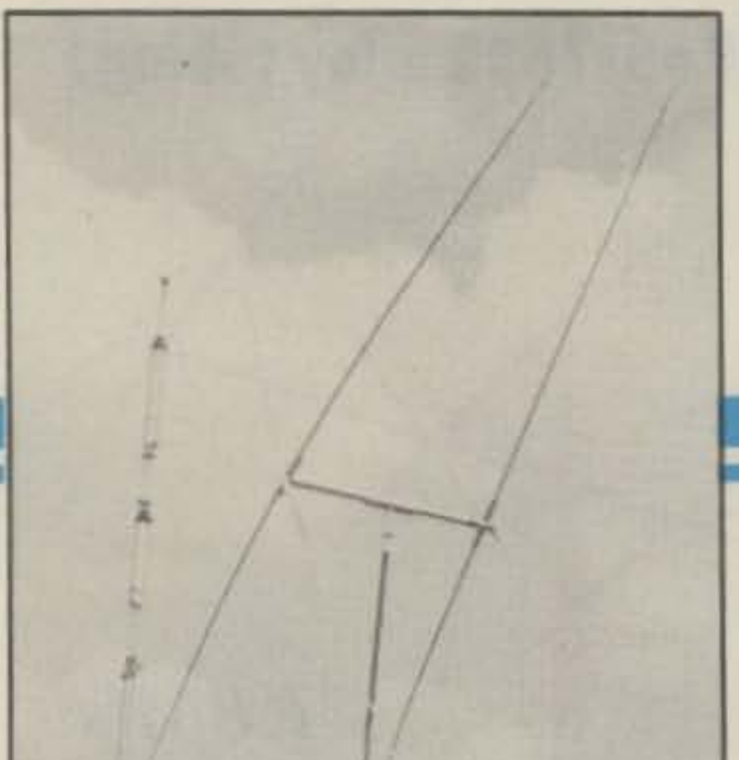


The Youth Palace is a sizable building in Omdurman town separated from Khartoum by the Nile river. The building consists of auditoriums and laboratories and an amateur radio station as well. The TH3MK3 donated by NCDXF dresses the building elegantly.



The antenna farm in Southern Sudan, a Hy-Gain 12AVQ and 15M Quad. The Bamboo was brought to Africa from a sporting goods store in Helsinki. 9000 contacts were made and the Quad is now used by K5LBU/ST0 and GP DF3NZ/ST2.

Here we pose at the entrance. The signboard tells that the building is a donation from North Korea to Sudanese youth. The idea of a youth palace is based on a Korean type of work for young people and represents the Korean social system.

Once again we're on the road with Marty Laine, OH2BH, as he travels the globe. Keeping track of Marty is almost as hard as keeping track of Bob Hope.

A Finnish DX-Safari To Africa

BY MARTY LAINE*, OH2BH

The following narrative is a distillation of two weeks spent in the avid pursuit of DX. Marty, OH2BH, and Ville, OH2MM, world renown DXers, trudged across East Africa last summer to give 20,000 amateurs a new country, and in so doing made a lot of us aware of the extreme hunger and serious medical problems faced by the people of Southern Sudan. The grim picture used for the ST2FF/ST0 QSL card bears witness to the misery and suffering experienced in the area. The Finnish Red Cross is now adding their weight to the other relief organizations in the area to help those unfortunate people. —K2EEK

6T1YP, Khartoum, The Sudan

Our first week of this two week operation was spent in Khartoum, the capital of the Sudan. Ville and I spent considerable time teaching and lecturing on amateur radio to a group of students at the Youth Palace. The Youth Palace is a sizable building, donated by North Korea, consisting of auditoriums, laboratories and an amateur radio station. Its function is to provide educational services in several fields such as chemistry, physics, theatre, music, farming and the arts. A TH3MK3 antenna donated by the Northern California DX Foundation (NCDXF) sits atop the building for use at the station.

Mr. Amir Kobani, 6U1AA, is Director of the Youth Palace and Mr. Fadul Kabbar, ST2FF is the Secretary General. Several new amateurs will be licensed shortly when their training period is completed. Cooperative development projects started by Yugoslavia have started bearing fruit in conjunction with donations of equipment and teaching aids by DARC, SRAL and the NCDXF. In fact, arrangements were made for a Region I All-African Conference to be hosted by Khartoum.

We got our operating in at night from the rooftop of the Youth Palace where the temperature was a scorching 120° to 140°F. Even in this tremendous heat we netted over 10,000 contacts. Since electrical power is cut off in some parts of town at night, we had a secondary station at the home of Dr. Sid, ST2SA (Dr. Sid Ahmed Ibrahim). Prior to the Youth Palace project he was the only licensed Sudanese amateur, and now he was our most gracious host. The c.w. station was located in Dr. Sid's air-conditioned bedroom, and we wore native white gowns supplied by our host.

AT2FF/ST0, Juba, Southern Sudan

ST0 is located on the southern edge of the Sahara desert close to the Equator on the Nile. It counts as a separate DXCC country. The region enjoys complete autonomy and has its own government, including a President. Southern Sudan differs from the rest of the country in almost all respects. It has a more favorable climate and tropical nature with a population completely different in race, religion and language from the rest of the country. It is an area plagued with misfortune, disease and hunger.

In the south food is always in critically short supply, and serious epidemics pose constant problems. We arrived at a time when fuel stores had been depleted, which brought normal transportation to a halt. Ours was the first flight into the area in three months. Air service had been suspended for three months due to a cholera outbreak, and many passengers took up a form of residence at the airport, cooking and living there until service resumed. As a result of many ongoing international relief programs, whites (foreigners) had priority access to all flights, and so we managed to hop a flight with supplies.

From Room 1 of the nearly 100-year-old Juba Hotel we managed to make over 9,000 contacts. The antennas consisted of a 12AVQ and a 15 meter quad. The electrical power, when available, was a shaky 140 to 200 v.a.c., and so our primary source of power was a battery. We used the local power when available just to keep the battery charged. The only regular amateur in the Region is Frosty, K5LBU, who works with an American relief organization. Frosty was QRT however, due to licensing difficulties and having his equipment confiscated.

**Pyorrekuja 4C43, 01600 VANTAA 60, Finland.*

The amateur training course had seven participants. After the course the number of ST stations will be tripled again, and these people will act as leaders for local amateur training. From the left, standing, are the director of the Youth Palace, Amir, 6U1AA; German relief expert DF3NZ; the Secretary of the Youth Palace, Fadul, ST2FF; the first Sudanese radio amateur, Dr. Sid, ST2SA; and the proud leaders of the course, OH2BH and OH2MM.

The equipment included a Kenwood TS180 and TS120 with a Dentron linear which were powered by the battery in the middle. The battery was charged when electricity was available.

The operation took place mainly on the roof of the Youth Palace. The electricity was cut off frequently, and an exotic view of Khartoum on the desert of the Sahara was spread before our eyes when we stood on the roof of the high building. A sand storm which rose in a few minutes twice interrupted the operation.

An antenna party, Sudanese style. 60 centigrade (140°F) heat is typical, and even a small amount of work brings you to a state of exhaustion. In the middle of the photo Jouko, OH2BCP, conducts the Sudanese students.

Summary

For its basic subsistence, the Sudan relies on large-scale relief aid from both the East and West. The country possesses neither self-sufficiency nor natural resources, just an over-abundance of very real need. Yet there is a form of irony in the midst of this deplorable state, for the area has an up-to-date television satellite tracking station.

We returned to Finland in early July (1980) about 30 pounds and $5,500 lighter, but with 20,000 solid contacts and a wealth of experiences to our credit. It's always thrilling and exciting to leave on a DXpedition, but it is nearly as satisfying to get back home.

The QSL cards for the DXpedition were donated by the Northern California DX Foundation and were sent out in September by Miika, OH2BAD.

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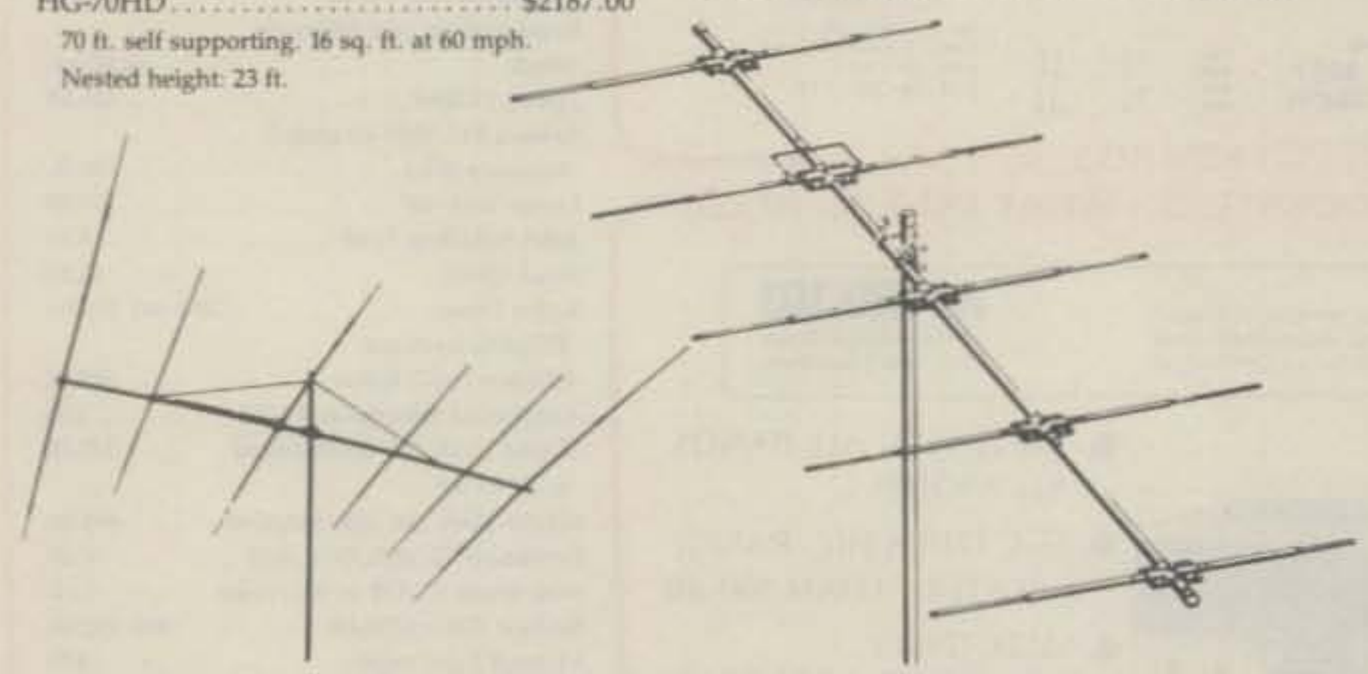

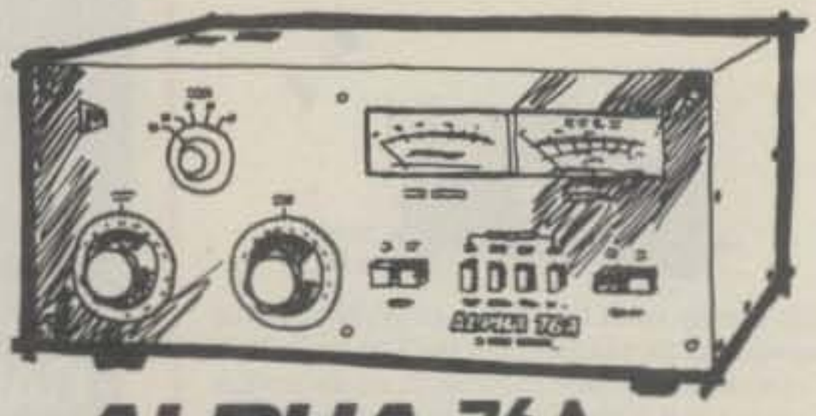

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It now can be revealed. . . Heisseluft developed Stealth technology 30 years before U.S. discovery. U.S. defense community amazed to learn that Lauton Institute experimented with Stealth in late 1940s. . .

Applications Of Stealth Technology To The Design Of Invisible Antennas

BY PROFESSOR EMIL HEISSELUFT*
LAUTON INSTITUTE GROSSMAUL-AN DER DONAU, AUSTRIA

It was only last year that the communications world was shocked to learn that sporadic-E was not a natural-occurring phenomenon, but rather was produced by wire grids which floated 60 miles above the Earth (see CQ, April 1980). Now, the defense establishments around the world will be left aghast at the revelation that Stealth technology was developed at the Lauton Institute almost 30 years before the same technology was developed by the United States. In this exclusive article for CQ, Professor Heisseluft reveals for the first time how he was able to produce a Stealth antenna for use in apartment complexes, and how the same Stealth techniques were used to produce the first Stealth aircraft!

—K2EEK

Introduction

In the days following World War II, dear readers, numerous apartment buildings were constructed throughout Austria to house the many homeless people of my devasted homeland. At the same time, there was a rebirth of amateur radio in my country. These two events were to have far-reaching consequences with respect to national defense, for the need to develop hidden (invisible) antennas suitable for use in apartment complexes led directly to the development of Stealth technology in 1948. . .30 years earlier than this technology was made public in the United States![1]

The need for developing an invisible antenna was first voiced to me by my optics professor, Dr. Jerzy Ostermond-Tor, D.O.S.E. (ex YM4XR).[2] Tor was having trouble convincing his landlord to permit him to operate his amateur transmitter in an apartment building near the Institute, and so, he encouraged me to investigate revolutionary new techniques for creating hidden antennas. I chose to use a technique based on principles known to everyone who has taken a course in physical optics: multiple reflections from a plane-parallel film. Permit me to review the basic theory involved.

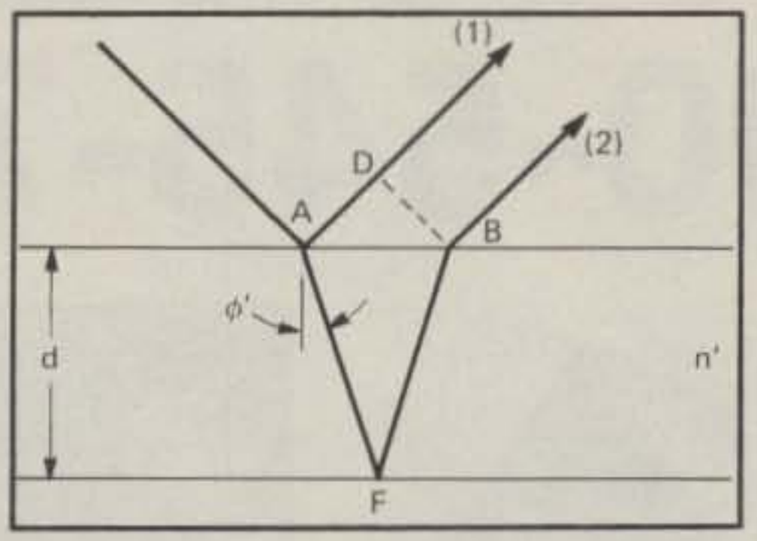

Fig. 1– Optical path differences between two rays lead to interference between the rays (modified after Jenkins and White, 1957).

Multiple Reflections From A Plane-Parallel Film

The Stealth antenna I designed was based on the principle that interference involving multiple reflections from a plane-parallel film can be used to minimize or maximize light reflected from the film. That this is possible can be seen from the diagram shown in fig. 1. Here, two consecutive rays—one reflected from the top of a thin film, and one reflected from the bottom—have an optical path difference of Δ:

$$\Delta = n' \cdot (AFB) - AD$$

where n′ is the index of refraction for the film. Taking into account that ray 1

**Professor Heisseluft is currently preparing his testimony on Stealth technology for presentation to the House Armed Services Investigating Subcommittee in its inquiry into the Stealth leaks of August 27, 1980. Correspondence to the Professor may be directed c/o CQ Magazine.*

The Volker Wraase SC-422 SSTV Converter with the optional KB-422 ASCII Keyboard.

The Volker Wraase SC-422 Two Memory SSTV Scan Converter and KB-422 Keyboard

BY MIKE STONE*, WB0QCD

Not all the hoopla in electronic design and packaging finds its way to our shores via the Orient. The product about to be reviewed was a quiet entry into the U.S. market during 1980. Starting with a modest display at the last Dayton Hamvention, and more recently at the New England Boxboro show, the units have drawn attention from avid SSTVers and neophites alike. It's not a cheap price for a new mode that sparks this attention, for there are certainly far less expensive routes one could travel to reach the same destination. It's simply the all-inclusive nature of the product that beckons the curious, for the price admittedly is high. While the ultimate destination may be the same, how you get there, which options, ease and style are ultimately the factors you pay for.

The following resulted from a review I read in A5 *magazine recently and the ensuing letters with the author, Mike Stone, WB0QCD.* A5 *is a magazine devoted to amateur television and as such caters to the avid SSTVer. As with any special-interest magazine, those with a peripheral interest or knowledge and those hearing of the subject for the first time may not be aware of the material available on the subject. This review will then serve to familiarize you with a new product and another source of information within the specialty. I want to thank Mike and Henry Ruh, KB9FO of* A5 *for permission to use this material. For more information on* A5, *write to:* A5 *Magazine, 7391 W. Hwy 46, Ellettsville, IN 47429.*

—K2EEK

In wine, it's the French '67 Chateau d' Yqllem or the German '76 Dr. Thannisch Bernkasteller Auslese. In automobiles it's the Mercedes or Porche. In cigars it's Havanna or Jamaican Macanudo. But in Slow-Scan Television it's Volker Wraase's SC-422 Converter and matching keyboard! Many of you have never heard of the name. But mark my words—before the year has ended you will be seeing more and more of these fantastic little machines on frequency. I feel so excited about this new product now available stateside for the first time that I sold my Robot 400 SSTV Converter to acquire the system. I found it hard to believe that anything could top the 400 converter with it's already excellent picture reproduction quality and 4K memory. Well, move over Robot, here comes your new competitor!

I first became acquainted with DL2RZ's work when I began working many European SSTV stations who boasted of the SC-421 early model units. I saw "tricks" being done with the video that I never saw any stateside stations do. I wrote Volker Wraase for some printed material, but the return mailing needed a German translator to understand what was stated in the brochure. Then I worked Gerald, ZS6BTD, in South Africa several times on 10 meters as he demonstrated his new 422 model. Meeting

*P.O. Box H, Lowden, Iowa 52255

with Volker at the spring Dayton Hamvention for over two hours and carefully examining the SC-422 unit on display, I was sold! The next step was to contact the newly authorized U.S. distributor in New York. My contact with Mr. Walter Giesser at KW Control Systems, Inc. in Middletown, New York brought immediate results! It seems as though the multi-million-dollar company produces the "Piller" (TM) line of power control generators, frequency converters, redundant systems and diesel generators for the "computer world." Who are their customers? Only businesses like IBM, Commonwealth Edison, GTE, Lockheed, all kinds of insurance companies and universities. Mr. Giesser's "baby" is a unit that retails at a mere $8,350 and remotely analyses internal meters and LEDS within the large power systems via Phoneline Slow-Scan Television. And, guess what is the heart of this "watchful eye" that saves thousands of dollars every day for the computer industry? Right, Volker Wraase's SC-422 converter. Well, knowing your interest is at a peak, let's continue on with the specifics of the review!

SC-422 Specifications

With experimentation being done on Color SSTV and Medium Scan Television, what could be more natural than a 2 memory converter? No need to buy extra boards of expensive chips and a nightmare of interface wiring, just flip the 3-way switch on the 422 and you take command of memory #1, memory #2 or a combined 256 rendering that will make your mouth drop when compared to the popular converters on the market today with unmatched resolution. To be fair, Robot's model 400 uses 256 rendering but displays only 128 pixels by 128 lines. The SC-422 has 16K RAM of memory and 128,000 bits of memory capacity in comparison to 4K and 65,000. The popular 400 model has 8 shades of grey levels, whereas the SC-422 has 16 levels for better coloring and shading. Memory #1 can be dumped on the air while you are "setting-up" memory #2. Interesting artwork can be formed by intermixing the two memories with proper individual pictures that can "lay" on top of each other.

A surprise bonus became apparent on my first contact, as when the sending station stopped his video, the picture automatically locked up in memory and did not paint "noise" as my previous unit! (No more "sorry for the noise on top" routine.) Unlike the generated grey scale on the bottom of the picture, the SC-422 employs its 8 level scale at the top of the frame with the belief that a picture not properly tuned until the bottom of the frame is a poor picture. An easy to read LED tuning indicator for the SSTV signal and built-in filter assure proper signal alignment. A tunable pot for correct syncing also allows copy of non-standard color and sync tones (other than 1200 Hz sync, 1500 Hz black and 2300 Hz white).

The Camera "see through" (FSTV) setup is similar to operation of the Robot 400. The big advantage is utilizing the two memories of storage. Individual controls for contrast and brightness align the camera for a proper picture. Black/White reversal is standard and a special built-in SSTV output filter for distortion-free output of the sine wave signal really cleans up the act! For improved displayed pictures, a switchable Dot/Line blanking raster control is mounted on the rear of the unit which allows the operator to select a 256 dot raster or 128 line structure. This does not affect the picture output.

The converter itself is remarkably small and very lightweight (12″ × 4″ × 7″). It is housed in a very attractive black and silver all aluminum cabinet. All solid-state, the unit also houses the power supply for the matching keyboard. All connectors are standard

The SC-422 has two full-size SSTV picture memories.

Any picture in the memory of the SC-422 can be used as a background for the alphanumeric information generated by the keyboard.

SO-239, BNC, etc., except for the audio cables which are supplied. An optional accessory tool that would be desired by those not getting the keyboard or for those who like to draw is a "video-pen" that attaches to the converter and allows writing on the monitor screen (bit change). Certainly, this SSTV converter is ahead of its time and is the "Cadillac" of Slow-Scan Equipment. Unfortunately, not all of us can afford "Cadillacs," but considering the design preparation, size, memory, filtering, and special effects, not to mention overseas shipments, duty tarriffs, distributor advertising and promotion and "at home" (NY) repair service, it isn't a bad buy at $1,184. Volker Wraase SC-422 SSTV Converter carries a one-year warranty on all parts and materials.

The KB-422 Keyboard

A further compliment to an already "fantastic" system is the KB-422 SSTV Graphic Keyboard. Gold-plated contacts represent "nothing but the best" for this ASCII keyboard. It has the standard 26 character alphabet, ten numbers including a slant Ø and 28 special characters for punctuation and special effects artwork. The unit displays 8 lines (small format) and 4 lines in the large format (same

across). A switchable Black on White (BOW) and White on Black (WOB) control backgrounds the character which can be alternated with each character (unlike other SSTV keyboards that can only "reverse" the entire frame). Okay, ready for the BIG NEWS? *The graphics can be superimposed over any video picture in memory*! Now think of the possibilities! The unit has a non-interfering but recognizable "cursor" that tells you where you are for insertion. The special "delete" key erases any character or background video not desired. The KB-422 Keyboard is so small and lightweight that it will fit anywhere. The KB-422 can only be used with the SC-422 SSTV Converter and retails at a reasonable $296 including a one-year warranty. You should see the amazement when I return the sending station's self-portrait with his callsign and name typed in with the picture. The usual response is "What type of computer are you running there?"

Specifications

SC-422

Digital IC: 16K/128K bits
Memory: Two-switch selectable
Definition: Up to 256 pixels × 128 lines
Grey levels: 16 shades of grey
Reversing: Positive/Negative
Tuning indicator: LED
Filtering: Sine-wave distortion output filter.
Camera video: FSTV "see thru" setup
Raster: Dot/line or smooth
Tape inputs: Yes
Construction: All aluminum cabinet
Size: 12" × 4" × 7"
Cost: $1,180 U.S.
Guarantee: 1 year (NY repair center)

KB-422

Character data code: ASCII
Power supply: In SC-422
Compatible with other conv: No
Memory overlay: Yes
Character formats: Two sizes
Characters available: 64
Lines of graphics: 8 × 4 and 8 × 8
Size: 22 × 15 × 5 (10 cm)
Price: $296
Guarantee: 1 year

Options: Pixel change "light pen" available April 1981

U.S. Distributor:
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Easy Hookup To H.F. Equipment

Cables are provided for easy interface to your receiver's speaker system and to your transmitter microphone circuit to send SSTV transmissions. With experimentation now being done in color Slow-Scan and in Medium Scan (movement) TV, a double memory 16K RAM system seems only natural. It must be noted that SSTV can be gotten into for under $100 with most A5 SSTV systems running about $400. The SC-422 German system is at the other end of the spectrum and is the ultimate for the SSTVer who "wants the best."

In summary, it is an expensive system. But when compared with a new Robot 400, additional required memory boards and a similar SSTV keyboard, you are ahead moneywise and have more features with the SC-422/KB-422 SSTV System. My "hat is off" to designer/builder Volker Wraase, DL2RZ, for a very worthwhile contribution to Amateur Television!

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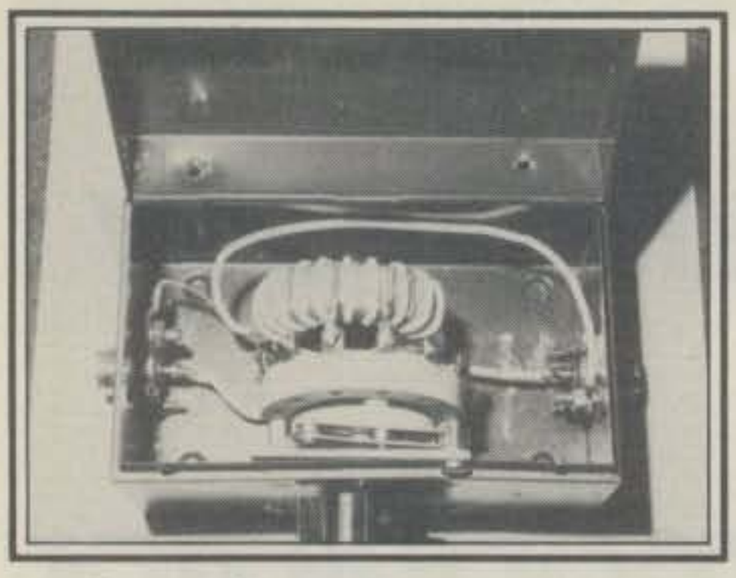
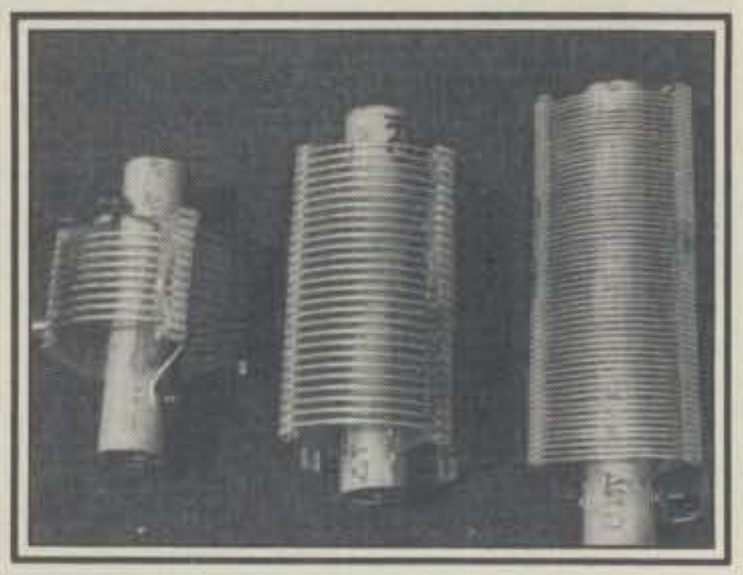


Toroidal base matching coil.

Trunk-mounted linear with antenna coils.



75, 40 and 20-15-10 tapped coil.

There are "Big Guns" and "Big Guns." W0NY goes a little beyond by becoming a "Rolling Cannon" in this kw mobile installation.

High Power Mobile Operation

A KW Mobile And Antenna To Match

BY JOHN R. KERSTEN*, W0NY

Most of us who regularly operate h.f. mobile have probably fantasized at one time or another about the notion of having a kw on wheels. The basic idea sounds simple, but when you get down to it, the problems you run into with using the auto battery and charging system tend to discourage all but the enterprising amateur.

This project was prompted one evening while I was looking through the Montgomery Ward Catalog. Listed there was a 110 v.a.c. alternator which developed 2500 watts of continuous power and up to 3500 watts of peak power. It has a companion voltage regulator which allowed constant voltage at varying engine speeds. The side note that at higher engine r.p.m. higher a.c. frequencies developed presented interesting but not insurmountable problems. I planned to use a spare linear, a Hunter Bandit 2000A, in the mobile, which would be driven by my Atlas 210X. The linear uses four 572Bs which have rapid heating filaments, a convenience and definite plus for a mobile linear.

Installing the quickly obtained alternator/regulator combination in my 1976 Dodge Colt proved simpler than I thought. The drive shaft already had an extra pulley, and the engine block came with extra threaded holes, both meant for the optional air conditioning unit. It was an ideal mounting situation for the alternator, which was "shoehorned" in place by sawing off a nonessential top corner portion of the left front motor mount. The manufacturer does recommend, however, that the alternator be mounted in place of the original alternator and that a suitable place be found for the original.

The voltage regulator for the new alternator should be, and was, mounted in a cool place in the engine compartment, and its control box with On-Off switch was mounted on the firewall inside the driver's compartment.

The pulley that came with the new alternator had a diameter of 2¾" which proved to be too small, resulting in a too high line frequency at 110 v.a.c. This was replaced with a 3¾" o.d. pulley which had to be adapted for proper shaft size. The new pulley now allowed for the development of 110 v.a.c. at 60 Hz at 40 m.p.h. and an acceptable higher frequency 110 v.a.c. at 55 m.p.h.

The Interesting Problems

As will happen in any project at about the half-way mark, "interesting problems" develop. These are the things you either didn't think about, or if you did concern yourself with the possibility of a problem it certainly could be resolved at a later date. This then is the later date.

If you operate a linear amplifier at

*717 Crest Ave., Fort Dodge, Iowa 50501.

line frequencies much higher than 60 Hz, an interesting phenomenon occurs. The built-in antenna relay starts to chatter. This is and was corrected by installing a bridge rectifier in the 6.3 v.a.c. winding for the relay coil. At higher line frequencies cooling became a problem. Since the linear is mounted in the trunk compartment, I installed "in and out" Rotron synchronous motor fans on the inside rear deck to vent the air in the trunk. These fans and the internal cooling fan in the linear became more and more inefficient at higher line frequencies. The answer was to add supplemental cooling with a non-synchronous squirrel cage fan mounted next to the linear in the trunk, which also vents to the inside rear deck. One side benefit to all this "cooling" is a very comfortable rear seat while driving in winter. Another interesting problem is what to do about all that heat during the summer.

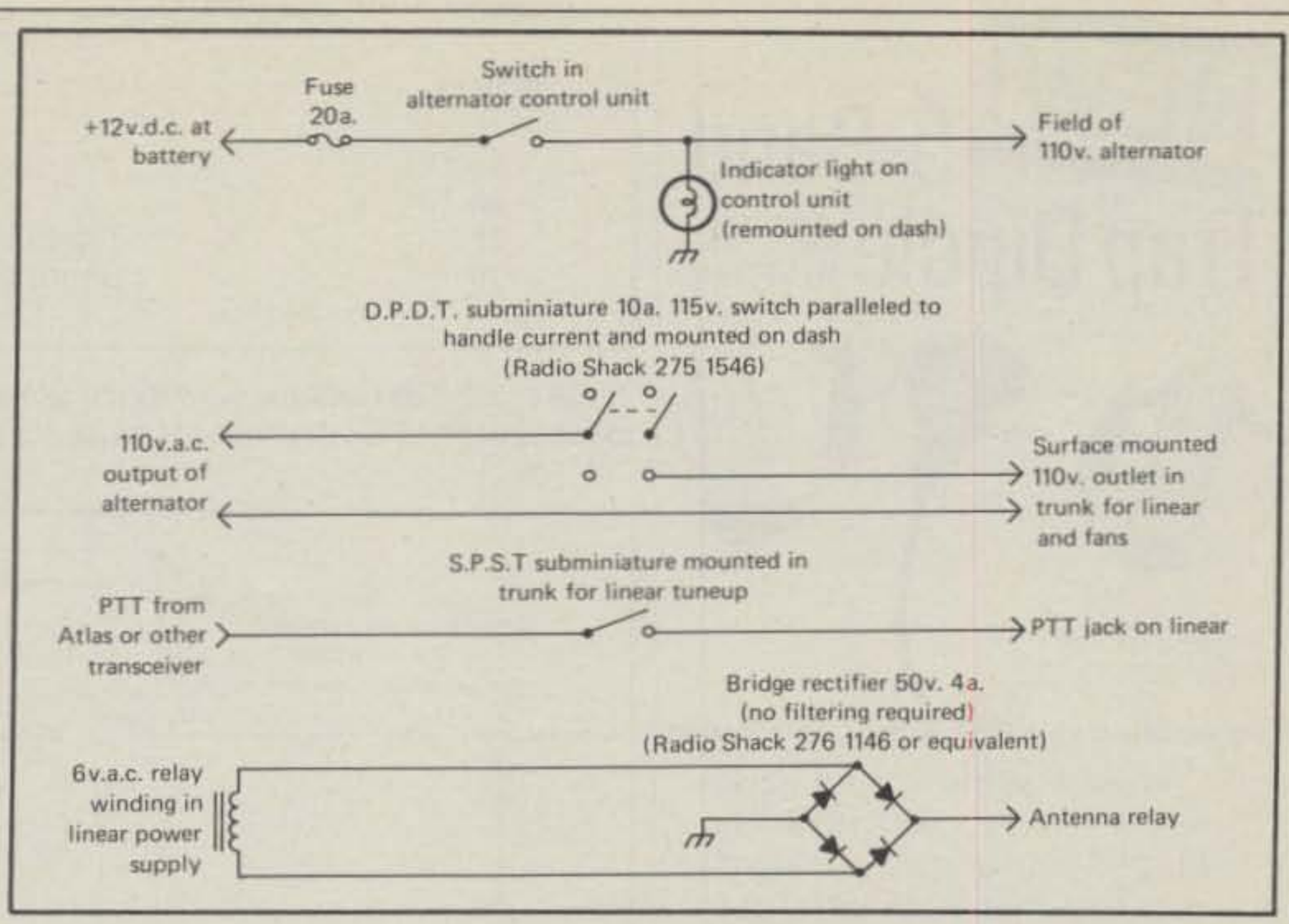


Fig. 1– The basic hook-up configurations for the kw mobile installation.

Other Considerations

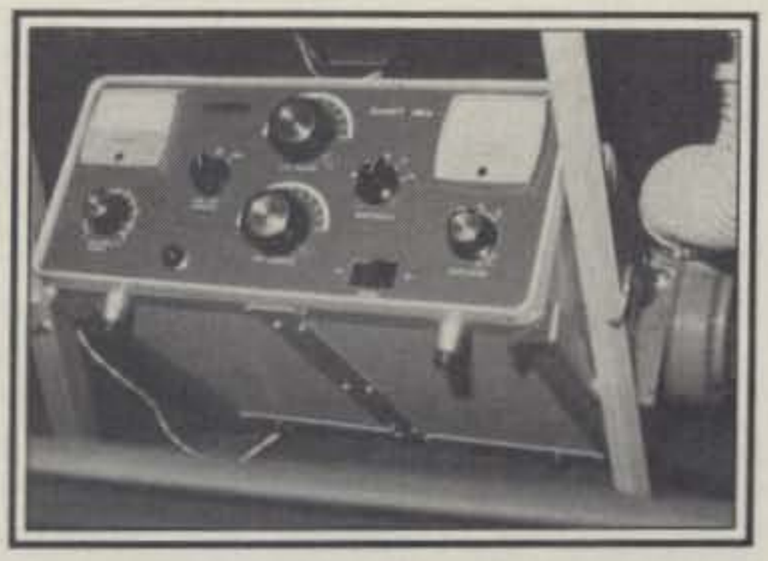
The linear is mounted at an angle far forward in the trunk, which still leaves room for luggage and allows air to circulate all around the unit. The alternator control box with switch is mounted high inside the firewall accessible to the operator. The switch is used to energize the alternator field. The alternator field draws a lot of current and will deplete a battery in a few hours if inadvertently left on. After a few such lapses of memory, I moved the red indicator light from the control box to a highly visible spot on the dashboard, and the dead battery episodes remarkably ceased.

The linear is only used on the open highway, as constant starting and stopping in traffic results in too low a primary voltage to the linear which might cause some damage. As a safeguard, the a.c. line to the trunk is switched at the dashboard through an a.c. voltmeter used for monitoring. Perhaps a more sophisticated system could include an automatic cut-off circuit below crucial a.c. voltages.

For single-handed tune-up, a throttle control is supplied with the alternator and fed to the trunk. Additionally, a switch in the PTT line to the linear is mounted next to the linear to facilitate tune-up. The settings for each band can be marked on the linear front panel for quick, easy future reference.

The Big Secret

The more valuable part of the entire mobile system has nothing to do with adding power. The most valuable part of a mobile system is the same as the one in the home QTH, namely a relatively efficient, well-matched antenna system. The one about to be described proved enough of an advantage over the old system that I probably could have done without the linear.



Trunk-mounted linear amplifier.

110 v.a.c. alternator in place.

The antenna system uses a toroidal base matching network that is patterned after the Swan MMBX unit but uses an Amidon T 200 core and two 16 turn coils of #16 wire. It is tapped with the aid of a very heavy-duty s.p. 6 t. switch and mounted in a 3 × 5 card file box (see fig. 2). The antenna uses a Newtronics fold-over base and a K-Mart telescopic replacement auto antenna, 22″ to 57″, with a 3 × 24 threaded rod at the base. The top of each telescopic section is gently squeezed in a vise for a firm, positive connection. The coils are made from B&W 3″ diameter coil stock as described in Table I. The coils are mounted on 1″ o.d. PVC tubing, the ends of which have brass slugs inserted and tapped with a 3 × 24 thread. The coil mounting is via polystyrene support strips affixed to the PVC with epoxy. To prevent corona discharge on 75 meters, a small 1″ diameter round metal cabinet door handle was braised to the antenna top replacing the usual anti-corona ball. The resulting antenna admittedly is a bit heavy and does require the use of 40 lb. fishing line leader as a guy line.

Since the inductance of the center-loaded coil will be a function of a particular installation, it would be wise to start with an extra turn or two and carefully prune one-quarter turn at a time for optimum s.w.r. on each band. This s.w.r. is optimized further with the use of the toroidal base matching network. On 75 meters the telescopic top section is fully extended and the coil is trimmed for the lowest operating

Meters	Turns	Coil Stock
75	58	B&W 3035 (10 t.p.i.)
40	27	B&W 3033 (6 t.p.i.)
20	9	B&W 3033 (6 t.p.i.)
15	Tap down 2⅓ turns on 20 meter coil.	
10	Shunt entire 20 meter coil.	

Table I - Coil data. Start with extra turns and prune for your installation. For a local source of B&W products write to: B&W, Canal Street, Bristol, PA 19007.

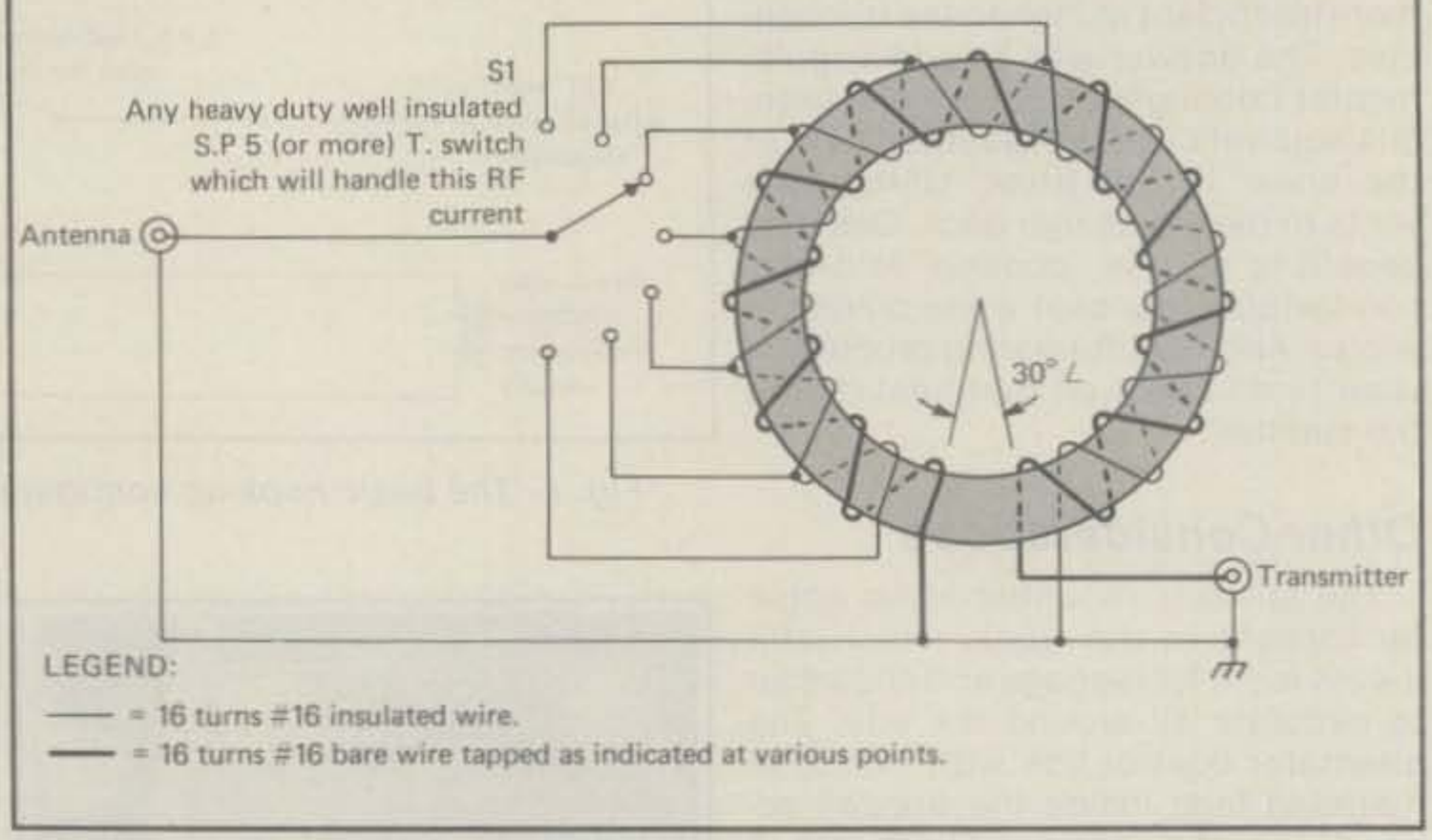


Fig. 2– The toroidal matching network as described in the text.

Trunk-mounted linear.

Dash installation showing 2-meter gear, Atlas transceiver and SW broadcast converter.

frequency. For each one inch the top section is shortened, the resonant frequency increases by 25-30 kHz. On the higher frequency bands, one setting of the top section will cover the entire phone band.

Performance

With regard to performance, if you add the complete antenna system too, you may find that you can forget about the linear amplifier. This may be particularly likely if you drive a late model car with air conditioning and no room under the hood for a wrench, let alone for a 42 pound, 10″ × 6″ alternator.

On the plus side, the linear does give the expected boost in signal reports. The effect on gas mileage is minimal; it drops slightly from 33 to 30 m.p.g. with the linear steadily in use on a trip. When the alternator is not energized, the free-wheeling drag is minimal.

For marine installations, this 110 v.a.c. alternator would be ideal. Since cruising speed is usually constant, the voltage regulator can be eliminated and the pulley sized for constant 115 v.a.c., 60 Hz output.

The increase in power, and especially the increase in antenna performance, has made operating h.f. mobile a true pleasure and worth the effort.

MFJ Super Keyboard

For **$279.95** *you get: CW, Baudot, ASCII, buffer, programmable and automatic messages. Morse code practice, full featured keyer, human engineering.*

Sending CW has always been a task, especially when you get a little tired. Electronic keyers help, but it's still too much work.

Now MFJ has a Super Keyboard that makes sending perfect CW effortless. It also sends Baudot RTTY and ASCII.

"Big deal" you say. "What's so special about that. There are lots of keyboards." Yes, but this one is different.

HUMAN ENGINEERED

A lot of thought has gone into human engineering the MFJ-494 Super Keyboard.

For example, you press only a one or two key sequence to execute any command.

All controls and keys are positioned logically and labeled clearly for instant recognition.

Pots are used for speed, volume, tone, and weight because they are more human oriented than keystroke sequences and they remember your settings.

A meter gives continuous readout of buffer memory and speed. Two characters before full, the meter lights up red and the sidetone changes pitch.

PROGRAMMABLE, AUTOMATIC MESSAGES

Four automatic messages and two programmable message memories (A and B) are provided. Messages A and B can be a total of 30 characters. B starts where A ends.

When recalled, each message takes only one character of the buffer. They may be chained and/or repeated via the buffer.

"Well," you say, "that sure is not much memory." But it's more than it seems because of the built-in automatic messages.

