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Seasons Greetings

THE RADIO AMATEUR'S JOURNAL

John Rogers W2ADC

Rack Attack from DenTron

Components are the latest in communication systems adapting to your stations' needs. The DTR-3KA and DTR-1200L are equipped with heavy-duty handles for easy rack mounting and rack brackets that can be easily removed. The DTR-1200L linear amplifier provides 1200 watts SSB and 1000 watts CW input continuous duty. It features large 3½" shadow box, back lit meters for easy reading, and tuned input for compatibility with solid state or tube transceivers. The DTR-3KA antenna tuner handles a full 3KW PEP. It features a built in 2KW dry dummy load with thermostatically controlled forced air cooling, a remote sensor box to insure meter accuracy and 50 OHM impedance. Component racks available at your DenTron Dealer.

DTR-1200L Linear Amplifier

Frequency Ranges:

80 Meter Band	3.45 - 4.6 MHz
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15 Meter Band	20.95 - 23.50 MHz
10 Meter Band	Export Model
Modes:	USB, LSB, CW, RTTY, SSTV
Power Input:	1200W - SSB, 1000W - CW
Power Requirements:	234/117 VAC 50/60 Hz
RF Drive Power:	150 Watts maximum and 65 watts minimum for 1 KW DC input.
DC Plate voltage:	Idle + 2300V approximate
Duty Cycle:	100% SSB, CW, RTTY, SSTV
Input Impedance:	50 Ohms nominal
Input VSWR:	1.5 to 1 average
Output Impedance:	50 Ohms nominal
Antenna load VSWR:	2 to 1 maximum
ALC:	negative going, adjustable from front panel
Spurious Emissions:	IMD - greater than 30 db down Harmonics - greater than 40 db down
FCC Type Accepted	
Size:	5¼" H x 17" W x 13" D (19" W with rack brackets)
Weight:	46 pounds

Switchable 12VDC accessory output voltage
Multimeter:

Plate Voltage	0 - 3000VDC
Plate Current	0 - 500ma
Relative Output	Adjustable

Front Panel Plate Voltage Switching

DTR-3KA Antenna Tuner

Frequency Coverage: 1.8 - 30 MHz continuous
Built in 2 KW PEP Dummy Load - Forced Air Cooled
Input Impedance: 50 ohms (Resistive) to transmitter
Antenna Inputs
- Coax 1, 2 & 3 - unbalanced—may range from a few ohms to a high impedance
- Long wire - low to high impedance
- Balanced line - 75-660 ohms

Power Capability: 3000 watts P.E.P.
Wattmeter: 200 watts forward
2000 watts forward
200 watts reflected
Accuracy: ± 5%
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Integral 3KW Balun

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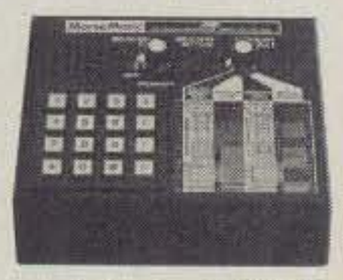

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CQ The Radio Amateur's Journal

ON THE COVER: This wonderful winter scene was captured by John Rogers, W2ADC. See page 4 for more details.

DECEMBER, 1980 VOL. 36, NO. 12

FEATURES

DEPARTMENTS

Zero Bias

AN EDITORIAL

Here it is, one year later. As the TV ads say, "We've come a long way." The new *CQ* is here, maturing and prospering. It's a far cry from those first few hectic weeks of putting the December 1979 issue together to putting this one out. We've had an outpouring of help from our contributors and columnists, plus numerous letters of support from our readers.

We've added three people to our staff and hope to add a few more during 1981. *CQ* has grown and is growing thanks to you. We've got bigger and better things planned for *CQ* in 1981. Last month I outlined some of them, and there are more in the works.

Our Cover

Sometime ago I told you about my joining the QCWA and attending the local chapter dinner meetings. At one of those meetings I ran into an old friend, John Rogers, W2ADC. I first met John years ago through a mutual friend who owns an art gallery. John is an accomplished and renown artist, whose work was being displayed by our friend. It was sometime later, probably a year and several meetings later, that the subject of amateur radio came up and John said he was a ham. I hadn't seen John for several years, and at one of the QCWA dinners he and I sat at the same table. One thing led to another, and he said that he had always wanted to do a cover for an amateur radio magazine. We concluded with a handshake deal on the spot.

I'm sure you'll agree that John has captured the winter scene where everyone seems to be a ham. There's the traditional sense of Christmas and the holidays and of the family dinners yet to come. The windmill towers amidst the countryside add warmth to the scene, and we could all very easily imagine ourselves sitting in that upstairs room at the rig. By the time you read this, the painting will be hung in our offices, where we'll enjoy it for years and Christmases to come.

If there seems to be enough interest generated, we will look into having large-size prints made in a limited edition. I'm sure John won't mind.

Since The Last Time

CQ had a booth as reported at Radio Expo in Chicago earlier this month where we talked to several thousand 9's. The flea market was great on Saturday but was rained out for the most part on Sunday. I bought some large glass insulators, but they turned out to be too big (and heavy).

I sold the insulators a few weeks later at the LIMARC flea market here on Long Island. I'm still looking for some decent size (about 3" or so) egg insulators to break up some guy wire. There were none to be found at that flea market.

Next week I'll try again when we go to the New England ARRL Convention at Boxborough, Mass. We'll have to trim our stay there by a day to come home early on Sunday. That's the day our Associate Editor, Gail Shieber, gets married, and the whole staff has to turn out to help celebrate the happy occasion. I guess that most of us will be in a little late Monday morning, or maybe we'll just continue celebrating on to Tuesday.

In the suggested reading department, I would recommend that you try and obtain a copy of a club bulletin called *CORA Collector & Emitter* for September 1980. Michael Salem, N5MS, has a terrific article in there called "Section 605 Rides Again (Or the FCC Plays 'I've Got a Secret')." It is perhaps one of the best things I've read on the subject and one that I would like to cover in future issues. If possible, I'll try to get it reprinted here in an upcoming issue.

John Attaway, K4IIF

When you read the DX column this month, you'll see that John will be stepping down as DX Editor after a long run and a lot of very hard work. John has been an invaluable aid and addition to *CQ*'s DX Department. His leadership and managerial input have shaped up our whole DX Awards Program to a point second to none. Although John will step down from this active position, he will not retire entirely but will remain as Chairman of the *CQ* DX Awards Advisory Committee which he founded 14 years ago. The mundane requirements of work, family and personal needs have finally caught up with him.

Although John has stepped down to take a very well deserved breather, he made sure that his desk would be fully manned by an equally top DXer and long time *CQ* supporter, Hugh Cassidy, WA6AUD. "Cass" is no stranger to *CQ*, having helmed the DX Column years ago. Those of you familiar with his *West Coast DX Bulletin* know that his fine reputation in the DX community was earned through dedication and hard work. For those of you who are new to amateur radio and are not familiar with Cass or his writing, you're in for a treat.

If I sound boastful and proud, you're very perceptive. We've rounded out the best DX team anywhere, bar none. Welcome back Cass, welcome home.

Year's End

1980 has been good to *CQ* and to most of us in general. The ups and downs and nitty-gritty problems have begun to sort themselves out, and we're all looking forward to a happy holiday season. We've seen the resurgence of *CQ* and a general renaissance in amateur radio. We've witnessed the dramatic results of WARC, the increased numbers of amateurs and a panoply of new equipment for us to drool over and purchase. We've added ASCII to our vocabulary and commonly toss about microprocessor this and microprocessor that in conversation. Computers are no longer tools used by businesses and banks exclusively, but adjuncts to a lot of amateur stations. Computer/Hamfests have been very popular this past year, melding the two interests. Next year is a whole new ball game with new trends, new equipment and lots of new amateurs.

There's an up feeling in the air as this year draws to a close, and it's a feeling that we can all share. What faces us in 1981 is certainly nothing insurmountable compared to the world situation. We've even managed to weather another election process and can go forward accordingly. The best is yet to come.

In that happy frame of mind, and on behalf of everyone here and there connected with *CQ*, I'd like to wish you all a very happy holiday season and an especially happy and prosperous new year.