For example, type your call into message A. Then by pressing the CQ button you send CQ CQ DE (message A). Press twice to send twice, etc.

The other automatic messages work the same way: CQ TEST DE (message A), DE (message A), QRZ (message A).

Special keys for KN, SK, BT, AS, AA, and AR.

TEXT BUFFER

The 50 character text buffer sends smooth perfect code even if you "hunt and peck."

Since each automatic or programmable message takes only one buffer character, this gives a far larger effective buffer.

You can preload a message into the buffer. Then when you are ready to transmit press the control key.

You can hold the buffer by pressing the shift key and space bar.

With the buffer in hold, you can send a comment with an external paddle as a keyer. To resume sending buffer, press the control key.

Simply backspace to delete errors.

RTTY: BAUDOT, ASCII

5 level Baudot is transmitted at 60 WPM. RTTY and CW ID are provided via message A.

Carriage return, line feed, and "LTRS" are sent automatically on the first space after 63 characters on a line. After 70 characters the function is initiated without a space. This gives unbroken words at the receiving end and frees you from sending the carriage return.

All up and down shift is done automatically. A downshift occurs on every space to quickly clear any garbles in reception.

The buffer, programmable and automatic messages, backspace delete and PTT control (keys your rig) are included.

The ASCII mode includes all the features of baudot. Transmission speed is 110 baud. Both upper and lower case are generated.

MORSE CODE PRACTICE

There are two Morse code practice modes. Mode 1: random length groups of random characters. Mode 2: pseudo random 5 character groups in 8 separate repeatable list. With answer list.

Insert space between characters and groups to form high speed characters at slower speed for easy character recognition.

Select alphabetic only or alphanumeric plus punctuation. Pause function lets you stop and then resume.

IT'S A KEYER, TOO

Plug in a paddle to use it as a deluxe full feature keyer with automatic and programmable memories, iambic operation, dot-dash memories, and all the features of the CW mode.

MORE FEATURES

Tune switch with LED keys transmitter for tuning. Tune key provides continuous dots to save finals. Built-in sidetone and speaker.

PTT (push-to-talk) output keys transmitter for Baudot and ASCII modes.

Reliable solid state keying for CW: grid block, cathode, solid state transmitters (-300 V, 10 ma. Max, + 300 V, 100 ma. Max). TTL and open collector outputs for RTTY and ASCII.

Fully shielded. RF proof. All aluminum cabinet. Black bottom, eggshell white top. 12"D x 7"W x 1¼"H (front) x 3½"H (back).

9-12 VDC or 110 VAC with optional adapter.

OPTIONS

MFJ-53 AFSK PLUG-IN MODULE. 170 and 850 Hz shift. Output plugs into mic or phone patch jack for FSK with SSB rigs and AFSK with FM or AM rigs. $39.95 (+ $3).

MFJ-54 LOOP KEYING PLUG-IN MODULE. 300 V, 60 ma. loop keying circuit drives your RTTY printer. Opto-isolated. TTL input for your computer to drive your printer. $29.95 (+ $3).

BENCHER IAMBIC PADDLE. $42.95 (+ $4).

110 VAC ADAPTER. $7.95 (+ $3).

A PERSONAL TEST

Give the MFJ-494 Super Keyboard a personal test right in your own ham shack.

Order one from MFJ and try it — no obligation. See how easy it is to operate and how much more enjoyable CW and RTTY can be. If not delighted, return it within 30 days for refund (less shipping). One year unconditional guarantee.

To order, call toll free 800-647-1800. Charge VISA, MC or mail check or money order for **$279.95** for MFJ-494 Super Keyboard, **$39.95** for MFJ-53 AFSK module, **$29.95** for the MFJ-54 loop keying module, **$42.95** for Bencher Paddle, and **$7.95** for the 110 VAC adapter. Include $5.00 shipping and handling per order or as indicated in parentheses if items are ordered separately.

Why not really enjoy CW and RTTY? Order your MFJ Super Keyboard at no obligation today.

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MFJ ENTERPRISES, INCORPORATED
Box 494, Mississippi State, MS 39762

CIRCLE 11 ON READER SERVICE COUPON

1980

CQ World Wide WPX C.W. Contest Results

BY BOB COX*, K3EST

Even though scores were consistently better than last year's, the prevailing conditions were far from consistent—good to excellent on Saturday and depressed on Sunday. In spite of this adversity, the number of submitted logs rose to over 1,000, a fine testament to the WPX program. Ten meters was the biggest disappointment. Closed down by a solar flare, it was obvious where you had to be located—somewhere near LU8DQ and LU2KAK. They both acted as beacons and they show the advantage of a lack of polar path to all major population centers. It is hard to envision for a northern hemisphere ham, but JA is due *west* from Buenos Aires!

The top all band score was KP2A operated by Terry Baxter, N6CW. Terry used KP2A's fine antennas to crank out 2,564 QSOs! He was followed by OL7RZ, 9H1EL, ZW4OD, HA5NP and UV9AX. Clearly the band to be on was 21 MHz. HDØE operated by K7CA topped all scores in the contest in the single operator category. His 21 MHz single band effort will be a hard target to hit in the future. He also had 496 PX single op world high. In the PX battle right behind HDØE was OL7RZ 495, KP2A 483, 9H1EL 424, HA5NP 415, K5RC 411, ZW4OD 408, W1CF 401, YU3ZV 401 and RX1DZ with 400.

In the multi-single category, a special call plus a fabulous station allowed UZ9A (UK9AAN) to waltz away with the title. The boys from Chelyabiask must do a lot of bicycling to keep their legs in shape to push those foot switches at such high rates! Another fine effort was 4N4Y. They finished second, but ran away with the highest number of PX ever worked in the WPX C.W. Contest: 550. Third, fourth and fifth fell to UK2PCR, UK2PAP and R2B.

KP2A had the World High score. Photo shows N6CW at the key.

The high multi-multi score was the Frankford Radio Club's K3WW followed by JA3YBF and JA7YAA.

The QRPp category increased by nearly 100% with N3RS taking the flea-power crown in the all band category. He was followed by H31XAT and YO5AVN/3. Many QRPp entrants wished to thank other contesters for digging in the pileups or standing by every once in a while for QRPp stations.

On their initial club effort in the WPX test the Fraser Valley DX Club won the Club Trophy. An outstanding job which requires, as all club participants know, a great deal of work and cooperation. If you missed UP in the contest you must have been using a wire hung down a well. Three competitive clubs were active from Lithuania. The Lithuanian Contest Group finished third in the world. U.S. club competition was won by the Potomac Valley Radio Club (second in world) followed by the Frankford Radio Club (fourth in world).

We wish to thank the entrants who went to the trouble to obtain special calls for the WPX contest. The fellows from the U.S.S.R., Spain, Italy, Brasil, Panama, Czechoslovakia, and Ecuador, to name a few, made it a good time for all participants. We also would like to thank the many entrants who made suggestions or comments on their logs. It makes checking logs a lot easier when we hear what you consider important.

Let us hope the contest *continues* to do what is its most significant contribution: increased ham radio spirit!

I wish to thank Phil Allardice, WB4SGV. Phil helped check and tabulate many scores.

Hope to CU in 1981 WPX!

73, Bob, K3EST

Brice, W9PNE, was the fourth high U.S.A. QRPp score.

Random Comments

Generator and battery problems—it's a miracle we made it on the air at all. . .AL7O/VY1. A nasty aurora just wrecked 40 meters. Spent hours listening to a dead band. . .KL7Y. The propagation god would rather we work 18 and take 30 hours off it seems... KL7RA. 15 meters crashed on Sunday

*6548 Spring Valley Drive, Alexandria, VA 22312

early—so did I!. . .AL7Z. The NL7 prefix must have given the 8 foot piece of wire about 15 dB gain. . .K1ZAT/NL7. R2B was a special call sign assigned to UK2BBB; see you next year!... UK2BBB. It sure was a great deal of fun operating the C.W. WPX for the first time. . .UZ9A. Made the first 346 QSO's with a straight key!. . .WB2SJG. Great conditions on 7 MHz Sunday morning. . .WB2RNT. Was a very fine contest; congratulations to the organizers. . .YO6KNR. I'm very glad worked this fine contest. . .UO5ODB. Very, very high noise level second nite (1.8)—two, three hours without hearing a soul. . .W2XQ. Enjoyed my first WPX very much. . .N3ED. For the first time in monoband, I hope. . .ON4FD. Tks for FB contest!. . .UK0QAA. Good band condx on 15 first night. . .KA3DDJ. Made new countries like 5W1BZ, 9M2AS, etc. . . .4Z4DX.

My first C.W. WPX contest. It is a great one because everyone is an equal multiplier. . .AA4NC. Thank you very much for nice new contest... TA2HIA. I did it! My first million in 14 years of contesting. . .4Z4KX. I believe I was the lowest powered station *not* in the QRPp section (40 w). . .W9TS/4. We are all so delighted to have a large score phone and c.w. (for many it was their first contest *ever*). . .Fraser Valley DX Club. Had great fun in contest. JA was little bit worse than last year, but still ok. . .4N4Y. I tried to get the logs done quickly. It sure helps when you are QRPp. . .AB5N. I managed to work a couple of new ones as well as several new c.w. countries. . .PA3AIC/W6TOY. My wife and I have done our best to make out this log. I'm almost blind, so my wife is trying to read those figures I wrote down on big papers during contest time. . .SM6ID and XYL. *(Thanks for your splendid effort Karl. . .ed.)* Sometimes we nearly asked if "that one on the other side" really had a receiver, until we understood that conditions were not better than this. . .SK4NI. Worked OR4YN my number 157 and his number 157... W4YN. Tnx for nice contest!... UQ2GCN.

My code speed went up by the second hour. . .WB5VZL. This contest is great, but it would be much better at a time when the low bands are better!... K5RC (K5ZD op.). Rcvd a QSL for K8TE/HK. . .K8TE/5. Sure wish 10 had been open. . .WA5SOG. Very happy to take part in WPX CW; hope in next year's conditions will be better and my result also. . .UA6LLT. Superb condx first day but the flare ruined it all Saturday night. Should have had WPX CW a long time ago!. . .K5GN. Had great fun with QRPp and 2 element quad. . .UQ2IF. I'm leaving Botswana to return to VK. I'm set for another c.w. contest next year, and if all goes well

EG7AAN had a good time with special prefix!

will enter as VK7UX. . .A22DW. The second day was flat. . .W7LPF/DU2. Let me promise you that this is the last c.w. contest I will enter using only my hand key. . .N4ADJ/KH2. Enjoyed the contest again in spite of poorer conditions and my tri-band Yagi traps shorted out. . .5W1BZ.

Just arrived from Chagos a month before the contest so didn't have time to do much antenna work. Ran the test with only two phased verticals. . . KP4KK/DU2. W5AC reported the same serial number (1118) as mine. I asked him 2 times to confirm; he said "Yes, just the same". . .PY2DLK. Calling CQ on a seemingly dead 80 meter band at 3 a.m. and having 5W1BZ answer is enough to keep me contesting. . . VE3JTQ. Had some good openings and got a couple of new ones... VE1ABU. Made 44 QSO's on 10 in 22 hours; each QSO was approximately 30 letters which would make my code speed 1 letter/minute!. . .KA9AUS. Contest too late in the season... W8UVZ. You may have worked R2B, but I bet you missed R2D2. A very nice assortment of rare prefixes. . .N8II. Futility is calling CQ with 2 watts during solar flare!. . .K7ZR. I thought I'd load up my all aluminum mobile home. Snagged YV, KH6 and 4U1UN... W7JYW. 24th WWV A10 K4! Can't get much worse I said so 25th *A40 K5*!... W6YMH.

Never count on Sundays. . . WA6DBC. Quite a thrill when VS5RP called me on 21 MHz. . .W6OUL. Condx on ten no. . .SP9CAV. Three new ones for DXCC. . .PA3ABA. I like contests very much, but with influenza it is very difficult. . .OH5RZ. Sunday poor condx, the WX also poor—cold and rain. Mounting antennas I was soaked through, but who tells us to make it? Hi!. . .I4IND.

WORLD TOP SCORES
SINGLE OPERATOR

ALL BAND

KP2A	3,463,593	UV9AX	1,769,472
OL7RZ	2,331,945	ZZ4DD	1,594,352
9H1EL	2,151,376	YU3ZV	1,540,640
ZW4OD	2,058,360	RX1DZ	1,471,200
HA5NP	1,834,715	K1GQ	1,468,987

SINGLE BAND

28 MHz		21 MHz	
LU8DQ	1,627,660	HD9E	3,544,416
4X4UH	252,068	VP2VFL	1,472,310
LU2KAK	247,406	I4IND	1,245,013
YU3MY	154,451	4Z4KX	1,081,330
9H1CH	140,693	YU7BCD	957,026
VE3BMV	113,412	CX7BY	905,545

14 MHz		7 MHz	
4N1U	1,540,640	4Z4DX	717,336
VK4QK	1,276,584	UP2NK	643,454
VE3EDC	971,584	G4FAM	541,856
ZX4BW	886,330	UB5JIM	428,582
W5FO	854,044	UB5IJK	410,972
W5WMU	851,400	SM0AJU	351,168

3.5 MHz		1.8 MHz	
AN2OP	117,750	SP5IXI	10,920
YU5RU	106,784	UP2PAP	10,504
UB5WF	103,818	YU2OB	9,976
UB5ZAL	103,104	RP2BET	8,160
UC2WBJ	98,968	UC2AAK	8,112
UP2BCG	75,140	DJ3ZX	7,776

QRPp

N3RS	A 303,866	UR2OI	28 9,144
H31XAT	" 93,532	HA6OA	21 106,554
YO5AVN/3	" 84,360	JA7EMH	14 29,808
K7SS	" 83,260	UO5OCA	7 91,020
W9KEA	" 66,232	SP4LDT	3.5 27,984
W9PNE	" 59,940	OZ1W	1.8 2,376

MULTI OPERATOR

Single Transmitter

UZ9A	5,000,135	HG6V	2,684,475
4N4Y	3,831,300	VE1DXA	2,286,744
UK2PCR	3,071,356	SK4NI	2,184,372
UK2PAP	3,004,212	UK5MAF	2,081,700
R2B	2,806,554	K3EST	1,980,636

Multi Transmitter

K3WW	3,290,656	JA2YEF	1,405,719
JA3YBF	2,162,824	JA1YXP	725,952
JA7YAA	1,430,408	JA4YQO	439,250

U.S.A. TOP SCORES

SINGLE OPERATOR

All Band	K1GQ	1,468,987
28 MHz	K8WW	10,010
21 MHz	W3MM	607,464
14 MHz	W5FO	854,044
7 MHz	N6ND	246,400
3.5 MHz	K1MM	50,400
1.8 MHz	AE6U	3,444
QRPp	N3RS	303,866

MULTI-OPERATOR

Single Xmtr	K3EST	1,980,636
Multi-Xmtr	K3WW	3,290,656

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

QRPp —SECTION— WORLD WIDE

N3RS	**A**	**303,866**	**422**	**274**
H31XAT	"	**93,532**	**333**	**134**
YO5AVN/3	"	**84,360**	**251**	**152**
K7SS	"	**83,260**	**254**	**181**
W9KEA	"	**66,232**	**211**	**136**
W9PNE	"	**59,940**	**206**	**162**
WA9POC		49,868	170	137
DK1DKW		**35,322**	**137**	**87**
Y23TL	"	**22,300**	**134**	**100**
JA1NLX	"	**14,210**	**94**	**58**
AB5N	"	13,680	142	90
SM0FSM	"	**9,452**	**91**	**68**
DK5RV	"	792	22	22
SM7BNG	"	192	12	12
UR2OI	**28**	**9,144**	**108**	**72**
JA1EF	"	**5,247**	**62**	**53**
UA3PGO	"	1,960	40	35
JR6LUD	"	330	16	11
HA6OA	**21**	**106,554**	**272**	**177**
UA2PAZ	"	**97,006**	**322**	**169**
JI1CBF	"	**75,999**	**206**	**147**
YE3KZ	"	**57,936**	**171**	**136**
DH5WH	"	**54,631**	**227**	**147**
JA7HMZ	"	**53,865**	**186**	**135**
W9OA	"	27,720	116	99
OZ1FTE	"	26,880	134	105
Y22PM	"	20,152	126	88
JA2BMS/1	"	20,020	104	91
N6UU	"	15,554	121	101
W8VSK	"	13,317	82	69
JA9UAD	"	5,504	50	43
EC3AP	"	4,272	59	48
YO5TA	"	120	10	10
UA9MM	"	110	10	10
OH2BUT	"	77	7	7
WJ2EK	"	27	3	3
JA7EMH	**14**	**29,808**	**137**	**81**
DK2BMA	"	**25,419**	**141**	**111**
UI2DF	"	**22,050**	**130**	**105**
JA1CMD	"	19,099	109	71
Y23UA	"	15,750	105	90
K7ZR	"	12,283	90	71
HA3MY	"	9,870	120	70
UO5OCA	**7**	**91,020**	**240**	**123**
UB5NDA	"	**52,664**	**208**	**116**
HA3BF	"	**20,640**	**185**	**80**
SP6CJZ	"	18,834	127	73
UC2AFJ	"	7,904	77	52
SM7CZC	"	3,496	52	38
JJ1NO	"	2,624	36	32
JI1DPP/7	"	132	12	11
SP4LDT	**3.5**	**27,984**	**160**	**88**
DJ6TK	"	**10,880**	**87**	**64**
HA1ZU	"	9,570	100	55
HA6OM	"	7,884	74	54
HA6OS	"	240	13	10
OZ1W	**1.8**	**2,376**	**44**	**27**
SP1CTN	"	**2,052**	**39**	**27**

SINGLE OPERATOR NORTH AMERICA

UNITED STATES				
K1GQ	**A**	**1,468,987**	**1284**	**391**
W1CF	"	**1,447,618**	**1283**	**401**
AF1O	"	587,552	811	301
AI1S	"	478,429	637	287
W1CNU	"	37,771	125	107
KA1EGZ	"	10,062	91	78
W1OPJ	"	6,728	61	58
WA1FCN	**28**	**8,352**	**64**	**58**
WB1ANT	**21**	**253,291**	**342**	**241**
W1FJ	"	13,533	75	68
WB1HIH	14	5,400	50	45
WA1UZH	**7**	**202,384**	**320**	**182**
AA1M	"	**145,780**	**289**	**185**
K1MM	**3.5**	**50,400**	**151**	**112**
WI1BI	**1.8**	144	9	8
N2ME	**A**	**1,023,050**	**1073**	**381**
W2FTY	"	153,652	369	214
WA2LJM	"	68,527	209	139
W2FUI	"	41,100	139	100
K2HPV	"	15,015	100	77
W2LPV	"	18	2	2
W2TV	**21**	**484,848**	**654**	**296**
N7TT/2	"	**418,800**	**620**	**300**
N2RM	"	163,944	336	184
WB2SJG	**14**	**207,570**	**424**	**222**
WB2RNT	**7**	**76,500**	**199**	**153**
W2NRD	3.5	24	4	4
W2XQ	1.8	380	30	19
W3GM	**A**	**960,828**	**915**	**348**
N3ED	"	607,389	724	293
W3BGN	"	93,496	236	124
N3KR	"	81,760	229	140
WA3DMH	"	12,296	72	58
KA3OOJ	"	7,076	70	58
N3RL	"	5,040	44	40
W3MM	**21**	**607,464**	**740**	**312**
		(Op: WA2ZKY)		
K3VW	"	329,448	510	259
K3HPS	**14**	**654,608**	**787**	**326**
N3AFU	"	27,744	114	96
N4WW	**A**	**615,109**	**659**	**281**
K4OD	"	401,008	527	284
N4DW	"	317,720	550	260
W4EI	"	283,062	459	247
W4BV	"	187,182	324	228
W4YN	"	97,328	232	154
WA4QMG	"	84,096	222	146
K8AZD	"	70,771	383	181
AA4RF	"	70,376	201	152
N4UA	"	51,246	163	117
W4KMS	"	37,698	154	122
W9TS/4	"	23,268	101	76
K4OAQ	"	22,134	109	93
W4GGB	"	12,412	80	58
K4RV	**21**	**432,390**	**586**	**290**
AA4NC	"	**406,368**	**570**	**306**
AA4M	"	197,100	381	219
N4MO	"	138,009	293	179
WA4OML	"	54,252	180	137
AA4FF	14	14,924	165	131
WA4DRU	3.5	5,076	51	47
K5RC	**A**	**1,358,355**	**1249**	**411**
			(Op: K5ZD)	
K5GN	"	**1,127,230**	**1124**	**377**
K5NW	"	594,716	752	314
WA5SOG	"	229,477	375	233
KE5C	"	185,318	406	217
W5OB	"	141,174	267	207
N5AU	"	12,672	84	64
N5BFM	"	1,089	38	33
WD5GDI	"	986	30	29
K5FUV	**28**	1,269	27	27
WB5ZAM	**21**	61,576	302	172
WB5VZL	"	13,572	83	78
WD5ENY	"	12,936	129	98
W5FO	**14**	**854,044**	**965**	**356**
W5WMU	"	**851,400**	**1009**	**360**
W5UN	"	**766,584**	**944**	**338**
AF5K	"	498,960	741	311
WD5COV	"	226,967	365	221
K5UR	**1.8**	**448**	**34**	**28**
N6AW	**A**	**282,464**	**381**	**222**
W6BYH	"	71,400	202	141
KJ6V	"	34,608	147	103
N6GL	"	16,560	102	80
AJ6V	"	10,528	119	94
K6YK/M	"	9,453	93	69
W6YMH	**28**	828	20	18
SM@CCM				
/N5S	**21**	**217,356**	**546**	**236**
AI6Z	"	52,855	239	155
W6OUL	"	49,410	208	135
AA6EE	"	45,120	176	96
WD6EEQ	"	5,828	78	58
N6JM	"	672	16	14
WA6DBC	**14**	**436,800**	**556**	**271**
N6ND	**7**	**246,400**	**401**	**154**
KK6C	"	1,900	59	52
K6XD	**3.5**	**9,604**	**63**	**49**
AE6U	**1.8**	**3,444**	**66**	**42**
K7RI	**A**	**1,065,486**	**1193**	**311**
		(Op: W7WA)		
W7JYW	"	242,216	510	221
K7WA	"	173,160	334	180
N7RO	"	137,340	338	180
W7EKM	"	54,750	205	146
W7IIT	"	48,720	157	105
K7NW	"	8,064	63	48
W7JKA	"	6,972	74	28
W7BCS	"	2,300	33	25
W7AYY	**21**	51,876	166	131
KB7G	"	3,762	57	48
K7ZA	**14**	**140,844**	**310**	**194**
K7UR	**7**	**246,006**	**381**	**173**
W7BYK	**1.8**	108	10	9
N8II	**A**	**898,505**	**976**	**355**
K8CW	"	**612,300**	**709**	**325**
WO8ALG	"	355,880	683	248
K8SIA	"	115,788	272	177
AA8S	"	103,240	279	178
N8TN	"	73,876	219	146
WB8OQP	"	32,364	132	93
WB8RE	"	25,410	123	105
WO8MOV	"	12,935	76	65
W8CAR	"	2,784	36	29
N8BTT	"	924	12	12
K8WW	**28**	**10,010**	**102**	**77**
KL7JER/8	**21**	31,458	158	107
K8HV	**14**	**451,129**	**635**	**289**
AF8O	"	35,203	135	107
W8UVZ	**7**	**166,412**	**264**	**188**
N8MN	"	7,616	60	56
W8LRL	**1.8**	**2,100**	**45**	**30**
AI9J	**A**	**662,758**	**847**	**326**
K9BG	"	402,300	532	310
WA9EJ	"	289,110	587	230
WO9DBC	"	93,214	307	209
KA9AUS	**28**	**1,924**	**42**	**37**
WA9EKA	**21**	**182,320**	**431**	**215**
K9TI	**14**	**237,568**	**428**	**232**
W9CG	**1.8**	**504**	**24**	**21**
WD9AVV	**A**	22,557	143	103
W9LHS	"	4,180	45	38
AC9S	**14**	**120,958**	**443**	**197**
AK9A	"	49,692	189	139

ALASKA

KL7HR	A	1,435,988	1396	388
KL7RA	"	928,200	1167	312
KL7AF	"	260,000	452	208
KL7H	21	769,103	988	311
AL7Z	"	290,301	603	209
K1ZAT/NL7	"	3,675	45	35
KL7Y	7	27,840	102	60
KL7HBK	1.8	728	15	13

BRITISH VIRGIN ISLANDS

VP2VFL	21	1,472,310	1675	369
		(Op: W7KHN)		

CANADA

XL3LON	A	1,337,560	1275	382
VE7CC	"	727,892	877	284
VE3JTO	"	473,040	582	270
VE3DUS	"	317,250	461	225
VE1CAN	"	741	21	19
VE3BMV	28	113,412	317	156
VE2AFJ/3	"	6,419	53	49
VE7WJ	21	611,298	814	312
		(Op: AH6Z)		
VE1ABU	"	202,440	388	210
VE3EDC	14	971,584	1023	376
VE4IK	"	466,125	719	275
		(Op: VE4VV)		
VE3FCU	"	129,195	295	165
VE1UG	7	39,374	106	73
VE3INO	1.8	288	9	8

DOMINICAN REPUBLIC

HI8LC	A	162,504	307	222

HAITI

HH2VP	A	465,465	623	243

REPUBLIC OF PANAMA

HB1AC	21	80,600	222	120

U.N. (NEW YORK)

4U1UN	A	356,960	651	184
		(Op: DJ6LV)		

U.S. VIRGIN ISLANDS

KP2A	A	3,483,593	2564	483
		(Op: N6CW)		

AFRICA

ASCENSION ISLAND

ZD8TC	A	1,291,845	1036	351

BOTSWANA

A22DW	A	240,295	429	187

CANARY ISLANDS

EA8SR	21	357,540	507	236

CEUTA

EA9GT	21	689,080	822	280
EA9JG	"	249,642	414	201

LIBERIA

EL2AV	A	288,437	459	211

REPUBLIC OF SOUTH AFRICA

ZS5ZI	21	17,496	108	54

ASIA

ISRAEL

4X4UH	28	252,068	498	212
4Z4KX	21	1,081,330	1060	355
4Z4KM	"	226,416	387	212
4Z4DX	7	717,336	516	243

JAPAN

JE1JKL	A	886,655	957	329
JA1IDY	"	499,200	726	240
JH0CWU	"	494,520	674	260
JH7UJN	"	136,784	311	166
JH2JEV	"	78,603	263	133
JG3GQA	"	74,786	247	122
JI1PCN	"	49,168	173	112
JA6BIF	"	39,590	150	107
JR3XEX	"	19,053	101	73
JE1TSD	"	10,290	76	49
JA9FT	"	8,294	100	26
JA9GTM	"	5,343	55	39
JH3UVU	"	3,544	41	28
JR4HVF	"	3,024	60	56
JA4AQR	"	2,256	34	24
JA7FMZ	"	332	14	14
JA6FYM	"	390	27	15
JF2VDY	28	8,085	78	55
JA8TRT	"	6,042	86	57
JA3EQC	"	5,220	63	45
JH7UJU	"	4,418	68	47
JA1AAT	"	408	12	12
JH3LPT	21	632,573	780	313
JA5THU	"	471,580	594	292
JA6DKB	"	461,700	695	270
JE1CSB	"	402,268	571	268
JA9SOT	"	189,880	347	202
JA7YAB	"	144,396	299	191
		(Op: JA7UMT)		
JH1QLB	"	125,567	264	169
JE2KPM	"	91,784	245	154
JH1BCY	"	88,350	226	150
JH1HQS	"	19,975	104	88
JH7BRG	"	11,310	70	58
JA6AKV	"	11,001	72	57
JA8OOB	"	4,680	45	45
JK1OEO	"	2,324	31	28
JA2KPV	"	1,672	36	19
JA1JAT	"	846	19	18
JA5UXR	"	558	22	18
JE1EAV	14	476,766	782	243
JA1GSK	"	190,470	338	210
JA8CGJ	"	74,772	214	134
JG1QGQ	"	27,639	123	83
JA3ECR	"	17,290	96	65
JA4UDP/2	"	14,406	106	49
JH4DRB	"	7,938	56	49
JA1KKA	"	1,826	30	22
JA1KFX	"	1,806	32	21
JA1UPO	"	825	21	15
JG1FZG	"	306	12	9
JA5BJC	7	341,124	383	186
JE3MCC	"	312,984	373	189
JA3BCT	"	3,800	25	25
JA9WCD	"	728	15	13
JA6LCJ	3.5	3,800	33	30
JA9YAP	"	1,242	24	23
		(Op: JF3HKY)		
JE1SPY	1.8	182	14	13
JA4OEL/1	"	6	2	1

KOREA

HM1JJ	21	135,020	401	172

QATAR

A7XE	7	285,516	349	154

SAUDI ARABIA

HZ1HZ	A	1,223,370	1177	345

THAILAND

HS1ABD	A	1,279,250	1561	350

TURKEY

TA2HIA	14	159,088	342	163

U.S.S.R.

ARMENIA

UG6JJ	21	11,220	94	66
UG6GAI	7	196,840	251	140

ASIATIC

UV9AX	A	1,769,472	1375	384
UA9AFG	"	273,066	446	213
UA9OC	"	235,940	419	188
UA9WFB	"	96,250	246	145
UA9OD	14	246,558	568	218
UA9UTF	"	135,795	299	165
UA9AIG	7	41,610	160	95
UA9SOW	"	4,760	68	44
UA9SY	A	99,873	316	137
UA9JAY	"	53,125	208	125
UA9ILJ	"	11,656	121	62
UA9WAS	14	407,255	643	235
UA9ACM	"	165,006	347	178
UA9SKL	7	320	15	4

AZERBAIJAN

UF6FEF	14	92,574	230	139

GEORGIA

UD6DKW	A	256,984	358	182
UD6CN	A	228,512	332	193
UD6DLJ	21	480,318	700	277

KAZAKH

UL7GAA	A	208,416	415	208
UL7GCU	28	260	10	10
UL7QF	21	250,984	442	214
UL7LCZ	14	634,626	758	296
UL7JAW	"	317,760	515	240

KIRGHIZ

UM8MBA	21	263,516	495	212

TADZHIK

UJ8JAS	21	657,405	853	315

TURKOMAN

UH8HBR	A	241,152	454	192
UH8HAI	28	72,479	267	121
UH8BO	"	600	33	15
UH8DC	21	757,512	900	324
UH8EAD	7	162,250	248	69

UZBEK

UI8AFA	A	781,860	980	249
UI8ACO	7	4,158	33	27

EUROPE

AUSTRIA

OE1TKW	1.8	2,970	48	33

BELGIUM

OR4XG	A	208,320	562	210
OT6FT	A	138,368	380	184
ON4FD	14	598,504	938	316
OR5WL	"	28,665	174	105

BULGARIA

LZ1EP	A	117,594	260	139
LZ1NJ	14	62,804	149	96
LZ1YG	7	25,596	133	81

CZECHOSLOVAKIA

A		2,331,945	1957	495
OL7RZ				

TROPHY WINNERS

Single Operator-All Band

WORLD - Canadian DX Assn. Trophy. Won by: **Station KP2A: Opr. Terry Baxter, N6CW.**
U.S.A. - Corker A. Rhines, W8EAO Trophy, Charles Rhines, W7VIU Memorial. Won by: **William Myers, K1GQ.**
CANADA - Canadian Amateur Radio Federation Trophy. Won by: **XL3LON: Opr. Mitch Powell, VE3OT.**
EUROPE - Sigurdur Jakobsson, TF3CW Trophy. Won by: **Jiri Kral, OL7RZ.**
JAPAN - Palm Garden Contest Club Trophy. Won by: **Saty Nakamura, JE1JKL.**
WORLD - QRPp - Nevada Amateur Radio Assn. Trophy, George Hewitt, WB7OOQ Memorial. Won by: **Ron Sigismonti, N3RS.**

Single Operator-Single Band

WORLD - Pedro Piza, Jr., KP4RF/KP4Q Trophy. Won by: **KDØE: Opr. Alan Van Buren, K7CA (21 MHz).**
U.S.A. - Kansas City DX Club Trophy. Won by: **Lynn A. Schriner, W5FO (14 MHz).**
SOUTH AMERICA - John Kroll, K8LJG Trophy. Won by: **Jorge Humberto Bozzo, LU8DQ (28 MHz).**

Multi-Operator Single Transmitter

WORLD - Ron Blake, N4KE Trophy. Won by: **Club Station UZ9A: Oprs: UA9ACZ, UA9AEN, UA9AJD, UW9BY, UA9AIS, UA9AGR, UA9AKI, UA9-165-1288, 930, 1382, EZ9AAA.**
CANADA - Tehrahedral Contest Circle Trophy. Won by: **Club Station VE1DXA: Oprs.: VE1FH, VE1MX, VE1AWS, VE1AVX.**
EUROPE - Jonas Bjarnason, TF3JB Trophy. Won by: **Club Station 4N4Y: Oprs: Edib, Tomo, Ivo, Dubo, Miro, Goran, Ivek, Emil, Edin, Ilfan, Ferid.**

Multi-Operator Multi-Transmitter

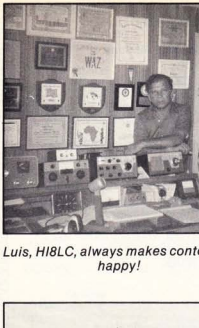
WORLD - North Florida DX Assn. Trophy. Won by: **Station K3WW: Oprs.: K3WW, KB3GJ, K3WJV, AJ3G, KA3BLP, N2ATX.**

Contest Expedition

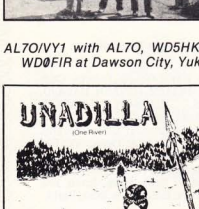
WORLD - Northern Ohio DX Assn. Trophy. **No Winner.** A total of at least 3 different logs must be received in this category.

Club Competition (SSB & C.W.)

WORLD - Canadian DX Assn. Trophy, Bud Abraham, VE1VR Memorial. Won by: **Fraser Valley DX Club.**



Luis, HI8LC, always makes contesters happy!



AL7O/VY1 with AL7O, WD5HKI, and WD@FIR at Dawson City, Yukon.

OK2BLG	"	**768,621**	**936**	**357**	OK3CAQ	"	684	28	19	**OH2PM**	**7**	**113,460**	**288**	**155**
OK2YAX	"	**613,704**	**850**	**312**	OL9GJB	"	504	19	18	OH6RE	"	59,020	212	130
OK2BEC	"	488,430	886	270	OK1DCF	"	42	7	7	OH2SX	"	15,136	134	43
OK3BA	"	272,571	569	241						OH6CT	"	1,200	33	20
OK2UAS	"	267,540	512	245		**DENMARK**				**OH2BDL/1**	**3.5**	**6,120**	**62**	**45**
OK3FN	"	222,642	410	217	**OZ1LD**	**A**	**1,180,918**	**1420**	**373**	**OH3JR**	**1.8**	**2,442**	**40**	**33**
OK3YCA	"	201,240	423	215	OZ1EOE	"	166,716	388	198	OH5NG	"	1,980	37	30
OK2DB	"	158,598	347	198	OZ7BW	"	23,564	100	86					
OK1DXP	"	107,730	340	171	OZ8E	"	952	44	26			**FRANCE**		
OK1KSH	"	100,270	241	185	**OZ1FAO**	**28**	**13,608**	**138**	**81**	**F9KP**	**A**	**666,710**	**1111**	**290**
		(Op:OK1DOJ)			OZ5KU	"	5,668	63	53	**F6FBQ**	"	**430,464**	**781**	**236**
OK1KZ	"	83,369	280	143	OZ1CQB	"	475	32	19	F8TM	"	150,751	285	233
OK2PBG	"	71,672	232	136	**OZ1EE**	**14**	**218,978**	**491**	**206**	F6EOV	"	16,530	144	58
OK2JK	"	63,600	228	150						F2VD	21	37,752	157	121
OK3IF	"	60,306	205	138		**ENGLAND**				**F6DKV**	**14**	**103,484**	**330**	**164**
OK1MAA	"	59,640	220	140	**G3KDR**	**A**	**1,340,696**	**1216**	**356**	**F6DYY**	**1.8**	**3,248**	**57**	**29**
OK3IAG	"	40,468	141	134	**G3MXJ**	"	**1,077,816**	**1203**	**376**					
OK2SGW	"	23,941	112	89	G3XTT	"	415,758	580	266			**GERMANY (F.R.G.)**		
OK1MZD	"	20,124	114	86	G7AJB	"	77,028	212	147	**DL7AV**	**A**	**1,306,262**	**1337**	**389**
OK1FCA	"	15,760	86	80	G6NK	"	10,512	124	36	**DK8AX**	"	**540,254**	**846**	**286**
OK1AEH	"	7,526	56	53	**G4CNY**	**28**	**84,132**	**308**	**171**	DL8OE	"	491,854	875	283
OK2LN	"	3,080	38	35	**G3MZV**	**21**	**300,842**	**450**	**259**	DK9FD	"	351,960	629	280
OK1JDJ	"	2,352	46	42	G4GDY	14	44,408	130	91	DK3QJ	"	331,430	559	262
OK2BTI	28	4,444	60	44	**G4FAM**	**7**	**541,856**	**651**	**287**	DJ1YH	"	248,863	500	247
OK1AGN	**21**	**457,958**	**724**	**298**						DL7DF	"	211,265	443	235
OK2SAT	"	170,699	357	211						DL4FF	"	205,642	469	229
OK3PQ	"	111,384	280	182		**FINLAND**				DF3QN	"	84,700	300	154
OK1AVD	"	106,560	313	185	**OH6DX**	**A**	**986,974**	**1336**	**361**	DJ4EY	"	60,781	211	133
OK1ASQ	"	97,038	259	162	**OH1VR**	"	**812,820**	**1156**	**345**	DK9NH/p	"	28,152	142	102
OK2SLS	"	54,128	174	136				**(Op: OH3HC)**		DL1AM/A	"	448	16	16
OK1AOV	"	38,080	157	119	OH7UV	"	278,478	602	243	**DF2CHA**	**28**	**5,044**	**62**	**52**
OK2SPS	"	32,300	138	85	OH2BTI	"	203,392	520	227	DK9LG	"	4,920	96	40
OK3CWA	"	14,070	96	70	OH6UM	"	207,608	502	216	**DK3GI**	**21**	**899,899**	**1092**	**341**
OK3KFF	**14**	**721,192**	**1229**	**317**	OH6MM	"	63,118	271	151	DL7AA	"	247,213	463	233
		(Op: OK3CW)			OH2BSA	"	57,744	233	144	AH3A/W/DL	"	117,600	331	160
OK1MG	"	**210,056**	**436**	**248**	OH2VZ	"	56,826	183	123	**DK4TA**	**3.5**	**34,556**	**138**	**106**
OK2ABU	"	153,045	409	171	OH9TD	"	49,742	166	133	DL1KAV	"	700	27	25
OK1JHR	"	90,300	307	150	OH5RZ	"	39,368	200	133	**DJ3ZX**	**1.8**	**7,776**	**72**	**54**
OK1DIE	"	70,213	240	143	OH2BTG	"	27,995	141	83	**DK1DU**	"	**2,584**	**58**	**38**
OK3AS	"	54,945	185	109	OH9PN	"	26,353	269	73					
OK1MHI	"	48,360	199	124	OH2CZ	"	19,832	102	74					
OK3CFS	"	41,261	169	121	OH5PT	"	17,608	101	76			**GERMANY (E.D.R.)**		
OK1AJY	"	35,984	164	104	OH1MQ	"	16,512	101	86	**Y47YN**	**A**	**426,233**	**823**	**257**
OK3CKJ/p	"	28,968	156	102	OH2BVM	"	14,840	132	53	**Y46WO**	"	**205,794**	**425**	**210**
OK1MIZ	"	16,900	101	75	OH1PY	"	12,992	90	70	Y46XL	"	187,320	437	210
OK1AYQ	"	16,653	150	91	OH9YX	"	5,085	46	45	Y31XA	"	184,704	521	208
OK1AOU	"	5,439	53	49	**OH6ZAB**	**28**	**48,618**	**297**	**146**	Y41ZF	"	126,415	365	193
OK2BWH	"	3,744	55	45	**OH6RC**	"	**20,352**	**170**	**106**	Y47XN	"	125,668	379	178
OK2PEQ	"	644	28	23	OH2JQ	"	5,922	92	63	Y35RK	"	118,498	376	179
OK3CEG	"	300	10	10	OH6ZH	"	2,090	45	38	Y22TO	"	79,659	270	159
OK1MSD	"	9	3	3	**OH1AA**	**21**	**817,278**	**1132**	**319**	Y27IL/A	"	72,504	226	152
OK3TOA	7	9,020	81	55				**(Op: OH3OM)**		Y33VA	"	54,404	469	116
OK2NI	**3.5**	**22,620**	**125**	**87**	OH2FQ	"	345,644	651	299	Y38WG	"	49,147	413	119
OK1DRY	"	**21,672**	**127**	**86**	OH2BVI	"	49,623	232	139	Y21JH	"	45,981	200	117
OK3CEL	"	6,468	65	49	OH3NM	"	35,733	140	129	Y45WF	"	38,295	181	115
OK3CDK	"	4,536	54	42	OH6UH	"	22,145	127	103	Y52ZL	"	31,518	179	102
OK2BRE	"	3,234	49	33	OH5MO	"	18,748	123	86	Y31ZE	"	28,356	136	102
OK3CEI	"	1,248	26	26	OH3RF	"	5,782	74	59	Y23CM	"	19,475	104	95
OK1DIJ	**1.8**	**7,544**	**76**	**52**	**OH6PF**	**14**	**840,075**	**1196**	**345**	Y25LE/A	"	18,792	101	81
OK3CWQ	"	**3,360**	**35**	**32**	OH1QB	"	126,732	366	179	Y32ZF	"	16,350	102	75

Y51ZE/ Y44TD	"	10,653	68	53
Y23HM/A	"	9,792	69	64
Y42ZB	"	6,600	77	55
Y24HG	"	4,212	151	27
Y59ZF	"	3,612	57	43
Y48ZF	"	1,600	27	25
Y54XA	**28**	**3,040**	**51**	**38**
Y37ZE	21	33,376	140	112
Y26SO	"	11,719	84	79
Y22UB	"	6,292	66	53
Y21DC	"	3,913	107	43
Y39RA	"	1,242	35	27
Y37UF	**14**	**223,560**	**521**	**243**
Y67XL	"	75,368	357	172
Y22JA	"	49,387	207	131
Y27HL	"	34,578	181	113
Y39YA	"	29,744	150	104
Y46WF	"	25,935	171	105
Y38YE	"	19,602	138	99
Y21YH	"	9,983	84	67
Y23JN	"	5,684	70	58
Y26WL	"	2,440	42	40
Y62QN	"	2,146	44	37
Y31ZF	**7**	**216,546**	**401**	**193**
Y45SA	"	83,400	266	139
Y64YG	"	38,412	160	97
Y21EA	"	25,482	140	93
Y75UL/p	"	24,752	104	30
Y23RB	**3.5**	**48,488**	**216**	**116**

GIBRALTAR

ZB2EO	**A**	**261,800**	**442**	**187**

GREECE

SVØAT	**A**	**605,760**	**979**	**320**
SVØAR	**"**	**541,487**	**908**	**281**
SVØAU	"	287,500	615	250

HUNGARY

HA5NP	**A**	**1,834,715**	**1896**	**415**
HA4XX	**"**	**745,396**	**1181**	**307**
HA8EK	"	588,300	913	300
HA3PW	"	226,884	476	219
HA9KPU	"	211,275	455	225
		(Op: Bela Mihaly)		
HA7SU	"	203,280	412	240
HAØTU/9	"	142,964	362	206
HA8WU	"	87,450	330	165
HA3GO	"	56,376	204	116
HA3HZ	"	55,808	220	128
HAØIG	"	41,064	181	118
HA3HE	"	35,995	179	115
HA7SQ	"	31,605	134	105
HA3IB	"	14,560	127	65
HA2MJ	"	14,060	123	74
HA5MJ	**21**	**190,744**	**416**	**211**
HA6NW	**14**	**230,964**	**503**	**228**
HA1TQ	"	138,184	361	184
HA1ZG	"	103,597	341	169
HA2MN	"	35,298	145	111
HA5JK	"	19,295	129	85
HA8KQX	**7**	**167,736**	**400**	**174**
		(Op: HA8-781)		
HA3NU	"	41,160	178	105
HA3PT	"	8,466	88	51
HA5BA	3.5	4,134	59	39

ITALY

I4IND	**21**	**1,245,013**	**1245**	**407**
IV3NCB	"	83,942	399	94
I5JFG	"	43,092	161	126
I7LMR	"	36,192	176	116
IV3FJV	**14**	**66,120**	**219**	**152**

LIECHTENSTEIN

DK1II/HBØ	**A**	**793,600**	**1200**	**310**

MALTA

9H1EL	**A**	**2,151,376**	**2087**	**424**
9H1CH	**28**	**140,693**	**356**	**199**

THE NETHERLANDS

PAØVDV	**A**	**267,988**	**498**	**238**
PAØDIN	"	172,912	428	214
PAØINA	"	154,470	401	190
PAØTA	"	100,398	260	174
PAØSKP	"	27,900	168	93
PAØRRS	"	2,982	46	42
PA3ADJ	**21**	**42,912**	**288**	**149**
PA3AIC	**14**	**144,406**	**383**	**206**
PA3ABA	**3.5**	**9,280**	**76**	**58**

NORWAY

LB8CA	**A**	**371,025**	**738**	**291**
LA9HW	**"**	**271,614**	**674**	**223**
LA6ZV	"	89,604	350	171
LA3UG	"	18,768	118	92
LA7XB	14	48,144	194	136

POLAND

SR2FAP	**A**	**477,120**	**848**	**280**
SR5ES	**"**	**257,088**	**621**	**206**
SR8ECV	"	129,108	379	174
SR3HC	"	93,060	337	165
SR9BRP	"	69,208	221	164
SR6DMJ	"	61,344	203	142
SR9AKD	"	59,796	208	132
SP9BBH	"	59,670	185	135
SP8SR	"	36,852	157	111
SR9KZ	"	27,391	141	91
SP7DTP	"	16,133	89	53
SP9AOA	"	12,320	97	77
SR6EQZ	"	6,345	58	47
SP9HNB	"	5,504	47	43
SR8FHJ	"	2,450	36	35
SP7AW	"	442	14	13
SR9CAV	**28**	**12,792**	**118**	**78**
SP5AD	**21**	**69,361**	**188**	**139**
SR5JTR	"	29,088	131	101
SR3BYZ	"	15,675	102	75
SP3JRK	**14**	**64,815**	**273**	**145**
SP9CVY	"	49,128	209	138
SP2HBP	"	44,574	160	138
SR9EMU	"	23,075	138	87
SR8GEY	"	14,413	103	71
SR2JGK	"	14,130	130	90
SR9JBK	"	2,392	32	26
SP9EML	"	1,593	32	27
SR9EMI	**7**	**121,368**	**311**	**156**
SR6EIY	"	92,700	288	150
SP5LGP	"	41,909	177	97
SP5LGT	"	28,724	150	86
SR4AAZ	"	7,300	78	50
SP5GIQ	**3.5**	**45,600**	**213**	**100**
SR9HWN	"	13,888	114	62
SP9BMH	"	13,104	103	63
SP4GFG	"	216	14	9
SP5IXI	**1.8**	**10,920**	**109**	**60**
SP3FLR	**"**	**6,570**	**81**	**45**
SP9DH	**"**	**4,510**	**62**	**41**
SR9EPY	"	3,384	55	36
SR8EMO	"	3,024	47	36

REPUBLIC OF IRELAND

EI1DH	**21**	**264,320**	**450**	**224**

ROMANIA

YO4XF	**A**	**178,281**	**426**	**213**
YO2BEO	"	132,696	358	171
YO6MD	"	112,902	428	186
YO3JG	"	109,611	283	171
YO5BRZ	"	39,382	157	97
YO3CR	"	9,234	70	54
YO7AUU	"	3,610	79	19
YO6XA	**21**	**88,389**	**273**	**161**
YO5AVP	"	7,442	70	61
YO3JJ	**14**	**200,298**	**426**	**251**
YO6EZ	"	52,020	204	107
YO6ANZ	"	18,834	126	86
YO8BSE	"	6,160	120	35
YO7AWZ	"	2,376	86	22
YO2IY	"	24	4	4
YO3AWD	**7**	**122,112**	**276**	**159**
YO4KRB	"	36,290	175	95
		(Op: YO4BCG)		
YO4CAH	"	2,530	100	22
YO8CEZ	"	2,024	45	22
YO2AQO	**3.5**	**10,922**	**124**	**43**

SPAIN

EA1JD	**A**	**198,360**	**467**	**228**
EA7ATE	"	19,173	114	83
AN5DD	"	12,008	110	79
AN7AIN	"	5,612	64	61
EA3GF	"	3,645	47	45
EA3BIW	"	1,620	31	30
EG2IA	28	1,885	31	29
EG7AAW	**21**	**108,402**	**411**	**178**
AN2LY	"	80,364	280	148
AN2CR	"	19,580	106	89
EC5AR	"	12,600	81	72
EC3AP	"	4,272	59	48
EG7ALG	**7**	**195,088**	**358**	**178**
AN2OP	**3.5**	**117,750**	**289**	**157**

SWEDEN

SM5AOE	**A**	**801,736**	**1128**	**338**
SM4CNN	**"**	**763,656**	**1004**	**376**
SMØGNU	"	541,570	760	310
SM5AFE	"	36,288	137	112
SM5RE	"	36,179	190	121
SMØCGO	"	22,500	125	90
SM6HCJ	"	3,588	50	46
SM7BKH	**28**	**12,948**	**121**	**78**
SMØCKT	"	2,226	53	42
SM5GMG	**21**	**381,706**	**655**	**277**
SM5CMP	"	272,014	600	277
SM7TV	"	2,112	32	32
SM6ID	**14**	**126,831**	**333**	**201**
SM6FKF	"	116,572	315	193
SMØBVQ	"	96,520	300	190
SM5CBM	"	52,548	212	151
SMØDJZ	"	20,448	115	96
SM6JY	"	18,190	125	85
SM6DUA	"	3,168	40	24
SMØAJU	**7**	**351,168**	**494**	**248**
SM5CSS	3.5	3,182	40	37

SWITZERLAND

HB9KC	A	31,065	148	95

YUGOSLAVIA

YU3ZV	**A**	**1,540,640**	**1706**	**401**
YU7SF	"	469,025	922	257
YU3FK	"	364,966	582	262
YU1NZW	"	284,862	570	241
YU7NZR	"	162,648	390	216
YU3TVI	"	59,924	208	142
YU1OON	"	52,400	216	131
YU2BTU	"	10,540	70	62
YU3MY	**28**	**154,451**	**389**	**209**
		(Op: YU3EY)		
YU7BCD	**21**	**957,026**	**1191**	**347**
		(Op: YU7OOZ)		
YU3TU	**"**	**888,300**	**1041**	**350**
YU4PH	"	99,680	265	178
YU4VWW	"	47,725	162	115
4N1U	**14**	**1,540,640**	**1706**	**401**
		(Op: Mike)		
YU1OVK	"	73,853	250	169
YU5FAM	"	49,270	191	130
		(Op: YU5XRP)		
YU2RAT	"	16,147	94	67
YU7AEW	**7**	**81,926**	**237**	**137**
		(Op: YU7OON)		
YU7QEF	"	66,500	200	125
YU5RU	**3.5**	**106,784**	**341**	**142**
YU2BOP	**"**	**73,406**	**261**	**127**
YU4VBR	"	62,920	223	121
YU2OB	**1.8**	**9,976**	**90**	**58**

U.S.S.R.