73, Alan, K2EEK

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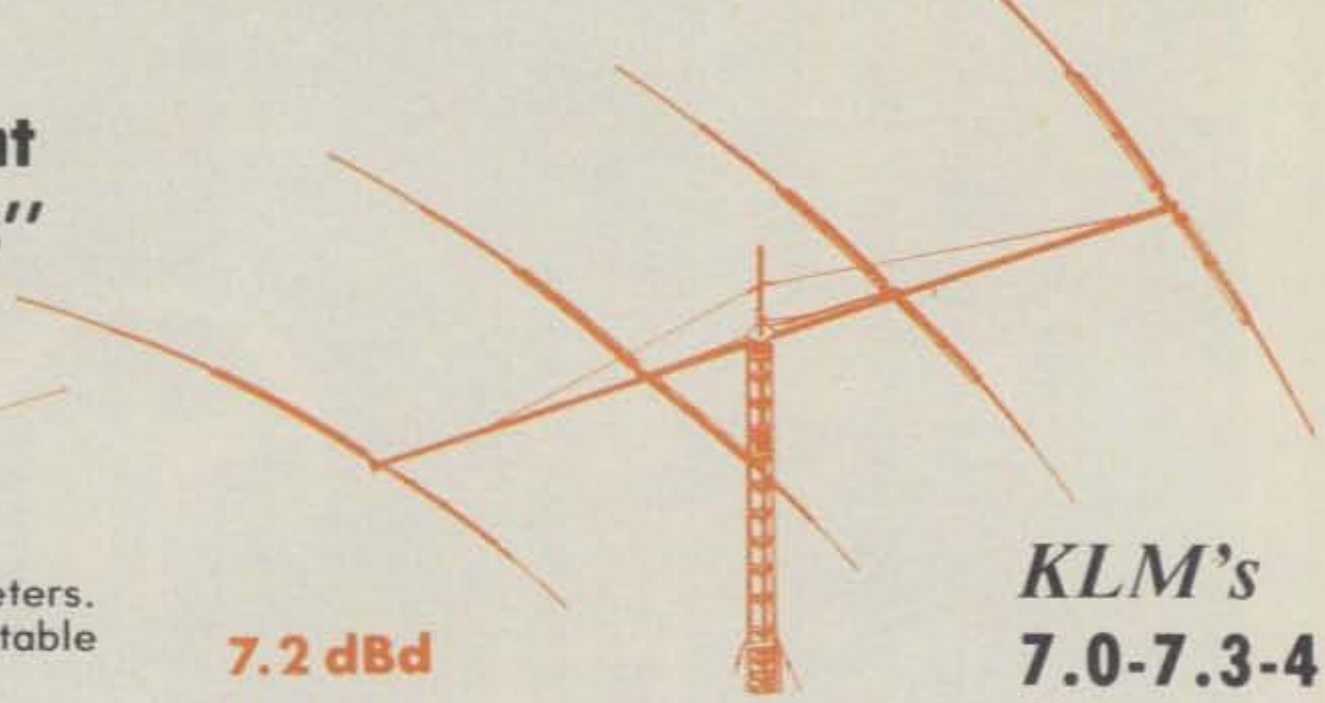

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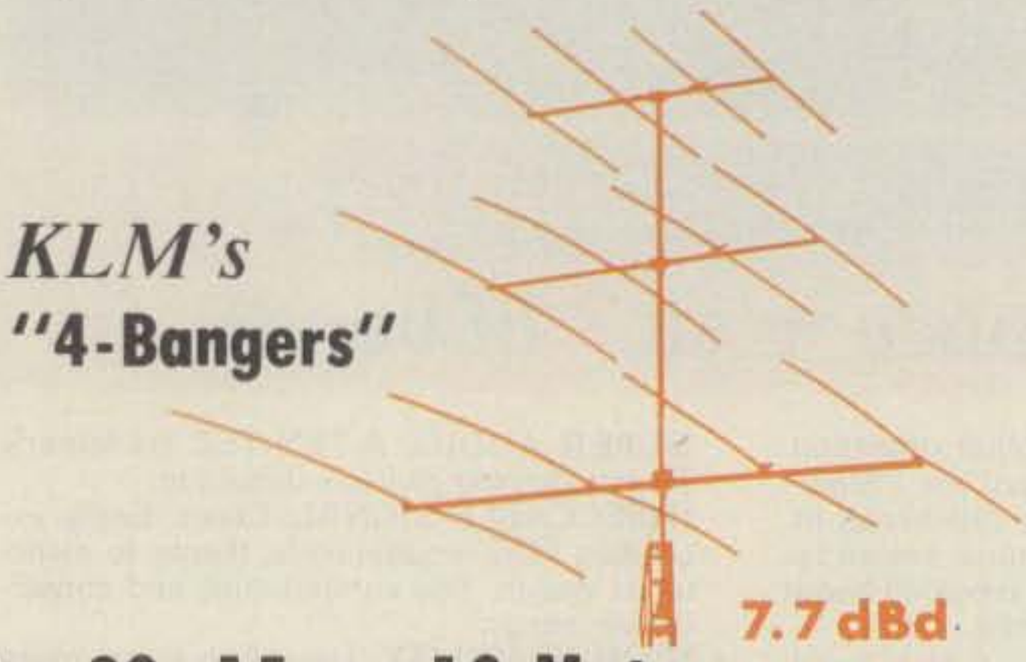
DX punch on 40 meters. Constant gain and low VSWR across the band-phone and CW. Linear loaded to reduce size and weight.