BYELO-RUSSIA

RZ2ACA	**A**	**633,150**	**853**	**335**
RZ2AAX	**"**	**369,241**	**759**	**277**
RZ2DQ	"	222,069	512	237
RZ2AAP	"	96,492	258	151
UC2ACL	"	74,382	165	154
UC2WBN	"	28,712	190	74
UC2OBA	21	9,765	78	63
UC2OAI	**14**	**464,032**	**796**	**272**
UC2AAD	"	151,164	410	221
UC2AFI	"	93,500	285	170
UC2ACT	"	30,210	140	114
UC2AFD	"	6,324	74	51
UC2WBL	**7**	**138,944**	**353**	**167**
UC2WBM	"	85,918	302	133
UC2ACZ	"	85,652	279	133
UC2LBJ	"	70,056	286	37
UC2WBJ	**3.5**	**98,968**	**331**	**139**
UC2AAK	**1.8**	**8,112**	**80**	**52**
RK2ABC	"	98	7	7

ESTONIA

RU2QD	**A**	**378,590**	**701**	**262**
RU2CR	"	82,010	328	139
UR2RKS	"	33,750	146	90
RU2RDQ	"	14,274	93	78
UR2TAB	**28**	**46,169**	**289**	**137**
RU2JL	"	2,457	63	39
RU2RCU	**21**	**193,795**	**501**	**245**
UR2RHF	**14**	**238,681**	**521**	**257**
RU2RER	**7**	**168,912**	**367**	**184**
UR2QY	"	7,030	66	55
UR2RIC	**3.5**	**2,436**	**42**	**29**

EUROPEAN RUSSIA

RX1DZ	**A**	**1,471,200**	**1761**	**400**
RW3HV	**"**	**791,908**	**1371**	**314**
UA3QAQ	"	422,400	755	300
RZ3ACJ	"	298,371	712	271
RZ3AGF	"	242,202	701	222
RZ3AAH	"	219,978	464	242
UA6AJO	"	209,608	517	222
UA3HH	"	201,505	525	191
UW3MW	"	153,075	444	195
UA3AEX	"	151,041	447	199
RX3GO	"	91,280	281	163
RZ3ABN	"	79,156	267	154
UV3DN	"	76,230	304	154
RZ3AEZ	"	70,707	215	147
UA4ACD	"	62,431	246	149
UA4YY	"	58,236	247	138
UA4CK	"	56,007	249	147
UA4OP	"	10,556	90	58
UA1DF	"	6,954	60	57
UA6AKB	"	3,724	44	38
UA1XM	**28**	**4,399**	**73**	**53**
UA3YAO	"	2,331	51	37
UA3MDX	"	70	7	7
UA6LFX	**21**	**426,808**	**749**	**248**
UA6LLT	**"**	**410,400**	**573**	**304**
UA3QBP	"	368,500	648	268
UW3UO	"	278,964	597	234
RV3GZ	"	253,368	560	216
UA3EZ	"	187,660	451	220
UA6AKT	"	49,792	165	128
UA6AJG	"	36,500	150	125
UW3GL	"	36,000	153	115
UA3QBC	"	26,460	159	105
UA1QAV	"	3,827	57	43
UA6ARX	**14**	**606,204**	**910**	**324**
RV3HD	**"**	**437,276**	**748**	**322**
RZ3AGL	"	341,640	637	292
UA4PWU	"	335,080	651	270
UA3PAW	"	283,195	663	271
RZ3AAJ	"	269,724	580	273
UA3ESN	"	168,130	400	230
RZ3AHS	"	164,065	556	209
RZ3AFQ	"	154,008	483	216
UA3ALE	"	76,776	253	168
RZ3DFG	"	70,304	274	169
RZ3ADD	"	54,750	210	146
UA3ST	"	39,440	167	116
UA3DIN	"	27,830	175	126
UA4CDY	"	27,610	157	107
UA3DLN	"	26,900	180	121
UA3TAG	"	26,776	215	33
UA3UBN	"	12,586	82	62
UA3AIF	"	5,875	55	47
UA6ADV	"	1,560	32	31
UA4HGG	**7**	**159,960**	**354**	**186**
UA1AUA	"	75,980	278	145
UA3QEB	"	29,568	150	96
UA6DU	**3.5**	**54,056**	**234**	**116**
UA3ZP	"	28,923	172	93
UA3XBY	"	16,264	112	76
UA6ALV	"	3,268	50	38
UA1QBM	**1.8**	**2,100**	**34**	**30**
EZ6PAD	"	40	5	5

KALININGRAD

UA2FCB	A	13,588	99	79
UA2EC	**21**	**177,790**	**400**	**230**
UA2DC	**14**	**38,570**	**134**	**95**
UA2FEF	"	6,321	57	49

KARELIA-FINNISH

UN1CB	**14**	**168,080**	**528**	**220**

LATVIA

UQ2PQ	**A**	**117,810**	**441**	**170**
UQ2GCN	**7**	**160,512**	**341**	**176**
UQ2GEI	"	97,290	291	140
UQ2GEC	"	40,766	161	109
UQ2PP	**3.5**	**19,360**	**120**	**80**

Jiri made all entrants happy with his special prefix.

This beautiful shack belongs to SM5CMP.

VP2VFL alias W7KHN.

LU2KAK, Bror, takes it easy after his 10 meter effort.

Chris, G4FAM, finds a way to cope with 40 meter QRM.

LITHUANIA				
UP2BAO	**A**	**682,992**	**1049**	**324**
UP2BFE	"	**544,307**	**909**	**313**
UP2CY	"	456,840	660	282
UP2GF	"	397,712	765	268
UP2BBC	"	329,160	606	260
UP2BEL	"	325,596	663	258
UP2PAQ	"	233,926	534	217
UP2RCE	"	212,048	503	232
UP2BDX	"	203,814	509	201
UP2BF	"	115,522	366	178
UP2BEI	"	97,344	271	156
UP2PBM	"	68,943	238	147
UP2DV	"	62,729	209	149
UP2BGX	"	49,720	225	113
UP2PCU	"	44,821	250	133
UP2DM	**21**	**62,496**	**230**	**126**
UP2ND	"	56,682	220	141
UP2BAE	"	47,399	222	139
UP2PAW	"	40,764	192	129
UP2BCB	**14**	**79,520**	**245**	**140**
UP2AW	"	40,480	150	115
UP2PBI	"	3,485	41	41
UP2BEU	"	624	25	24
UP2NK	**7**	**643,454**	**737**	**287**
UP2BFB	"	167,040	415	174
UP2BFH	**3.5**	**83,688**	**312**	**132**
UP2BCG	"	**75,140**	**267**	**130**
UK2BAB	"	38,480	193	104
UP2BFF	"	5,984	70	44
UP2PAP	**1.8**	**10,504**	**175**	**52**
RP2BET	"	**8,160**	**89**	**51**
MOLDAVIA				
UO5AP	**A**	**482,949**	**843**	**279**
UO50WC	"	278,272	568	256
UO50DA	"	184,240	380	245
UO50BD	**14**	**126,819**	**347**	**189**
UKRAINE				
UB5ICS	**A**	**311,406**	**472**	**258**
UB5HEK	"	**277,876**	**600**	**254**
UY5TE	"	170,914	500	194
UB5ZBF	"	135,660	350	190
UB5AAL	"	128,696	331	212
UB5IF	"	39,780	208	117
UB5MFU	"	37,338	144	98
UB5FDG	"	27,371	133	101
UB5HQ	"	8,050	59	50
UB5ZAT	"	1,988	29	28
UB5QCK	"	1,484	31	28
UB5MOT	**28**	**56,840**	**248**	**145**
UB5EEQ	"	12,090	113	80
RB5IWF	"	10,366	100	71
UB5UMJ	"	1,590	32	30
UY5OQ	**21**	**148,520**	**371**	**158**
UB5KBF	"	82,152	260	163
UB5MGL	"	44,730	182	105
UB5VAW	"	20,381	123	89
UT5PI	**14**	**352,960**	**665**	**290**
UB5UCH	"	**269,240**	**563**	**254**
UB5LCK	"	259,281	490	243
UB5RBN	"	164,499	404	209
UT5CF	"	152,680	428	220
UB5QAU	"	140,835	366	205
RZ5UDH	"	115,412	317	172
UT5HP	"	101,844	287	207
UB5EJU	"	94,977	352	183
UB5UBS	"	90,644	282	172
UB5RS	"	73,416	232	184
UB5SG	"	73,050	217	150
UB5EEP	"	25,760	140	112
UB5IAU	"	21,384	120	97
UB5UCO	"	11,128	83	79
UX5JCB	"	5,402	91	73
UB5JIM	**7**	**428,582**	**554**	**253**
UB5IJK	"	**410,972**	**545**	**254**
RZ5UWG	"	**246,362**	**457**	**199**
UB5QEO	"	129,244	304	156
UT5EH	"	34,650	590	105
UB5EDM	"	22,348	115	74
UB5IBX	"	15,708	88	73
UB5WF	**3.5**	**103,818**	**334**	**143**
UB5ZAL	"	**103,104**	**340**	**146**
RT5BN	"	60,960	256	120
OCEANIA				
AUSTRALIA				
VK3AHI	**A**	**919,592**	**935**	**284**
VK3AEW	"	395,429	504	244
VK5FS	"	75,756	239	107
VK4QK	**14**	**1,276,584**	**1251**	**344**
GUAM				
N4ADJ/KH2	**A**	**371,384**	**302**	**116**
NEW ZEALAND				
ZL1AMO	**7**	**358,050**	**368**	**165**
PHILIPPINES				
W7LPF/DU2	**A**	**589,836**	**953**	**199**
KP4KK/DU2	**7**	**245,468**	**367**	**114**
WESTERN SAMOA				
5W1BZ	**A**	**351,522**	**549**	**177**
SOUTH AMERICA				
BRAZIL				
ZW4OD	**A**	**2,058,360**	**1679**	**408**
ZZ4OD	"	**1,594,352**	**1323**	**397**
PY2OLK	"	**1,160,311**	**1065**	**353**
PY1BOA	"	755,016	815	326
PY2XIO	"	121,656	460	137
PY2XMA	"	11,055	81	67
PR8ZPJ/				
PT9	**21**	**311,558**	**578**	**246**
PY2ZTH	"	112,761	383	99
PY1MGH/4	"	63,648	208	104
ZX4BW	**14**	**886,330**	**980**	**305**
COLOMBIA				
HK4DKR	A	4,896	60	48
ECUADOR				
HD9E	21	3,544,416	2384	496
			(Op:K7CA)	
REPUBLIC OF ARGENTINA				
LU8DG	**28**	**1,827,660**	**1411**	**388**
LU2KAK	"	**247,406**	**413**	**206**
LU4DTJ	**21**	**209,056**	**380**	**188**
URUGUAY				
CX7BY	**21**	**905,545**	**1008**	**305**
VENEZUELA				
YV4BOU/2	**7**	**50,100**	**167**	**50**
YV10B	**3.5**	**4,176**	**31**	**24**

MULTI-OPERATOR SINGLE TRANSMITTER

NORTH AMERICA

UNITED STATES				
K3EST		**1,980,636**	**1389**	**438**
W7NI		**1,670,136**	**1450**	**404**
N5RM		**1,554,888**	**1438**	**444**
AA2Z		**1,182,099**	**1225**	**375**
W7ZR		1,180,719	1155	381
W3GG		976,954	994	367
K8RWL		**967,944**	**1092**	**372**
K8TE/5		507,058	787	302
K8US		**134,160**	**302**	**195**
CANADA				
VE1DXA		**2,286,744**	**1808**	**453**
VO1AW		**1,843,914**	**1614**	**382**
VE7FF		**916,584**	**1113**	**299**
VE2DZE		**906,270**	**1299**	**255**
ALT0/VY1		18,304	133	64

ASIA

4X4GV		**1,882,920**	**1723**	**390**
JA7YCQ		**682,374**	**845**	**294**
JA1YFG		623,283	593	373
JA5YKC		570,250	863	250
JA1YAD		316,800	531	240
JA4YFH		228,487	453	192

EUROPE

4N4Y		**3,831,300**	**2905**	**550**
HG0V		**2,684,475**	**2440**	**485**
SK4NI		**2,184,372**	**2284**	**423**
OK5TLG		**1,893,044**	**1876**	**426**
AN3AXA		**1,405,015**	**1631**	**333**
IA5LXW		**1,328,316**	**1500**	**347**
G4DSE		**1,321,008**	**1487**	**377**
HB9H		**1,308,656**	**1421**	**356**
SR9KRT		**737,502**	**1053**	**303**
DH3AA		**732,550**	**1100**	**322**
HA2KRZ		692,048	1076	296
HA5KFG		689,910	1007	290
HA5KHG		686,169	1067	319
OK3VSZ		648,945	1037	297
OK3EE		584,974	981	307
HA8KAZ		547,079	874	307
LZ2KSO		**540,855**	**915**	**303**
OZ9HBD		**446,285**	**760**	**281**
OK1KRQ		446,196	822	284
DK1WA/HB9		**426,750**	**770**	**256**
OK2KMR		401,210	737	265
HA6KVD		393,764	705	287
HA1KZZ		382,968	715	243
OZ1CYZ		375,240	702	265
OE2S/OE1WL		**357,886**	**636**	**265**
HA5KHC		313,740	605	249
HA6KVC		281,637	575	243
SK6MY		281,290	677	224
SP4PBI		280,035	595	245
HA5KAI		216,729	530	207
HA8KBS		190,000	484	203
OK1KDK		150,348	306	201
OK1KPZ		120,285	310	165
HA1KSL		115,116	331	181
OK3KKF		106,731	300	177
OK3KOR		105,210	318	167
OK3KYR		96,552	300	149
OK2KQO		86,821	281	157
OK2KET		81,840	300	165
SR7KTE		64,395	209	135
HA5KHE		51,171	232	111
YO6KNR		39,780	175	102
HA2KMG		39,100	183	115
SJ9WL		13,756	100	76
OK1KPU		10,878	50	37
OK1KYS		3,034	44	37
YU3DRM		2,990	50	26
OK1KCF		2,788	50	34
OK1KTW		1,350	32	25

U.S.S.R. CLUB STATIONS

ASIA				
UZ9A		**1,000,135**	**2983**	**511**
UK0QAA		**1,417,168**	**1534**	**368**
UK8MAA		**1,040,383**	**1125**	**323**
UN7CAC		**493,680**	**703**	**255**
UK8YAC		25,456	132	44
EUROPE				
UK2PCR		**3,071,356**	**2734**	**527**
UK2PAP		**3,004,212**	**2770**	**474**
R2B		**2,806,554**	**2875**	**474**
UK5MAF		**2,081,700**	**2103**	**450**
UK2BAS		**1,747,026**	**1778**	**426**
UK4HBB		**1,560,006**	**1819**	**378**
UK5AAH		811,566	1325	342
UK1NAD		**778,075**	**1299**	**365**
UK5OBE		705,006	1051	318
UK0AU		666,304	1137	309
UK2BCC		604,072	938	322
UK1ZAO		449,980	786	302
RK2AAB		**439,263**	**760**	**261**
UK5XAA		363,676	722	236
UK4WAB		312,914	620	217
UK2BAP		283,410	702	235
UK5UAZ		276,206	837	218
UK5QAA		156,222	300	198
UK4FAV		126,560	714	226
RK2AAP		70,493	297	157
UK5EDX		50,064	230	149
UK3XAM		13,289	158	97
UK5FAB		2,340	27	26

MULTI-OPERATOR MULTI-TRANSMITTER

WORLD-WIDE				
K3WW		**3,290,656**	**2177**	**526**
JA3YBF		**2,162,824**	**1816**	**424**
JA7YR		**1,430,408**	**1412**	**356**
JA2YEF		**1,405,719**	**1415**	**371**
JA1YXP		725,952	862	304
JA4YQO		439,250	719	250
SP6PAZ		116,065	381	167
YU1PKC		6,048	66	56

CHECK LOGS: The following were used for cross-checking. Thank you:
EA6FD, EC5AA, EZ8AA, EZ2BAB, EZ2BAC, HA2MD, HA8KBE, JA1SIN, JH7RJW, LA2KO, LA7A, LZ1IA, LZ1IF, LZ2BR, LZ2CC, N6IUW, OH2BSI, OH2BSS, OH9PH, OK1CU, OK1IAR, OK1MWN, OK2BSJ, OK2BSU, OK3MW, OZ1BII, OZ1EXZ, PA3AFL, PA9PHK, PABWAC, RK3ACR, RV3CX, RY5AO, RZ3AAO, RZ3AAU, RZ3AEM, RZ3AFO, RZ3AJU, RZ5UBI, RZ5UWB, SM5APS, SM5BDV,SM5CSS, SM5DAO, SM5RH, SM6AYN, SM7KTX, SP2BRZ, SP2FEU, SP5LGG, SP7DTP, SP7HOR, SP7HT, SP9CDA, SP9CKV, SP9UPA, SP9ZCZ, SR3AIJ, SR3XR, SR4AAZ, SR5LM, SR7EJS, SR8EMD, SR8NAA, SR8OSC, SR8WWH, SR9FZF, UA1NBD, UA1OBG, UA1TCO, UA3AGZ, UA3AMR, UA3DFV, UA3DGU, UA3DLM, UA3EAT, UA3ECJ, UA3PBY, UA3QHA, UA3QHH, UA3MO, UA3TAG, UA3TAM, UA3TCJ, UA3TDK, UA3TDL, UA3XBB, UA4ACA, UA4CM, UA4FCL, UA4FCZ, UA4FDE, UA4FUJ, UA4HAB, UA4HBP, UA4HLX, UA4WWF, UA4YBG, UA6AJG, UA6AUZ, UA6EAE, UA6XAE, UA9CLQ, UA9FDW, UA9HAU, UA9OBL, UA9NW, UA9OEX, UA9OGT, UA9UOC, UA9WDM, UA9WOR, UA9XS, UA9YCI, UA9YBB, UA9ZCM, UA9QCJ, UA9SBQ, UB5ABY, UB5OBE, UB5EES, UB5EF, UB5HI, UB5IBX, UB5IJK, UB5IJU, UB5JAY, UB5MDP, UB5UAU, UB5UBU, UB5UCE, UB5UCH, UB5UCR, UB5UGF, UB5VDB, UB5ZAB, UB5ZBG, UC2SJ, UC2SLT, UI8ADQ, UK1AAF, UK1NAF, UK2BAG, UK2BAT, UK2BBF, UK2FAJ, UK3ABF, UK3DCF, UK3TAN, UK5CAP, UK5MAG, UK2UBB, UK5UDX, UK5ZAC, UK6FAA, UK8FAA, UK9ACP, UL7DAZ, UL7PBY, UM8MBN, UO50DB, UP2BEB, UP2BGP, UP2BV, UQ2DCR, UQ2DAH, UQ2GBR, UQ2GDQ, UQ2GEE, UT5AAY, UT5CY, UV3FL, UV9DB, UW3DZ, UW3XH, UW6CV, UW6MF, UX2IO, UZ3TG, VK0DL, W3GGC, Y22DB, Y22TD, Y22YF, Y22ZL, YZ3BF, YZ3GB/A, YZ4EA, YZ7GL/A, YZ3IL, YZ4MF, YZ4TG, YZ5TO, YZ5XH, YZ6MH, YZ6XM, YZ7DL/A, YZ7KO, Y32YN, Y32WK, Y38XO, Y41ZM, Y43XL, Y47YM, Y53TA, Y53UA, Y53YF, Y57RH, Y57YL, Y59ZM, Y62XG, YU4WST, YV5AGS.

STATION OPERATORS

Multi-Operator, Single-Transmitter

AA2Z & AB2E. **AN3AXA**: EA7AIR, EA3BXE, EA3AVV, EC3AT. **G4DSE** & G3RZI, G4GXL, G8IUY. **HA1KSL**: Molnar, Pek. **HA1KZZ**: Nemeth, Czolpoiri, Bali, Keller, Nagy, Komdy. **HA2KMG**: Sviq, Bunyik. **HA2KRZ**: Sipos, Balogh, Raduly, Gaal, Simon, Lemon. **HA3KHC**: Nemeth, Szabolajos, Borstold, Kormendi. **HA5KAI**: Bocsik, Kovesdi. **HA5KFL**: Budai, Pekarik, Szollosi, Baranyi, Osztas, Kincses. **HA5KHE**: Szalai, Soos, Pinter, Benedek. **HA5KHG**: Szabadkay, Szabo, Hortobapyi, Krausz, Liptak, Metz. **HA5KKB**: Appel, Csukovics, Szesztay, Szilagyi. **HA6KVC**: Kiss, Vringender, Hammer. **HA6KVD**: Vas, Hankusz, Toth, Olah. **HA8KAZ**: Olasz, Csak, L., Csak, I., Szabo. **HB9H**: HB9LG, HB9BLQ, HB9CAT. **DA1WA/HB8** & DJ0LC, DJ9CB. **HG6V**: Simon, Suszter, Csepanyi, Vargar, Laki, Papp. **IA5LXW**: I5LXW, I5NSR. **JA1YAD**: JA7RHJ, JH7SJH. **JA1YFZ**: JG1CFO, 1I1OAE, JL1OLH, JI1JMH, JH1RCB. **JA3YKC**: Club. **JA4YFH**: JA4XKL, JH4BXA, JH4FMI, JH4DIT, JH4SQJ, JH4MVB. **JA7YCQ**: JI1FLB, JH7FZI, JH7QMG, JA9XBG, JF2OCZ, JH7IZS, JH7XUZ.JH9CZQ. **K3EST** & N3TR, WB3JIQ, WA3SGV. **K7FES** & W5VBO, N5MF. **K8US** & WB8YQJ. **K8RWL** & AK0A, K0VBU, KB0G, WB0LFY, KA0AQZ, WA0ZHY. **LZ2KSQ**: Kirilov, Stovanov. **N5RM** & N5BET, K5IU, N5AIL. **OE2SSCWL**: OE2VEL, OE5CWL. **OH3AA**: OH3KS, OH3XS, OH3TQ, OH3WS. **OK1KCF**: Club. **OK1KOK** Club. **OK1KPU**: Club. **OK1KPZ**: Club. **OK1KRG**: Club. **OK1KTW**: Club. **OK1KYS**: Club. **OK2KET**: Club. **OK2KMR**: Club. **OK3KEK**: OK3CGG, OK3CTL, OK3TKA, OK3CEE. **OK3KKF**: Club. **OK3KXR**: Club. **OK3KTR**: Club. **OK3VSZ**: OK3ZAF, OK3CRW, OK3-4158, OK3-26701, OK3-27270. **OK5TLG**: OK1MMN, OK1PFM, OK1FCW, OK1AMY. **OZ9HBO**: OZ9MQ, OZ9BI, OZ9TL, OZ1GAX, OZ1DOY, OZ1GBO, OZ1BUR, OZ1EUO, OZ2PG. **R2B**: UP2BAV, UP2BBF, UP2BAS, UP2BAW, UP2CPW, UP2PX, UP2-38-937, UP2-38-938, UP2-38-517. **RK2AAB**: UC2-009.453, Konopelko, Kazakevich. **RK2AAP**: Tracevski, Chernin. **RK3AAH**: UA3DHH, UA3AFS, UA3DNK, UA3-170-362. **SJ9WL**: SM6JCX, SM6CPO. **SK4NI**: SM4GLC, SM6EOI, SM6GMZ, SM7DLZ, SM6CJK. **SK6MY**: Club. **SP4PBI**: SP4JSP, SP-0027BK. **SR7KTE**: Club. **SR9KRT**: SP9FKQ, SP9HMF, SP9HNB, SR9EPY. **UK1NAD**: UN1CC, UA1NBO, UA1NBF. **UK1ZAO**: UA1ZV, UA1ZCZ, UA1ZBQ. **UK2BAP**: Vasiliauskas, Daunys, Kontenis, Kuchinskas. **UK2BAS**: UP2PAJ, UP2-38-948, UP2-38-898. **UK2BCC**: UP2BDW, UP2BHK, UP2-38-346, UP2-38-881, UP2-38-1630. **UK2PAP**: UP2BCI, UP2OX, UP2PAX, UP2-38-574. **UK2PCR**: UP2BBT, UP2BCT, UP2BFI, UP2BGV, UP2BBX, UP2BDF, UP2BFN, UP2PAV, UP2BCR, UP2BEY, UP2BGF, UP2BGW, UP2-38-728, UP2-38-1620. **UK3DAU**: UA3DKF, Ex. UD6DKT. **UK3XAM**: UA3XBY, UA3XCT. **UK4FAV**: UA4-148-391, UA4-148-273, UA4-148-407. **UK4HBB**: UA4HBW, UA4HAU, UA4HFG, UA4HFR, UA4HCW. **UK4WAB**: Gabitov, Klepanov, Saifullin. **UK5EDX**: Gudima, Grech, Stepanchenco. **UK5FAB**: Grishin, Zhabsky. **UK5IAZ**: Marenets, Polyakow, Mityukov. **UK5MAF**: UY5LK, UB5MNX, UB5MNM, UB5MDC, UB5MOA, RB5MUV. **UK5QAA**: UB5QFD, UB5QDU. **UK5QBE**: Club. **UK5XAA**: Giligur, Woznjuk, Andzijevsky. **UK7CAC**: UL7CBP, UL7VAJ, UL7CH. **UK8MAA**: UM8MMM, UM8MCY, UM8-36-124. **UK8YAC**: Sine Govskij, Malcev, Golovchenko. **UK8QAA**: UA8QBB, UA8QDL, UA8-98-74. **UZ9A**: UA9ACZ, UA9AEN, UA9AIS, UA9AJD,UA9AGR, UA9AKI, UW9BY, UA9-165-1288, UA9-165-930, UA9-165-1382, EZ9AAA. **VE1DXA**: VE1FH, VE1AWS, VE1UX, VE1AOX. **VE2DZE** & VE4QY, VE3KKB, VE7BBQ. **VE7FFI** &VE7CNY, VE7CMK. **VO1AW** & VO1HI, **AL7OVY1** & WD9FIR, WD5HKI, VY1AB, W3GG & WA3ZAS. **W7NI** & AG7M, K5MM. **W7ZR** & N7ZZ, W7ES. **YU2CCY**: Club. **YU3DRM**: Jbrvar,T. Brvar. **4N4Y**: Edib, Tomo, Ivo, Dubo, Goran, Ivek, Emil, Edin, Ilfan, Ferid, Miro. **4X4GV** & 4X4VL, 4Z4TI, 4Z4NUT, 4Z4NU, 4X6NBO, X/UB5.

Multi-Operator, Multi-Transmitter

K3WW & K3WJV, KB3GJ, AJ3G, KA3BLP, N2ATX. **JA1YXP**: JI1HGD, JR6NJD, JH4QLX, JK1BRV. **JA2YEF**: JA0VEX, JR2TPD, JR2PVI, JH2TBS, JF2ENY, JA9QNC, JF5THB, JR2VDA, JR2TWA, JE2ATB, JE2LDO, JE2RWP, JE2WBH, JE2RDI, JF2WMP, JE2KIH, JF3EIT, JF2NTV, JR2UWZ, JF2ACB, JE2KCR, JE2TUH, JH5FSN, JH4XKV, JE2FRT, JF2HKR. **JA3YBF**: JH3KIL, JR3VSW, JE3OPD, JF3ELY, JR3IOT, JE3KIV, JE3PED, JF3KZB, JF3NXN, JH4CES, JH5BIT, JA9TAF, JI3AEH, JA5XUU, JA9QPF. **JA4YQO**: JR2EVU, JE2NLF, JA4XGA, JH4HKM, JH4UAN, JR2SCJ, JA4QVM, JH4AQA, JH4LGI, JH4WAT, JR4CBJ, JR4LLT, JR4NEA, JA6WSB, JR6FXQ, JR4CLW, JR4MOQ, JA5POE, JH6CGU, JR6JMT, JR6JZT, JE6AJT, Nagayasu. **JA7YAA**: JG1IGW, JH7AEF, JH7UJN, JH7CUD, JH7GFO, JH7LIS, JG1UJD, JH7WTC, JR7OMD, JR7SEI, JH7HWR. **SP6PAZ**: SR6DVP, SP6HEK. **YU1PKC** & YU1FD.

SSB & C.W. CLUB COMPETITION

Fraser Valley DX Club (Canada)	**38,762,436**
Potomac Valley Radio Club	23,240,590
Lithuanian Contest Group (Lithuania)	21,082,791
Frankford Radio Club	20,791,936
Yankee Clipper Contest Club	16,534,004
Chelyabinsk Radio Club (USSR)	16,198,259
North Texas Contest Club	13,345,603
Kaunas Polytech. Int. Radio Club (Lith)	12,458,316
Northern California DX Club	10,915,531
Northern Lithuania DX Group (Lith)	9,997,842
YU DX Club (Yugoslavia)	7,129,828
Ontario Contest Club (Canada)	6,707,806
San Diego DX Club	5,503,335
Northern Ohio Amateur Radio Society	4,909,076
Club de CW de Minas Gerais (Brazil)	4,781,562
Moscow-City Radio Club (USSR)	4,442,250
Western Washington DX Club	4,167,044
Michigan DX Assn	4,112,186
Dayton Amateur Radio Assn	3,265,821
Kansas City DX Club	3,024,210
Southern California DX Club	2,902,710
III Wind Contest Club	2,774,433
Trondheim DX Club (Norway)	2,596,132
Minsk Radio Club (Byelorussia)	2,387,803
Halifax Amateur Radio Club (Canada)	2,326,859
Gloucester County ARC	2,130,652
Danish DX Group (Denmark)	1,795,560
Southeastern DX Club	1,456,224
SP DX Club (Poland)	1,398,378
Lynchburg Amateur Radio Club	1,138,378
North Florida Amateur Radio Society	1,121,270
North Florida DX Assn	1,021,483
Northern Ohio DX Assn	1,017,525
Willamette Valley DX Club	834,084
Alamo DX Amigos	764,094
DX Assn. of Connecticut	464,421
Toronto DX Club (Canada)	421,930
Noviomagnum DX Group (Holland)	225,104

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ISOPOLE 144
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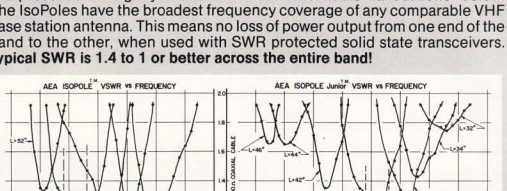
MAST NOT SUPPLIED

The IsoPole is building a strong reputation for quality in design and superior performance. The IsoPole's acceptance has already compelled another large antenna producer to make a major design modification to his most popular VHF Base Station antenna. Innovative IsoPole conical sleeve decouplers (pat. pend.) offer many **new** design advantages.

All IsoPole antennas yield the **maximum gain attainable** for their respective lengths and a zero degree angle of radiation. Exceptional decoupling results in simple tuning and a significant reduction in TVI potential. Cones offer greater efficiency over obsolete radials which radiate in the horizontal plane and present an unsightly bird's roost with an inevitable "fallout zone" below. The IsoPoles have the broadest frequency coverage of any comparable VHF base station antenna. This means no loss of power output from one end of the band to the other, when used with SWR protected solid state transceivers. **Typical SWR is 1.4 to 1 or better across the entire band!**



Outstanding mechanical design makes the IsoPole the only logical choice for a VHF base station antenna. A standard 50 Ohm SO-239 connector is recessed within the base sleeve (fully weather protected). With the IsoPole, you will not experience aggravating deviation in SWR with changes in weather. The impedance matching network is weather sealed and designed for maximum legal power. The insulating material offers superb strength and dielectric properties plus excellent long-term ultra-violet resistance. All mounting hardware is stainless steel. The decoupling cones and radiating elements are made of corrosion resistant aluminum alloys. The aerodynamic cones are the only appreciable wind load and are attached directly to the support (a standard TV mast which is **not supplied**)

Operating on MARS or CAP? The IsoPole and IsoPole Jr. antennas will typically operate at least ± 2 MHz outside the respective ham band without re-tuning. However, by simple length adjustment, the IsoPoles can be tuned over a wider range outside the ham bands.

Our competitors have reacted to the IsoPole, maybe you should too! Order your IsoPole or IsoPole Jr. today from your favorite Amateur Radio Distributor. For more information on other exciting AEA products, contact Advanced Electronic Applications, Inc., P.O. Box 2160, Lynnwood, WA 98036. Call 206/775-7373

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A loaf of bread, a jug of gas and a new rig to fill the airwaves. Romantic? Yes and no. Expensive? Yes and no. N3DF gives us a quick lesson in economics, history and money.

The Effect Of Inflation On Amateur Radio Equipment Prices

BY NEIL D. FRIEDMAN*, N3DF

One of the most popular subjects around now is the topic of money or the lack thereof. It is no longer a big secret that most of us feel the pinch now and again, and there is little attempt made in this generation to avoid speaking about one's financial position in front of non-family members. It's not that we're all being super honest for a change; it's simply that we're all basically in the same boat for a change. Not only has the price for our basic necessities risen tremendously, but as amateurs we've all seen through the years the price for our "toys" rise as well.

Nostalgia at this point would dictate a return to the good old days when life was simpler and prices were lower. A loaf of bread cost this much, a gallon of gas that much and a new Harvey Wells Bandmaster seemed *incredibly cheap by today's standards. The interesting word in the last sentence is "seemed." If we can put aside our daydream of yesteryear for a while and read what N3DF has to say, then we can view our "toys" in a different light. Incredibly, it just may be that we are in effect paying less and getting far more for our amateur radio dollar than in the good old days. As far as amateur radio equipment goes, we appear to be getting not only better gear each year, but we are also getting more than our money's worth.* —K2EEK

The many marvelous advances in amateur equipment since the end of World War II have been accompanied, unfortunately, by a long-term trend toward higher prices. The "thousand-dollar radio," unusual not too long ago, now sits atop almost every manufacturer's product line. While complete stations may still be purchased for much less than this benchmark figure, the cost of new equipment is generally higher now than in past decades and continues to rise.

But this does not mean that amateurs today receive less value for their money! Despite ever-increasing sophistication, amateur gear is no more "relatively" expensive now than in the past when considered in comparison with the rising cost of consumer goods in general. Equipment price increases are largely accounted for by the declining value of the dollar resulting from the inflation affecting the entire economy. Unlike the volt and the amp, the dollar is a measure that varies over time. If the equipment offerings of the past three decades are priced according to a dollar of unchanging value, we discover little or no "real" price growth.

This point is illustrated by example in the table "1980 Equivalent Prices Of Selected Amateur Equipment," which converts the list prices of selected gear manufactured from 1947 through 1973 into equivalent prices based on "1980 dollars." The first two columns state the equipment under consideration and a "sale year" in which the equipment was marketed. Equipment was selected to represent a variety of manufacturers. The sale year is often, but not always, the first year of manufacture.

The third column indicates the retail list price of the equipment during the sale year, rounded to the nearest dollar. In the case of transmitters and transceivers, the cost of a matching external power supply is included in this price if such is necessary for a.c. operation. Prices are for factory wired models with tubes, except for Heathkits. These figures were gathered from advertisements and product reviews in contemporaneous amateur publications. Note that discounting of list prices was not widespread before the early 1970's, when state "fair trade laws," which allowed manufacturers to prevent dealers from discounting

*6616 River Trail Court, Bethesda, MD 20034.

"1980 Value" Of One Dollar From 1947-1977

Year	Value
1947	$3.63
1948	3.37
1949	3.40
1950	3.37
1951	3.19
1952	3.05
1953	3.03
1954	3.01
1955	3.03
1956	2.98
1957	2.88
1958	2.80
1959	2.78
1960	2.74
1961	2.71
1962	2.68
1963	2.65
1964	2.61
1965	2.57
1966	2.50
1967	2.43
1968	2.33
1969	2.21
1970	2.09
1971	2.00
1972	1.94
1973	1.83
1974	1.66
1975	1.51
1976	1.42
1977	1.34

Source: Derived from "Purchasing Power of the Consumer Dollar" tables published by the U.S. Department of Labor.

1980 Equivalent Prices Of Selected Amateur Equipment

Item*	Sale Year	List Price	1980 Value of Sale Year Dollar	Equivalent 1980 Price
Receivers:				
Hammarlund Super-Pro	1947	$ 398	$ 3.63	$ 1,445
National HRO-50	1949	349	3.40	1,187
Collins 75A-3	1952	530	3.05	1,617
Hallicrafters SX-88	1954	595	3.01	1,791
National 300	1957	399	2.88	1,149
Hammarlund HQ-170	1959	359	2.78	998
Collins 75S-3	1961	620	2.71	1,680
Drake 2B	1963	280	2.65	742
Heathkit SB-300 (kit)	1963	265	2.65	702
Hallicrafters SX-146	1966	270	2.50	675
Drake R4B	1968	430	2.33	1,002
Yaesu FRdx-400	1970	360	2.09	752
Kenwood R599	1971	300	2.00	600
Swan 600R	1972	440	1.94	854
Drake R4C	1973	500	1.83	915
Transmitters:				
Collins 32V-1	1947	475	3.63	1,724
Hallicrafters HT-19	1948	360	3.37	1,213
Johnson Viking & VFO	1951	369	3.12	1,151
Hallicrafters HT-30	1954	350	3.01	1,054
Heathkit DX-100 (kit)	1957	190	2.88	547
Johnson Viking Valiant	1959	440	2.78	1,223
Collins 32S-1	1961	781	2.71	2,117
Hammarlund HX-50	1962	400	2.68	1,072
Heathkit SB-400 (kit)	1964	325	2.61	848
Hallicrafters HT-46	1966	350	2.50	875
Drake T4XB	1968	530	2.33	1,235
Yaesu FLdx 400	1970	300	2.09	627
Kenwood T599	1971	345	2.00	690
Swan 600T	1972	590	1.94	1,145
Drake T4XC	1973	630	1.83	1,153

list prices, were invalidated or revoked. Nevertheless, some dealers circumvented the fair trade laws by offering "extra-large" trade-in allowances.

The fourth column, "1980 value of sale year dollar," lists the amount of money (rounded to the nearest cent) needed in April 1980 to purchase "average" consumer goods that cost one dollar in the specified sale year. For example, one dollar in 1947 could buy about as much as $3.63 could purchase in 1980; one 1947 dollar is therefore said to be worth 3.63 1980 dollars. In effect, these figures index the declining value of the dollar.

These figures were derived, by use of a simple ratio, from the "Purchasing Power of the Consumer Dollar" tables published by the Bureau of Labor Statistics of the U.S. Department of Labor. The latter tables compare the purchasing power of one dollar in each year against a selected "standard" year, 1967. They are based on changes in the retail prices of a wide variety of consumer goods. By

Transceivers:

Collins KWM-1	1957	$ 956	$ 2.88	$ 2,753
Collins KWM-2	1959	1,210	2.78	3,364
Sideband Engineers SB-34	1962	390	2.68	1,045
Drake TR-3	1962	630	2.68	1,688
Swan 350	1964	480	2.61	1,253
Drake TR-4	1965	685	2.57	1,760
National NCX-5	1965	750	2.57	1,928
Galaxy V	1966	500	2.50	1,250
Yaesu FTdx-400	1968	600	2.33	1,398
Heathkit SB-101 (kit)	1968	420	2.33	979
National NCX-1000	1969	995	2.21	2,199
Yaesu FT-101	1971	500	2.00	1,000
Kenwood TS-520	1973	599	1.83	1,096
Drake TR4C	1973	700	1.83	1,281
Ten Tec Triton II	1973	694	1.83	1,270

VHF & Miscellaneous:

Simpson 260 multimeter	1947	38	3.63	138
Turner CX microphone	1948	16	3.37	54
Millen grid dip meter	1949	55	2.40	187
B & W low pass filter	1950	23	3.37	78
Gonset Communicator	1952	190	3.05	580
Weller S-500 soldering gun	1953	10	3.03	30
Johnson KW Matchbox	1955	125	3.03	379
Mosley TA-33 yagi	1957	100	2.88	288
Webster Bandspanner mobile antenna	1960	25	2.74	69
Hallicrafters TO keyer	1960	80	2.74	219
Clegg 99'er	1961	140	2.71	379
Collins 62S-1 VHF converter	1962	895	2.68	2,399
Clegg 22'er	1964	240	2.61	626
Superex AP-S headphones	1965	25	2.57	64
Henry 2K-4 amplifier	1966	675	2.50	1,688
Waters Codax keyer	1966	93	2.50	233
Drake TR-6	1968	700	2.33	1,631
Drake L4-B amplifier	1968	695	2.33	1,619
Robot 70 SSTV monitor	1970	569	2.09	1,189
Clegg 27B	1972	480	1.94	931

**Includes external power supply where necessary for a.c. operation. All equipment prices as factory wired and tested with tubes, except where indicated as "kit."*

April 1980, according to the Bureau, the value of the dollar (against the 1967 standard) had dropped to 41.2 cents.

The final column presents "equivalent 1980 prices" for each piece of equipment. They were established by multiplying each list price by the corresponding "1980 value of sale year dollar" figure. These "equivalent prices" allow us to directly compare the purchasing decisions we face today with those faced by amateurs in the past. For instance, the amateur who bought a Hammarlund "Super-Pro" receiver in 1947 spent $398, but in doing so he (or she) had to forgo the purchase of other goods that would cost about $1,145 today. Thus, the modern buyer of a $1,000 rig is actually giving up less in the way of alternative purchases of consumer items than the 1947 "Super-Pro" buyer.

The "equivalent 1980 price" figures clearly indicate that, when the general decline of the dollar is accounted for, amateur equipment is as good a value at today's prices as at any time in the past thirty years. Considering the technological advances incorporated into new equipment, amateur gear is actually a much better value today! Prices may have generally increased, but the villain is not the greater sophistication of new offerings or "greedy manufacturers"; it is the inflation that has beset every aspect of our economy.

You can determine the "1980 equivalent prices" of your own past purchases. Simply multiply your original purchase prices by the figures beside the appropriate sale years on the table "1980 Value Of One Dollar."

What of the future of equipment prices? Inflation has proven to be very erratic and difficult to predict. However, if we make the *very* speculative assumption that inflation will increase the price of radio equipment by ten percent every year for the next thirty years, then a one-thousand dollar rig in 1980 will have an "equivalent price" in the year 2010 of $17,449!

Here's an interesting, fairly easy to build VOX unit you can add to that CB rig you're about to convert to 10 meters.

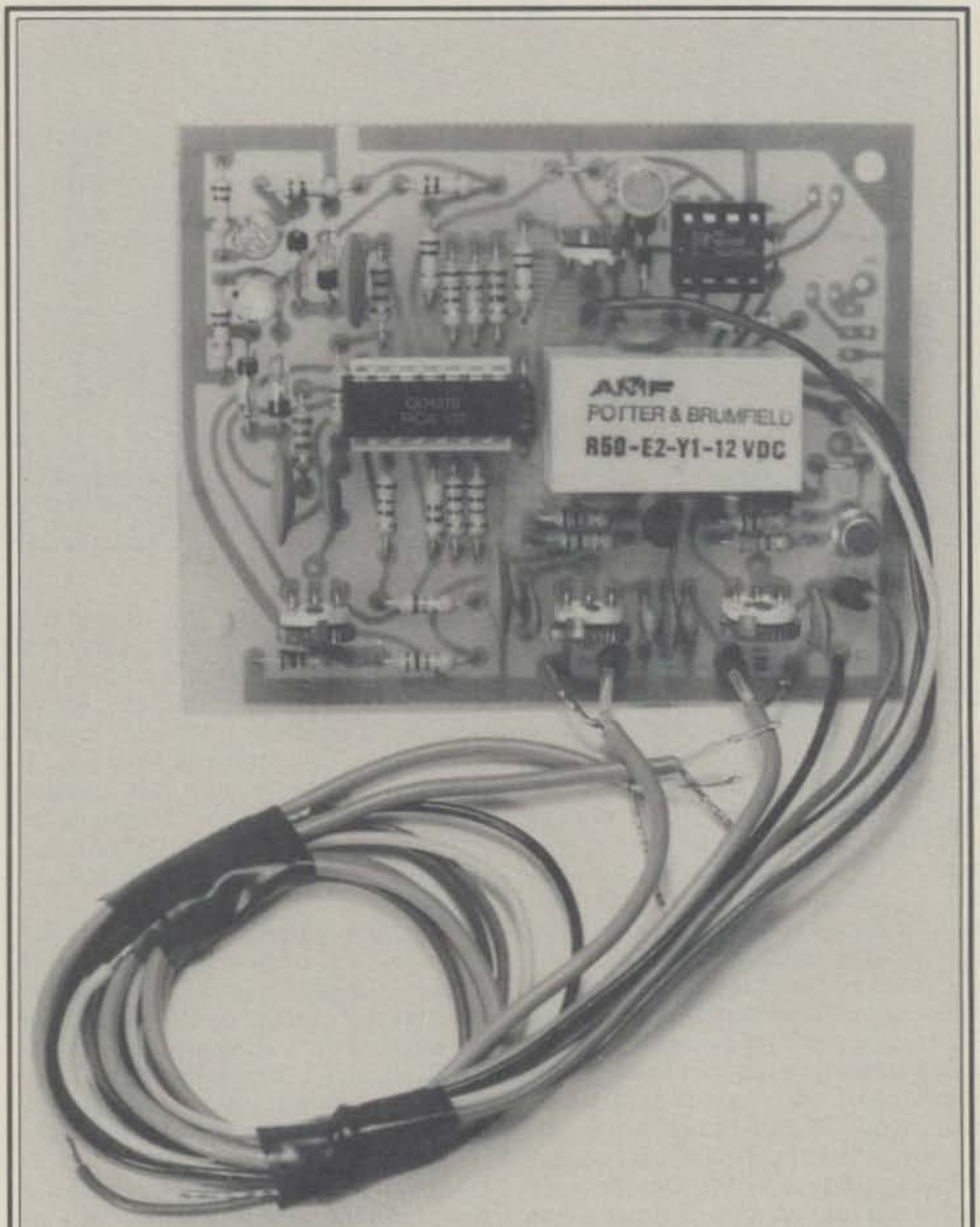
How To Build A Deluxe Solid-State Voice Operated Relay

BY LOU FRANKLIN*, K6NH

As the owner of several converted 10 meter CB sideband rigs, I found the absence of any built-in VOX feature somewhat disappointing. I've never quite understood the short-sightedness of CB manufacturers in this area; after all, CB has "borrowed" a lot of good ideas from the amateurs, so why not VOX for s.s.b. use? With this in mind, I proceeded to develop my own VOX accessory that could be easily retrofitted into any of my radios, and this article is the result of that effort.

The VOX circuit described here is compact, sophisticated, fully adjustable, and even contains an on-board relay for T/R switching. Since one of my CBs uses electronic T/R switching and the other has relay switching, I needed something flexible enough to interface with either type radio. This flexibility also makes it attractive for use with homebrew rigs or any other voice-controlled equipment; you could probably even find a way to connect it to your cassette recorder or telephone answering machine!

My design evolved from a VOX circuit originally described by N1RM in the 1979 edition of the *Radio Amateur's Handbook*. However, after building the prototype, it became evident that the basic circuit would be inadequate for my needs. The circuit described here represents a significant improvement over the original. Like the original design, this VOX is built around two very common ICs, with most parts available locally or through mail-order suppliers. I would like to thank my good friend Gary Waldeck, WB7CLP, for his invaluable assistance in working out all of the bugs in the original circuit.



The completed VOX module is built on a 2½" × 3" PC board. Predrilled boards are available from the author. See the note at the end of the article.

*P.O. Box 31500, Phoenix, AZ 85046

The Basic Challenge

All VOX circuits start with the same idea: Two audio input signals, one from a microphone and one from the radio's speaker, are compared, and the net result determines whether or not a T/R changeover will occur. The big question is whether this occurs from just the mike input (i.e., the operator's voice), or whether speaker sounds picked up by the mike can trip the switch. The ideal is of course switching due only to the operator speaking directly into the mike. The ability to reject speaker sounds by the mike input is called the **anti-VOX** function, and this is often the true test of a good VOX design. Also desirable is the ability to adjust the mike and anti-VOX input sensitivities, as well as the delay drop-out time of the switch. All these functions are electrically related and will depend upon the individual operator's usual speech patterns and radio volume settings. This circuit provides for adjustment of all these parameters in the form of miniature trimmer pots with rotating thumbwheels. In addition, a choice of transistor or relay switching outputs is built in and selected by a jumper wire on the circuit board. Thus, the operator can tailor the actual T/R switching arrangement to suit his particular radio.

Circuit Description

Refer to the block diagram and schematic (figs. 1 and 2). Operation can be summarized as follows: The mike input is amplified by U1-A and U1-B, producing a (+) d.c. voltage proportional to the input level. Similarly, the anti-vox speaker input is amplified by U1-C and produces a (−) d.c. voltage proportional to its input level. These two voltages are then compared in U1-D, and the net sum, (+) or (−), determines whether the output of U1-D will switch. The output of U1-D, Pin 4, is normally high; when the appropriate input level change is sensed, it goes low, which starts the timing cycle of U2. The output of U2 drives switching transistor Q2 and the relay.

Since the VOX mike input is wired in parallel with the radio's mike line, I found it desirable to isolate the two, and that is the function of Q1, an FET configured as a simple Source follower. The input impedance for matching purposes is roughly equal to the Gate resistor; thus, a Gate resistor of about 10K works quite well with typical low-impedance dynamic mikes. For high-impedance mikes, the builder can simply substitute a large Gate resistor of about 1M.

Sections U1-A, U1-B, and U1-C of the LM3900 IC are wired as typical audio

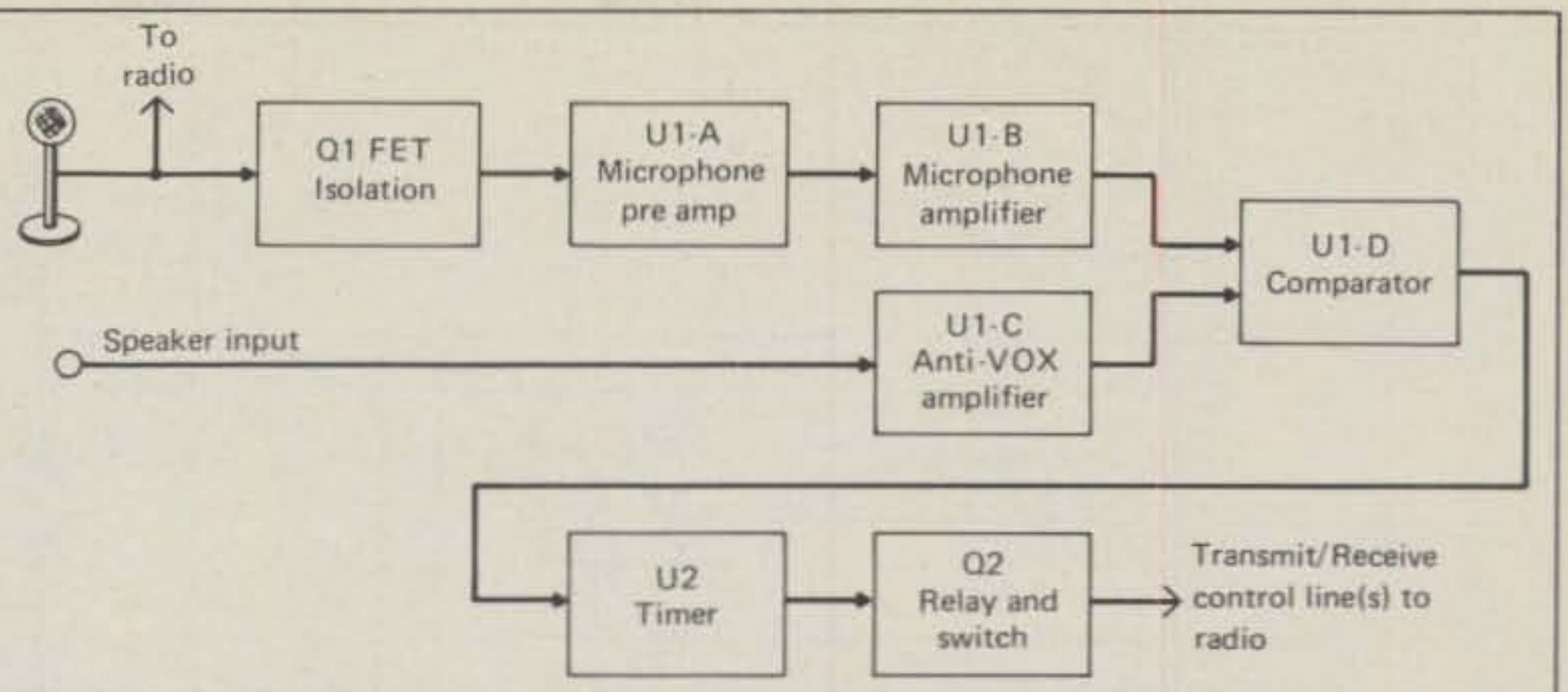


Fig. 1- Block diagram of the voice operated relay (VOX) described in the text.

amplifiers. As with all op-amps, stage gain is basically the ratio of the feedback resistance to the input resistance. The builder can easily experiment with the various stage gains as required to suit special circumstances, such as the use of a high-output mike, etc. Note, however, that the gain of the anti-VOX amplifier, U1-C, has purposely been kept relatively low; since typical solid-state transceivers already have about 2-4 watts of audio output, little gain is needed. All the parts values shown in fig. 2 were chosen by trial-and-error, and I believe they represent a very good overall compromise.

The amplified audio signals are converted to d.c. voltages by D1-D4, applied to slightly differing R-C timing circuits, and eventually enter comparator U1-D. Note also that a small forward bias is applied to both diode pairs rather than simply grounding them. This was necessary to ensure that enough positive voltage would always appear at the **VOX-antiVOX** summing point to trip the comparator; otherwise it is quite possible that the speaker input will develop enough negative-going voltage to keep the comparator from ever switching.

The comparator is the real heart of the circuit. A small reference voltage is applied to both inverting and non-inverting inputs, but the non-inverting input is made adjustable with a fourth trimpot, called **Trip Sens**. Originally fixed voltage-divider bias was used here, but this proved too inflexible and tricky to adjust under a wide range of operating conditions. In addition, a small amount of positive feedback has been included between Pins 2 and 4. The effect of this is to broaden the comparator's switching points slightly, allowing some tolerance before a hard switching decision is made. The net result is to prevent the relay from chattering or switching back and forth randomly.

The high-to-low transition of U1 Pin 4 triggers the 555 timer. Use of this handy IC insures a definite, repeatable timing cycle, which is a big improvement over older VOX designs that relied on capacitor-discharge circuits to control the relay dropout delay. I've also added diode D6 to the original design to prevent the timer from timing out prematurely. Without it, there would still be occasional relay dropout while speaking.

A jumper was included to completely eliminate the relay in case it's not needed. For rigs with relay T/R switching, all that's required is the transistor switch, Q2; its Collector provides a low pull-down point for energizing typical relay keylines during transmit. However for CBs or other rigs with electronic T/R switching, the relay is required to provide a means to open the speaker and mute it during transmit. Q3 is another switch option.

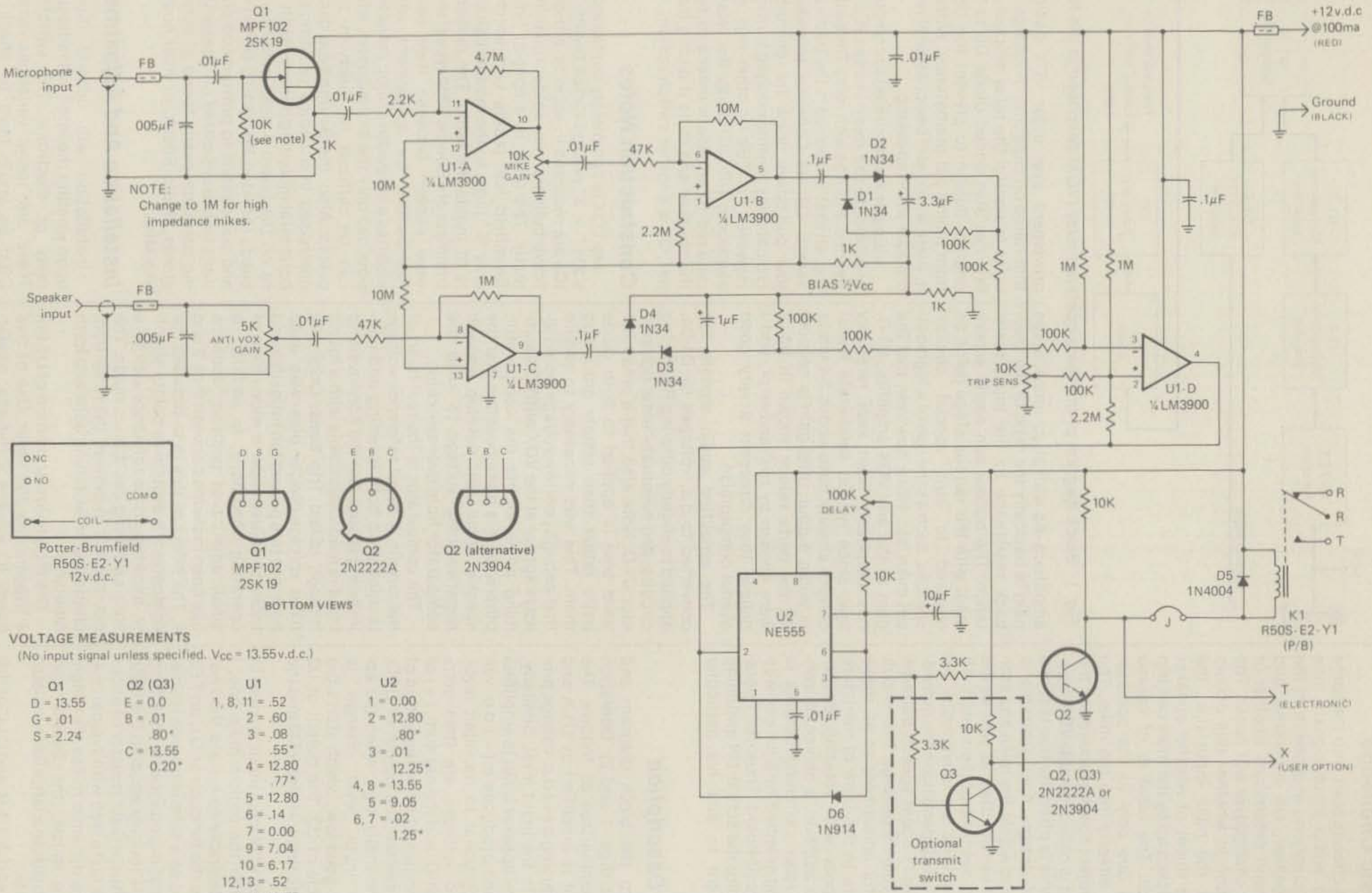
Construction Notes

My VOX is completely contained on a 2½" × 3" printed circuit board. The ICs are mounted in sockets, although brave builders may solder them in directly. The relay is a special Potter-Brumfield low profile unit which is only ½" high, so the module can easily fit inside the radio. The miniature trimmers are Bourns 3352 types; these were chosen because they use a thumbwheel for adjustment which also has a screwdriver slot; many trimpots use only the slot adjuster, which can be difficult to reach in tight places. Also, the Bourns type can be purchased in a choice of vertical or horizontal mounting options; both will fit on the board. I used small ferrite beads (Amidon FB-73-101) on the d.c. and audio leads to prevent complications from transmitted r.f. The remaining parts are easily found at surplus stores, Radio Shack, or mail houses like MHz.

Installation And Adjustment

Installation will depend mostly upon whether the intended radio uses relay or electronic T/R switching. There are many variations among CBs, so you'll have to check the radio's schematic. Relay-switched

Fig. 2- Schematic diagram of the VOX unit. All resistors are ¼ watt, 5% composition. All capacitors are 25 - volt minimum.

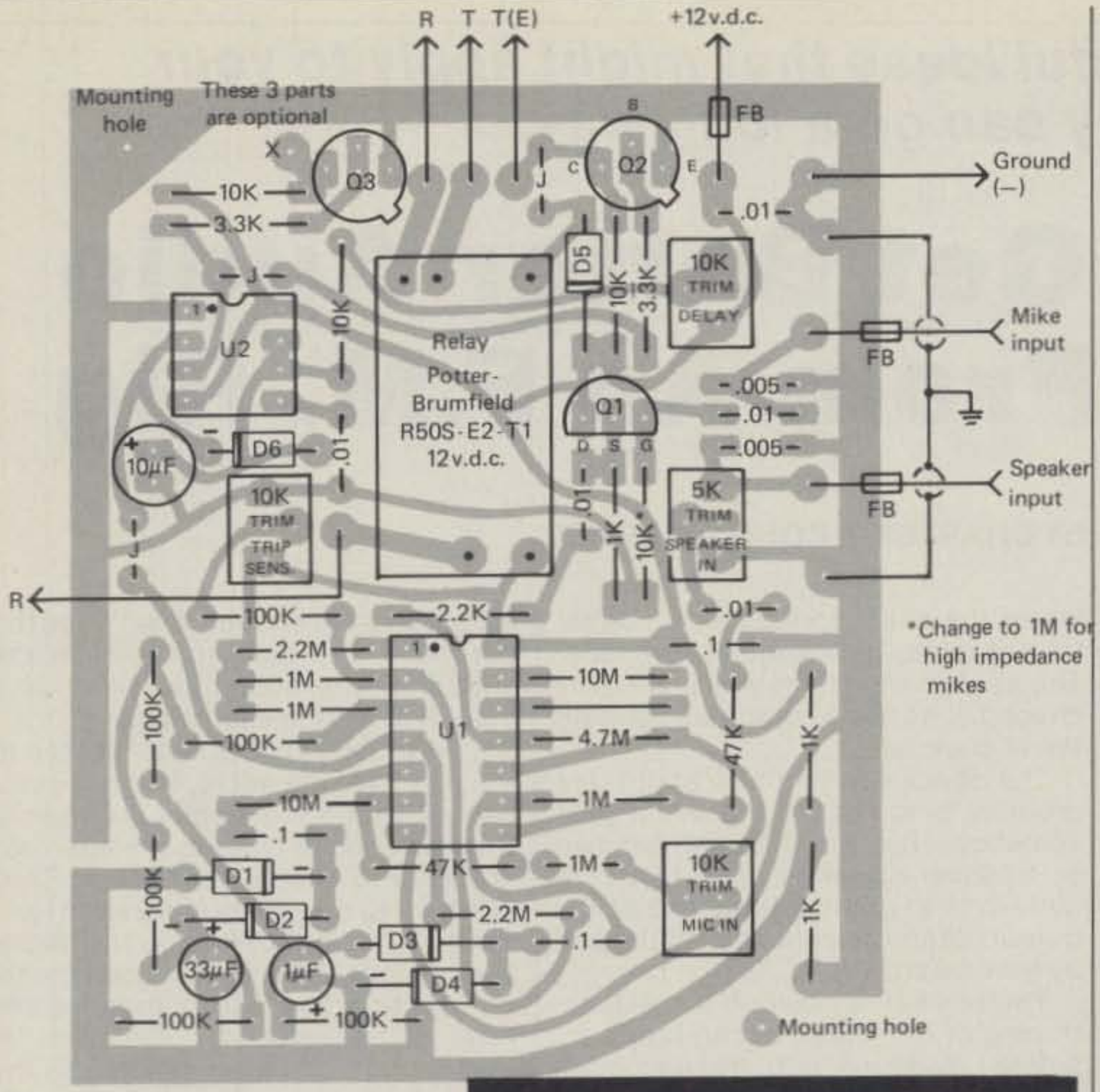


VOLTAGE MEASUREMENTS

(No input signal unless specified. V_{cc} = 13.55v.d.c.)

Q1	Q2 (Q3)	U1	U2
D = 13.55	E = 0.0	1, 8, 11 = .52	1 = 0.00
G = .01	B = .01	2 = .60	2 = 12.80
S = 2.24	.80*	3 = .08	.80*
	C = 13.55	.55*	3 = .01
	0.20*	4 = 12.80	12.25*
		.77*	4, 8 = 13.55
		5 = 12.80	5 = 9.05
		6 = .14	6, 7 = .02
		7 = 0.00	1.25*
		9 = 7.04	
		10 = 6.17	
		12,13 = .52	
		14 = 13.55	

* = VOX activated (i.e., Transmit)



NOTE:
All holes are .032" except:
Wires, cable shields = .052"
Center of cables = .040"
Relay holes (5) = .052"
Trimmer pots may vary;
smaller in-line pots are = .032"
Larger center lead-offset types = .052"

Fig. 4– Parts placement for the PC board.

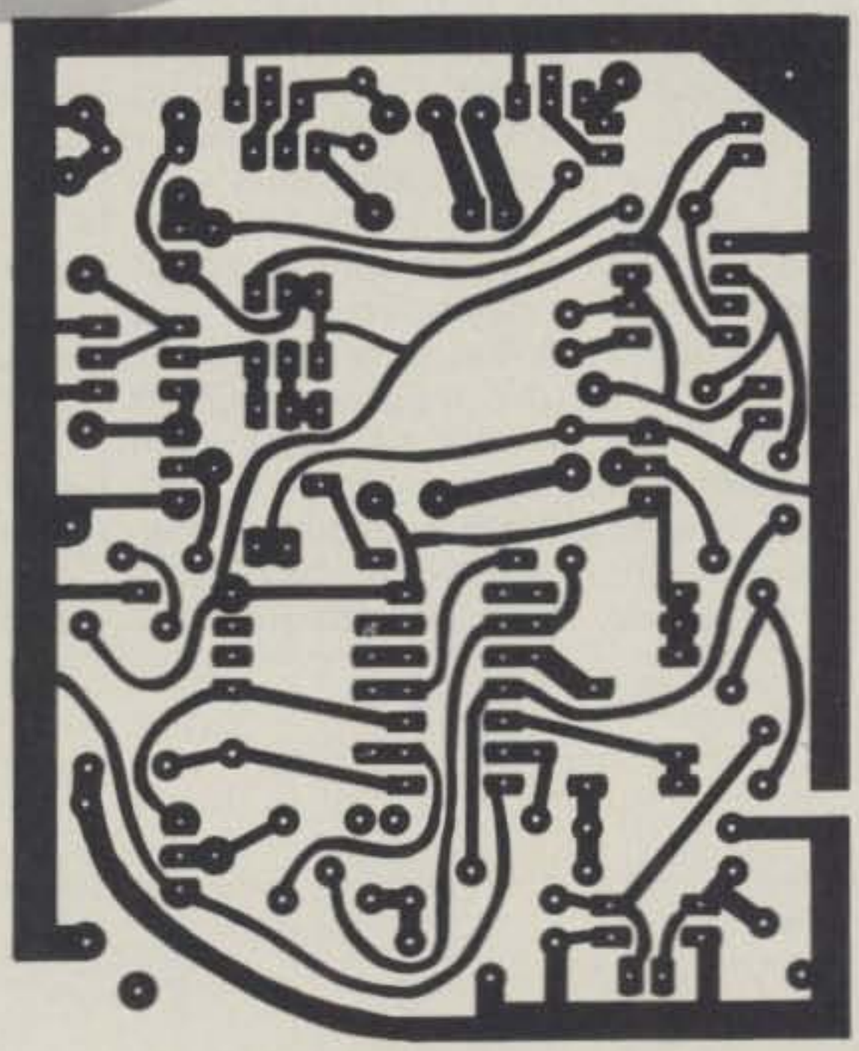


Fig. 3– Full sized foil pattern for the VOX unit.

rigs are the simplest to connect, since all that's required is to parallel the transmit keyline with the Collector of Q2. For electronic switching, you may want to ignore connecting the VOX's shield braids and use only the center conductors; otherwise, you may establish a permanent rather than switched ground which will prevent the speaker from muting during transmit and result in feedback squeal. Finally, most CB mikes have an open audio line that closes only when the PTT button is pressed; you'll have to jumper around it so that mike audio can reach the VOX input.

Adjustment consists of first finding the trigger threshold that will trip the relay with no signal inputs, using the 10K **Trip Sens** trimpot. It is then backed off slightly, and the **Mike Gain, Anti-VOX Gain,** and **Delay** are adjusted to suit the operator's personal preference. Speaker volume should be made slightly louder than normal during the adjustment. All four trimmers will interact with each other slightly, so the adjustment may need to be repeated until the ideal operating settings are determined.

NOTE: A ready-to-use PC board, plus theory, construction, and installation details are available from the author for $12 postpaid.

Here are some helpful ideas that might apply to your rig. A little ingenuity can go a long way.

How To Get Better Audio Quality From An F.M. Rig

BY CHARLES E. COHN*, WB9SKX

When I put my "new" 2-meter f.m. rig into service a while ago, it was immediately evident that it needed some work. (The rig is a Model 3880 manufactured by Yaesu and marketed by Sears a couple of years ago, which I obtained at an attractive closeout price.) The problem was audio quality—I got many on-the-air complaints of unintelligible, distorted audio.

I dealt with the problem by putting the rig on the bench and focusing my attention on the speech amplifier, whose circuit is shown in fig. 1. As can be seen from the schematic, this consists of a two-transistor audio amplifier, a diode clipper, and a one-transistor amplifier following the clipper. The output of the circuit goes directly to the varactor-diode modulator.

I connected an oscilloscope to the speech-amplifier output, a dummy load to the antenna connector, and a battery eliminator to the power input. I keyed the mike, spoke in my normal tone of voice, and looked at the scope. The speech waveform was so heavily clipped, it was no wonder I was getting those complaints.

The obvious thing to do about this problem is to reduce the audio gain somehow. But how? There are two screwdriver-adjust gain pots in the circuit—one at the input and one at the output. Which one should I adjust and by how much?

The answer is obvious if the functioning of the circuit is carefully considered. To begin with, the maximum audio level is controlled by the clipper. The output pot VR202 controls what proportion of this maximum level is fed to the modulator, and thus controls the maximum deviation. Obviously, proper adjustment of this pot would require a deviation meter. Not having one, I left it strictly alone.

In contrast, the input pot VR201 controls the amount of audio gain preceding the clipper, and thus controls how heavily the speech is clipped. This, then, is the one which needed adjusting. Such adjustment helped, but was not enough. Even when the pot was turned down to minimum, the gain was still enough to produce a high degree of speech clipping.

This problem could be attributed to the way I use the microphone. I have a naturally loud voice and I like to hold the microphone close to my lips. I did not want to change that usage. Talking at other than my normal voice level would be a strain. Holding the microphone close to the lips is recommended practice because it reduces the level of background noise that the microphone picks up relative to the level of the voice. Therefore, it made most sense to adapt the rig to me, rather than having to adapt myself to the rig.

Thus I had to reduce the audio gain still further, which I did by putting a resistor in series with the microphone input, as shown in fig. 1. I connected a substitution box, talked into the microphone while looking at the scope, and selected that value of resistance at which only occasional peaks were clipped. This came to 33K. I soldered a suitable resistor between the input

*445 Ridge Ave., Clarendon Hills, Illinois 60514

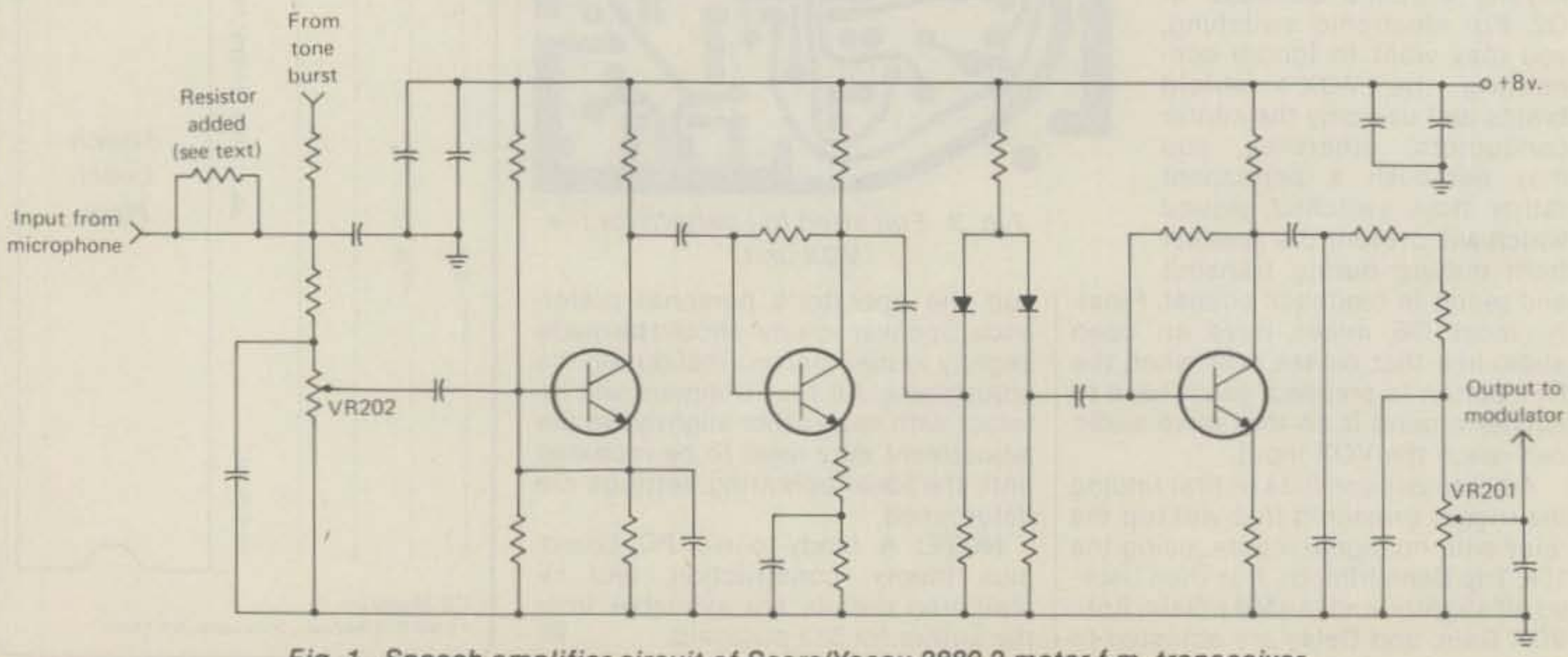


Fig. 1- Speech amplifier circuit of Sears/Yaesu 3880 2-meter f.m. transceiver.

CQ SHOWCASE

Azden PCS-3000 2-meter Transceiver

The Azden PCS-3000 2-meter microcomputer f.m. transceiver covers 142.000 to 149.995 MHz, has eight memory channels, band scan with programmable limits, discriminator-controlled scan stop, provision for three non-standard offsets (CAP and Air Force MARS splits are built in), a green LED frequency display, built-in PL tone oscillator, and a backlighted keyboard. When first turned on the unit emits a burst of tone, and each keyboard entry is accompanied by this same musical tone. The discriminator-controlled scan sensor allows the unit to scan in steps of 5 kHz without stopping too soon, eliminating frequency correction operations.

The PCS-3000 comes with a mobile mounting bracket and all hardware, power cord with fuse and spare fuse, microphone, and touch-tone microphone kit. Optional accessories include a 15 ft. cable for remote head operation, 6-amp ac power supply, and external speaker. For more information, contact Amateur-Wholesale Electronics, Inc., 8817 S.W. 129 Terrace, Miami, FL 33176, or circle number 101 on the reader service coupon.

Simpson Model 467 DMM

The Model 467 hand-portable DMM is a combination of digital and analog LCD displays to analyze both steady and pulsating signals, plus differential "+" and "−" peak-holding capability and fast pulse detection and indication. In the differential peak mode, the Model 467 can make percent modulation and signal tracing measurements. In the pulse detection mode, it can give visual and/or audible indication of pulse presence and logic states.

Other standard features include 26 a.c./d.c. voltage, current and resistance ranges, true RMS a.c. voltage and current measurements, 0.1% basic d.c. volt accuracy, continuity detection with both visible and audible indications, high-energy double fusing protection, high-voltage transient protection, and overload capabilities. The Model 467 comes in either a blue or black case and sells for $239. For more information, contact Simpson Electric Co., 853 Dundee Ave., Elgin, IL 60120, or circle number 105 on the reader service coupon.

Ten-Tec Antenna Tuners

Two antenna tuners feature 2-inch, 47-tap toroids with silver-plated 18 gauge wire and tap selectors. Used in a wide-range "T" network with variable capacitors, the toroids permit vernier tuning for easy, accurate adjustment. The tuners match dipoles, inverted Vees, long random wires, windoms, beams, rhombics, mobile whips, Zepps, Hertz, and similar antenna types over a frequency range of 1.8 to 30 MHz. A front panel 5-position antenna selector switch offers a choice of dummy load, one of three different antennas, or tuner by-pass for one of the antennas. Also, one antenna may be a long-wire type.

Model 228 has a built-in s.w.r. bridge, forward/reverse switch, sensitivity control, and a meter that indicates ratios between 1:1 and 5:1. Model 227 is identical but without the s.w.r. bridge. Model 228 is $95; Model 227 $79. For more information, contact Ten-Tec, Inc., Highway 411 East, Sevierville, TN 37862, or circle number 106 on the reader service coupon.

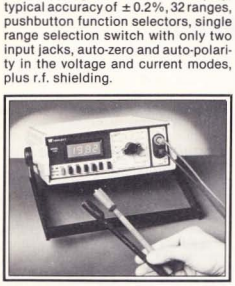
Centurion Replacement Products

Batteries have been added to Centurion's line of replacement products for hand-held radios, pagers, and other electronics equipment. The battery packs and single cells are available in nickel-cadmium, alkaline, and mercury types for exact long-life replacements for original batteries in radios and pagers. Models are available to fit all major and most other brands of communications equipment, including hard-to-find snap-on battery packs for Motorola MX, RCA Tac-Tec, Repco, and GE PE Series.

Centurion nickel-cadmium batteries are provided with a one-year date-coded warranty from date of shipment. For more information, contact Centurion International, P.O. Box 82846, Lincoln, NE 68501, or circle number 103 on the reader service coupon.

Triplett 4200 Digital Multimeter

TheModel 4200 Digital Multimeter features true RMS conversion for improved measurement of complex ac signals. It computes the true mean-square level of a complex ac signal and gives an equivalent dc output level for accurate measurements. The unit features fuse overload protection to 1000 volts on all ranges, an easy-view 3½-digit .43" LED display, typical accuracy of ± 0.2%, 32 ranges, pushbutton function selectors, single range selection switch with only two input jacks, auto-zero and auto-polarity in the voltage and current modes, plus r.f. shielding.



Included in the price of $270 are safety test leads, combo carrying handle/bench stand, line cord, and instruction manual. Optional accessories include high voltage probes, miniature clip leads, 30 amp dc current shunt, clamp-on ac ammeter, and carrying case. For more information, contact Triplett Corp., One Triplett Drive, Bluffton, OH 45817, or circle number 102 on the reader service coupon.

Universal Coax-Seal

Coax-Seal is a pliable, plastic material which is wound over coax fittings of any size or shape and then hand-molded, giving a long-lasting, flexible waterproof and dustproof seal. This material stays flexible at temperatures from −25°F to 350°F. Coax-Seal maintains its sealing qualities regardless of movement of the coax. It also adheres to poly-vinyl or vinyl outer coax jackets. It allows quick decoupling of a coax fitting and also the resealing of the fitting using the same material. Application is by hand.

Coax-Seal comes in rolls 60 inches long, 1/8-inch thick, and ½-inch wide on backing paper. For more information, contact Universal Electronics, Inc., 1280 Aida Drive, Reynoldsburg, OH 43068, or circle number 104 on the reader service coupon.

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

Antennas

DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

A Look At The Longwire (Part I)

We've pretty much "run the gamut" of wire antennas. We have looked at dipoles of most every description, Zepps, Windoms, tuned-feeder types, and more. So, far we've touched only lightly on the longwire— and for good reason. It's a very confused and confusing area of antenna lore, but one that we should be able to straighten out without too much difficulty.

We can't possibly cover *all* the different types of longwires—that's book-length material. But we can highlight singlewire and randomwire antennas, center- and unsymmetrically-fed longwires, and long end-fed Zepps. Next month we'll point out how longwires can be used on the v.h.f. and u.h.f. bands, and we'll review some important feed considerations.

Let's turn first to the terminology of longwires and related antennas.

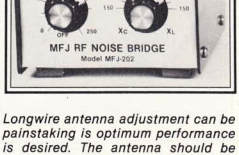
Longwire Lingo

First, a *true longwire* is a wire antenna at least several wavelengths long, supported on each end. The longer the antenna, the greater the directionality and gain. This type of antenna is frequently confused with *singlewire* and *randomwire* types. A wire antenna doesn't qualify as a longwire unless it is, in fact, **long** in terms of the operating wavelength. At 80 meters, for example, we're talking in terms of flattop lengths of about 750 feet or more (three wavelengths).

So, then, what is a **singlewire**? This is a direct-fed antenna, in which the return circuit for the system is the earth. We're really describing the *method of feed* when we cite the singlewire, but, in effect, with this kind of antenna, the transmission line and antenna are as one. A singlewire may be a longwire, *too,* if it's really long, but all longwires aren't necessarily singlewires, since many are fed with parallel-conductor feeders or even coax, if routed through a matching device such as a balun.

The **randomwire** is just what the name implies. It's an *antenna of chance*, usually of singlewire construction, of any convenient length and driven by the transmitter or fed through an antenna coupler or matching circuit. It, too, may be a longwire, but *only* if it's in fact long.

While these terms are used so interchangeably as to create new synonyms, mixing them up makes it more difficult to understand the basic distinctions between these antenna types.



Longwire antenna adjustment can be painstaking is optimum performance is desired. The antenna should be trimmed carefully to resonance and the feedpoint impedance checked for a good match to the transmission line. The r.f. noise bridge facilitates making antenna adjustments of the kind that s.w.r. bridges only indirectly measure. The MFJ instrument pictured allows measurement of resonant frequencies, radiation resistance, and reactances. Working over the range 1 to 100 MHz, the device enables one to determine whether to lengthen or shorten the antenna for minimum s.w.r. (Photo courtesy MFJ Enterprises, Inc.)

Popular Longwire Types

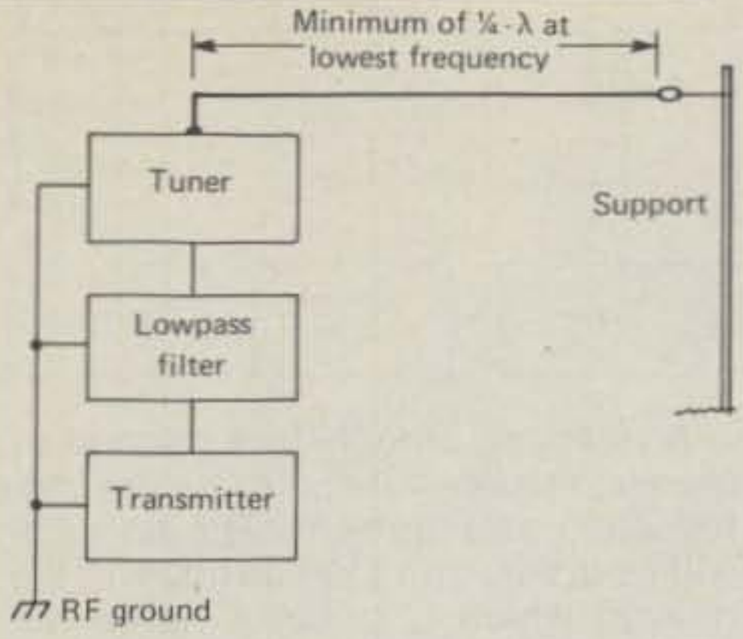
When we speak of the longwire family, we are concerned mainly with four types: (1) long antennas of chance, such as the randomwire and singlewire; (2) centerfed longwires, essentially extra-long dipoles; (3) unsymmetrically fed longwires, sometimes called off-centerfed Hertzes; and (4) end-fed types, closely related to the classic Zepp antennas of airship fame.