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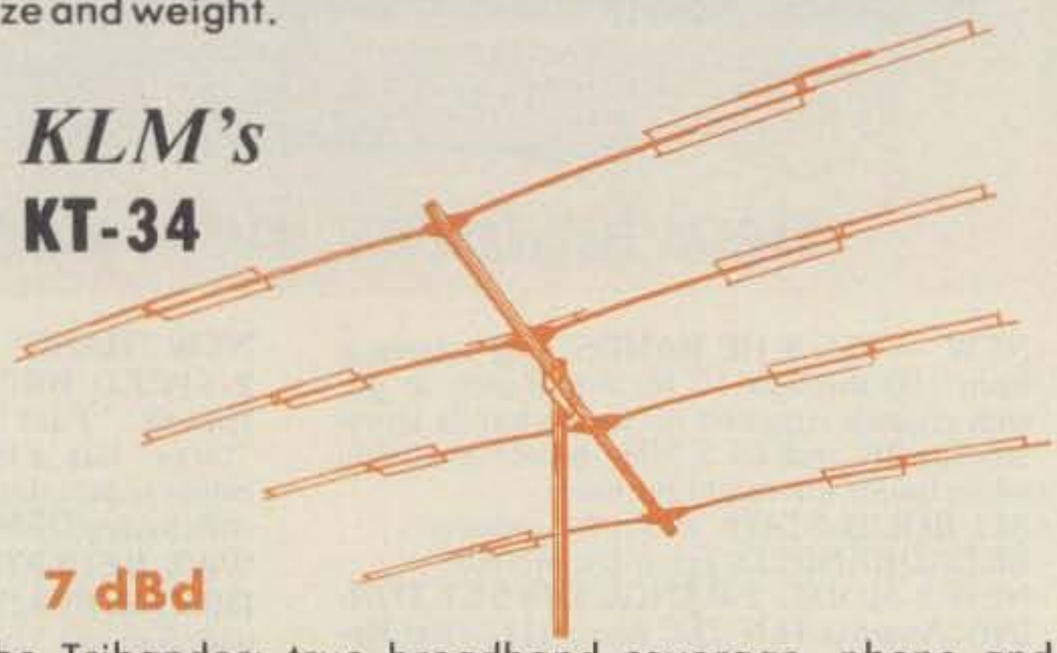

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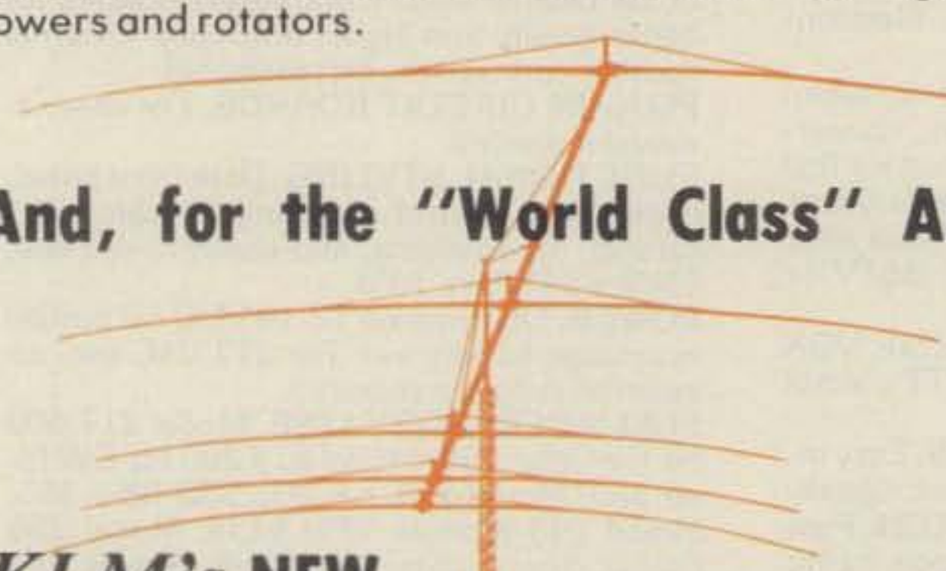

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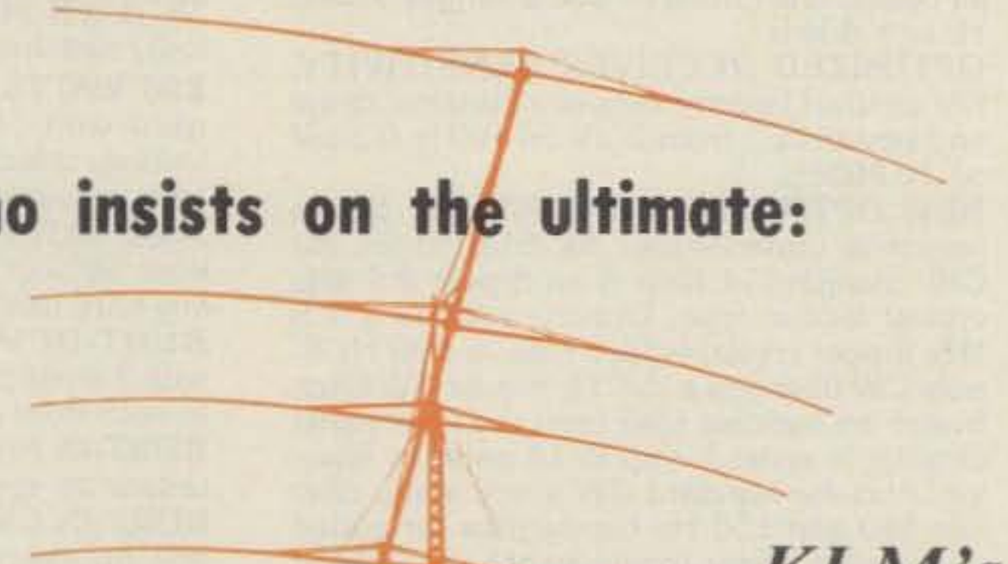

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Lockable equipment compartment ensures the safety of family members as well as the security of the station. Slide-out desk surface glides on 100 lb. capacity ball slide tracks. Upper section contains 15" deep fixed shelf for transceiver, and two 10" deep adjustable shelves for accessories, books, logs, etc. Lower section doors open wide to access a cavernous storage area . . . big enough to swallow up a 19" color TV. Built-in work surface light is fully adjustable.