All four types are capable of yielding substantial gains over the basic dipole, especially when very long. A 3-wavelength longwire will show slightly less than 2.5 dB gain on the major lobes. A 6-wavelength flattop shows 5 dB gain, and a 15-wavelength longwire exhibits 10 dB gain. Generally speaking, maximum radiation occurs about 45° off the wire's axis. As the antenna is made longer, the greater the number of horizontal lobes and the more directional the antenna becomes off the ends. The radiation pattern of the centerfed longwire is symmetrical, but off-centerfed and longwire types are more directional in the direction of the long leg. Radiation angle depends on the antenna height above ground; it will be lower (favorable for DX) for antennas that are high with respect to wavelength.

Let's look at each of the four main types in turn.

Long antennas of chance. We are speaking here of two antennas that are as old as the hills: the singlewire and randomwire types, shown in fig. 1. Though feeding and matching are sometimes tricky, they often work amazingly well. Almost anything has been used as antennas, including rain gutters, metal windowsill frames, wires strung from ceilings, bedsprings—you name it. Often these antennas are erected when there is no

*317 Poplar Drive, Millbrook, Alabama 36054



Singlewires and randomwires are birds of a feather, though they are not exactly synonymous. Both are considered to be antennas of chance, since their fed-against-ground, often causual constructions may make feeding and matching difficult and tricky.

One of the easiest antennas to set up is the direct-fed randomwire, which is of any convenient length and connected directly to the transmitter's or transmatch's output terminal. The length of wire used should be a minimum of one-quarter wavelength at the lowest frequency band to be used.

Loading will be best when the total wire length isn't really random, but is instead an odd multiple of a quarter-wavelength on the favorite band to be used. This allows the antenna to present a low impedance to the tuner.

As with all single-wire fed antennas, the ground system plays a very important part and if inadequate can cause substantial signal loss.

Fig. 1- Chance-fed antenna configurations.

hope of stringing a precisely measured and accurately fed flattop, such as in some landlord-restricted apartments, condominiums, and in vacation and portable work. The basic rule of thumb is, if you can get your transmitter to load, with or without the use of a transmatch, try it if it's the only way to get on the air.

Perhaps the easiest antenna to install is the *randomwire*, which can be of any convenient length depending on the space available. Called a direct-fed antenna, the flattop and feedline are as one, being connected directly to the output terminal of the transmitter or antenna coupler. The problem here is that it's hard to predict what the impedance will be at the transmitter. This will vary for each band, and on some bands awkward impedances will be presented which may make loading difficult even when using a transmatch. With a wide-range tuner, it will probably be possible for the antenna to be loaded up on all bands unless the antenna is very short, say less than about 1/8-wavelength. This would make about 32 feet the shortest wire that should be used if all-band (80–10 meter) operation is planned. Shorter lengths, in addition to being hard to load, will likely be poor performers. Generally speaking, it's preferable to bend the antenna to use a full-length flattop.

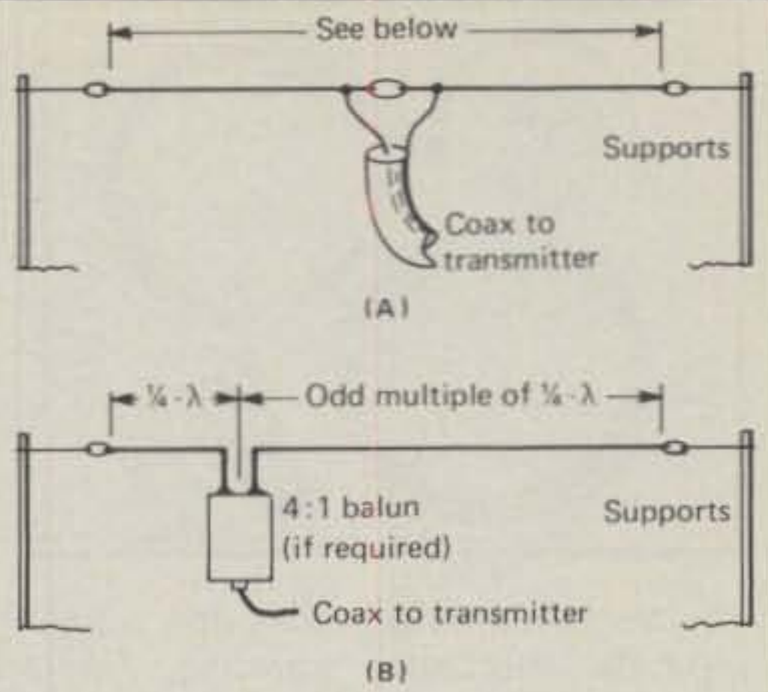
The randomwire should be erected as high and as free from obstructions such as telephone and power wires as possible. It should be supported by two poles, or by a pole and a tree, and isolated from the supports by means of insulators. The antenna itself is usually made of No. 12 or 14 copper wire. The feeder portion (not a true transmission line) should be of heavy insulated wire, and it should not come in contact with the house or antenna supports. Flexible plastic tubing can be slipped over the wire where it passes through walls or windows.

Amateurs who have landlord problems report good results using very fine wire, No. 30 or even smaller. Very small-diameter wire is practically invisible when strung high in the air. Small buttons or even rubber bands have been used for supports and insulators.

While many randomwire enthusiasts follow the old maxim that the more wire in the air, the better, certain lengths will give more consistent results, reducing the element of chance. The antenna can be cut for a ½- or ¼-wavelangth at the lowest frequency to be used, either 67 or 135 feet for 80–10 meters. You can minimize "r.f. in the shack" problems by having a current loop occur on your favorite band or bands at the transmitter end. Thus, a ¼-wave wire length or *odd* multiple thereof would be desirable from this standpoint. This would work out to about 65 feet on 80 or 33 feet on 40, or odd multiples of these lengths.

A good r.f. ground system is important, lest a good deal of power be lost via the ground path. Some experimentation with the ground will almost certainly be required. Try using cold water pipes that are known to be earth-grounded, outdoor ground rods, buried radials, indoor counterpoises (¼-wavelength sections of insulated wire), and various combinations of these grounds. The ground run length will modify the antenna's effective length and impedance characteristics.

Centerfed longwires. In an earlier column, we described the basic centerfed dipole and several variations,



(A) Long centerfed, single-band dipoles are good candidates for direct coax feed. And, it turns out that an antenna length of 112 feet is a good compromise dimension for work on both 10 and 15 meters. For all-band work, 135-foot flattops are popular, though the antenna will not behave as a true longwire on those bands where its legs are even multiples of quarter wavelengths; feedpoint impedance will be high on those bands.

(B) Connecting the feeder ¼-wavelength in from one end allows low-impedance feed; the long end can be any odd multiple of a quarter wavelength. Direct coaxial feed is possible if operation is limited to a single band and if the antenna isn't terribly long in terms of wavelength. Extremely long antennas of this type will exhibit somewhat higher feed impedance and require parallel-conductor feedline or the use of a balun transformer.

Fig. 2- Centerfed and unsymmetrically-fed longwire antennas.

including the extended double Zepp and multiband versions. We'll piggyback on these in covering longwires.

We're partial to the centerfed antenna; it's just a neater overall system, in my book. A low impedance feedpoint can be had by making each leg an *odd* multiple of a quarter wavelength. This, for example, allows the ordinary 40-meter dipole to be fed easily with low-impedance coax on 15 meters, though the antenna only minimally qualifies as a longwire.

For single-band work, a centerfed longwire is a good candidate for direct coax feed, though some tweaking using an antenna noise bridge or s.w.r. meter may be necessary to get the antenna exactly resonant. An antenna length of 112 feet (56 feet on a leg) is popular for dual-band 10/15 meter

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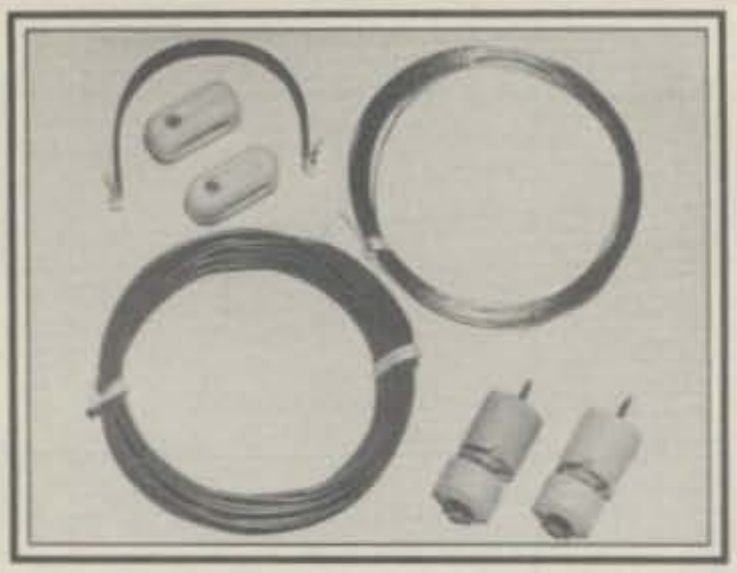


The basic building blocks of a receiving-type shortwave antenna. Radio Shack kit is complete and includes 75 feet of stranded copper antenna wire, 50 feet of insulated singlewire leadin, an insulated window feedthrough with Fahnestock-type clips, standoff insulators, and instructions. Such an antenna would not be suitable for transmitting except in very low-power (QRP) applications. (Photo courtesy Radio Shack)

work. The antenna works out to be a 2½-wavelength skyhook on 15 and a 3½-wavelength radiator on 10 meters, with a symmetrical radiation pattern strongest about 45 degrees off the wire axis.

For all-band work, a flattop of 135 feet works well. And a 67-foot length should give good results on 40 through 10, if fed with an open-wire line as described in an earlier column. However, the antenna will not strictly act as a longwire on those bands where its legs are even multiples of quarter wavelengths, and feedpoint impedance will be high. Thus, some of the advantages of center feed melt away where the antenna is operated in the multiband mode. Unsymmetrically- and end-fed versions hold much promise, however.

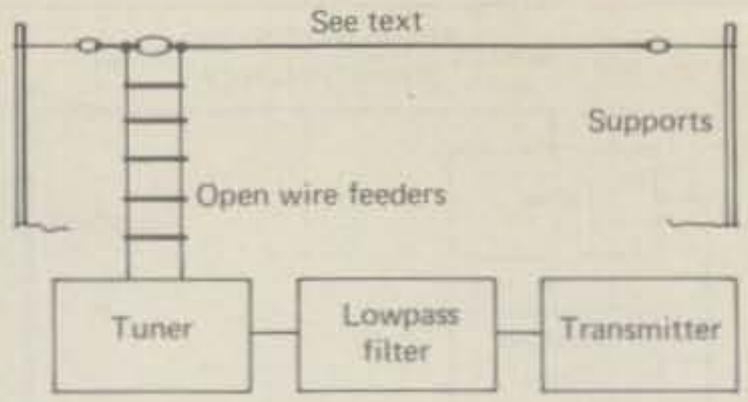
Unsymmetrically-fed longwires. The longwire antenna can be conveniently fed at a low impedance point. This means connecting the feeder a quarter wavelength in from one end. The long end can be any desired odd multiple of a quarter wavelength. For antennas not terribly long with respect to wavelength, it's possible to directly feed the antenna with coaxial cable, though the feedpoint impedance will be somewhat higher than the usual 70–75 ohms. For longer antennas, a 4:1 balun can be used at the antenna to effect an impedance transformation to yield a satisfactory match to coax. Alternately, the antenna can be fed with open-wire line.

This type of longwire is an essentially single-band affair. However, if you can erect the antenna so as to be able to easily get to it to make adjustments, it may be worthwhile to design it for multiband operation. This can be done by segmenting the antenna and using fixed insulators and alligator clips to clip-in the required quarter-wave sections on the short side, and the longer sections on the long side. Though a pain to adjust each time when changing bands, the antenna has some advantages: it's preset to frequency on each band, the patterns are predictable, and it can be fed with coax through a balun.

Fig. 2 shows typical centerfed and unsymmetrically-fed longwires.

End-fed versions. Probably the best all-around way to achieve true longwire operation on all bands is to use the end-fed Zepp, in which a single flattop is fed at one end by open-wire line. The antenna will work well on all bands down to the one at which the antenna is but a half-wavelength long. Any convenient line length can be used if a wide-range transmatch is employed at the transmitter end.

As with all end-fed antennas, the system—though convenient—usually suffers from considerable antenna current on the line, feeder unbalance and line radiation, with resultant antenna pattern distortion. The Zepp's normal radiation pattern will change as the wire is made longer relative to wavelength, though maximum radiation will still occur at about 45 degrees off the ends of the wire. Radiation angle will be lower as the antenna height is increased, in common with other horizontal antennas. High mounting provides a low vertical angle for DX work.



A relatively trouble-free method of feeding the longwire is to use the end-fed Zepp arrangement. The antenna will work well on all bands down to the one on which it is but a half-wavelength. Although the antenna is cut in most cases for some multiple of the wavelength of the lowest band to be used, any length of wire can be used. Best results are attained using low-loss open-wire feeders routed through a wide-range transmatch.

Fig. 3– A method of end-feeding the longwire antenna.

Fig. 3 shows end-fed longwire configurations.

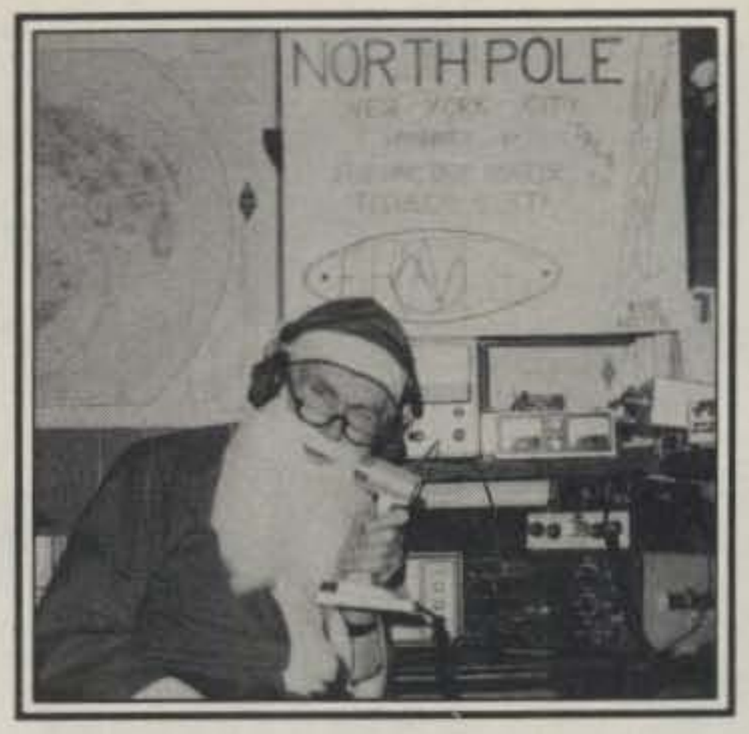
So far, we have dwelled on the three most common h.f. longwire configurations. There are many others, more complicated types that allow modification of the directivity pattern and increased gain. These sophisticated types include parallel longwires, multiple longwire Vee beams, resonant and nonresonant rhombics, and very *long* longwires. Space doesn't allow us to cover these now.

(To be continued)

A balun provides smooth electrical transition between the unbalanced mode of coaxial cable and the balanced mode of the antenna. Without the balun, this change is abrupt and pattern-distorting and TVI-inducing currents can be set up on the outside of the coax. The balun shown here is a 1:1 model; a 4:1 impedance-transforming balun is often used to feed the longwire with coax. (Photo courtesy Unadilla/Reyco)

Murch high-power antenna tuner is of the classic "ultimate transmatch" design pioneered by ARRL staffer Lew McCoy. It is particularly suited to loading up longwires fed with parallel-conductor (open-wire) transmission line, and it contains a built-in three-core balun. The unit will also accommodate other antennas, such as ordinary dipoles, randomwires, verticals, whips, and beams. (Photo courtesy Murch Electronics)

Henry, WB2YFK, holds the HT while one of the little ones listens to Santa. (Photo courtesy N2BXW.)



Here's Santa, Frank, N2BAF, at his North Pole (?) headquarters as he spoke with the children at the hospital.

Part of the fun and reward of amateur radio is in bringing happiness to those less fortunate than ourselves.

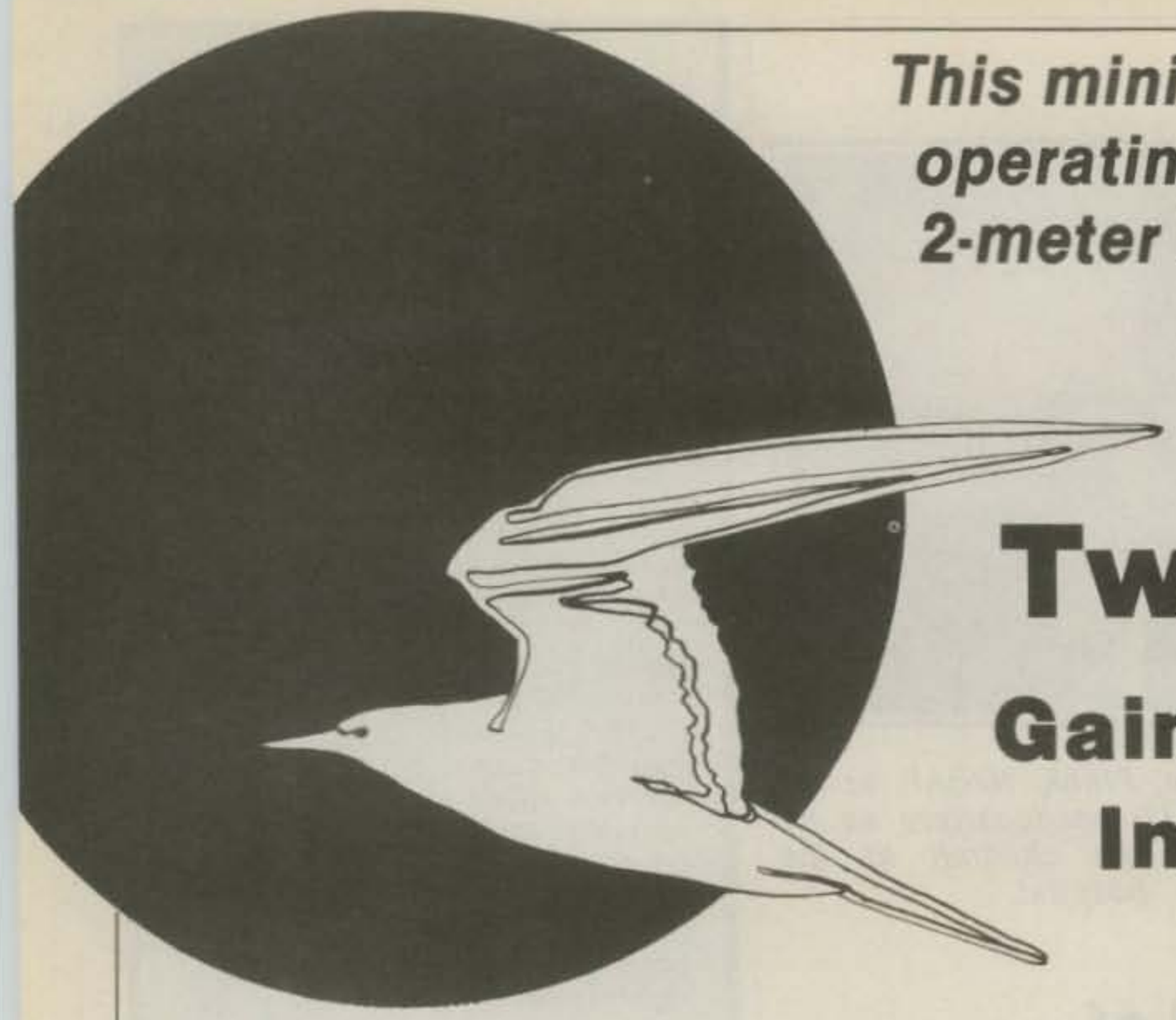
From Amateur Radio With Love

BY FRANK WALDECKER*, N2BAF

Making use of amateur radio to bring some joy and happiness to hospitalized children at Christmas time is a very rewarding and satisfying project for any public-service-minded radio club. Early in December of last year the members of the Bronx Amateur Radio Society (B.A.R.S.) set up their 2 meter rigs at Saint Mary's Hospital For Children in the Bayside section of New York City and got a big 5-9 thrill out of letting the little ones chat with Santa Claus. Henry, WB2YFK, with his HT introduced each child to Santa (way up there at the North Pole) via a simplex frequency, and the kids chatted away at great length with not only the Big Fella himself, but also with Mrs. Claus and some of the Elves!

Retired TV announcer N2BAF was the voice of Santa, and his XYL doubled as Mrs. S and the Elves! Other club members involved were Ira, AJ2Z, and Bob, WB2JOB. Mark, N2BXW, photographed the proceedings for the Club's Activities Album. Future projects along the same lines may bring the Easter Bunny, or some Halloween spooks, to some hospitalized children. The Club members call it "From Amateur Radio With Love!"

**108-25 72 Ave., Forest Hills, N.Y. 11375.*



This mini DXpedition finds W1CDC operating from Montserrat, where 2-meter FM is becoming a popular form of communication.

Two Meter FM

Gaining In Popularity In The Caribbean

BY ALEX M. KASEVICH*, W1CDC/VP2MM

Those of you who might be considering a mini DXpedition to some sunny tropical island in the Caribbean should take a two meter handheld or small transceiver along with your other equipment. It certainly will enhance your stay, and it is a great way to meet the local amateurs. Here is a list of the frequencies and locations of island repeaters now in operation.

146.31/.91 St. Croix
146.28/.88 St. Thomas
146.13/.73 Tortola
146.16/.76 St. Maarten
146.31/.91 Barbados
146.34/.94 Trinidad
146.07/.67 Puerto Rico
146.19/.79 Puerto Rico
146.25/.85 Puerto Rico
146.34/.94 Antigua

There are, of course, many islands that do not have repeaters. However, with the greater range a v.h.f. signal has over open water, you may be able to use a repeater on a nearby island, or the local activity on 146.52/.52 simplex might catch your interest.

Many of the local amateurs on these islands have added this popular mode to their low band capability, enabling them to have a very dependable means of local communication between islands during and after impending emergencies.

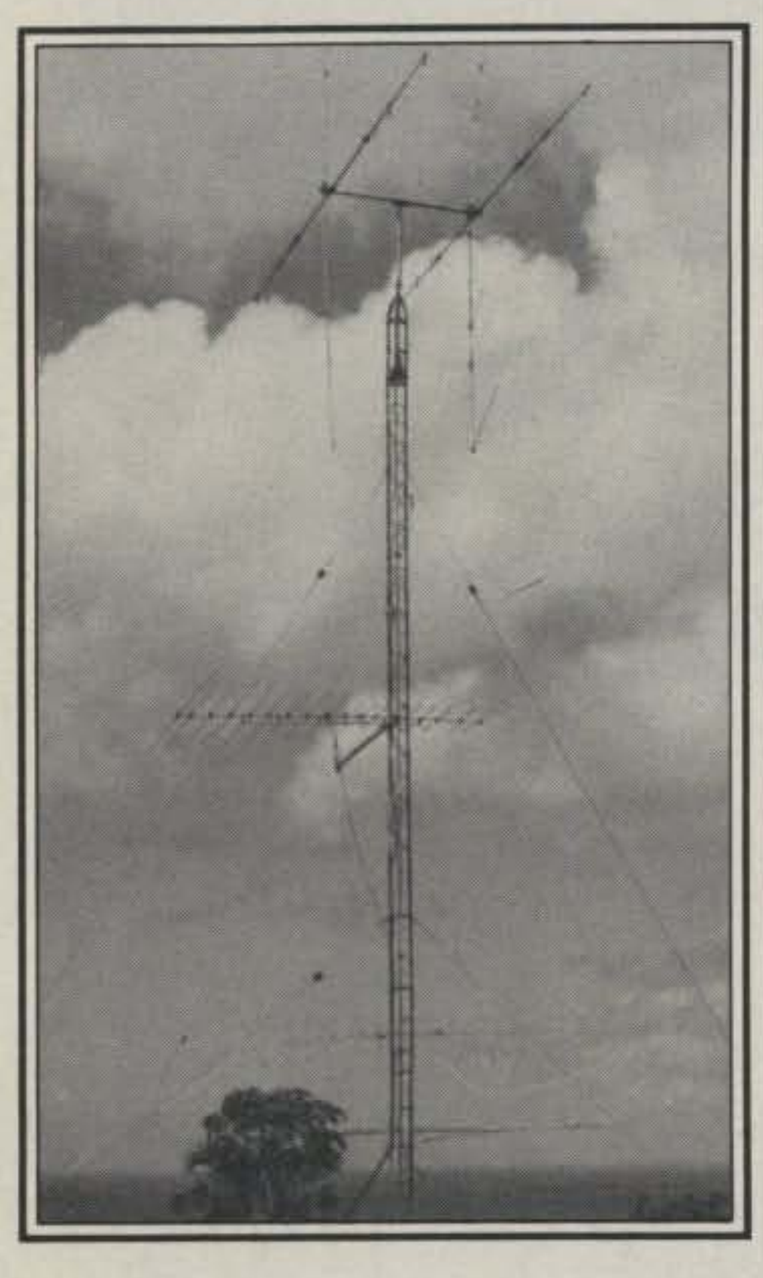
So don't forget to include a two meter radio on the list of equipment when making your plans to go on a Caribbean mini DXpedition. When traveling outside the U.S.A., be certain to take care of any prearrangements that may be required to obtain a reciprocal license; this should be taken care of in advance before your departure. Have fun!

Errol Martin, VP2MO, (right) and Vernon Buffonge, VP2MV, spare a few moments during a busy day to exchange some ham talk in front of the local post office. Errol is President and Vernon is the Executive member in the Montserrat Amateur Radio Society. They have extended much of their time and effort to make the local people and government officials aware of the importance of amateur radio during impending emergencies.

Here Tom Walton, VP2MGT, takes some time off from his studies at the university to enjoy small talk and lunch among friends on Spanish Pt. When he has the time to get on the radio, you might catch him on c.w. Tom's station consists of a TS-120 and 2-element tribander.

**43 Dover Road, Manchester, CT 06040.*

The month of August found me, W1CDC, again activating my VP2MM station. Arriving on the island just two days before hurricane Allen I was minus my baggage which somehow got mixed up in Miami. I had my FT-301 which I carried with me, and the ac power supply, 2-meter transceiver, and other equipment was packed with the baggage. Errol, VP2MO, made his station available for me to use, but very little operating took place outside of local nets and hurricane emergency activities. When the baggage finally arrived later in the week, everything was rain soaked; what a disappointment. However, after drying and cleaning all the equipment, everything seemed to perform satisfactorily. Inspite of all the problems, VP2MM made over 4,600 contacts mainly using c.w. on 15, 40, and 80 meters.



"An ideal DX location." Errol, VP2MO, has little difficulty cracking a pileup to snare a rare one. I think his antenna and location have something to do with it. His thunderstix is a 2 element triband quad on a 60 foot tower situated high above the Caribbean.

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The Printed Word: new reading material

Educational Systems and Instruments Catalog. A free, full-color, 40-page catalog describing educational programs and test instruments for schools, industry, government, and self-instruction is available from the Heath Company. Detailed is course information on 17 complete self-instruction and group instruction college-level programs in electronics, microprocessors, automotive, and computer programming. Also featured are product descriptions and specs on more than 40 available test instruments. For more information, contact Heath Company, Dept. 350-370, Benton Harbor, MI 49022, or circle number 115 on the reader service coupon.

The Linear Amplifier Planbook. Published by A.P. Systems, *The Linear Amplifier Planbook* covers topics such as complementary symmetry amplifiers, low-distortion s.s.b. driver designs, linear amplifiers for mobile operation, a two-stage 1 kw solid state linear amplifier, an a.m. aircraft transmitter power amplifier using low-cost plastic transistors, a simplified approach to v.h.f. power amplifier design, and much more. The text is fully illustrated with photographs, diagrams, and component layout illustrations. Cost of the 92-page soft-cover book is $11.95. For more information, contact A.P. Systems, P.O. Box 263, Newport, RI 02840, or circle number 116 on the reader service card.

Instruments for Testing and Design. Featured in Global Specialties' catalog is their full line of benchtop instrumentation, frequency counters, logic probes, and solderless breadboards. Full product descriptions and instrument specification are given. Several new products are introduced, including a benchtop frequency standard, benchtop case, and the "Idea Box," an innovative approach to the prototype circuit design problem. For a copy of the catalog, contact Global Specialties Corp., 70 Fulton Terrace, New Haven, CT 06509, or circle number 118 on the reader service coupon.

Sounds of Shortwave. The 60-minute cassette Sounds of Shortwave features dozens of off-the-air sounds—facsimile, teletype, multiplex, jamming, interval signals, spy transmissions, slow-scan TV, telemetry, time signals, and more. Side two helps the listener select the best shortwave receiver, design an effective antenna, choose accessories, and get the most out of listening. The tape is priced at $5.95 postpaid, and is available from Grove Enterprises, Inc., Route 1, Box 156W, Brasstown, NC 28902, or for more information, circle number 112 on the reader service card.

a monthly feature by
IRWIN MATH, WA2NDM

Math's Notes

A LOOK AT THE TECHNICAL SIDE OF THINGS

When using CMOS type circuits, many, if not all, of the normal TTL logic functions can be implemented at extremely low power drain. There are other uses of these devices, however, that take advantage of their low input current requirements, and some of these uses are the topic for this month.

If you were to take a simple CMOS inverter, as shown in fig. 1, and slowly raise its input voltage, you would find that at some particular point the inverter would switch from high to low. This is, of course, normal. If you do the same experiment with a 100K resistor in series with the inverter, however, the results are still the same. This is because the extremely low input current requirements virtually ignore the high resistance.

Using this same technique, look at fig. 2. Here we have connected two inverters in series with an RC circuit between them. The waveshapes are shown in the figure and the results are a simple delay circuit. Simply adding a diode across the resistor results in the waveshapes of fig. 3. You will see that the diode eliminates the delay function in one direction only by rapidly charging or discharging the capacitor so you can make a pulse "stretcher" or pulse reducer. Finally, by using small values of R and C, an efficient "bounce eliminator" can be added to any CMOS circuit as shown in fig. 4. The capacitor must charge before the inverter switches.

Referring to fig. 5, we have expanded our CMOS circuitry with an inverter as well as a NAND gate. As you can see, the application of a high has no effect. The removal of the high, however, produces an output pulse that is located at the fall time, and is as long as the RC time constant allows. If you now rearrange the components as shown in fig. 6, then the pulse will occur at the beginning of the input.

By using RC circuits in this manner, all sorts of circuit responses can be achieved with CMOS elements. In many cases, these simple components can enable functions to be achieved that would normally require more involved circuitry. Since CMOS is low power, all of these circuits are suitable for use for battery operation, and voltages of up to 15 volts can be used on most chips.

In conclusion, keep in mind that many of the new "complex" circuits such as counters, timers, electronic thermometers, etc., use CMOS cir-

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

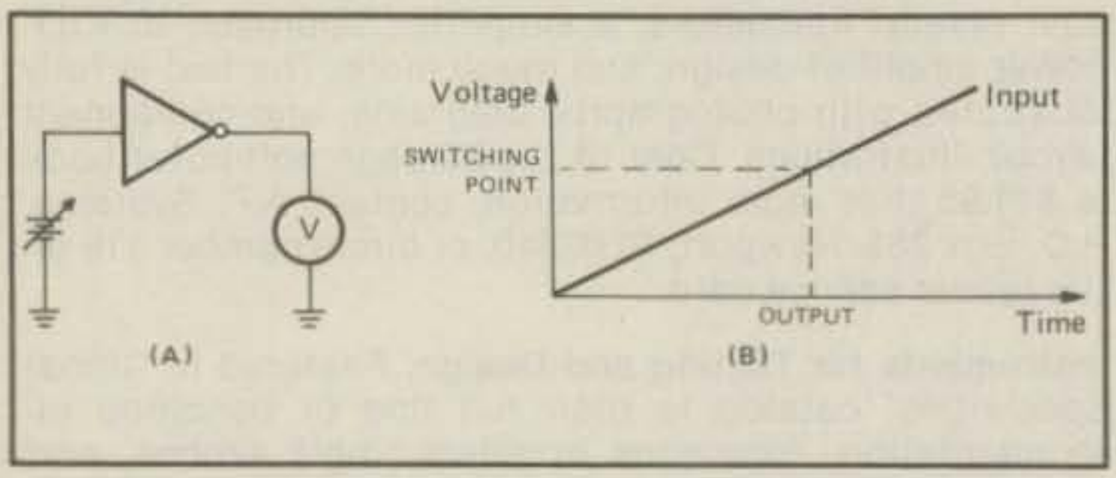


Fig. 1– Simple inverter switching characteristics.

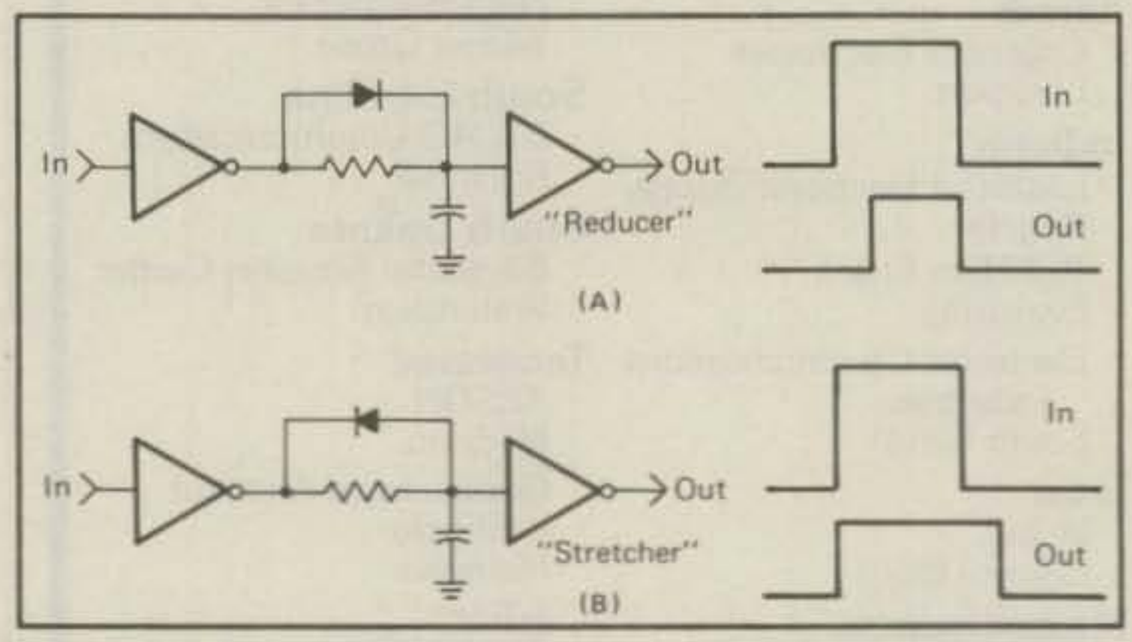


Fig. 3– The addition of a diode to produce longer or shorter pulses.

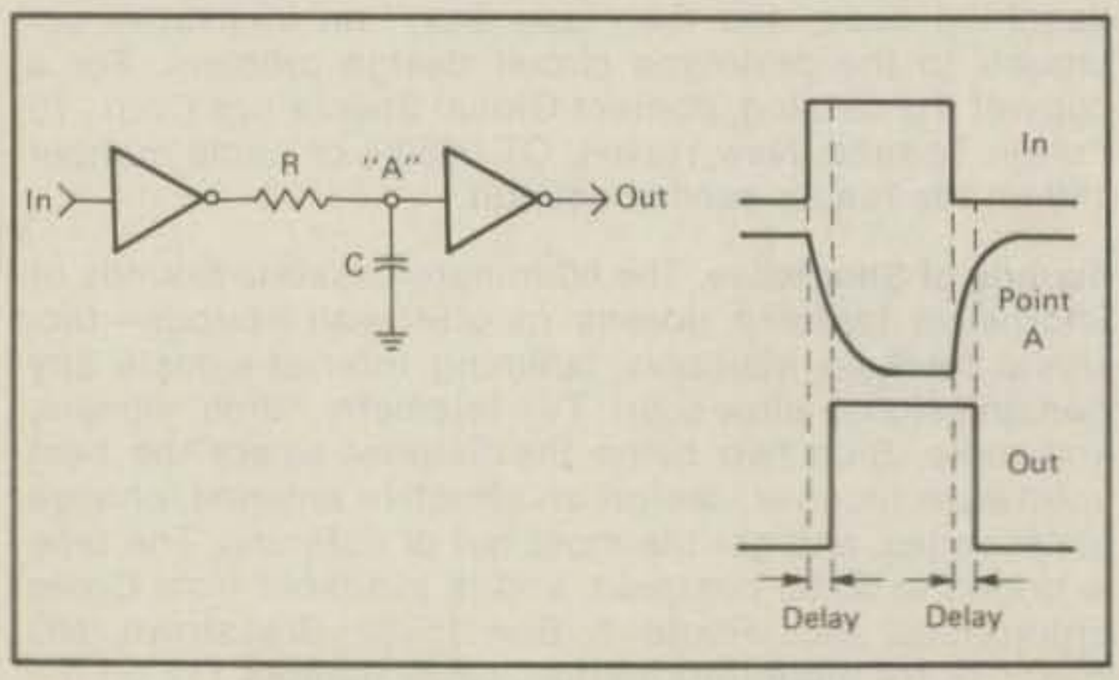


Fig. 2– Simple CMOS delay.

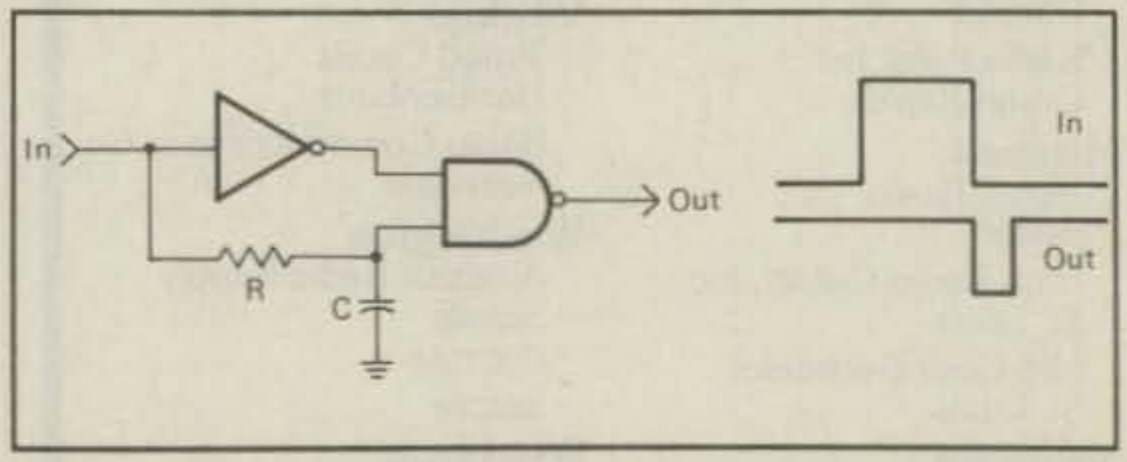


Fig. 5– A pulse generator at the finish of input.

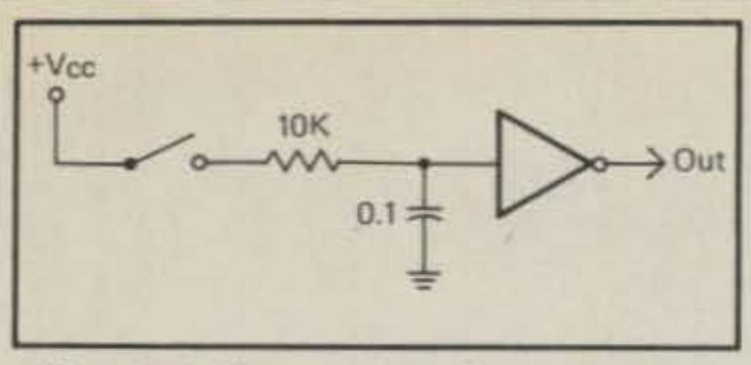


Fig. 4– A "bounceless" mechanical switch interface.

cuits and that the R/C techniques are suitable for use in modifying these devices.

I again would like to apologize for the lapses in this column due to the "last minute" requirements for my new book *Wires and Watts.* This book should be published by the time you read this and will be available in all larger bookstores in the U.S. and Canada. The publisher is Charles Scribner's Sons, of New York, and the book is, in one sense, a continuation of my first publication, *Morse, Marconi and You.* It is a learn-by-doing book which takes the young reader (ages 10 to adult) through the basic principles of electricity, utilizing many construction projects and experiments and almost no math. If you wish a copy of either book, try to have your local book store order one. In later columns, I'll tell you how to obtain an autographed copy.

73, Irwin, WA2NDM

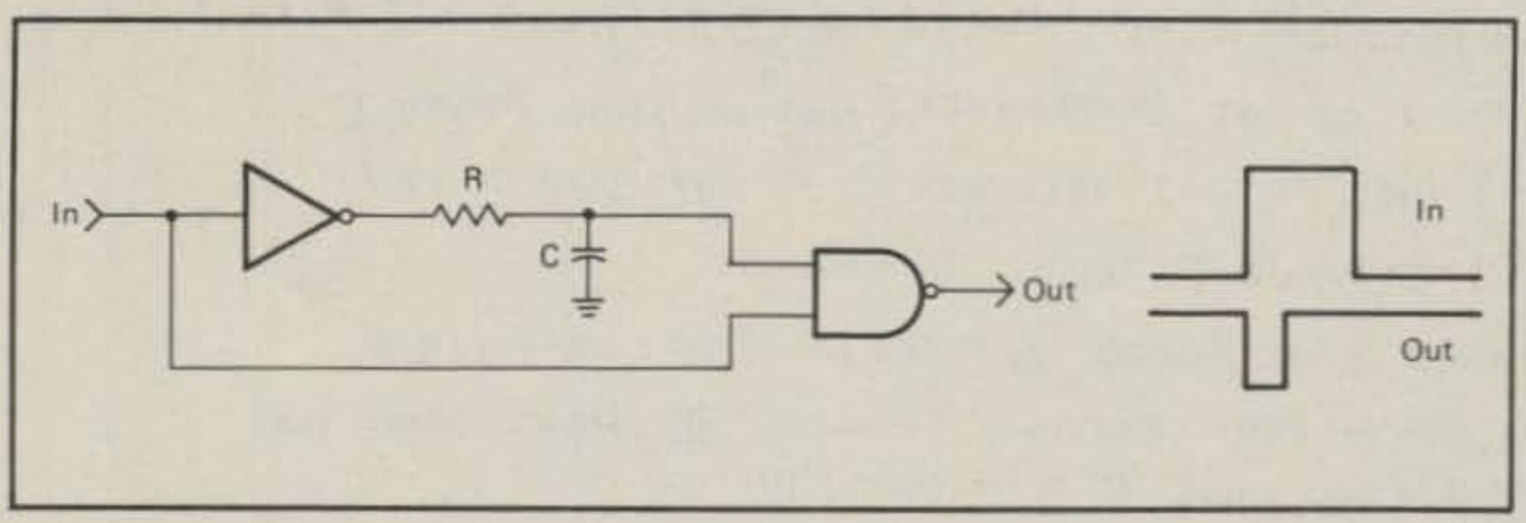


Fig. 6– A pulse generator at the start of input.

KA4RUL
Dennis W. Phillips
3901 Ibis Drive
Orlando, Florida 32803

DEAR FRIENDS;

THIS IS ONE OF THOSE LETTERS YOU ENJOY GETTING!
THE HEART OF MY NEW HAM STATION IS YOUR KLM-34A TRI-BANDER AND WOW WHAT AN ANTENNA ....

I'm 34, WAS A BROADCASTING ENGINEER FOR A FEW YEARS, BUT JUST GOT INTO HAM OVER THE SUMMER. MY TICKET CAME THE FIRST OF OCTOBER. THE FINE FOLKS AT AMATEUR ELECTRONIC SUPPLY HERE IN ORLANDO TALKED ME INTO A KLM-34A FOR THE TOP OF MY ROHN 25G 50 FT. TOWER. I BOUGHT IT AND WITH THE HELP OF 2 OF MY EMPLOYEES (NON-TECHNICAL PEOPLE, I SUPERVISED AND ASSEMBLED) WE PUT IT TOGETHER. IT WAS WORTH IT!!!! IT FEEDS DOWN TO MY KENWOOD TS-180S TRANSCEIVER.