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Model 1528

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Continuous Duty
160-15* Meters

2kW Linear Amplifier

Temperature-controlled design for "key-down" operation over a wide frequency range.

2 kW PEP, 1 kW cw, RTTY, SSTV operation—all modes full rated input, continuous duty cycle.

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The Drake L7 utilizes a pair of Eimac 3-500 Z triodes for rugged use, and lower replacement cost compared to equivalent ceramic types.

Accurate built-in rf wattmeter, with forward/reverse readings, is switch selected. Calibrated 300/3000 watt scales.

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Amplifier is comprised of two units—rf deck for desk top and separate power supply.

Operates from 120/240 V-ac, 50/60 Hz primary line voltage.

DRAKE L7 SPECIFICATIONS

• **Frequency Coverage*:** Ham bands 160 through 15 meters*. Non-amateur frequencies between 6.5 and 21.5 MHz may be covered with some modification of the input circuit. • **Plate Power Input:** 2000 watts PEP on ssb and a-m. 1000 watts dc on cw, RTTY, and SSTV. • **Drive Power Requirements:** 100 watts PEP on ssb and 75 watts on cw, a-m, RTTY, and SSTV. • **Input Impedance:** 50 ohms. (Bandpass tuned input) • **Output Impedance:** Adjustable pi-network matches 50 ohm line with SWR not to exceed 2:1. • **Intermodulation Distortion Products:** In excess of −33 dB. • **Wattmeter Accuracy:** 300 watts forward and reflected, ±(5% of reading + 3 watts). 3000 watts forward, ±(5% of reading + 30 watts). • **Power Requirements:** 240 volts 50-60 hertz 15 amperes, or 120 volts 50-60 hertz 30 amperes. • **Tube Complement:** Two of 3-500Z or 8802/3-500Z or 3-400Z. • **Dimensions: Amplifier** 13.69″W x 6.75″H x 14.25″D (34.8 x 17.1 x 36.2 cm). **Power Supply** 6.75″W x 7.88″H x 11″D (17 x 20 x 28 cm). • **Weight:** Amplifier 27 lbs (12.25 kg), **Power Supply** 42.5 lbs (19.3 kg).

**Export model includes coverage of the 10-meter Ham Band.*

Model 1539

Drake Matching Networks MN7 and MN2700

Models 1538 and 1539

- **Frequency Coverage:** 1.8 - 30 MHz
- **Antenna Choice:** Matches antennas fed with coax, balanced line (use optional B-1000 Balun), or random wire.
- **Antenna/By-Pass Switching:** Allows matching unit by-pass regardless of antenna in use, and selects various antennas.
- **Extra Harmonic Reduction:** Employs "pi-network" low pass filter type circuitry for maximum harmonic rejection.
- **Built-in Metering:** Accurate Rf Wattmeter and VSWR Reading, pushbutton controlled from front panel.
- **Input Impedance:** 50 ohms resistive.
- **Power Capability:** MN7—250 watts average continuous duty (0-300 W scale). MN2700—1000 watts average continuous duty (2000 watts PEP). (0-200 or 0-2000 W scale).
- **Dimensions:** MN7—13.1″W x 4.53″H x 8.5″D excluding knobs and connectors (33.26 x 11.5 x 21.6 cm). MN2700—13.1″W x4.53″H x 13″D excluding knobs and connectors (33.26 x 11.5 x 33 cm).
- **Weight:** MN7—10 lbs (4.5 kg). MN2700—11 lbs (5 kg).

Drake MN7 and MN2700 Specifications

• **Frequency Coverage:** 1.8 to 30 MHz. Band Switch marked for 160, 80, 40, 20, 15, and 10 meter amateur bands; however, frequency coverage between amateur bands is possible by using the nearest band positions with a small reduction in matching capability. • **Input Impedance:** 50 ohms (resistive). • **Load Impedance:** 50 ohm coaxial with VSWR of 5:1 or less at any phase angle (3:1 on 10 meters). 75 ohm coaxial at a lower VSWR can be used. • **Balanced Feedlines:** With the Drake B-1000 accessory balun, which mounts on rear panel, tunes feed point impedances of 40 to 1000 ohms, or 5:1 VSWR referenced to 200 ohms (3:1 on 10 meters). • **Long-Wire Antennas:** Feed point impedances up to 5:1 VSWR referenced to 50 ohms. Also, 5:1 referenced to 200 ohms with the Drake B-1000 accessory balun (3:1 on 10 meters). • **Meter:** Reads VSWR or forward power. • **Wattmeter Accuracy:** ±5% of reading ± 1% of full scale. • **Insertion Loss:** 0.5 dB or less on each band after tuning. • **Front Panel Controls:** Provide for the adjustment of resistive and reactive tuning, antenna switching, band switching, VSWR calibration, and selection of watts or VSWR calibration, and selection of watts or VSWR functions of the meter. • **Rear Panel Connectors:** The rear panel has four type SO-239 connectors (one for input and 3 for outputs), three screw terminal connections (for long-wire and open-wire feeder systems), and a ground post.