WITHIN THE LAST MONTH I'VE FILLED 6 PAGES IN THE LOG - U.S.A. ALMOST TOTALLY, GERMANY, JAPAN, PERU, ENGLAND, FRANCE. I DON'T CHASE THE DX, IT CHASES ME! HEY, I'm ONLY USING 75 TO 100 WATTS!!!!!

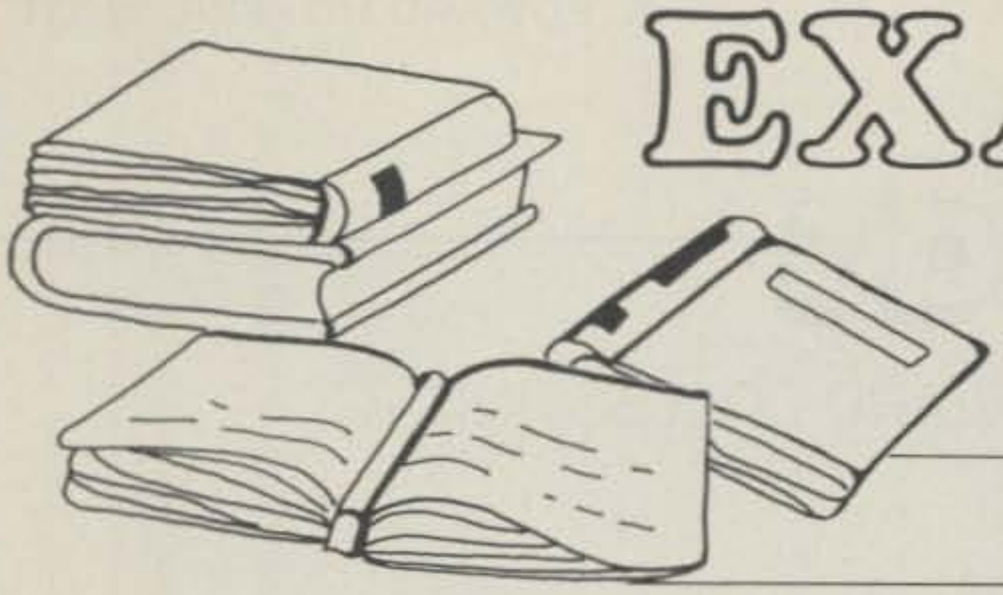
NOW, UNDERSTAND, I'M A REAL LID (SO TO SPEAK, "RANK NOVICE" MIGHT BE A BETTER TERM) BUT THIS DOG GONE SYSTEM DOES THE JOB! I THOUGHT YOU GUYS WOULD LIKE THIS KIND OF FEEDBACK!

YOUR INSTRUCTIONS WERE GOOD, EASY TO FOLLOW AND IT WENT TOGETHER EASILY. YEP, IT'S A DEVIL TO BUILD, TIME CONSUMING, BUT LOADS OF FUN AND WELL WORTH THE EFFORT TO DO. IT'S AN EDUCATION ON ANTENNAS (BILL ORR - EAT UR HEART OUT!). I MADE A SLING AND WE HOISTED IT UP THE J-POLE AND CLAMPED IT ON MY HAM IV. BINGO!!!!! SKIP THE QUADS (FLORIDA WX BLOWS THEM TO PIECES), FORGET A DIPOLE (IT HAS LESS GAIN THAN A BOX OF "FIGURINES"), TO HECK WITH VERTICALS (MAY AS WELL "LOAD UP" MY FISHING POLE), OTHER YAGIS ARE SECOND CLASS CITIZENS (COMPARE "BIG MACS" TO STEAK - PORTERHOUSE-). GIVE ME MY KLM-34A!

I GO UPGRADE THIS WEEK FROM NOVICE. YES, KLM GETS SOME OF THE CREDIT! NO, I WON'T GET A 34X KIT NOW, I'M SCARED I COULDN'T HANDLE THE DX!!!! GIVE ME AT LEAST ANOTHER MONTH, OK!!!!!

SERIOUSLY, TNX FER THE ANTENNA, IT'S EVERYTHING YOU CLAIM AND DOGGONE NICE WITH MY SET-UP (SOLID-STATE TOUCHY SWR PROTECTION CIRCUITS)
KEEP UP THE GOOD WORK - I'LL BUY KLM ALWAYS

73's
Dennis



EXAM CORNER

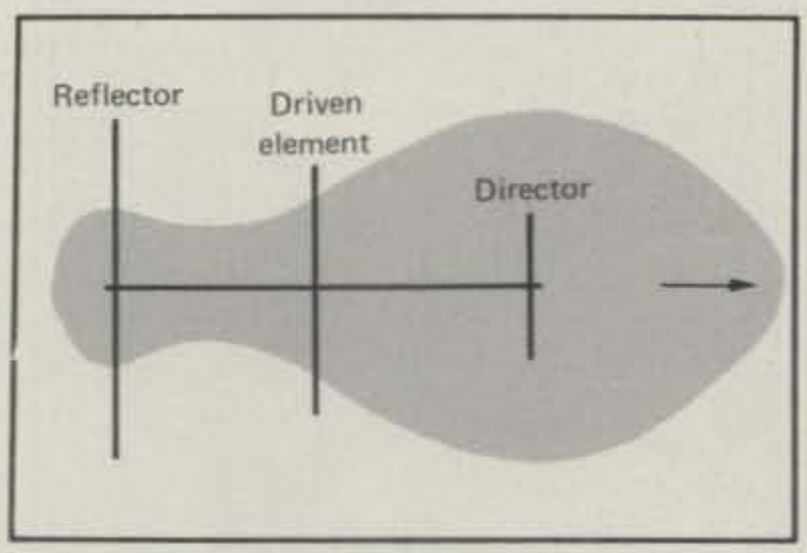
Yagi Antenna

BY DICK BASH*, KL7IHP

This month's column will journey into the realm of the General Class/-Technician Class applicant as we select our topic from the F.C.C.'s January 1980 study guide. We've picked the Yagi antenna and I'll try to show why it's so popular with amateurs and what it'll do for you.

The Yagi antenna, like so many of the modern transceivers, is a product of Japanese design. The inventor was a Mr. H. Yagi and the antenna was created by him in 1926 at Tokyo University. According to Bill Orr's *The Radio Amateur's Antenna Handbook*, the antenna came into use by amateurs around 1936 and has been essentially unchanged since then. The antenna consists of a metal pole about 0.3 wavelengths long called a **boom** with two or more metal elements perpendicular to it. As shown in the diagram, the elements are called the **reflector**, **driven element**, and **director**. This comprises the common 3 element Yagi that is so extensively used in amateur radio.

The *driven element* is connected to the rig in your shack via the transmission line and is generally ½ wavelength long (a dipole). The *reflector* is about 5% longer than the driven element and the *director* is about 5% shorter than the driven element. The signal is transmitted primarily in the direction from the driven element to the reflector, as illustrated by the arrow. Thus we can see that the Yagi antenna has the capability of radiating more of its power in one particular direction. This capability of *directivity* is further enhanced by being able to rotate the antenna and then point the directed energy/radiation anywhere we want.



Another characteristic of the Yagi is that of **gain**. Gain, as you know, is measured in decibels (dB) and is the characteristic of the antenna which puts out more radiation in a particular direction than a reference antenna (usually a dipole). The 2 element Yagi, consisting of a driven element and a reflector, has a gain over a dipole antenna of about 5.4 decibels. The three element Yagi, made up of a reflector, a driven element, and a director, has a gain over a dipole over something like 7.3 dB. The 4 element Yagi has two directors instead of one and a gain of about 8.8 dB.

These numbers were extracted from charts found in the ARRL's *Antenna Book*. This is a good source of technical information but we recommend *Practical Antennas for the Radio Amateur* by Scelbi Publications and/-or Bill Orr's previously mentioned book for the layman. These two manuals spell things out so you can understand them and, later when you develop a better feel for things, you may wish to purchase the ARRL's *Antenna Book*. The final authority is *Antennas* by John Kraus.

The feedpoint impedance of the Yagi is in the neighborhood of 14 ohms for 2 and 3 element Yagis and you will therefore need a balun of some kind to match your common 52 ohm coax to it. The impedance will vary according to spacing between elements and length of the elements.

By placing the Yagi on a rotor mechanism atop a tower or pole we can turn the antenna in any direction. This accomplishes a couple of things. First of all, we are directing our radiation in a particular direction and thus the receiving station will feel you are running more power than you actually are! Additionally, from a receiving standpoint, you will not hear other stations to either side of you and to the rear of you as well and therefore you eliminate some QRM with the Yagi.

What about the future? I think you'll see antennas that have a more pronounced front-to-back and front-to-side ratio. Work will be done to narrow the beamwidth of the antenna's emissions. By improving the front-to-back ratio and the front-to-side ratio we can minimize the reception of other stations and can hear the desired station better. As the bands become more crowded we will have to find more innovative ways of dealing with QRM. The manipulation of the antenna system will be one of the ways this can and will be done.

This overview of the Yagi antenna was not intended to make antenna engineers of you but to explain the Yagi to the level the General/Technician Class applicant requires for his/her examination. I encourage you to develop more interest in antennas and read all you can. Antenna experimentation is still within the budgets of most amateurs and the great forthcoming advances will be made by the amateur who devotes his energies to this exciting field. Your comments on this article are welcomed. Please write me at Bash Educational Services, P.O. Box 2115, San Leandro, California 94577.

Bash Educational Services, P.O. Box 2115, San Leandro, CA 94577.

a monthly feature by
A. EDWARD HOPPER, W2GT

Awards

NEWS OF CERTIFICATE AND AWARD COLLECTING

The "Story of The Month" for April as told by Charlie is:

Charles C. Justice, W4JUJ All Counties #281 4-24-80

"Born in Hartford, Connecticut, July 11, 1909, he and Mary now reside in Richmond, Virginia. They have three children and eight grandchildren.

"First licensed as 8CFL in 1926, he has had QCWA Certificate for 50 years continuous license, and has held calls 8CFL, NU8CFL, W8CFL, W3CFL, W3COW, and now, of course, W4JUJ. He is also QCWA member #900, OOTC #805, a member of the Richmond Amateur Radio Club, and was chairman of their Awards Committee several times and president from 1958-1959. He is member YL-ISSB #10,040, MARAC R-312, CHC #149, Class "A" Op Club #148.

"Charlie holds a CP-35 certificate from the ARRL and has been ORS/OTS for many years and handles lots of traffic on the VA Nets.

"He has the usual awards, such as WAC, WAS, DXCC, WAC/YL, YLCC/700, and some 150 other awards including those from LARK, GAYLARK, WAYLARK, Buckeye Belles, Florida YLs, WRONE, and Trilliums. Has been active in both C.W. and Phone YL/OM QSO Parties for 25 years, and in fact has participated in most QSO parties, both USA and foreign.

"Charlie graduated from Ohio State University, Columbus, Ohio, in 1935 with a Bachelors degree in Architecture. While there he was on the freshman and varsity baseball teams. He later taught mathematics at the Virginia Institute, Richmond, Virginia, in night school for 10 years.

"He is a partner in the architectural engineering firm of Ballou and Justice, Richmond, Virginia. (Partner Ballou died in April 1979.)

"Ballou and Justice served as architectural engineers on many (in fact, too many to list) projects such as restoration of the Virginia State Capitol (Richmond), which was originally done by Thomas Jefferson: restoration of the Rotunda at the University of Virginia, Charlottesville, also originally done by Thomas Jefferson; Richmond City Hall; and many other historic buildings, banks, schools, churches throughout Virginia, and the tallest building in Richmond.

Charlie, W4JUJ, at his operating position. Note all the fine Awards.

"Charlie's professional activities include membership in the Virginia Chapter of the American Institute of Architects—treasurer, secretary, and in 1953 president—and he is now being considered for Fellowship in the A.I.A.

"He is a member of the National Council Architectural Registration Board which permits practice in all 50 states. In 1968, he was chairman of the Middle Atlantic Conference. He was a member of the Virginia State Licensing and Examining Board for Architects, Engineers, and Land Surveyors from 1958-1968 and president from 1967-1968.

"Charlie's other interests include travel (he has been in 19 European plus many Caribbean countries/islands), bridge, music, and sports.

"Charlie has had five cartoons published in the Mobile Amateur Radio Awards Club monthly newsletter."

(Note: After reading this, I wonder when Charlie has had time to sleep, let alone acquire all the QSLs necessary for all those awards. Congratulations!—Ed, W2GT.)

P.O. Box 73, Rochelle Park, N.J. 07662

Awards Issued

Pat Creapo, WD9BCG, added to her fine collection USA-CA-3000 and All Counties endorsed Mixed.

Jon Baldwin, WB2AZM, did his paper work and received USA-CA-500 through USA-CA-2500 endorsed Mixed.

Bob Garceau, K1YRP, obtained USA-CA-2500 endorsed Mixed.

Paul Wells, W4LQF, added USA-CA-2000 and 2500 endorsed All S.S.B. to his fine collection.

Barry Brewer, WA5DTK, picked up USA-CA-500 through 2500 endorsed Mixed.

Tommy Rodgers, WB5UKI, also added to his collection USA-CA-1000 and 1500 endorsed All S.S.B., All Mobiles, and USA-CA-2000 endorsed All S.S.B.

"Buck" Lewis, W4BV (ex-9CCS, W9CCS, K2DNA, K1PNN, W3AXW), acquired USA-CA-500 endorsed All S.S.B., All Mobiles, All 14, All C.W.; USA-CA-1000 endorsed All S.S.B., All Mobiles, All 14; and USA-CA-1500 endorsed Mixed.

Jean Fis, F5FJ, obtained USA-CA-1000 endorsed Mixed, #1 to France.

Joao Judice Pargana, CT4SL, claimed USA-CA-500 and 1000 endorsed All S.S.B.

USA-CA-500 Certificates, endorsed Mixed, were awarded to:

Hideo Takahashi, JF1SEK
Mark Thebeault, WB8JDM
Larry Gerbaz, K0CL
Kjell Larsson, SM5BFC
Bengt Winroth, SM0PX
Bob Phelps, W6YMH
Arnold Rosett, WB3DCJ

USA-CA-500 Certificates, endorsed All A-1, were requested by:
Luciano Glarey, I1YRL.
Max Martin, WD9AWW.
Jouko Kujala, OH3NM (#1 to OH3)
USA-CA-500 Certificates, endorsed All S.S.B., were won by:
Jose Miguel Sintes Pujol, EA6ET (#1 to EA6).
Kjell Naess, LA9GV.
Alex Burr, K5XY, also endorsed All 20, All Mobiles.

Awards

Big Sky Worked All Counties—Montana.

Big Sky Worked All Counties (Montana): The Lower Yellowstone ARC of the Sidney/Glendive, Montana area decided to sponsor a Montana Worked All Counties Award to increase amateur radio activity among and with Montana operators. The Certificate and idea were those of WB7UTJ and N7BMR with WB7FBW doing the art work.

To qualify for this Award, any licensed amateur applicant must QSO and QSL all 56 Counties in Montana on any band/mode. No repeater contacts are accepted. All QSOs since January 1, 1980 count, and applicants need only have their QSL list verified by two other amateurs. Send the list with one dollar and two first class stamps to Dorothy, WB7UTJ, or Ron, N7BMR, at P.O. Box 449, Sidney, Montana 59270.

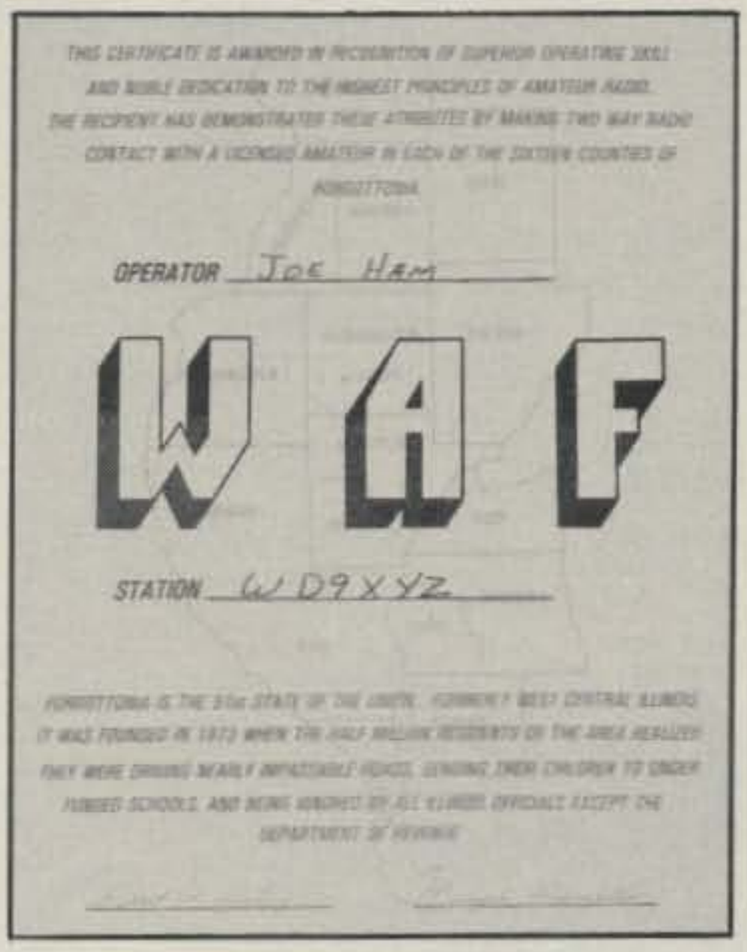
WARM Certificate: The Worked Albany Radio Members Award, issued by the Albany Amateur Radio Association, Albany, NY, USA, in past years has been revived by popular request. The Award is available to all amateurs, including AARA members.

The basis for the Award is unusual and may be unique. It involves all the cities, towns, etc., in the world named "Albany" or with "Albany" in the name. An atlas search has turned up at least 13 (one of them in Australia), and there well may be more.

Warm Certificate rules: Contacts needed—DX stations need 5 Albanys*, lower 48 states 7 Albanys*, NY state 10 Albanys*, Albany, NY area (Albany, Schenectady, Rensselaer Counties) need 15 Albanys**.

No repeater contacts, except satellite. Send only the following log information: call, date, UTC, MHz, mode, QTH. Submit this information with your name, call, mailing address, and return postage (2 IRCs for DX, 2 first-class stamps for USA) to: Harry H. Hovey, KB2FC, WARM Award Manager, 15 Sylvan Lane, Troy, NY 12180, USA. (Thanks to Wm. Lowenberg, W2OOJ for this data.)

Special Honor Roll
All Counties
#309 Patsy A. Creapo, WD9BCG
12-18-80.

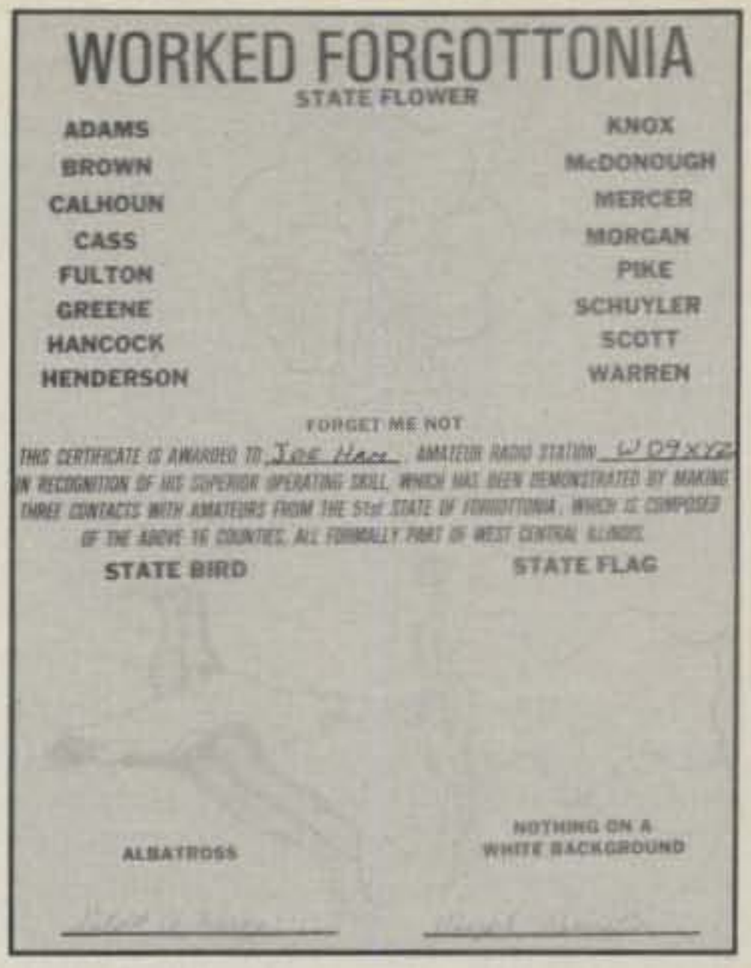


Worked All Forgottonia Award.

Worked All Forgottonia Award: Sponsored by the Lamoine Emergency Amateur Radio Club of Macomb, Illinois. Forgottonia is the 51st state. It consists of the following counties (formerly part of west central Illinois—Hi): Adams, Brown, Calhoun, Cass, Fulton, Greene, Hancock, Henderson, Knox, McDonough, Mercer, Morgan, Pike, Schuyler, Scott, and Warren.

The Award will be issued to operators confirming contact with at least one amateur in each of the sixteen counties of Forgottonia.

WB9TEA is the club station that issues an unusual QSL for all contacts. Persons earning the award should send QSLs or certification list by their club secretary with a 9 × 12 s.a.s.e. to AG9Y, LEARC, 1224 Maple Avenue, Macomb, IL 61455. (Thanks to Bob, WD9FQD, for this information.)



Worked Forgottonia Award.

Worked Forgottonia Award: Issued by LEARC for working at least three stations in any of the 16 counties of Forgottonia. Apply to AG9Y.

Dutch Wadden Islands Award: Sponsored by the Dutch Wadden Amateur Radio Group. These islands are also known as the West Frisian Islands and include Texel, Vlieland, Griend, Terschelling, Ameland, Schiermonnikoog, and Rottumeroog Islands. European stations must work 5 stations on 3 of these islands, and stations outside Europe must work 2 stations on 2 islands.

Contacts must be made after 1-1-80. Send log list and 5 DFL or 5 DM or $2 to: Awards Manager, P.O. Box 2, 8830 1414, West Terschelling, The Netherlands. (Thanks to PE1DTU for the data and copy of the beautiful Award.)

Dutch Wadden Islands Award.

**At least one must be a member of AARA; others can be any Albany, worldwide, except home QTH.*
***At least five must be AARA members; others can be any Albany, worldwide.*

USA-CA Honor Roll

3000		1500		500	
WD9BCG	334	WB2AZM	505	JF1SEK	1543
		WB5UKI	506	WB2AZM	1544
2500		W4BV	507	WB8JDM	1545
WB2AZM	392	WA5DTK	508	I1YRL	1546
K1YRP	393			W4BV	1547
W4LQF	394			KØCL	1548
WA5DTK	395	1000		WD9AWW	1549
		WB2AZM	639	SM5BFC	1550
2000		F5FJ	640	SMØPX	1551
WA2AZM	446	WB5UKI	641	EA6ET	1552
WB5UKI	447	W4BV	642	OZ8BZ	1553
W4LQF	448	WA5DTK	643	OH3NM	1554
WA5DTK	449	CT4SL	644	W6YMH	1555
				LA9GV	1556
				WB3DTK	1557
				WA5DTK	1558
				K5XY	1559
				CT4SL	1560

OE6 Aichfeld Award: This "Aichfeld Award" is issued by the Radio Club Judenburg in Styria. Only contacts after 1 January 1978 count. Available to licensed amateurs worldwide, also SWLs. OE amateurs must work 5 stations from the "Aichfeld-Group-Judenburg". Other European stations need 3 amateurs from the "Amateurradio Club Judenburg" and 1 other OE station. DX stations need 2 stations from Amateur Club Judenburg and one other OE station.

Stations of the Amateurradio Club Judenburg are : OE6MOG, ESG, HUG, EMG, KDG, CAG, FKG, JMG, WVG, BVG, OPG, ZAG, US, HMG, UKG, YAD, YMD, and YKG.

Austrian stations please send log data and OS 100.--; foreign stations

OE6 Aichfeld Award.

please send log data and $7.00 to: Hans Mayerl, OE6MOG, Dr.-Korner-Strasse 16, A-8761 Pols, Austria. (Thanks to Ruth, K5OPT, for the data and copy of the Award.)

Notes

Paul Schuett, WA6CPP, All Counties #299, with the help of K6YK is intending to take over one or more Awards that were formerly handled by K6BX, who is a silent key. They do *not* intend to take over CHC nor the Awards Directory. More information to come. Anyone interested in the Directory should get in touch with W4OMW.

Sad to report the passing of:

"Ben" Scothorne, K1UNM, All Counties #173.

Mac Meyers, W2BIB, who was one of the first non-residents to operate from the Vatican at HC1CN in July 1961.

Dr. Sam Rosen, WA2RAU, well-known DXer, physician, and surgeon.

Charles F. H. Johnson, K2ED, former head of Botany Mills, who was very active as a ham in Passaic, NJ before moving to his Bernadotte Farm in Monmouth County.

J. Kenneth Hiler, W4SQ, a long-time friend who used to be 2SQ, W2SQ. Ken and I were operators at the then-famous 2OM spark station in Ridgewood, NJ when 2OM won the first Hoover Cup in the early 1920s for the outstanding U.S. amateur station. (The following year it was won by 5ZA.)

To repeat, as of 1 March 1981 all *CQ* Awards will cost $10.00 for non-subscribers, and for subscribers to *CQ* the cost will be $4.00. Subscribers will be required to include a mailing tab (or copy) from their *CQ* magazine with their application.

Also to repeat, there is no longer a POD 26. It has been combined with POD 65, and it is now called the National Zip Code and Directory of Post Offices and costs $8.00, stock #039-000-00264-7, and can be ordered from most U.S. Post Offices or directly from the Superintendent of Documents, U.S. Printing Office, Washington, D.C. 20402.

How was your month?

73, Ed, W2GT

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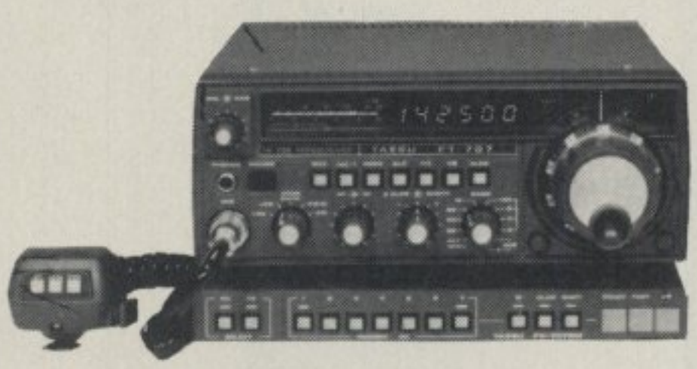
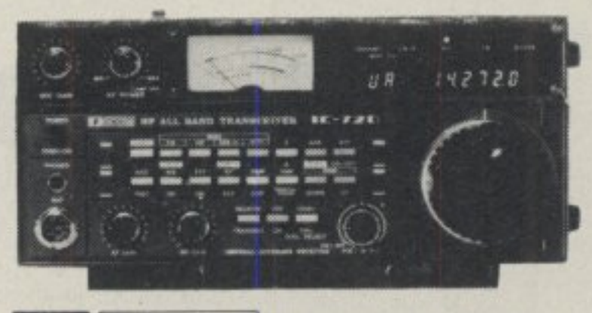


YAESU

FT-101ZD, FT-107M, FT-480R,
FT-707, FT-720RU, FT-720RVH,
FT-902DM

DRAKE TR-7 & R-7
L-7 2KW Linear Amplifier

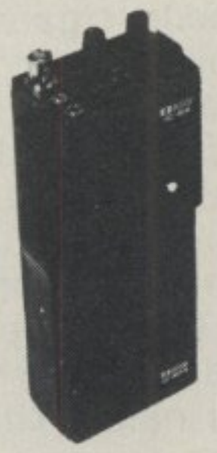


ICOM Model -720

Murch Model UT2000B

Rockwell/Collins
KWM-380

Alpha 76PA
2 + KW PEP/3-8874 FINALS



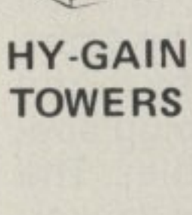
BIRD
Wattmeters &
Elements
in stock

TRIONYX Model TR-1000
Digital Frequency
Counter 0-600 MHz

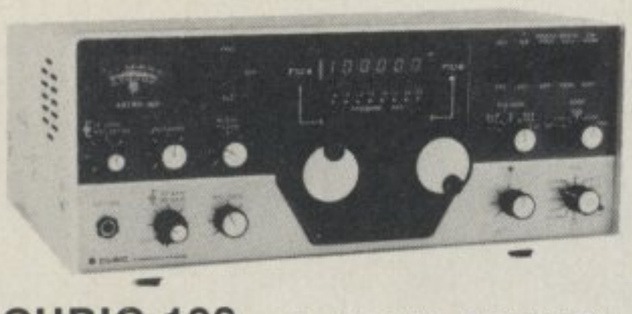
DTR-3KA Antenna Tuner DTR-1200L Amplifier
DLR-2000 / MTA-3000 / Clipperton "L"

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

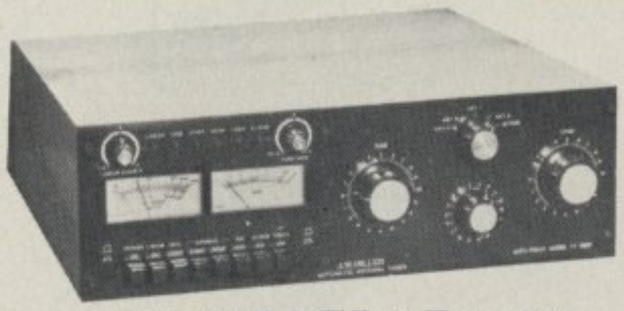
Synthesized
Handy Talkies
Yaesu FT-207R,
Santec HT-1200,
Icom IC2AT
Tempo S2 & S5



HY-GAIN
TOWERS



CUBIC 103 Cubic 102, & 100MX



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CIRCLE 26 ON READER SERVICE CARD

AD1B presents a one evening project that will take the whine out of your mobile operation.

The Mobile Filter

BY THOMAS M. HART*, AD1B

On a recent trip to New Hampshire, I rode with a friend who is not a ham. On my suggestion, we decided to bring along a 2 meter rig to help break up the monotony of the long trip. So, just before we left, I placed the transceiver on the seat between us, stuck the magnetic mount antenna on the roof and used a cigarette lighter plug to obtain power. During the course of events, we made quite a few contacts on the .25/.85 repeater in Derry, New Hampshire and the .28/.88 machine in Buckfield, Maine. All in all, the 2 meter rig was good company during the trip.

The only problem we encountered was that our signal picked up generator noise. This wasn't serious, but it was somewhat annoying to the listener. In order to avoid future problems, I put together a small filtering unit that can be used with a cigarette lighter (see fig. 1).

Before describing the filter, a few words on the subject of the causes of ignition noise might be helpful. Refer to the *A.R.R.L. Handbook* for a discussion of the major types of ignition noise. The first is caused by the spark plugs. This can be alleviated by the installation of resistive spark plug suppressors or resistive wire cables. The generator is the second noise maker. The brushes can produce an unpleasant whining sound. The cure usually consists of adding inductance and capacitance to the line that carries power to the radio gear. The third source of noise is the voltage regulator, which may produce a hash sound. This can be cured with coaxial feedthrough capacitors. My particular problem was caused by the generator.

The filter consists of a choke and capacitor which can be purchased as a package from Radio Shack, part number 270-030 ($3.99). These were mounted in a small utility box along with connectors for the lighter plug and the rig. The parts placement is definitely not critical.

The results have been very satisfactory. I can use the rig in a number of mobile situations and be confident that the signal will be free of generator noise. The big advantage of the system is that it can be used in almost any car.

The finished product is housed in a mini-box. It is a mechanical assembly with a minimum of components.

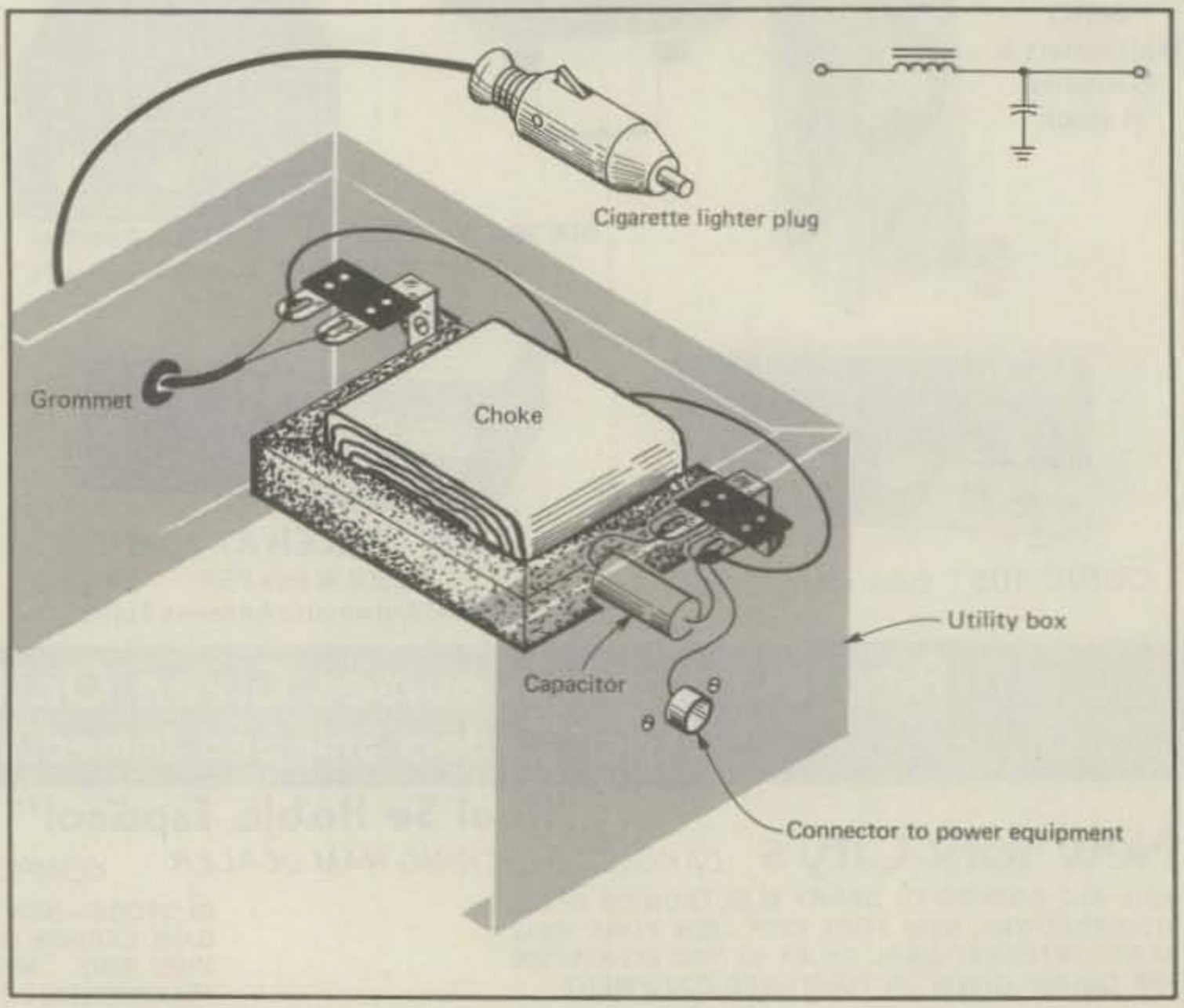

Fig. 1 –Parts placement of the mobile filter. The component values are not critical, and you can and should experiment with items from the junk box.

*32 Westwood Terrace, Westwood, Mass. 02026

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CIRCLE 31 ON READER SERVICE COUPON

a monthly feature by
HUGH CASSIDY, WA6AUD

DX

NEWS OF COMMUNICATIONS AROUND THE WORLD

One suspects that most every DXer at times thinks of a golden land where there are everlasting days of DXing. A place and time where the days are bright, the air warm and DX several layers deep.

Here on the western edge there are some wholly convinced that such places already exist. With Spring at hand, the eternal flame of DXing waxing brighter, the everlasting thirst for more DX bursting out and the madness evident that leads one to climb tall towers to tinker with massive directional arrays, it did seem a proper time to visit one of these DX holy spots. A place from which a DXer surveys the wide world. And so we went.

We went seeking knowledge. Perhaps we got it but we are not sure. Perhaps what we did was go to rediscover the obvious. Or it may be that we are not yet ready for full understanding. All we asked was, "Sam, how does it feel to be on top of all DX things? A big, all-band DXer! Tell us how it is!"

We were sure that we had come to the right spot. For here in a place that the Vedantas have long considered an 'energy' spot, the home of the first Aikio dojo in these parts, a DXer holds forth on all bands. With five-band DXCC worked twice, two hundred and more countries on all bands, far over 320 countries worked, this one will not even bother to submit cards, content only in knowing himself that he has worked just about them all. Certainly, we had anticipated, this is one who must know all the answers.

What we got was a shrug of the shoulders and a half-wave of a hand. This we could understand. The words were more difficult. "Every DXer is a potential has-been," we were advised. "Some strive to reach the top or near there; only a handful spend any time there. Mostly the joy of being at the top of DXCC is ephemeral."

Sometimes it does occur to us that it is hard enough to try to understand the meaning of things without worrying about the words. And the day did not seem to be as bright as it once was. But we persisted. We had to know more. "Go," Sam advised us, "go and check the DXCC lists. A check over the years will show that there are many who labored long but were quickly forgotten. Few remember yesterday's DX heroes."

77 Coleman Dr., San Rafael, CA 94901

Ken Miller, K6IR, one of our WAZ enthusiasts, has recently been elected to the rank of Fellow in the Radio Club of America. Ken is also an avid collector of amateur memorabilia during his free time from his duties as President of Penril Corporation.

You guessed it. We were somewhat confused. For almost a quarter century we have toiled in the DX vineyards. We recalled the great DXers who had come down the bands and remembered how mentioning them to a newly minted DXer usually brought a blank look. "But why, Sam?" we finally had to ask. "Why is it that you yourself are heard just about every dawn and long into evenings. At the top of the cycle you were cleaning up 10 meters; at the bottom we heard you combing 80. Why do you of all DXers try at something for which you will not even submit cards for a certificate. What does it mean?"

We had to listen carefully to his explanation. To him it made sense; at the end it did a bit to us. He works DX because he enjoys working DX. "DX is not an everlasting contest," he told us. "Maybe you like to work the tough ones; that's your satisfaction. And if you miss, maybe you can try another day. But between the extremes you can have the pleasure of talking with DX friends halfway around the world. There is nothing like DX, and the greatest enjoyment comes when you appreciate it. You should. . .everyone should!"

We had to think this over, for somewhere deep inside we knew that it might be possible that what he was saying was true. DX is the experience to enjoy. One may have heard it said that only the young and the very old know that dawn is the best part of the day. And it may also be true that it is the very new DXer and the worn, old-time DXer who gain the greatest joy from DXing.

Somehow when we speak with Sam things seldom run the way we expect. And sometimes things are never quite the same after we do. Though we may still seek the golden lands and the glory days, we also know that DX is always a joy.

"It sounds to me like you are on a DX soapbox, Sam," we said, and we did get a laugh from that.

"Always where DX is concerned," he said, "and how many true-blue DXers have you ever heard knocking DX in general?" We had to admit that we had heard very few. For, as has been noted elsewhere, "DXers are the true internationalists!" That's not DX rhetoric; that's fact. That's something you can believe.

DX Notes

The Radio Club of Chile, headquartered in Santiago, has elected a handful of new officers for 1981. Elected President is Rogelio Gomez Fernandez, CE3GF. 1st Vice President is Jaime Fabregat S., CE3XI. 1st Secretary is Rene Alvarez N., CE3TC. If you are looking for some words with the club, drop them to Casilla 13630, Santiago, Chile.

The CQ WPX Contest went well as it usually does. VE3IUE says that he

There was much less QRM on the bands when these well known DXers got together at the Dayton Convention. Left to right are John, KP2A, Jack, W2LZX and Jim, N6RJ. (Photo via Lenny, K5OVC, who should have been in the photo.)

knows nothing about FP0EP reported on St Pierre and Miquelon around the turn of the year.

LA5HE sighs for the good old days of DXing. . .back before lists. Ragnar heard a long-time DXing friend in the states, and not having talked with him for some years, he gave him a call. He got a quick brush-off. The state-side type was running lists on 20 for an Asian station. "Son of a Gun!" says Rag, "has DX gone into a decline? Is this what DXCC means?" Some will agree with Rag, some will disagree. But a concensus. . .never! But some will always seek the ultimate answer, sometimes seeking it a bit stridently. With stalwarts at the extremes, the answer probably is somewhere in between. In an age of absolutes, one should learn to agree with any forceful argument on lists. Be it for or against, just agree. Most times it will save a lot of ear-bending. Don't argue. . .just give your Mona Lisa smile.

In the CW WW DX Contest last Fall, EI9CB pounded out 6715 QSOs, 134 zones and working six bands racked up 422 countries. Paddy made DXCC on 10 and 20 meters, just missing on 15. Undoubtedly some made better scores. Well, possibly, and we are sure we may hear from some. We mention EI9CB's effort to note the last CQ WW DX Contest came around the peak of the current cycle—anyhow, not too far off. Good things may not go on forever, but they are sure fun while they are around. And if Cycle 21 was so good, maybe Cycle 22 will be even better. Live in anticipation.

Maybe you've already heard it, but we will run it by again as it does seem worthy of note. 1A0KM is a special station from the Sovereign Military Order of Malta. This SMOM is a fully independent entity headquartered since 1834 in an extra-territorial area in Rome. This Sovereign Military Order of Malta issues its own passports and maintains diplomatic relations in many countries of the world.

The WAZ Program

10 M Phone

96	N0AMI	101	K3BEQ
97	WB3JWC	102	I3AVZ
98	W3GDK	103	DF7NM
99	HM1QD	104	N7ABJ
100	VK3NDY	105	VK3NOL
		106	JA6EOR

15 M Phone

71	JH5FQO	74	JH4OQF
72	W3DR	75	JJ1KUV
73	K4IQN	76	W7FP

20 M Phone

342	K4XG	345	K9IW
343	WN3KER	346	W2CC
344	WA7RQS	347	JA5BZL
		348	VK5APW

10 M C.W.

14	JH3FYR	16	W4WJ
15	SM5AKT		

15 M C.W.

43	G2GM

20 M C.W.

129	N6UH	130	W5HEZ

40 M C.W.

19	W8UVZ	20	K0ZZ

All Band WAZ

S.S.B.

2084	WD5HRX	2103	I5ENL
2085	AF3T	2104	KB5AC
2086	K8MG	2105	EA2TV
2087	WB0TQW	2106	DL2KC
2088	W0YNZ	2107	F6BFI
2089	WB8VPA	2108	JE1TTI
2090	W0RYW	2109	W9NIO
2091	W1YOU	2110	OH1AA
2092	W2CKR	2111	KC8A
2093	WA6KMS	2112	OE3KTA
2094	DL9JH	2113	W5AYZ
2095	WB2KCI	2114	AG9S
2096	UA9MS	2115	W4PTT
2097	UW3DH	2116	WA7JUJ
2098	UQ2MU	2117	W3EFA
2099	SV8JE	2118	WB9OTX
2100	K2EY	2119	W0DG
2101	K7VV	2120	LA5QN
2102	I8IHG	2121	WA4FHQ

C.W. and Phone

4990	K4XG	5014	K7HRW
4991	WB5ZAM	5015	WB5YKD
4992	AG5X	5016	OH1AA
4993	WB8VPA	5017	W7POC
4994	DA1EW	5018	LZ1KDP
4995	W3ODJ	5019	W2HG
4996	K8AQM	5020	N2GG
4997	WA5QCH	5021	AK6A
4998	K6QC	5022	G4BPV
4999	K7NTW	5023	AE1T
5000	JH4UVU	5024	GM3YTS
5001	W1UYL	5025	K4KUZ
5002	WB5PBA	5026	K3GJ
5003	AD3R	5027	FR7BP
5004	UA9AAP	5028	N4KE
5005	UD6CN	5029	YU3FK
5006	UA6FJ	5030	W7DAZ
5007	UA3HV	5031	HB9BNF
5008	UA3QAQ	5032	ZL2MY
5009	UA3GBI	5033	N5RF
5010	DK3HC	5034	YU2CAO
5011	DF3XD	5035	YU2CAO
5012	DJ2JX	5036	K6PWR
5013	JH7FMJ	5037	JH7FQK

Applications and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (30 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the W A Z manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

I0MGM is the QSL Manager for this station. At this point some will start to wonder about DXCC status. It has been applied for. However, before you start breathing heavily, inquiry on country status has been made before but without success. Somewhere along the line things may take a different tack. The Knights of Malta have been around for a long time; the order was founded in Jerusalem in the Middle Ages. Along the way it was known as the Knights of Rhodes back in the 1300s, and Sovereign and Military Order of the Knights of Malta from 1530 until Napoleon took over the islands in 1798. Since 1834 its title has been Sovereign and Military Order of the Knights Hospitaller of St. John of Jerusalem, the headquarters being in Rome. Some research will show that in several areas various branches of the original order still exist, these being in Europe and the States. Mostly its diplomatic relations are with the Holy See in Rome and Roman Catholic States.