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

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DRAKE 7-Line Family

ACCESSORIES

A Model 7077 Dynamic Desk Microphone

• **Audio and level characteristics** custom designed to match the transmit audio requirements of the Drake TR7. • **Features both VOX and PTT** operation without modification. • **High Impedance** • **Includes coil cord and plug** wired for direct connection to the Drake TR7. • **Style and color** provide a beautiful match to the Drake 7-line • **Size** 4.3"W x 5.8"D x 9.3"H (10.9 x 14.7 x 23.6 cm). **Weight** 1 lb 7 oz (650 g).

Model 1553

C SP75 Speech Processor

Provides an increase in average power/readability of a single sideband voice signal during weak signal, high interference conditions. The SP75 is connected between the microphone and microphone input of the ssb transmitter, requiring no modification of existing transmitter or transceiver. A front panel switch allows the processor to be switched in or bypassed. Two additional inputs, such as a tape player or phone patch, may be front panel selected.

Rf envelope clipping adjustable between zero and twenty decibels. LED indicates proper audio input level.

Muting circuitry reduces gain during speech pauses, allowing VOX operation with the processor on.

SPECIFICATIONS • Processing Type: Preclipping audio compression followed by rf envelope clipping at the processor intermediate frequency. • **Rf Clipping Range:** Adjustable 0 to 20 dB from front panel control. • **Input Level (Microphone Input):** 3.5 mV minimum for full processing. Gain adjustable to accommodate up to 300 mV maximum. • **Input Level (Tape and Patch Inputs):** 15 mV minimum for full processing. 30 mV maximum. • **Input Impedance (Microphone):** 1 megohm. • **Input Impedance (Tape and Patch):** 50 kilohm. • **Output Level w/Processing:** 0-50 mV adjustable into 50 kilohm load. • **Output Impedance:** 50 kilohm. • **Muting (Microphone Input Only):** 10 to 20 dB attenuation during speech pauses. • **Frequency Response:** 400-6000 Hz@6 dB. • **Distortion:** Less than 5% T.H.D.@1kHz, 20 dB clipping. • **Power:** 11-16 V-dc@95 mA. • **Size:** 7"L x 6¼"W x 2¼"H (17.3 x 15.9 x 5.4 cm). • **Weight:** 1.4 lbs. (.63 kg).

Model 1520

D P75 Phone Patch

Hybrid Phone Patch for use with 7-line or other receiver/transmitter combination. • In/out Switching • Adjustable TX and RX level controls.

Model 1535

E CS7 Coax Switch

• Switches up to five coax-fed antennas via one main feed line. • Allows selection of up to five radios at other end of main feed line. • Minimizes amount of coax needed for multi-antenna installation. • Grounds unused inputs (both local and remote).

DRAKE CS7 SPECIFICATIONS • Maximum Input Power: 2000 watts PEP • **Frequency Range:** Up to 30 MHz, insertion of Switch changes VSWR no more than 1.05:1. From 30 MHz to 150 MHz, insertion changes VSWR no more than 1.5:1 (both switches). • **Operating Temperature Range:** −40°F. to 150°F. • **Supply Voltage:** 120 V-ac or 240 V-ac selectable, 50/60 Hz, 50 watts. • **Dimensions & Weight: Console**—5.25"H x 6.81"W, 7.06" cabinet depth (13.3 x 17.3 x 17.9 cm); 4.33 lbs (1.96 kg); **Remote Antenna Switch**—7.13"H x 5.88"W x 4.39"D (18.1 x 15.0 x 11.1 cm). 8.19" (20.8 cm) center to center mounting; 5 lbs (2.27 kg).

Model 1531

B MS7 Matching Speaker

• **Size:** 7.5"D x 6.9"W x 4.6"H excluding feet (19 x 17.5 x 11.6 cm). • **Weight:** 2.5 lbs (1.13 kg).

"Dry" Dummy Loads

—no oil required

Model 1551

Model 1550

Model 1551 Drake DL-1000

• **1000 watts** for 30 seconds, with derating curve to 5 minutes. Accepts Drake FA7 cooling fan for extended high power operation. • **VSWR of 1.5:1 max.** 0-30 MHz • **SO-239 coax connector** • **Rubber feet** for desk or bench use • **Size** 14" x 3.6" (35.6 x 9.1 cm). **Weight:** 2 lbs (910 g).