What does all this mean? Work 1A0KM and you are working history. A study of the group, now mostly confined to humanitarian efforts, will show that in the past it was both tough and ready to fight, a trait often noted in some DXers.

Over the years we have strongly leaned to the belief that Erik Sjolund, SM0AGD, has been right at the top in DX activity and certainly one of the major ones in activating the rare ones. In case your memory has dimmed, it was Erik who demonstrated amateur radio in Baghdad some years back, this action eventually bringing YI1BGD on the air and Iraq available for some DXers who first had to work the station and then figure how to get the QSL. Erik late last year left his duty with the Swedish government and figures that from now on he will be found more in SM-land than in some far distant, exotic and often rare DX stop. Over the years he showed in a long list of rare ones; his change of duties inevitably will lessen the chance to bring the needy DXer what he wants and often got.

DX Conventions

There are a number of these showing on the horizon. Next month will bring the DX quiet period when many DXers head for Visalia, the 1981 site of the International DX Convention. While the action is the same, the title for this one becomes a movable feast as the yearly search goes on for a site that will accommodate the jumping group of DX types that gathers annually. Usually the Fresno International DX Convention, this one is just the "International DX Convention," this year, moving down the highway a bit to the next town. It will be at the Airport Holiday Inn in Visalia from May 1st to the 3rd. The programmed action starts at Saturday noon and ends Sunday noon. Other activities start on Friday evening and run until endurance fails.

Bob Thompson, K6SSJ, returns again as the Chairman in 1981. He has a string of unbroken triumphs as chairman when the Northern California DX Club is the host group. Drop him a line at Box 608, Menlo Park, Calif. 94025 is you need more information or want the brochure mailed to you.

Over the years a large number of JAs have shown at these International DX Meetings in California. This year they held their own, the Tokyo DX Convention, in February. In several areas of the states DX conventions are held regularly—the north west, the midwest, and New England. Listen for the hail and answer the call if you can. You will remember these gatherings as always a pleasurable experience. DXers never meet as strangers.

CQ DX Awards Program

S.S.B.

951	SM6DYK	961	I8WES
952	GM4ELV	962	XE1MDX
953	I2MQP	963	AI9U
954	WD9FKS	964	AG9S
955	UA9AAP	965	F6CXB
956	UF6RB	966	WD5ABG
957	UK2BAB	967	WD2AER
958	UB5ABJ	968	W6LUR
959	UW9SG	969	EA7TV
960	N6PV		

C.W.

470	SM6DYK	474	UA6PAM
471	UA3DIW	475	UB5JIM
472	UA4OZ	476	UB5UCH
473	UA6AHX		

S.S.B. Endorsements

310	VE2WY/316	250	I2MQP/254
310	DJ9ZB/315	250	XE1OX/251
310	I4ZSQ/314	200	I8WES/208
300	K9MM/309	200	VK3NDY/227
300	OE3WWB/309	150	XD1MDX/178
275	K1UO/299	150	WD5ABG/157
275	ZL1BIL/291	150	WD9IIC/150
275	YU2RTW/288	QRPp	GM4ELV
275	W2FGY/280	28MHz	WB0SNG
275	I5BDE/275	28MHz	WD9IIC
250	XE1OW/254	28MHz	AI9U
250	XE1NI/255		

C.W. Endorsements

275	WA8DXA/294	150	WD9IIC/170
250	WB4RUA/252		

The total number of active countries as of deadline was 318. The basic award fee is now $4 for CQ subscribers and $10 for non-subscribers. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement fee for stickers is $1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, 911 Rio St. Johns Dr., Jacksonville, Fla. 32211 U.S.A.

Frank Turek, DL7FT, is planning to be at the California meeting next month. You'll find a lot of DX and DXers on the program.

Russian Call Signs

Sooner or later things change. There are some early signs that the whole USSR call sign assignment system is under study and revisions will eventually come. All this will help one identify things a bit easier. That's the way it always works out. . .we think.

Last Minute Notes

The Southern Oregon DX Club patrols the beat around the Medford area. They are encouraging members to handle QSL Manager duties, and some of their products are noted elsewhere.

Lee Manning, AK7T, 507 Barnes Avenue, Medford, Oregon 97501, is the one who can supply any needed information on the club activity. They meet on Fridays at 0100Z on 21370 kHz to discuss things. You might also catch them on 14290 kHz at 0500Z on the same day.

In the distant realms of the western reaches, the Redwood Empire DX Club

5 Band WAZ

Standings as of January 1, 1981

Plaques have been won by the following stations:

Plaque No. 1, ON4UN, John Devoldere (Belgium)
Plaque No. 2, K4MQG, Gary Dixon (U.S.A.)
Plaque No. 3, SM4CAN, Kent Svensson (Sweden)
Plaque No. 4, AA6AA, Steve Orland (U.S.A.)
Plaque No. 5, W8AH, Albert Hix (U.S.A.)

The top contenders for WAZ:

1. N6DX, 191 zones
2. W8UVZ, 190 zones
3. W8GT, 189 zones
4. SM0AJU, 189 zones
5. N4WW, 186 zones
6. K7UR, 183 zones
7. WA4JTI, 180 zones
8. DL3RK, 180 zones
9. W1NG, 178 zones
10. VK6HD, 177 zones

is reported as deep in the arroyos of Sonoma County and adjacent areas. This one has Chuck Ternes, N6OJ, as President; Len Geraldi, K6ANP, as the VP; and Bill Pearson, K6ASI, as the Secretary. You can find K6ASI at 25 Rudnick Avenue, Novato, Calif. 94947.

Some issues back there was a query about WT1ITU, those special calls of almost ten years back. W9JR says that that call was held by WA1KVI who is now KA1BR, Barry Wollman, 18 Russet Lane, Storrs, Conn. 06268.

TU2JJ is William Jones, who works with the American Embassy at Abidjan in the Ivory Coast. His home call is WA0ZQI, and TU2JJ is often found at the low end on 20 s.s.b. plus some 20 RTTY action. He was active in the CW WW DX Contest last Fall and will be heard in the Spring Contests. QSLs for this one go to KN0KCW, Doug Wilkowske, 1010 West Trott Ave, Willmar, Minn. 56201. Sase or Sae/IRC needed.

Sam Yates has a QSL Managers' listing service. Drop him a line at 1514 Cotherstone Drive, Durham, NC 27712 if you are interested. In Accra, Ghana, Rod Hallen is being heard signing 9G1RT, and not content with the local action he is thinking of some scouting and patrolling activity in other west African countries. Rod will be there until this summer; his home call is KB7NK. His QSLs go via KB7HB.

In the recent CQ WPX Contest, Dick Allardyce, N4RA, was in the Grand Caymans signing ZF2CC. If you worked him, rush your QSL to N4RA and guess what you'll get. Your personalized ZF2CC QSL card!

Also working that side of the street, ZF1KG/ZF1DL during the last part of March was VE3KGK. This one is good in recent callbooks, but if yours is old, try David Lambert, Box 1703, Station 'A', Ontario, Canada N6A 5H9.

PZ1DR runs a schedule with his QSL Manager at 14240 kHz, 0830Z on Tuesdays. This is with WD4NBX, John Kemp, Box 955, Lebanon, Tenn. 37087, who handles his QSLs. After they handle the logs, PZ1DR will often move up to 14280 kHz to work any deserving Generals who are waiting.

If you still seek a UK1PAA/UK1PGO QSL for the 1979 activity, it might be worth a try to send a card to UA1SOM, Box 47, Archangel 60, 163060 USSR. It is said that a reply usually comes with no delay. You might look for an endorsement stamp; UA1OSM stamps the cards to show that it is true-blue and not valid without the endorsement. Serge is a collector; he collects radio society lapel pins.

The Franz Josef cards have been a continuing problem, and there have been pressures to clean up the backlogs. A supply of cards has been reported as the main problem, since it is difficult to QSL without them. Even the best address and intentions help little when the material is in short supply. 5Z4QS has returned to Canada, and QSLs for the Kenya activity should go directly to him, Manfred Hanke, 3166 Forest Glade Drive, Windsor, Ontario, Canada N8R 1Z2. While he was in East Africa, the 5Z4QS QSLs were being handled by Chuck Michaud, N1NA. But no more.

5BWAZ

If you are new at DXing and think DXCC is hard, just wait. Someday you may try WAZ and that will be harder. If you want to try at one of the ultimate back-breakers, try 5BWAZ. AA6AA recently sent in all forty zones in five bands to earn 5BWAZ #4. Leo Haijsman, W4KA, who handles this one, points with awe to this being but the fourth one since the award was set up some years back. AA6AA is Steve Or-

The WPX Program

Mixed

877	EA7AGO	881	OK3CEE
878	WD4GCE	882	SM6ID
879	K0QMU	883	N8BJQ
880	W6OUL	884	YU2TS

S.S.B.

1329	VE3HZH	1335	DK9OV
1330	KB9IS	1336	PA0MA
1331	I2DMK	1337	VK6YL
1332	EA9HA	1338	KA9CQM
1333	KE4E	1339	JA7HMZ
1334	KB0C		

C. W.

2018	WA4YCI	2023	JH3XGD
2019	JH2CJW	2024	K1CBR
2020	OH2PQ	2025	JH2JBT
2021	SM6DUA	2026	VE1BLX
2022	DL6OW	2027	JA7HMZ

WPNX

189	KA8AZN	190	KA2DLK

Endorsements

Mixed: 400 WD4GCE, K0QMU, N8BJQ. 500 EA7AGO, W6OUL, AC2J. 550 K5PR. 600 IS0MVE. 650 YU2TS. 700 N4IB, YU2CQ. 750 I2DMK, OK3IF, LA7JO. 800 LA7JO. 850 IT9HLO, W1CNU. 900 OK3CEE, YU2CAL. 1000 SM6ID, K8LJG, PA0LRK. 1750 W2NC. 2050 YU2DX.

S.S.B: 300 KB9IS, KE4E, KB0C, DK9OV, KA9CQM. 350 PA0MA. 400 JH5FQO, JA7HMZ. 450 WA2SRM, W4MNZ. 500 I2DMK, EA9HA, N4IB, VK6YL. 550 W3GXK, XE1XF. 650 KL7AF. 700 KC4OV, EP2TY. 750 I2MQP. 800 G3YBH. 1250 I0MBX.

C.W.: 300 OH2PQ, DL6OW, JH3XGD, K1CBR, JH2JBT, VE1BLX. 350 WA4YCI, JH2CJW, JA7HMZ. 400 AG5C. 450 N4IB. 500 SM6DUA. 550 JA7FFN/1. 600 I2DMK. 750 N4YB. 900 VE7CNE, PI1PT. 1000 OK1DH. 1050 W1WLW, W3TVB.

10 meters:	W1JR, KL7AF, WB8YQX.
15 meters:	W1JR, GW3SB, OK3IF, AC2J.
20 meters:	W1JR, WA2SRM, AF5M.
40 meters:	W1JR.
80 meters:	W1JR.
160 meters:	W1JR.

Asia:	WD9DCL, JH4PRU, N4IB.
Europe:	EA7AGO, DK9OV.
No. America:	W6OUL, PA0MA, WD9DCL, XE1XF.

WPX Award of Excellence holders to date: W4WSF, K6JG, W4CRW, WA5VDH, W6TCQ, WA2EAH, VE3GCO, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, YU2DX, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, I0JX, WA1JMP, K0JN, K4IEX, WA2AUB, W8CNL.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage for airmail) to "CQ WPX Awards," 5014 Mindora Dr., Torrance, Calif. 90505 U.S.A.

land of Studio City in Southern California. If you think hard you may quickly recall that you've heard that call in connection with other calls in other places.

Hardly had we recovered from AA6AA's great triumph, when in came Al Hix, W8AH, with 5BWAZ No. 5. Paraphrasing one of the beer commercials, "That ain't low cycle DXing!" Elsewhere W4KA who guards the 5BWAZ portico lists the 5BWAZ standings. It's most interesting.

French QSLs

L'Union des Radio-Clubs recently ran a QSL routing list in "Ondes Courtes—Information." If you have the French version of the Zip Code, in France the number is immediately in front of the city. The following will help you with some short routes for URC QSLs. If not listed here, you'll have to try the longer routes. To illustrate how things work, the 07 prefix is handled by F9RO, A. Robert Olivier, La Sarrazine, Salymes, *07*230 Lablachere. Here's the list:

07 area to F9RO
19 area to F9RE
20 area to FC6GDR
22 area to F6FMM
24 area to F6GQG
25 area to F6AFI
26 area to F6EFN
30 area to F6GJY
34 area to F6DYB
35 area to F1ECY
37 area to F5YG
41 area to F5YG
42 area to FE7634
43 area to FE7634
45 area to F6YG
54 area to F2LM
58 area to FE9438
59 area to F2KH
60 area to F1APH
69 area to FE7634
70 area to F6GEF
72 area to F3GU
73 area to F6FHS
75 area to URC
78 area to F1DWO
79 area to F1FJV
79 area to F6EUB
83 area to (below)
85 area to F6DRP
87 area to FE1198
88 area to (below)
91 area to F6FNZ
94 area to F6ERP

FE7634 Jacques Parmantier, 52, rue Le Corbusier, 42100 St. Etienne.
FE9438 Lucien Vincent, Pouques, 58140 Lormes.
FE1198 Francois Theveneau, 35, rue du Marechal Foch, 87100 Limoges.
83 Andre Dubuc, 4 b Mont des Eaux, Le Joncquet, 83200 Toulon.
88 Amicale des Radioamateurs Vosgiens, 56, avenue des Fusilles 88150 Thaon les Vosges.
URC BP 73-08, 75362 Paris Cedex 08.

PT-9

This one is for the new Brazilian state of Mato Grosso do Sul, the prefix being assigned by the Brazilian Communications Ministry. Remy Flores Toscano, PT2VE, Presidente da LABRE, passes along the complete list.

PP1 Espirito Santo (ES)
PP2 Goias (GO)
PP5 Santa Catarina (SC)
PP6 Sergipe (SE)
PP7 Alagoas (AL)
PP8 Amazonas (AM)
PR7 Paraiba (PB)
PR8 Maranhao (MA)
PS7 Rio Grande do Norte (RN)
PS8 Piaui (PI)
PT2 Brasilia (DF)
PT7 Ceara (CE)
PT8 Acre (AC)
PT9 Mato Grosso do Sul (MS)
PU8 Amapa (AP)
PV8 Roraima (RR)
PW8 Rondonia (RO)
PY1 Rio de Janeiro (RJ)
PY2 Sao Paulo (SP)
PY3 Rio Grande de Sul (RS)
PY4 Minas Gerais (MG)
PY5 Parana (PR)
PY6 Bahia (BA)
PY7 Pernambuco (PE)
PY8 Para (PA)
PY9 Mato Grosso (MT)
PY0 Oceanic Islands

73, Hugh, WA6AUD

QSL Information

WP2ABZ/C6A-to NP2AF
C6ADV-to N7YL
C5ACC-to KB4GQ
C5ACO-to W2TJ
C31MK-to EA3WZ
C31VM-to EA3GKZ
CT2DE-to WB3IFD
F0FZF/FC-to IS0IFA
FG0FIS/FS-to K6LPL
FO0ALN-to K4II
FP0FSZ-to VO1FB
J73A-to K2TJ
KG4KK-to N6AWD
LU1TAB-to W3KHQ
N7AQS/KH6-to WB7DDQ
N7AQS/NH8-to WB7DDQ
OA8CP-to N4CQ
OJ0MA-to OH0NA
P29RY-to WA4WTG
PZ1DR-to WD4NBX
TU2JJ-to KN0KCW
VE1AI/1 Sable-to VE1AI
VP2AZG-to WB4SXX
VP2AJ-to WB2TSL
VP2EA-to KB4QB
VP2KAA-to N4PN
VP2KAC-to N4RJ
VP2KAE-to K4UEE
VP2KJ-to WB2TSL
VP2VGF-to NP2AF
VP5GM-to NP2AF
WP2ABZ-to NP2AF
ZF2AN-to W5UF
ZF2DS-to K2ITT
ZF2CC-to N4RA
ZF1KG-to VE3KGK
ZL1BRQ-to WB7DDQ
ZP5KS-to WA4WTG
1A0KM-to I0MGM
PA0LVB/3A-to PA0LVB
PA0WRS/3A-to PA0WRS
4K1A-to UB5LHO
5Z4YV-to JA2AJA
5T5NC-to G3TXF
6Y5DA-to VE4JK
6Y5MC-WA4WTG
6Y5YL-to N2MM
8P6M-to VE3FCU
8P6J-to N6TJ
8P6CW-to N6TJ
9Y4E-to WA4WTG
9G1RT-to KB7HB
C6ANU-to Box 703 Nassau, Bahamas Islands.
P29EJ-to Box 1486, Lae, Papua-New Guinea.
PA0VDV/3A-to Joeke Van der Velde, Fazantenhof 57, 3755 EE Eemnes, Netherlands.
5Z4QS-to Manfred Hanke, 3166 Forest Glade Dr., Windsor, Ontario N8R 1Z2.

a monthly feature by
ADRIAN WEISS, K8EEG

QRP

THE ART OF VERY LOW POWER OPERATING

The QRP Beginner in 1926

I've been hard at work putting the *CQ-Milliwatt QRP Handbook* in publishable form. The project has involved some research into the early days of QRP operation in the U.S.; surprises abound as to the prevalence of the QRP spirit back then in the days of shortwave pioneering! A large majority of the early amateurs in the 'twenties ran QRP because that was the only power level available to them due to difficulties in acquiring transmitting tubes and providing B + power for them. And they did phenomenal distance work on frequencies ranging from the middle of our present a.m. broadcast band down to 40, and then 20 meters. In those days, the shortwaves (below 1500 kHz) were a total mystery; they simply did not know anything about propagation and other important matters. It was the most exciting period in amateur radio, when every amateur faced the possibility of making an important discovery every time he hit the key. But I'm getting off the subject of this column, and besides, you'll be able to read all the details about QRP in the early days in the upcoming *Handbook*!! To get back to the column, one day I was searching through a microfilm of the 1926 *QST*, eyes bleary and aching, fidgety from sitting for hours in the stuffy microfilm room. Then something caught my attention and brightened up the whole day. It was a story about a QRP beginner, written in an inimitable style from a delightful perspective. J.T. McCormick, 9BHR, knew what he was talking about and knew how to say it. His story is a classic, and much can be learned from it about the common sense, analytic approach that a successful beginner must learn if he is to succeed as an amateur—especially if he intends to operate QRP. At first, I intended to include the story, or selected parts of it, as part of the *QRP Handbook* chapter on the history of QRP, but after trying to do that, I realized that the story is one of those classics which lose much by being related in exerpted form. Poor stories and articles can be made to look better than they actually are if just the good passages are quoted—not so with stories like this. The only solution was to publish the piece here in its entirety, and preserve the wit, humor, and common sense attitude exhibited by the author.

As a preface, it might be helpful to provide a few explanatory comments on the equipment and terminology that 9BHR uses. First off, the transmitter that he describes initially is a two-stage affair, with an oscillator and an amplifier. The second version is simply an oscillator type transmitter. The problem with frequency stability ("swinging") occurred because the antenna was inductively coupled directly to the frequency determining inductance. In modern terms, the antenna was coupled directly to the v.f.o. inductance, and any slight change in impedance exhibited by the antenna "pulled" the frequency of the transmitter. The power level of the unit was determined by the 201-A tubes used in it. These were receiving tubes, and at a plate voltage of 96 volts could be expected to operate at an input of about 2 watts. With 192 volts, the input probably would have risen to about 5 watts. The "grid-leak" which 9BHR unfortunately replaced with a "C" battery stabilized the grid-filament circuit by means of a very high resistance shunted by a large capacitor—d.c. stabilization. The "tweeting" that he refers to as a tone problem is equivalent to our modern "chirp." The major method of tuning a transmitter in those days was by means of a thermocouple a.c. ammeter inserted in the antenna feedline; adjustment was aimed at maximum antenna current. However, they didn't quite perceive that the measured current was not necessarily going into the antenna wire; it could just as easily be feeding the "counterpoise" wire which was usually placed on the ground, or close to it. The "skywire-counterpoise" system was relatively simple: One piece of wire was suspended as high as possible and worked against another piece of wire termed the "counterpoise" and arranged as noted. At the time, using an actual "ground" connection was a matter of preference and debate. As a result, everything in a given installation could have been alive with r.f., and that led to 9BHR's problem with his wife's perambulations around the house. The unit that 9BHR initially built shows his rather ambitious, naive attitude. It is actually a receiver and transmitter built on the same 8" × 24" board with 6" front panel. The receiver was a regenerative type, which exhibited the same type of frequency instability problems as the transmitter, especially in the presence of a transmitted signal nearby, in which case the receiver would be "pulled" onto the transmitter frequency.

So much for background explanations. The piece speaks for itself.

**83 Surburban Estates, Vermillion, SD 57069*

Of, By and For the Beginner*

By J.T. McCormick

This article is meant for beginners and is written by a beginner. Old Timers who need a good laugh are welcome. Come on in!

The writer (the beginner of the first part) has had poor luck in securing advice from old timers. They have *tried* hard enough, goodness knows! The difficulty lies in their not getting the beginner's point of view. Beginner's problems simply are not problems to the old timer—and there you are!

I recently began to "get out" with my first little "peep peep" station. I believe that an account of my experience in "getting on the air" will prove rather helpful to the fellow who is just a jump or two behind me.

My first crystal set worked "right off the bat" but my first transmitter has, er—taken some of the conceit out of me. Before receiving my license, I knew everything—yes, everything! I had built a neat little outfit, transmitter and receiver combined, somewhat as it appears in the photographs, but not quite! Changes have been made.

Trouble Begins

The original transmitting hookup was a master-oscillator power-amplifier affair, using a 96-volt storage B-battery for power supply. 201-A tubes were used. I fondly hoped to neutralize this thing on forty meters! I suppose it could have been done by using enough shielding, time, and possibly, separate batteries for each tube. I did not have sufficient patience, however. Neutralization not being entirely necessary, it remained unneutralized.

My license finally arrived and I set out to "knock 'em dead" with low power. I had no meters and so was using the usual flashlight bulb to indicate resonance in the antenna circuit. I had no difficulty in tuning the plate circuit of the power amplifier to resonance with the master oscillator. A flashlight bulb shunted across the antenna pick-up coil did the trick. When I tried to tune the antenna to resonance, however, I ran into difficulties. I did not have enough antenna circuit to light the bulb. I had forgotten the radiation resistance!

I finally conceived the idea of placing the bulb in the tuned plate circuit of the power amplifier. The bulb, by the way, should be inserted in the lead going from the variable condenser to the plate of the tube. If it is placed in the other condenser lead, the current is too great and it will burn out. When the antenna circuit was then tuned more or less to resonance the bulb went out. Simple! The bulb was then short-circuited by means of a switch provided for that purpose. Fine! I now knew, at least, that I was radiating *some* energy.

Next, I wanted to know what my station sounded like on the air. I tuned my receiver to forty meters. There was nothing but a "swish" to indicate that my transmitter was oscillating. I had expected this, however. The transmitter oscillations being comparatively strong, the receiver was drawn into unison with the transmitter. I next tuned the receiver to twenty meters. Ye gads! The wave was afflicted with St. Vitus dance! I loosened the antenna coupling. Much better! I loosened it still more.

I next made a discovery. I listened on eighty meters and found that the wave seemed much steadier than when I listened on twenty. A little thought solved this mystery. For every change in frequency made by the transmitter its second harmonic goes through a change of frequency twice as great. When I listened on twenty meters I was listening *to* the second harmonic of my transmitter and things sounded twice as bad as they really were. When listening on eighty meters I was listening to the main wave of the transmitter *with* the second harmonic of my *receiver*.

All this sounds as if I had been holding the key down for hours. Not so. I believe that a fellow ought to have some sort of idea as to what he is trying to find out before he starts to test. If I do not hear what I want to hear within a minute or two, it is time to "shut 'er off" and think it over again.

I next tried working the key. Another problem! My note had a terrible "tweet". By "tweet" I mean that the wave "skidded" every time I pressed the key, so that I heard only the dots and the beginning of the dashes or else heard only the tail end of the dashes—depending upon how I tuned the receiver. I knew, in a general manner, the cause of this, but try as I might, I could not eliminate that "tweet". It seemed that the tube impedance began to change the instant the plate current started to flow and continued to change for a considerable fraction of a second. While the tube impedance was changing, the frequency was also changing. I did not try to "work" anybody. No one could have read such a note—though lots of folks never seem to think of that.

A Simpler Set

I suppose I should have "stuck to my bush", but I did not. I decided to work with something simpler and so discarded the whole master oscillator scheme.

I chose the series-fed balanced Colpitts circuit popularized by Hoffman of the Burgess Laboratories and used in the set which was built for the Wilkins north-pole expedition. This hookup was simple and would use all three of the variable condensers which were already mounted in my outfit. I did not use a grid leak, however. I had been using a C-battery in the old hookup and continued to use it in the new one.

Grief and more grief! The same old "tweet" persisted. Moreover, I now had no means of tuning my antenna to resonance. I decided to light up that antenna "ammeter" or go broke. I went to the nearest radio store and spent thirty dollars for another 96-volt storage B-battery and two dollars for a Bradleyohm to serve as a grid leak.

Glory be! My "ammeter" lit! The variable leak eliminated the "tweet". When the leak was properly adjusted, my note began to "toot", as it should, instead of "tweeting". If you do not understand what I am trying to say about "tweeting" and "tooting", listen to the crystal control stations—they "toot".

I was now nearer than ever before to having a real station, but was still far from the goal. The wave was swinging much worse than had been the case when using the master-oscillator power-amplifier arrangement. I loosened the coupling until it looked actually foolish. The swinging was improved by this, but not nearly enough. My next act was to give the neighboring BCLs a treat. I went out and guyed my aerial and counterpoise at short intervals with cotton string. (If you laugh, it shows that you don't know anything about "forty meters", so there!)

I tested again. Eureka! The wave was not entirely steady, but was good enough to try. Now to work someone! Anyone! I was really not very confident of the result. An interval of two months or so had elapsed by this time since receiving my license. Little things—such as continuous failure—have a way of undermining a fellow's faith.

I spent the remainder of the afternoon and evening trying to "raise" somebody. I called CQ (properly); I answered other fellows' CQ's, but without response. It was finally time to go to work (I work at night) and failure was still mine. (No sleep that day, of course.)

All night long, while at work, I pondered over the problem. I remember what the old-timers have told us so often—that the amount of antenna current is no indication of how well we are getting out. I had noticed, while adjusting the set, that oscillation did not seem to be very strong at the high frequency end of the forty meter band. I had supposed this to be due to the peculiarities of the choke coil—or some such thing. I now viewed the matter in a different light. "Perhaps," I thought, "oscillation is just as strong at this end of the band as at the other, but the antenna current is less because of *increased radiation resistance*!"

The following day I tuned the set as near to the short wave end of the forty meter band as I dared. It was necessary to couple the antenna coil closely in order to find resonance, afterward loosening the coupling until the wave was sufficiently steady.

Success at Last!

9CFN was on the air. I called him with as much outward confidence as if I was in the habit of working the antipodes daily, but I had an inward conviction that my signals were having a struggle to cross the county line. I threw the switch to the receiving side—expecting nothing.

I want to tell you, fellows, that the sound of my own call letters zipping through my phones was the sweetest music I had ever heard in my life! I shall never forget it during the rest of my days. The music in Heaven will doubtless prove to be a distinct disappointment to me, provided, of course, that I. . .

Habit kept my pencil going, but my thoughts danced about in chaotic ecstasy. (I am getting poetic, but dang it! I have to express myself, don't I?) 9CFN had finished and was waiting for my answer. I grasped the key. Something was wrong! It had turned into a "bug" key! I sent a string of dots at about sixty per. Perhaps I was nervous. I tried using both hands. This only made it twice as bad.

Horrors! I could not answer him! I wept and overturned my chair in excitement. My wife came running—convinced that lightning had struck the shack at last! She found me leaning weakly against the wall, gasping for breath. I grinned an idiotic grin. "Gosh Mom," I sputtered, "I *worked* a fellow!"

Sure, go ahead and laugh, but see what happens when *you* work *your* first station.

I was working too near to the edge of the forty meter band to be absolutely sure that I really was inside of it. Therefore, I went out and added a few feet of wire to my antenna for the purpose of increasing the radiation resistance in the middle of the band. I intend to stick right there—in the middle of the band—until I know my "stuff" better.

After working a few stations, I made another discovery. I found, while testing for "swinging", that a goodly portion of the unsteadiness was caused by my wife walking under the electric light fixtures. Experiment showed that the signal disappeared completely when the fixture was actually touched with the hand. This was true of any fixture in the house—and I lived in an apartment house! I solved the difficulty by establishing a local "ground" for the lighting circuit by grounding it through a condenser taken from a Ford Coil. This is as good as an actual ground so far as radio frequencies are concerned and it will not blow your fuses if a plug happens to get turned around.

I worked more stations. By the time I had worked an "8", nearly a thousand miles distant, I was growing more and more proud of my outfit and more and more ashamed of my operating ability. Learning the code and the Q signals does not make an operator. My station has been "off the air" for some time. At present, I am just listening to the other fellows while I try to learn something about good operating practice. Try to learn something about operating while you learn the code, fellows, it will save you time and embarassment.

**Reprinted by permission of ARRL from June 1926* QST, *p.17.*

Well gang, in a lot of ways, there are many differences between operating in 1926 and today, but notice that there are certain aspects of 9BHR's attitude which are the essence of successful QRP hamming even today.

A lot of good hard thinking is necessary, and to make sense of the phenomena which we meet in trying to get a new rig to work, we must do our homework. Remember, the QRPer relies upon knowledge and skill to offset his tremendous power disadvantage. That's the basis of the QRP challenge, but it is also what makes success such a sweet experience! We QRP operators and our attitude and approach to hamming go way back to the very beginning of the modern era in radio. You'll be able to read about the subject in much greater detail in the *Handbook* which, hopefully, will be ready by the summer of 1981. For now, I've got to get back to work on the thing. One closing note: I'm very pleased and excited to announce, unofficially, that the Board of Directors of the *QRP ARC I*, formerly a "100 watt QRP" organization, has recently voted to join the genuine QRP ranks by redefining the *QRP ARC I* as a *five-watt-output*-standard organization. In the future club awards will be on the basis of r.f. *output* powers of under five watts. This is good news for the worldwide QRP movement! K8IF expended a tremendous amount of energy and time, as well as taking a tremendous amount of flak, in convincing the Board that a great majority of club members favored the change. Job well done!

73, Ade, W0RSP/K8EEG

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47 pF CHIP CAPACITORS $6.00
For use with dual conversion board. Consists of 6-47 pF.
70 MHz IF BOARD $25.00
This circuit provides about 43 dB gain with 50 ohm input and output impedance. It is designed to drive the HOWARD/COLEMAN TVRO Demodulator. The on-board band pass filter can be tuned for bandwidths between 20 and 35 MHz with a passband ripple of less than ½ dB. Hybrid ICs are used for the gain stages. Bare boards cost $25. It is estimated that parts for construction will cost less than $40.
.01 pF CHIP CAPACITORS $7.00
For use with 70 MHz IF Board. Consists of 7-.01 pF.
DEMODULATOR BOARD $40.00
This circuit takes the 70 MHz center frequency satellite TV signals in the 10 to 200 millivolt range, detects them using a phase locked loop, deemphasizes and filters the result and amplifies the result to produce standard NTSC video. Other outputs include the audio subcarrier, a DC voltage proportional to the strength of the 70 MHz signal, and AFC voltage centered at about 2 volts DC. The bare board cost $40 and total parts cost less than $30.
SINGLE AUDIO $15.00
This circuit recovers the audio signals from the 6.8 MHz frequency. The Miller 9051 coils are tuned to pass the 6.8 MHz subcarrier and the Miller 9052 coil tunes for recovery of the audio.
DUAL AUDIO $25.00
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CIRCLE 83 ON READER SERVICE CARD

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dateline... Washington, D.C.

THE INS AND OUTS OF THE WASHINGTON SCENE

FCC Opens New Field Office

In a move designed to facilitate the enforcement of the Commission's rules, the FCC, in late December 1980, opened a field office in St. Louis, Missouri. St. Louis had been the largest metropolitan area without a field office, though the area has been served by the district office in Kansas City, Missouri. Creation of the new office was prompted by the difficulties encountered in investigating complaints in the St. Louis area. In this regard, personnel at the new office are already pursuing several cases related to interference by one amateur to the operations of another amateur.

The Commission is also planning to open a new field office in Little Rock, Arkansas in early 1981. Like the St. Louis office, the Little Rock office will be dedicated to enforcement, and both will provide fast response to cases involving so-called "safety-of-life" services (fire, police, aircraft navigation and control, etc.).

It is the FCC's goal to eventually have field offices located throughout the contiguous United States, with no area more than one day's car travel away.

FCC Postpones Office Move

According to *The Washington Post*, the Commission has delayed its plan to move its headquarters and 1,700 employees from downtown Washington, D.C., to two high-rise buildings in Rosslyn, Virginia. The delay resulted from a complaint by FCC Chairman Ferris' fellow commission members that they had been "kept in the dark" about the proposed move. These commissioners, in rebuffing Ferris and top staff officials, accused the chairman of trying to ram his plan through without adequately exploring alternative plans. Support for the move to Rosslyn by the union that represents most FCC workers also appears in doubt.

Action by the commissioners to delay the move resulted, in part, from congressional pressure. Several congressmen wrote to the FCC and requested that controversial decisions be delayed until the new administration and the new congress can take up such issues. Note, in passing, that the new administration is expected to appoint its own FCC chairman, and this change, together with the appointment of two new commissioners in 1981, throws into question exactly how the matter of an office move will be resolved.

Reagan Appointees To Reshape Communications Policies

According to *The Institute* (IEEE), changes to be made in key Federal posts by the Reagan administration will affect national policies in a number of areas, including communications. It is almost certain that the FCC Chairman, Charles Ferris, a Democrat, will be replaced by a Reagan appointee. Although Mr. Ferris will probably step aside he does have the option to stay on the Commission until 1984. In another change, the commission seat now held by James H. Quello, also a Democrat, will be filled by a Republican appointed by the incoming President.

Chairmen of the Communications subcommittees in both the House of Representatives and the Senate will also be replaced. In the House, Rep. Lionel Van Deerlin, who was the lead sponsor of the bill to amend the Communications Act of 1934, was defeated in his bid for re-election. A Democrat will succeed him because the House is still controlled by that party. In the Senate, however, which is now controlled by the Republicans, Sen. Barry Goldwater will replace Sen. Ernest Hollings as the chairman of the communications subcommittee.

AMRAD Requests STA For EME Spread Spectrum Experiment

As previously reported in this column (March 1981), the Amateur Radio Research and Development Corporation, a non-profit organization of over 350 technically oriented radio and computer amateurs, has requested that the FCC approve a Special Temporary Authorization which will permit the group to experiment with spread-spectrum modulation techniques. Three major spread-spectrum experiments were originally described. AMRAD has now added a fourth. . .an experiment which will use the earth-moon-earth path.

The EME (or moonbounce) path presents a highly dispersive and disruptive channel for communication. The problems of libration fading and fading due to wide space reflections from the moon make moonbounce difficult. AMRAD believes that spread-spectrum techniques could be used to improve this communication mode by spreading the information over many different frequencies, thus eliminating the deep nulls which occur on narrowband channels. The spread spectrum receiver would correlate the signal contributions at different frequen-

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cies across a band, and thus would more reliably recover the information transmitted.

An 84-foot dish antenna at Cheltenham, Maryland, will be used for the proposed experiment, with the center frequency for the tests expected to be 432 MHz. The minimum spread is expected to be 16 kHz, with maximum spread ±1 MHz. Part of the experiment will be devoted to determining the spread required to avoid deep nulls found on narrowband EME channels.

Amateurs interested in participating in the series of spread-spectrum experiments proposed by AMRAD are encouraged to contact the Corporation's president, Paul L. Rinaldo, W4RI, 1524 Springvale Avenue, McLean, VA 22101.

Coherent C.W. Commands Increasing Attention

Writing in the *AMRAD Newsletter*, Ray C. Petit, W7GHM, noted that "coherent c.w. is amateur radio's first use of matched filters for digital communication." Coherent c.w., or c.c.w., is a technique by which the bandwidth used for receiving a signal is reduced through sychronization of the transmitter and the receiver. Reduction of the receiver bandwidth, in turn, eliminates noise from the receiver output, thereby increasing the signal-to-noise ratio. Attempts to implement c.c.w., however, had been thwarted by two obstacles: ringing in high-Q resonators, and inadequate frequency accuracy and stability of commercially made amateur equipment. These obstacles have now been overcome through the use of so-called "matched" filters and low-cost frequency synthesis techniques.

According to Petit, "a signal buried in noise emerges from the (c.c.w.) receiver sounding like a code-practice oscillator." With performance like this, we should not be surprised to see and hear more about c.c.w. in the future. In the meantime, amateurs interested in this communication technique are referred to the 1981 edition of the ARRL's *Radio Amateur's Handbook* for an overview of the subject.

CQ was in the forefront in publicizing coherent c.w. back in 1977. Adrian Weiss, K8EEG/Ø, *CQ*'s QRPp Editor, wrote a two-part treatise called "Coherent C.W.—The C.W. Of The Future" which appeared in the June and July 1977 issues of *CQ*. The series went into great detail describing the early experiments done by Petit and others and current (1977) state of the art theory and design, as well as covering accomplishments derived by using this system.

Are you cramped for storage, but not that cramped? Would you rather have speed than random access? Here's how to add a few r.p.m. to your tape based system in exchange.

INTRODUCTION TO BASIC

A Computer Programming Language

Part XVI—Speeding Up Tape Systems

BY BUZZ GORSKY*, K8BG

In the last installment I discussed some of the techniques used with Disk-Basic files. For those who do not need huge storage areas and who do not require random access to files, it is the speed (or rather the lack thereof) which is most frustrating in tape systems.

There are some software approaches which can speed up PRINT #–1 and INPUT #–1 statements. When a PRINT#–1 is done the machine first goes through a start-up procedure and writes a leader on the tape before actually writing any data. This leader is written each time the PRINT# –1 is performed. So if you want to put 50 items on tape, say C$(I), a list of calls, and you write:

```
10 FOR I = 1 TO 50
20 PRINT#-1, C$(I)
30 NEXT
```

then 50 such leaders will be written and the process will be very slow—far slower than the nominal 500 baud at which data is actually written by a LEVEL II system. An alternative is to list out some of the data in the print statement as follows:

```
10 FOR I = 1 TO 50 STEP 5
20  PRINT#-1,  C$(I),  C$(I+1),
    C$(I+2), C$(I+3), C$(I+4)
30 NEXT
```

This does the same thing, but includes 5 items each time and so must write the leader only 10 times; this will be 5 times faster than the routine above. This approach, however, can be tedious and will require individualization for each list that is to be written. Furthermore, if each item in the list is small, then many such items should be included in each PRINT#–1 statement and that makes writing the statements quite tedious. There is, of course, a better (though not necessarily simpler) way!

The program shown in listing #1 provides a sample set of data and then demonstrates a way to encode the data so that a PRINT#–1 statement can perform with maximum efficiency. There is then a decoding part to the program to restore the data to its original form.

Let's see what the program does. The first part will generate 50 5-character random letter groups (to simulate 50 sets of call letters). The next part of the program will group as many of these as possible into a single string variable called Z$. Each call is separated by a */* so that even if the calls were of different length, the program would work. Of course the */* cannot be included in any of the random letter groups or that would throw things off. The final part of the program can read the encoded material from tape and restore it to the original groups of 5 letters.

In line 10 we clear some string space, set the random number generator, and save space for 50 C$(I). The PRINT CHR$ (23) will change the display to 32 char/line format. In line 20 we start the loop that will generate the 50 5-letter groups. If you wish to just enter 50 groups yourself, you could eliminate lines 20 through 80. We set C$ equal to the null string and then start the J loop which will run from 1 to 5. Z is set equal to a random number between one and 90, and if Z is less than 65 we try again. In this way Z will be between 65 and 90, or the ASCII value of one of the capital letters. Then Z$ is set equal to CHR$(Z), or the letter for which Z is the ASCII value. Now C$ is set equal to C$ plus Z$. You may recall that the + sign when used with strings "concatonates" or strings-strings-together. The first time through the J loop, then, C$ equals Z$, the next time through the new Z$ is added to the old Z$, and by the fifth time through we have a 5-character string. C$(I) equals C$ so that eventually we have 50 such 5-character strings. The statement in 80 prints I and J near the center of the screen so that you can keep track of what's happening, and the two NEXTs close the two loops. Line 80 concludes the generation of the random letter groups. Note that a routine just like this could be used to generate random letter groups for Morse code practice in a program that sent Morse code.

In line 90 we begin the process of encoding the data, or putting the C$(I) together to maximize tape output effi-

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LISTING #1

```
10 CLEAR 2000:RANDOM:DIM C$(50):CLS:PRINT CHR$(23)
20 FOR I = 1 TO 50
30 CS = " "
40 FOR J = 1 TO 5
50 Z = RND(90):IF Z < 65 THEN 50
60 Z$ = CHR$(Z)
70 C$ = C$ + Z$:C$(I) = C$
80 PRINT @ 480,I;J:NEXT:NEXT
90 J = 1
100 Z$ = " "
110 FOR I = J TO 50
120 Z$ = Z$ + C$(I) + "/"
130 IF LEN(Z$) > 240 THEN 150
140 NEXT
150 PRINT Z$: PRINT# – 1,Z$
160 IF I = 51 THEN END
170 J = I + 1:GOTO 100
200 CLEAR1000:CLS:DIMC$(50): N = 1
210 INPUT # – 1,Z$
220 FOR I = 1 TO LEN(Z$)
230 IF MID$(Z$,I,1) = "/" THEN 250
240 NEXT
250 C$(N) = LEFT$(Z$,I – 1)
260 N = N + 1
270 PRINT Z$:IF I < = LEN(Z$) THEN Z$ = RIGHT$(Z$, LEN(Z$) – I)
280 IF LEN(Z$) > 5 THEN 220
290 IF N > 51 THEN 210
300 FOR I = 1 TO N – 1
310 PRINT C$(I),;
320 NEXT
```

ciency. We set J equal to 1 and Z$ equal to the null string. We then start a loop that will run from J up to 50. Thus, the first time through this loop will begin at one, and the last time through it will end at 50 so that all 50 of the C$(I) will be taken care of. In line 120 the concatonation takes place by adding C$(I) and a slash to Z$. Each time through then Z$ is built up by another C$(I) with a slash on the end so that the slashes separate the C$s. In 130 we check to see if Z$ is getting too long and if it is over 240 characters (we can output a 254 character string, so this is not quite the biggest the machine can handle). If so, we go to 150; otherwise, we go through the loop again. At 150 we print Z$ on the screen, just to show what has happened, and then put it on tape. In line 160 we check on the value of I. If the loop had ended naturally at the NEXT in 140 then I would be equal to 51. In that case we END. Otherwise we know the loop was exited before all 50 C$s were put on tape. So we now set J equal to I plus one and go to 100 to begin the concatonation process once again with the next C$(I). With the 50 sets of 5-character strings, the second time through will take care of the remaining groups and the program will END.

Line 200 has the decoding program which would be used to take data from tape and restore it to its original form. You would type RUN200 to get this part of the program to run. We begin with some housekeeping and then read in the first Z$ from tape. In 220 a loop begins which will run from one to the length of Z$. In 230 we look to see if the character pointed to by the MID$ statement is a slash. If so we go to 250, if not we look at the next character by continuing the loop. In 250 we set C$(N) equal to the LEFT portion of Z$ up to but not including the slash. We then increment N. In 270 we print Z$ on the screen just to show what is happening; then if I is less than or equal to the length of Z$, Z$ is set equal to the right portion of Z$ beginning just after the slash. This then reduces Z$ by the character group that was just assigned to C$(N) and the slash that separated that C$(N) from the next. In 280 if Z$ still has more than 5 characters we go back to 220 and start the process of separating out the left hand group again. Otherwise we check to see if we have picked up all 50 groups. If not we go up to 210 and input another Z$; otherwise we are done. Lines 300-320 print the 50 groups on the screen.

You will note that in this decoding and encoding program one must know something about the lengths of the strings involved and about their characters (i.e., that there is no slash in the random letter groups). This would be true of any similar program written to encode and decode actual data. Routines similar to this will make working with data via tape much faster. This approach demonstrates that software can sometimes help solve hardware problems.

Bobby Vogel, KA0HHJ, first became licensed as a Novice in January 1980 and expects to have upgraded to General by the time this picture appears in CQ. He is afflicted with Dyslexia and Spinal Bifida, making it almost impossible for him to read. Nevertheless, Bobby has persisted for six years and is close to attaining his goal of becoming a General Class amateur radio operator. Dennis E. Johnson, KA0CYB, has been tutoring Bobby in code and theory since the fall of 1979. Bobby uses a Heath SB-104 Transceiver with a Hy-Gain trap vertical antenna for 10 through 80 meters. He also uses a scanner to monitor police, emergency, and two meter activities.

In alpha-numeric sequence, we are allowed to exchange third-party traffic (which is information directed to and/or from others besides the involved amateurs) with foreign amateurs using any of the callsigns in the following list. We are also allowed to exchange third party traffic with other American amateur radio stations.

A8	XA-XO
CA-CM	XQ-XR
CO-CP	YN
CV-CZ	YS
D5	YV
EL	ZP
HC-HD	ZV-ZZ
HH-HI	3E-3G
HK (not HK0)	4A-4C
HO-HR	4M
HT-HU	4T
H3	4U1ITU
JY	4V
LO-LW	4X4
L2-L9	4Z4
OA-OC	5J-5M
PP-PY	6D-6J
TD-TE	6Y5
TG	6Z
TI (not TI9)	8R
VA-VG	9G1
VO	9Y4
VX-VY	

Reciprocal Agreements

We have reciprocal agreements that allow American amateurs to operate in any of 55 foreign countries. These agreements also allow amateurs from the same 55 countries to operate when in our country. In each case, the amateur's license is accepted and she/he is allowed to operate in the foreign country without re-examination. Reciprocal licensees operating in America are granted Extra class privileges, regardless of their class of license in their home country. FCC Form 610-A is used to apply for reciprocal operating privileges; it can be obtained from most local FCC offices or by writing to FCC, P.O. Box 1020, Gettysburg, Pennsylvania 17325. Reciprocal operating permits are valid for one year, unless the reciprocal licensee's ticket expires before that time. We have reciprocal operating agreements with the following countries:

Argentina	Ireland (Republic)
Australia	Israel
Austria	Jamaica
Barbados	Jordan
Belgium	Kuwait
Bolivia	Liberia
Botswana	Luxembourg
Brazil	Monaco
Canada	Netherlands
Chile	Netherlands Antilles
Colombia	New Zealand
Costa Rica	Nicaragua
Denmark	Norway
Dominican Republic	Panama
Ecuador	Paraguay
El Salvador	Peru
Fiji	Phillipines
Finland	Portugal
France	Sierra Leone
Germany (West)	Spain
Greece	Surinam
Guatemala	Sweden
Guyana	Switzerland
Haita	Trinidad and Tobago
Honduras	United Kingdom
Iceland	Uruguay
India	Venezuela
Indonesia	

The only countries that are on our third party agreement list but are not included in current reciprocal operating agreements are Cuba, Ghana, and Mexico.

If you want to operate as a reciprocal licensee in one of the preceding countries, the FCC advises you to request a reciprocal operating permit from the radio licensing authority in the country you plan to visit. I advise you to also request information from the American Radio Relay League, 225 Main Street, Newington, Connecticut 06111. A couple of my ex-students got a lot of useful advice from ARRL personnel who are experts on this subject. League help made their reciprocal operation easier and better. A good source of foreign licensing authorities is your closest embassy for the country you plan to visit. If all else fails, request information from the QSL bureau and/or amateur radio clubs in the country you are going to visit; these addresses are available in the callbooks. If you plan to operate as a reciprocal licensee, you should get your permit long before your scheduled departure from home.

This is 14-year-old John Marcovecchio, KA2HKA, of Commack, New York. His station includes a Johnson Viking II Transmitter, an HA-600-A Receiver, and separate dipole antennas for 10, 15, and 40 meters. John has been a Novice since January 1980, and he has contacted other amateurs in 32 states, plus six countries. It appears that he is off to a great start in life, and his amateur radio training is likely to help him no matter what career he chooses.

DH Novices

Edmund Ramm, DK3UZ, advises that the Federal Republic of Germany has had a kind of Novice license since 1 June 1980. These operators are easily recognized on the air because their callsigns start with the prefix DH. Their operating privileges include A1, A2, A7J, and F1 on 3520 to 3600 and 21090 to 21150 kilohertz. They have voice privileges on 10 meters and higher frequencies and their output power limit is 150 watts. American Novices can work these West German beginning amateurs on their overlapping 10 and 15 meter band segments.

73, Bill, W6DDB

Wayne Gingerich, W6EUF, of Long Beach, California reads this Novice column regularly, and he has helped many people get started in amateur radio. Wayne handles sales of "The Radio Amateur's Conversation Guide." He just helped install 468 Altec Lansing horn speakers throughout Anaheim Stadium, the home of the California Angels and the Los Angeles Rams. He also helped install a cluster of giant deep throw speakers atop the stadium. That was quite a task for a 12-man company!

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Announcing

● **Madison Swapfest** - The Madison Area Repeater Association, Inc. will hold its ninth annual Madison Swapfest on Sunday, April 5 at the Dane County Exposition Center Forum Building in Madison, Wisconsin. Doors open at 8 a.m. for sellers and 9 a.m. for the public. There will be over 20,000 square feet of space for exhibitors and the flea market, with ample parking and hotel reservations available. Exhibits will include equipment and components for amateurs, computer hobbyists, and experimenters. Door prizes will be awarded. Breakfast, lunch, and free movies will also be provided. Admission is $2.50 per person in advance and $3 at the door. Children 12 and under free. Tables are $4 each in advance, $5 at the door. Talk-in on WR9ABT, 146.16/.76. For reservations or more information, write to M.A.R.A., P.O. Box 3403, Madison, Wisconsin 53704.

● **Michigan ARRI State Convention** - This event will take place on April 3-4 at the Muskegon Community College. There will be a "Ham Hospitality" on Friday evening, and doors open at 10 a.m. on Saturday. Featured will be a talk on the St. Pierre Island DXpedition (Friday evening) and technical forums, net meetings, commercial exhibits, swap-and-shop, and more, For more information, contact MAARC, P.O. Box 691, Muskegon,MI 49443, or contact Convention Chairman, Clarke Cooper, K8BP at 616-865-6198.

● **Rochester Area Hamfest** - The Rochester (Minnesota) Area Hamfest will be held on Saturday, April 4, at the John Adams Junior High, 1525 N.W. 31 St., Rochester, MN. Doors open at 8:30 a.m. There will be a large indoor flea market for radio and electronics items, prize raffles, refreshments, and free parking. Talk-in on 146.22/82 (WR0AFT). For further information, contact RARC, WB0YEE, 2253 Nordic Ct. N.W., Rochester, MN 55901.

● **Missouri ARRL Convention/Northwest Missouri Hamfest** - This event will take place on April 11-12 at the Old Airport, Kansas City, Missouri. There will be over 50,000 feet of commercial fleamarket space, forums, free parking. For information contact PHD, P.O. Box 11, Liberty, MO 64068.

● **Raleigh Amateur Radio Society Hamfest** - This 9th annual hamfest will take place on April 12 beginning at 9 a.m. at the Crabtree Valley Mall, US 70 West, in Raleigh, North Carolina. Prizes, fleamarket, hospitality room, special interest meeting. For more information and reservations, contact RARS Hamfest, P.O. Box 17124, Raleigh, NC 27619.

● **Framingham Spring Fleamarket** - The Framingham ARA will hold its annual Spring Fleamarket on Sunday, April 12, at the Framingham Police Station drill shed. Doors open at 9 a.m. Admission is $1, sellers $7 per table ($8 at the door). Talk-in on 75/15 and 52. For more information or to register, contact Ron Egalka, K1YHM, 3 Driscoll Drive, Framingham, MA 01701; tel: 617-877-4520.

● **12th Annual BASH** - The 12th Annual BASH will be held on the Friday night of the Dayton Hamvention, April 24, at the Convention Center, Main and Fifth Streets. Parking in adjacent City Garage. Admission free. Sandwiches, snacks, and c.o.d. bar. Live entertainment. Awards include a new synthesized HT. For further information, contact the Miami Valley FM Assn., P.O. Box 263, Dayton, OH 45401.

● **Puerto Rico ARC/ARRL West Indies Section Conventions** - These conventions will be held simultaneously on April 25 and 26 at the Palmas Del Mar Hotel, Humacao, Puerto Rico. Activities will include technical sessions, YL and children's special programs, plus banquet. Complete hotel and resort facilities available. Amateur radio manufacturers and dealers are invited to make arrangements for displays. For reservations and information, contact David Novoa, KP4AM, Convention Chairman, P.O. Box 50073, Levittown, Puerto Rico 00950, tel: (809) 784-7368.

● **Correction For "The HT Nicader"** - The article "The HT Nicader" (*CQ*, Jan. '81) did have an error in it which was brought to our attention by the author, Walt Becker, K1QPS. The schematic on page 47 has the error. The two bottom terminals of the top section of the function switch are reversed. The common, or center, terminal should be connected to the meter, and output jack, which then takes DC from either the top terminal, connected to the wall supply jack, or from the built-in AC supply. *(Sorry. Our eyes must have been crossed—ed.)*

Rx for a Bad Day

Is it one of those dull gloomy days when even the birds are walking, and it's not a fit day to go out and put up that new sloper or inverted vee antenna you wanted to try? DX isn't coming through yet because the MUF isn't right, some jerk squirrel keeps kerchunking the repeater or plays tunes on the Touchtone® so that two meters isn't fun. Maybe the wind played havoc with your beam last night and now it looks like a limp pretzel or some modern art object, or maybe your rig blew up in the middle of a QSO or just before that sked with a rare station in some far off land.

Any fool knows all these things aren't going to happen to you at once. But if it is 'one of those days' maybe you can just forget the whole mess and brighten your and someone else's day a little by taking some time to think of a fellow ham you admire and respect to nominate for Dayton's "Amateur of the Year Award" for 1981. No, it's not too early to think about it. It does take a little time and effort to nominate some one for "Amateur of the Year."

What is the stature of this individual that we seek for recognition each year at Dayton?

First, he or she will be a well-respected person in the community; a leader, not only in amateur radio activity, but in civic activity as well. He will probably be licensed for at least 10 years or more for it is long term overall excellence in amateur radio that we are looking for.

His contribution to amateur radio may be in any of the hobby related areas. Possibly his greatest contribution is in the engineering field of our hobby, or his expertise may be in antenna design, some new type of modulation or an improvement to existing design, etc. Maybe he has contributed greatly to improvement of amateur regulations or possibly his contribution is the legal field of our hobby, a very important one these days. Get the idea? In short, an outstanding individual and amateur.

In 1974, another award was established, the "Special Achievement Award." This award is just what it would seem to be — an award for one-time special event or specialized activity by an amateur or group of amateurs. This activity may be in the engineering field — QRP — DXpeditions —net activity — emergency work or any one-time outstanding activity related to the amateur radio hobby.

Nominees for both of these awards may be from anywhere in the world, not just the U.S.A.

So! Don't just sit back and say, "Gee!, somebody ought to nominate that guy for "Amateur of the Year." Don't wait for George to do it. Give us all the details you can gather, especially activities that are directly attributable to him or her.

All nominations are carefully reviewed and are saved from one year to the next for future consideration and to allow some nominees to develop to their full potential. All nominations are considered for both awards, and the awards will be presented at the 1981 HAMVENTION Banquet.

So, have you nominated some one in the past? You may want to renominate him with update on recent activities or just send in update information on his latest accomplishments.

Do it now! Besides you may win a set of free tickets to the "HAMVENTION" for your nominee and yourself.

For more information or nomination blanks (not mandatory) write to the address below:

HAMVENTION
P.O. Box 44
Dayton, Ohio 45401
Attention: Awards Committee

or

Bob Roettele, W8UNV
Awards Chairman
1299 Hanes Road
Xenia, Ohio 45385

a monthly feature by
FRANK ANZALONE, W1WY

Contest Calendar

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Some time ago I suggested that some of the records made in amateur radio should qualify for publication in the *Guinness Book of World Records*.

My initial inquiry to the publishers cited KV4AA, Dick Spenceley's record of 48,100 QSOs in 1978. Their answer confirmed that they were indeed interested in considering amateur radio as possible subject matter for their book, but they received little or no correspondence on this topic, so naturally there had been no material for publication.

At that time I suggested that a claim of a possible record could be sent to me, and I in turn would forward it to the *Guinness* publishers. However, Don Wallace, W6AM, was the only one who took time out to take advantage of this offer. His claim of contacting the most countries (365) should indeed qualify him for the *Book of World Records*.

How about most contacts in one hour, or one day, etc.? Some of you "hot shot" contesters should be able to make that claim.

Let me again remind you, however, that making a claim is not enough; it must be authenticated in a way that will be acceptable to the *Guinness* people. A published story in *CQ*, *QST*, or some other magazine or newspaper should be sufficient.

So stop procastinating, get off your duff, and send me your claims. We got our foot in the door, so let's take advantage of it.

A reminder about the two new Plaques that have been added to the All Band section of the WPX S.S.B. Contest—the Ray Alea, KB8JF, Carib. /C.A. Award and the Bernie Welch, W8IMZ, European Award.

Mailing deadline for your s.s.b. logs is May 10th, and this year you can send them to Bernie Welch, W8IMZ, 7735 Redbank Lane, Dayton, Ohio 45424, as well as to the CQ office, 76 N. Broadway, Hicksville, N.Y. 11801. Be sure to indicate S.S.B. Contest on the envelope.

73 for this time, Frank, W1WY

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

Mar. 28-29	N. & S. America RTTY
Apr. 4-5	ARRL Open CD Phone Pty
Apr. 4-5	Polish C.W. Contest
Apr. 5-6	Wisconsin QSO Party
Apr. 8-9	DX-Yl to N.A.-YL C.W.
Apr. 11-12	ARRL Open CD C.W. Pty
Apr. 15-16	DX-YL to N.A.-YL Phone
Apr. 18-19	Polish Phone Contest
* Apr. 18-19	YL ISSB Phone Party
Apr. 18-20	ARCI QRP QSO Party
Apr. 25-26	Swiss Helvetia Contest
Apr. 25-26	King of Spain Contest
May 2-3	County Hunters SSB
May 9-10	USSR "CQ-M" Contest
May 10	"Corona" 10 Meter RTTY
May 17-18	Michigan QSO Party
May 23-24	Europe & Africa RTTY
May 30-31	**CQ WW WPX C.W.**

* Covered last month.

North & South America RTTY

1800-0200 GMT Saturday, March 28
1200-2400 GMT Sunday, March 29

This is the second in a series of RTTY contests organized by the I.A.T.G. Radiocommunications. The first one, Oceania and Asia, took place back in January, but the announcement was received too late for publication. The next one, Europe and Africa, will be held next month.

Briefly the rules are as follows:

There are three classes—single operator, multi-operator, and s.w.l. All bands 3.5 through 28 MHz may be used.

Exchange: Signal report, QSO no., and your continent.

Points: Contacts on 3.5 and 7 MHz, 2 points. On 14 MHz, 3 points. On 21 MHz, 6 points. And on 28 MHz, 8 points. Contacts with stations in one's own country, no value.

Multiplier: One for each country worked on 14, 21, and 28 MHz, none for contacts made on 3.5 and 7 MHz within own continent.

Contacts with N. and S. American stations are worth 100 bonus points. Add another 100 bonus points if on 21 and 28 MHz. Other continents are worth 50 bonus points.

Final Score: Total QSO points × country multiplier × continent points + bonus points.

Awards: To the top four scorers; additional awards where warranted.

Scores in this contest are applied to the final standing in the Continent World Championship.

Entries must be received no later than April 30th and go to: Prof. Franco Fanti, Via A. Dallolio n 19, 40139 Bologna, Italy.

(Personally I found the rules and scoring much too complicated and difficult to understand. I would suggest that the good Professor rewrite and streamline them for future activities. Would also suggest you write to Prof. Fanti for his detailed RTTY booklet. You may be able to decipher it—Ed.)

ARRL Open CD Party

Phone: April 4-5 C.W.: April 11-12
Starts: 1800 Z Saturday
Ends: 0600Z Sunday

There are four of these CD (Communications Department) parties each year. The other three are only open to ARRL appointees. This one is open to all members of the ARRL family, and therefore merits mention here.

It's only a 12 hour affair with operation limited to 10 hours, and certain portions of the different bands have been designated for operation.

The exchange is very simple—transmit your "status" and your ARRL section. Non-appointees send "member" (MBR on c.w.). The rest of you know your title.

No point in my going into scoring details, etc., since to be eligible you must be an ARRL member, and if you are a member you will be receiving *QST*. The March issue had all the details.

There is a special CD Party report form. An s.a.s.e. to headquarters (225 Main St., Newington, CT 06111) requesting CD-136 will get you one.

(It is my personal opinion that this one CD Party a year should satisfy the

appetite of the competitive appointees and members. It would lighten the load on the already over-crowded weekends. I'll no doubt be receiving some flak on this. C'est la vie—Ed.)

Polish "SP" DX Contest

C.W.: April 4-5 S.S.B.: April 18-19
Starts: 1500 GMT Saturday
Ends: 2400 GMT Sunday

The SP DX Contest is now a two week affair, c.w. and phone, each independent of the other.

There are three categories—single operator, single band and all band, and multi-operator, single transmitter, all band only. Also s.w.l.

Exchange: RS(T) plus a 3 figure QSO number starting with 001 for foreign stations. Polish stations will send RS(T) and their province. (Wojewodztwo) i.e., 579KA or 57KA.

Scoring: Each QSO with a SP/SQ/3Z station on each band is worth 3 points.

Multiplier: Each different province (WOJ) worked. Counted once only (max. of 49).

Final Score: Total QSO points multiplied by number of provinces. The same station may be worked on each band for QSO points but not for a multiplier.

Awards: Certificates to the top scoring stations in each category and each mode. In each continent, each country, and each call area of Australia, Canada, Japan, USA, and USSR.

1980 "SP" Contest Results

C.W.			S.S.B.		
W1PL	AB	41,040	K1CC	AB	49,545
K1CC	"	39,600	K2VV	"	26,586
K1WT	"	29,025	KB8JP	"	22,572
W9OA	"	28,782	WA4QMQ	"	10,595
W3ARK	"	20,748	KB4DE	"	8,004
K2VV	"	20,286	K2POA	"	6,162
W8RSW	"	20,064	N7DF	"	4,212
W1END	"	19,071	KA1EP	"	3,816
W1BWS	"	15,120	WA4OPY	"	1,824
AG1M	"	14,175	W5LDH	"	1,302
W6UA	"	12,075	W9QWM	"	1,056
W4OML	"	9,486	WA7JUJ	"	660
W2PQZ	"	9,108	W4LVM	14	5,670
KA1EP	"	7,047	WA3IIJ	"	1,242
AA1M	"	6,750	WB9NXT	"	108
K9BG	"	6,075	N4OL	21	5,508
KD4Z	"	3,168	WB7RFC	"	3
WB9NXT	"	2,898	WA8IGG	28	75
W7ULC	"	2,775			
AK7G	"	2,706	VE1AVX	AB	34,440
W6TZD	"	1,215	VE3GCO	"	28,350
W9QWM	"	720	VE4RP	"	2,850
K9AYK	"	660	VE3FEA	"	459
K7NW	"	210	VE1CCC	14	7,650
W1DMD	14	9,894	VE3LH	"	4,536
W1SPI	"	3,300	VE3ECN	21	4,200
W2GUP	"	2,886	VE1BNN	28	2,268
W0 LHS	21	12			
W5EIJ	28	27	K1CC was top DX score.		
VO1AW	AB	17,316			
VE3GCO	"	15,318			
VE3DAP	"	14,385			
VE6LU	"	12,600			
4U1UN	AB	3,933			

S.w.l. entries must report the call of the Polish station as well as the call of the station being worked. Scoring same as above.

Contest contacts may be credited for the PZK awards in lieu of QSL cards, providing an application is

On the left we have Stu Meyer, W2GHK, presenting the 1978 Radio Club Venezolano multi-multi phone award to John Kanode, N4MM, one of the operators at PJ9JR, the winning station. Their 29,211,300 score set a new world record. (It was broken the following year by VP2KC's 37,770,012 score.)

On the right Ed Moody, N3ED, is accepting the CQ Club Plaque won by the Frankford Radio Club in the 1979 Contest. John Kanode, N4MM, President of the National Capitol DX Assn., is making the presentation. Stu Meyer, W2GHK, Chairman of EXPO-80, is making sure everything is in order.

DXPO-80 was the scene of a couple of CQ World Wide Contest plaque presentations last September.

made and the contact is logged by the SP station.

A summary sheet is requested showing the scoring, a signed declaration, and your name and address in Block Letters.

Entries must be postmarked no later than April 30th for c.w. and May 15th for phone. They go to: PZK Contest Committee, P.O. Box 320, 00-950 Warszawa, Poland.

Wisconsin QSO Party

Starts: 1800 GMT Sunday, April 5
Ends: 0200 GMT Monday, April 6

This one is sponsored by the West Allis Radio Amateur Club. The same station may be worked once per mode on each band, and mobiles on each county change.

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

Scoring: C.w. contacts are worth 2 points, phone contacts 1 point. The multiplier is countries + states and provinces + countries worked. (Presume they mean above multiplier for Wisc. stations. Others will use Wisc. counties.)

Frequencies: 3550, 3990, 7050, 7290, 14050, 14290. (Other bands not indicated.)

Awards not mentioned, but would assume that there will be some kind of compensation.

Entries must be postmarked no later than May 1st and go to: West Allis Radio Amateur Club, P.O. Box 1072, Milwaukee, Wisconsin 53201.

DX YL to N.A. YL Contest

C.W.: April 8-9 S.S.B.: April 15-16
Starts: 1800 GMT Wednesday
Ends: 1800 GMT Thursday

This is strictly a YL affair in which DX YLs will be contacting YLs on the North American continent. KH6, KL7, KP4, KV4 are considered DX.

All bands may be used but cross-band contacts are not permitted. And contacts with OMs do not count. The same station may be worked on each band for QSO credit. Avoid contacts on Net frequencies. Phone and c.w. are separate contests and require separate logs.

Exchange: QSO no., RS(T), state, province, or country.

Scoring: One point per QSO. Your multiplier is determined by the number of states, VE provinces, and DX countries worked. Counted only once, not once on each band.

There is a power multiplier of 1.25 for stations using 150 watts or less input, 300 p.e.p. on s.s.b.

Final Score: Total QSOs × (states + provinces + countries) × power multiplier if any.

There is a penalty for each duplicate contact removed from the log by the Contest Committee of three (3) additional and equal contacts.

Awards: Cups to the 1st place winners—DX phone, N.A. phone, DX c.w., N.A. c.w. And plaques to the highest combined c.w./phone DX score, and the highest c.w./phone N.A. score. Certificates to the 2nd and 3rd place DX and N.A. winners.

Submit separate logs for each contest. Include a summary sheet showing the scoring and other information, and the usual signed declaration.

Entries must be postmarked no later than April 30th and received no later than May 22nd. This year they go to: Kay Eyman, WA0WOF, RR 2, Garnett, Kansas 66032.

ARCI QRP QSO Party

Starts: 2000 GMT Saturday, April 18
Ends: 0200 GMT Monday, April 20

This is the Spring edition of this QRP activity sponsored by the QRP Amateur Radio Club International. It is open to members and non-members.

Exchange: RS(T), state, province, or country. Members include their QRP number, non-members their power input.

Scoring: Contact with a member 3 points, non-member 2 points, stations other than W/VE 4 points. The same station may be worked only once per band regardless of mode for QSO or multiplier credit.

There is also a power multiplier as follows:

Over 100 watts input	1.0
30 to 100 watts input	1.5
10 to 30 watts input	2.0
3 to 10 watts input	4.0
1 to 3 watts input	6.0
Less than 1 watt input	10.0

Stations using solar or wind power can add 500 bonus points to their final score. Those using battery can add 200 points.

Final Score: Total QSO points × (states + provinces + countries) × power multiplier + bonus points if any.

Frequencies: C.W.—1810, 3560, 7040, 14060, 211060, 28060, 50360, S.S.B.—1810, 3985, 7285, 14285, 21385, 28885, 50385. Novice—3710, 7110, 21110, 28110. No repeater contacts; try s.s.b. on even hours.

Awards: Certificates to the highest scoring stations in each state, province, and country with 2 or more entries; other areas depending on activity. Also to highest scoring Novice and station showing three "skip" contacts using lowest power.

1980 Helvetia Contest Results

* VE2WA	2,592	* W4OEL	20,532
* VE3HNO	351	W2GHK/4	6,438
* VE4MF	960	WA4OML	5,550
* VE5JQ	624	W4KO	4,350
* VO1AW	11,172	K4HHM	3,480
		W4KMS	1,512
		W4YN	1,350
		K4NYK	765
		WB4PHW	138
* KA1EP	8,694		
K1EM	4,650	* W5EIJ	867
W1END	3,276	W5SOD	429
WB1ANT	1,827	K5NE	48
W1CNU	540		
W1OPJ	147	* W6UA	9,120
		K6DDO	5,472
		N6ZX	3,828
* N2UN	15,675	N6JM	2,070
N2CQ	4,557	W6MYP	2,046
KA2EAO	1,482	N6BFQ	330
W2XQ	1,134	WB6NHV	330
K2QD	924	W6SZN	168
N2VW	624		
		* W7ULC	4,860
		K7NW	27
* W3ARK	10,701	* W8DA	10,062
W3EVG	6,030	KA8ANQ	1,596
N3AFU	5,544		
K3VW	4,320	* AE9X	270
WB3JRU	768		
WA3JXW	240	* WØLHS	108

*Certificate Winners

Logs must be received by May 20th and go to: QRP ARCI Contest Chairman, William W. Dickerson, WA2JOC, 352 Crampton Drive, Monroe, MI 48161. Include a large s.a.s.e. for copy of results.

Swiss Helvetia Contest

Starts: 1500 UTC Saturday, April 25
Ends: 1500 UTC Sunday, April 26

This activity offers an excellent opportunity to work some of the rare Swiss Cantons and build up your total for the new attractive Helvetia Award. Confirmation of all 26 Cantons is required, and only contacts made after Jan. 1, 1979 are valid.

Contacts may be made on all bands, 10 through 160 meters, phone or c.w. The same station may be worked on each band for QSO and multiplier credit, but only on one mode, either phone or c.w.

Exchange: RS(T) plus a three figure contact number starting with 001. Swiss stations will also include two letters indicating their Canton.

There are 26 Cantons: AG, AI, AR, BE, BL, BS, FR, GE, GL, GR, JU, LU, NE, NW, OW, SG, SH, SO, SZ, TG, TI, UR, VD, VS, ZG, ZH.

Scoring: Each HB QSO is worth 3 points. The sum of Cantons worked on each band is your multiplier (a possible multiplier of 26 on each band).

Final Score: Total QSO points multiplied by the sum of Cantons worked on each band.

Awards: Certificates to the top scorers in each country and each W/K and VE/VO call area.

Indicate a Canton in a separate column for each band the first time it is worked. Check your log for duplicate contacts. Include a summary sheet showing the scoring, and your name and address in Block Letters. The usual signed declaration is also requested.

Mail your log within 30 days to: USKA Traffic Manager, K. Bindschedler, HB9MX, Strahleggweg 28, 8400 Winterthur, Switzerland.

Applications for the Helvetia Award go to: Walter Blattner, HB9ALF, P.O. Box 450, Locarno 6601, Switzerland.

King of Spain Contest

Starts: 2000 GMT Saturday, April 25
Ends: 2000 GMT Sunday, April 26

The title and the top prize make this an attractive activity. The winner will receive an invitation to visit Calella for a period of 8 days to receive his Trophy. However, with the operation being spread over both the h.f. and v.h.f. bands, it is doubtful if anyone from this side will be taking a trip to Spain.

You can use all bands, 10 through 160 meters, and 144., 432., 1296, both on c.w. and s.s.b. Operation must continue on the same band for at least 15 minutes. There is a 4 hour compulsory rest period in the 24 hour contest period. The same EA station may be worked on each band and each mode for QSO point credit.

Exchange: RS(T) plus a 3 figure QSO number starting with 001. EA stations will also include 2 letters indentifying their province (a max. of 53 provinces on each band).

Scoring: One point per QSO. Multiply total EA contacts by the number of EA provinces worked on each band for your final score. (Contacts with Calella stations count an extra multiplier.)

Awards: Besides the Top Trophy there are also trophies for 2nd and 3rd place, and awards for the top continental and s.w.l. scores. Certificates will be awarded to all stations making 75 or more contacts, and s.w.l.'s logging at least 150 QSOs.

Logs must be mailed no later than June 1st to: Agrupacio Radioaficionats Calella, Apartado 181, Calella (Barcelona) Spain.

While HP or Tektronix might not lose sleep over this gadget, you can add a quick, simple and cheap item of test equipment to your shack.

The $3.00 Polarity-Sensitive Continuity/Voltage Sensor

BY MARTIN BRADLEY WEINSTEIN*, WB8LBV

Here's the bill of goods: One piezoelectric beeper-buzzer ($2.99 at Radio Shack), one battery (free from Radio Shack; just ask for your battery-a-month card), two pieces of hookup wire and, at your option, alligator clips or other connectors.

The little sucker beeps its head off when you put 3-18 v.d.c. (more or less) across it. And it draws only a few milli-Amps.

Hook up the positive lead to a positive supply and probe around with the negative lead to locate grounds or near-grounds. This can be especially useful in the car, for example, in locating those evasive wires accessories invariably require—courtesy light leads, instrument light leads, horn relay leads and so on. The reverse is true, of course, and you can locate hot lines by grounding the negative lead and probing with the positive. A straight pin is handy for piercing insulation and saving nerves.

In the shack, here's a way to locate hot or grounded lines inside a rig. And one more thing: the gadget is a very handy audible logic probe. While its frequency seldom varies, its amplitude seems dependent on voltage. To accentuate the difference, connect the battery positive to circuit ground and the buzzer negative to battery negative. Then a logic high will beep at high volume, low at a lower volume, and ground slightly lower still.

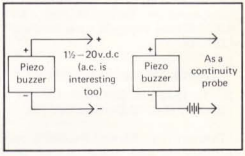


Fig. 1– For less than the price of a local movie and a bit more than a box of Malomars, you can build and use a multi-faceted piece of test equipment.

This series-battery connection also turns it into a handy cable ringer and continuity probe.

It's cheap, simple and useful. It can be put together in less time than it takes for a *Tonight Show* commercial break. So what are you waiting for?

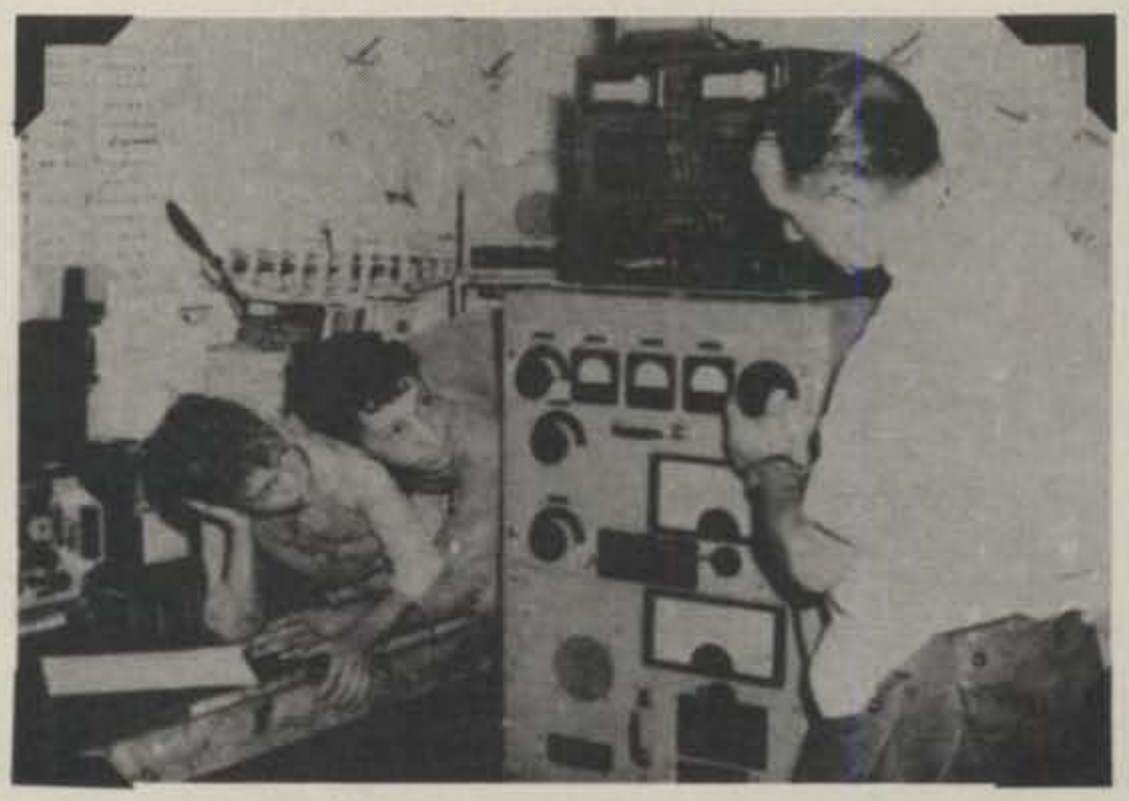
And people say that hams don't build things any more!

*c/o CQ Magazine

By The Way

To add to the CQ file of oldies but goodies, Peter (Papa Pierre) R. Turchi, K2IPK, sent us these vintage photographs of his amateur radio operation from the days before the advent of single sideband, solid-state transceivers, and all the advanced design innovations we know today. For those of you who were amateurs during the 1930's and 40's, these photos will bring back memories of your own. For the younger set, this is representative of amateur radio in "the good old days."

In 1934, Papa Pierre built the 10 meter rig shown in this photograph. It is now defunct and used for parts. With him in this picture is his wife, who used to enjoy rag chewing on the air.



Curiosity struck two boys as Papa Pierre was tuning up his transmitter in 1948. The rig on the left is a WW II tank transceiver; these units were made in the U.S. and supplied to the Russians.

K2IPK in 1949 at his station before he was recalled by the Navy for the Korean War. A Groucho Marx look-alike contest winner?

a monthly feature by
GEORGE JACOBS, W3ASK

Propagation

THE SCIENCE OF PREDICTING RADIO CONDITIONS

A new era began this year in sunspot record keeping. For more than 200 years the Swiss Federal Observatory at Zurich was the official keeper of sunspot records. However, the official records will now be kept by a newly formed international scientific organization located in Brussels, Belgium, called the Sunspot Index Data Center.

The Center will continue to publish daily and monthly sunspot counts, dependent on observations made at the Zurich Observatory and the station at Locarno, complemented by an international network of observatories. The data will be collated and evaluated by the Royal Observatory of Belgium, from where the daily and monthly values will be determined.

The changeover from Zurich to Brussels will not affect the long, uninterrupted chain of published sunspot data going back to 1749. The change apparently took place as a result of the Swiss Observatory's increasing interest in measuring solar activity electronically by means of solar flux radiation rather than optically through sunspot observations. With the burden of evaluating and publishing sunspot data now shifted to Brussels, the Swiss Observatory reportedly will devote more time to solar flux and other measurements.

The first monthly solar data to be reported by the Sunspot Index Data Center is 176.1 for December 1980. Daily values fluctuated from a low of 108 on the 7th to a high of 237 observed on December 16th.

This monthly mean results in a smoothed sunspot number of 155.2 centered on June 1980. A smoothed sunspot number of 135 is forecast for April 1981 as the present cycle is expected to continue its slow decline.

April Conditions

With the sunspot cycle still at a relatively high stage, the *10* meter band should remain very much alive during April and the spring months. Expect good DX openings to most areas of the world during the hours of daylight. While normal seasonal changes in propagation will result in fewer east-west openings, conditions towards southern and tropical areas are expected to hold up very well. Look for peak signal levels to most areas of the world during the late afternoon hours.

Expect *15* meters to be the best band for DX during most of the daylight hours in April and the spring months. The band should be loaded with DX signals from just after sunrise to well beyond sunset. Signals should be strongest to most areas of the world during the afternoon hours, but look for good, solid openings towards southern and tropical areas well into the early evening hours.

Twenty meters is expected to be a near 24-hour DX band during April and the spring months. Strongest signals, with DX openings to just about every area of the world, should occur during a two hour window after local sunrise and again during the late afternoon and through the evening hours, to as late as Midnight.

Shorter hours of darkness and increasing static levels in the northern hemisphere will result in somewhat poorer DX conditions on the *40*, *80*, and *160* meter bands during April and the spring months. Nevertheless, strong, stable signals should be possible to many areas of the world on *40* meters during the hours of darkness. Signals should peak from an easterly direction about an hour or two before Midnight, and from most other directions about an hour or so before local sunrise at the USA end of the path. Some fairly good DX should also be possible on *80* meters during the hours of darkness. Propagation patterns on *80* meters should be similar to those observed on *40* meters, but openings will be weaker and noisier. There is a chance for some DX openings on *160* meters during the hours of darkness, but expect to encounter increasingly high static levels.

The favorable equinoctial propagation conditions discussed in last month's column should continue through most of April. Check both long and short path openings during the sunrise and sunset periods, on all bands between *10* and *80* meters, for paths between the northern and southern hemispheres.

For *short-skip* openings up to approximately 250 miles, use *80* meters during the day and *160* meters at night. For distances between 250 and 750 miles, *40* meters should be best during the day, *40* and *80* meters from sundown to Midnight, and *80* meters from Midnight to sunrise. For openings between distances of 750 and 1300 miles, try *20* meters during the day, with both *40* and *80* meters best during the hours of darkness. Between 1300 and 2300 miles, check both *15* and *20* meters during the day, *20* and *40* meters from sundown to Midnight, and *40* meters from Midnight to sunrise. Short-skip openings beyond 1300 miles should also be possible on *10* meters during most of the afternoon hours.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for April 1981

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 9-10, 20, 28	A	A	B	C
High Normal: 1, 4, 6, 11-13, 21, 24-25, 29	A	B	C	C-D
Low Normal: 3, 5, 7-8, 16-17, 22-23, 26-27	A-B	B-C	C-D	D-E
Below Normal: 2, 15, 18-19, 30	B-C	C-D	D-E	E
Disturbed: 14	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 April 1st, fair-to-poor (C-D) on the 2nd, fair (C) on the 3rd, good (B) on the 4th, etc.

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

11307 Clara Street, Silver Spring, MD 20902

 No-85-86-87-88

The DX Propagation Charts in this month's column contain DX propagation predictions for each amateur band between *6* and *160* meters for the period *April 15–June 15, 1981*. Beginning this month and continuing through the summer and fall months, the times shown in the charts will be *local daylight* time (EDT, CDT, MDT, and PDT). For detailed predictions of short-skip openings between distances of 50 and 2300 miles, see the Short-Skip Propagation Charts, which appeared in last month's column.

V.H.F. Ionospheric Openings

Fewer DX openings expected on *6* meters this month as a result of expected seasonal propagation changes. Some openings may still be possible, however, from the USA towards southern and tropical areas such as the Caribbean, South America, Africa, the south Pacific area and Australasia. Look for possible openings towards the southeast and south from shortly before to an hour or two after Noon. Best bet for openings towards the south and southwest should be the late afternoon hours. Openings are more likely to occur when conditions are High Normal or better.

Trans-equatorial propagation (TE) often reaches a seasonal peak during April. These are difficult openings between the northern and southern hemispheres, passing nearly perpendicular to the magnetic equator. Signals are generally very weak and fluttery. Best time to check for *6* meter TE openings is between 8 and 11 p.m. local time. TE openings favor the southern tier states, but an occasional one may be possible further to the north.

Short-skip, sporadic-E propagation generally begins to pick up during April, and intensifies during the spring and summer months. Occasional short-skip openings should be possible on *6* meters during April, ranging between approximately 750 and 1300 miles. As its name implies, sporadic-E ionization may occur at any time, but there is a tendency for it to peak between 8 a.m. and Noon and again between 5 and 9 p.m. local time. Check *2* meters for possible sporadic-E short-skip openings as well.

There is a good possibility for meteor-scatter-type ionospheric openings on *6* and *2* meters during the *Lyrids* shower. This is a major shower expected on April 22–23. A maximum of up to 15 large-sized meteors may enter the earth's atmosphere hourly when this shower is at its peak.

April is a month in which widespread auroral activity can occur, producing unusual ionospheric short-skip openings on the v.h.f. bands. Check for auroral activity on those days shown in the *Last Minute Forecast* at the beginning of this column as Below Normal or Disturbed.

73, George, W3ASK

HOW TO USE THE DX PROPAGATION CHARTS

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

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

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

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

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

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

April 15 · June 15, 1981
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

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

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

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

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

April 15 - June 15, 1981 WESTERN USA TO:

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

70-91-92

Zero Bias *(from page 4)*

tors in no way connected with *CQ*. The 1979 record holders are upset and suggest that this new score was achieved unethically and shouldn't be counted because of the one member who was also a Committee member. If the effort must be counted, they suggest it must be gone over very carefully by them to seek out these implied alterations or suggested improprieties in handling. So what we have is the suggestion of unethical behavior, cheating, subversion, and betrayal all rolled up into one. The spirit of the Contest is challenged.

I can understand the group's concern over what is ethical and what isn't, but greater basis for the charge seems to be financial rather than ethical. The 1979 group stated that their world-record-breaking score had cost them over $200,000, and therefore by some extension of logic they were entitled to keep the record by virtue of expense. I was truly amazed to find out that they spent that much money or that any person or group would spend that much for our Contest. In a way it's flattering to have that much value placed on winning our Contest, but we don't have a money-spent category. Dick and I agreed that we would chip in and buy a trophy for the group that wrote the biggest check to charity in that time slot if enough people wanted it. Our Contests are designed for everyone, and for everyone to have a good time. You cannot put a dollar figure on them as any form of justification for either winning or losing. *That's* unethical. That's a betrayal of what we like to think of as sportsmanlike behavior.

I see nothing wrong in having anyone who wishes to, enter our Contests and perhaps win them. I have, and all of my predecessors have, expected the highest dedication and integrity from our Committee members, and we have all received it.

Everyone who enters our Contests has the right to expect that we have made every effort to be fair and impartial with every log received. We have never betrayed that trust.

We have tried to discourage bad operating techniques where possible and to discourage unsportsmanlike behavior. Sure it is nice to win, but winning anything should be held in a proper perspective with the rest of life's values. Every year there are new and better methods developed to increase scores, and it seems that the amount of money spent must be added to the list. There are also people who work off lists, arrange contacts via telephone (which amounts to using amateur radio to confirm telephone contacts), and hundreds of other tricks of the trade, which while not illegal, as such would appear to circumvent the spirit of Contesting.

The primary objective of our Contests is to have fun, which obviously almost everyone has. Like any Contest, we have rules that have evolved over the years through trial and error. Submitting a log to our Contest means that the rules and conditions are accepted by the entrant. The rules are guidelines for what we expect and what all the participants can expect. We have no automatic prohibitions from entering and enjoying, nor will we. It's an open Contest for everyone.

More Ethics

Speaking about what's right or wrong in another light is the matter of prospective authors submitting manuscripts to *CQ* or any of the other amateur magazines. Periodically an author will submit an article to several of the magazines at the same time, and on occasion the article will be published by more than one magazine also at the same time. If it happens to be a news-type article, it isn't too bad. But if it's a construction piece, then it loses its uniqueness and value to the magazines involved. The author will probably never have subsequent work considered for future publication. The remedy is simple. If you have an article you wish considered, submit it wherever you choose, but do it one magazine at a time.

73, Alan, K2EEK

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(Receiver Section) FT-107 TRANSCEIVER SPECIFICATIONS (Transmitter Section)

Sensitivity: 0.25 uV for 10dB S/N, CW/SSB, FSK
1.0 uV for 10dB S/N, AM
Image Rejection: 60dB except 12/10 meters (50dB)
IF Rejection: 70dB
Selectivity: SSB 2.4 kHz at —6dB, 4.0 kHz at —60dB.
*CW 0.6 kHz at —6dB, 1.2 kHz at —60dB.
*AM 6 kHz at —6dB, 12 kHz at —60dB
Variable IF Bandwidth
20dB RF Attenuator
Peak/Notch Audio Filter
Audio Output: 3 watts (4-16 ohms)
Accessories: FV-107 VFO (standard not synthesized)
FTV-107 VHF/UHF Transverter
FC-107 Antenna Tuner
SP-107 Matching Speaker
FP-107 AC Power Supply
(specify internal or external)

* AM/CW Filters Optional

Power Input: 240 watts DC SSB/CW
80 watts DC AM/FSK
Opposite Sideband Suppression: Better than 50dB
Spurious Radiation: —50dB.
Transmitter Bandwidth 350-2700 hz (—6dB)
Transmitter: 3rd IMD —31dB neg feedback 6dB
Transmitter Stability: 300 hz after 10 min. warmup
less than 100 hz after 30 min.
Antenna Input Impedance: 50 ohms
Microphone Impedance: 500 ohms (mic optional)
Power Required: 13.5V DC at 20 amps
100, 110, 117, 200, 220, 234V AC at 650 VA *

* with optional power supply

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481

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