Model 1550 Drake DL-300

• **300 watts** for 30 seconds, with derating curve to 5 minutes. • **Built-in PL-259** coax connector for direct connection to rear of transceiver or transmitter—no jumper coax necessary. • **VSWR of 1.1:1 max.** 0-30 MHz 1.5 max 30-160 MHz • **Ideal as bench test device** for amateur or commercial hf and vhf gear. • **Small size** fits conveniently in any field service tool box. 6.7" x 2.08" (17.0 x 5.3 cm). **Weight:** 11 oz (310 g).

WH7 Directional Rf Wattmeter

Model 1514

• Directional, in-line wattmeter. • Removable coupler provides remote metering. • Three calibrated scales (0-20, 0-200, and 0-2000 watts. • Fourth scale provides direct reading VSWR.

SPECIFICATIONS: • Frequency Coverage: 1.8-30 MHz. • **Line Impedance:** 50 ohm resistive. • **Power Capability:** 2000 W continuous. • **Jacks, Removable Coupler:** Two SO-239 input and output connectors. • **Semiconductors:** Two power meter rectifiers. • **Accuracy:** ±(5% of reading + 1% of full scale). • **VSWR Insertion:** Insertion of wattmeter in line changes VSWR no more than 1.05:1. • **Shipping Weight:** 3 lbs (1.4 kg). • **Dimensions:** 5.3"H x 6.9"W x 7.5"D (13.5 x 17.5 x 19 cm).

Model 1230

LA7 Line Amplifier

Line output, 1 mW nominal into 600 ohm balanced, adjustable by internal pre-set level control.

TV Interference Filters

High Pass Filters for TV Sets

More than 40 dB attenuation at 52 MHz and lower. Protect the TV set from amateur transmitters 6-160 meters.

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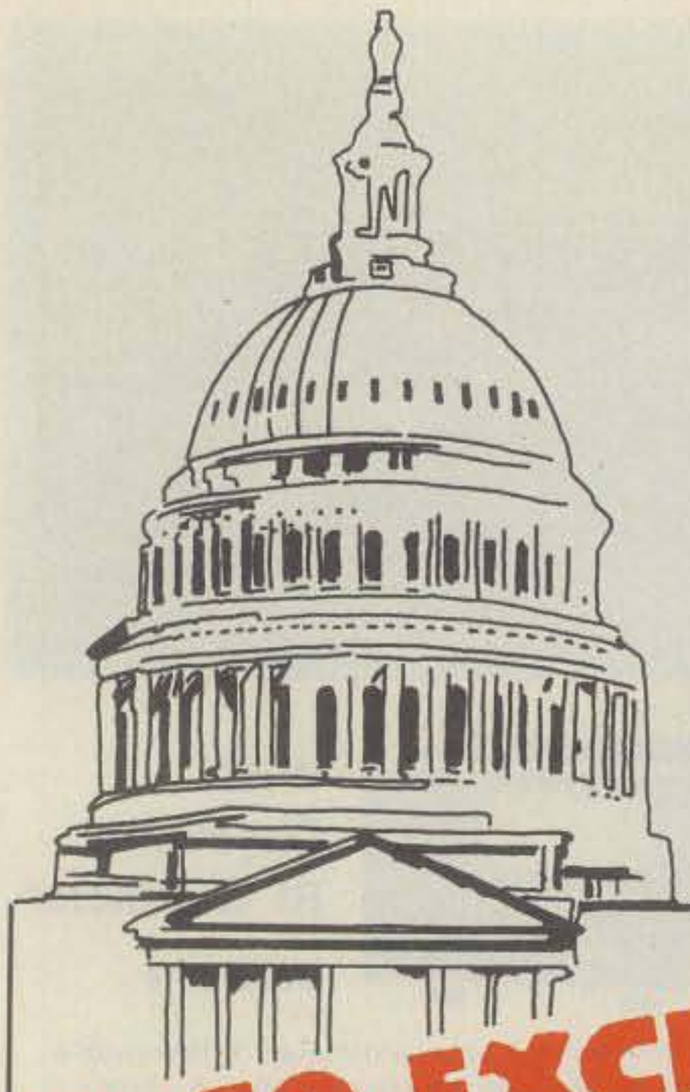

CQ Interviews: Dr. Michael J. Marcus

A CQ EXCLUSIVE

As Chief of the Technology Planning Staff, Office of Science and Technology, FCC, Michael J. Marcus is responsible for communication technology assessment and for the study of new and improved communication technologies. In this exclusive CQ interview, he discusses several new and exciting areas in which amateurs will have an opportunity to work in the 1980s.

BY THEODORE J. COHEN*, N4XX

Michael J. Marcus, a native of Boston, MA, received both his S.B. and Sc.D. degrees in electrical engineering from the Massachusetts Institute of Technology in 1968 and 1972, respectively. While an undergraduate at M.I.T., he participated in a cooperative program at the Bell Telephone Laboratories, where he continued as a consultant until 1971 in the area of telephone switching theory. For the next three years, Dr. Marcus served in the U.S. Air Force as a project officer. On leaving the Air Force, he joined the Institute for Defense Analyses, where he was involved in, among other things, computer communications network design.

Dr. Marcus joined the Federal Communications Commission in 1979 as Chief of the Technology Planning Staff, Office of Science and Technology. In this capacity, he is responsible for communication technology assessment, and for the study of new and improved communication technologies.

Dr. Marcus lives in northern Virginia with his wife, Gail Marcus, Ph.D. (ex WB2JSL), who is Assistant Chief, Science Policy Research Division, Congressional Research Service. Together, they often enjoy sailing on Chesapeake Bay.

While not an amateur, Dr. Marcus is very familiar with our service and with the contributions we have made, and are capable of making, to the advancement of the communications art. Thus, in this exclusive interview with *CQ* magazine, he discusses several new and exciting areas in which amateurs will have an opportunity to work in the 1980s.

CQ: Mike, what is the relationship between the the Office of Science and Technology and the amateur service?

Marcus: The Office of Science and Technology (OST), through the Chief Scientist, is the Commission's main technical advisor. As such, the Office plans and directs broad programs to develop information on the progress of communication technologies. This information is used by the various Bureaus and offices of the Commission in the preparation of rulemakings, many of which directly or indirectly affect the amateur radio service. Additionally, OST advises the Commission on all spectrum allocation issues, and it represents the Commission on various national and international organizations devoted to such items as the allocation of radio frequencies and the development of radio standards. This has a direct affect on the amateur service, as evidenced by the 1979 WARC.

CQ: You once referred to the amateur service as a "test bed for communication technology." Could you amplify this comment?

Marcus: The amateur service has always been rich in experimentation. In fact, many of the communication technologies that are used daily in other radio services were developed by the amateur community. Thus, by referring to the service as a "test bed," I meant that it was capable of providing the Commission with a vehicle for in-the-field testing of new technologies.

CQ: What are some of the communication techniques you would like to see amateurs investigate?

**Washington Correspondent, CQ.*

Marcus: Because of radio's many uses today, and the resultant scarcity of available spectrum, the Commission's interest is now focused on spectrum-saving technologies that can increase the effectiveness of this limited resource. Therefore, I would encourage amateurs to investigate techniques such as spread-spectrum modulation, digital speech processing, packet radio, and time division multiple access (TDMA).

"The Office of Science and Technology plans and directs broad programs to develop information on the progress of communication technologies."

CQ: Let's take "packet radio" first. What are we talking about here?

Marcus: The term "packet radio" describes a system in which data are sent in the form of packets, or short bursts, as opposed to being sent continuously in real time. For example, it might take an operator 20 seconds to type a line on a terminal and to send this information via radio in real time. If this information is locally stored while it is typed, and if it then is sent as one burst when the message is complete, the same information can be sent in a few milliseconds. Although packet radio systems generally are thought of in terms of computer communications, any information that can be put into digital form can be transmitted via packets.

CQ: Canadian amateurs have been quite active in the area of packet radio. What have they accomplished to date?

Marcus: The Canadian Department of Communications (DOC) has allowed the use of packet radio techniques in certain frequency bands (220 MHz, 433 MHz, and 24 GHz). In response, Canadian amateurs are actively involved in the development of packet radio nets for computer communications in Montreal, Ottawa, and Vancouver.

"I don't really believe that the solution to overcrowded bands will be as simple as the introduction of one new type of technology into the amateur service."

CQ: We understand that the Canadian Government now issues a digital communication license. Would you tell us about the code and theory tests for this license?

Marcus: The DOC does issue a Digital Radio Operator's Certificate for which an applicant is required to demonstrate his or her knowledge in three different areas: radio regulations, theory, and digital techniques. The tests on radio regulations and theory require a level of proficiency similar to that required for a Canadian Amateur Advanced Certificate. In the test on digital techniques, the applicant is questioned on such areas of communications as information theory, analog and digital transmission, computing, queuing theory, packet radio, channel access techniques, microprocessors, and error detection schemes. There is *no* Morse code requirement for this certificate, and so, in accordance with ITU regulations, all privileges are above 144 MHz.

"Spread spectrum is not an authorized emission in the amateur service. However, experimenters can apply for a Special Temporary Authorization (STA) to use such a modulation scheme."

CQ: Has the digital communication license met with the approval of Canadian amateurs? That is, has the fact that it is a no-code license caused any problems within the Canadian amateur community?

Marcus: To my knowledge, the Digital Radio Operator's Certificate has met with the approval of Canadian amateurs. Although there is no code requirement, it should be noted that the required exams are quite rigorous, and only 300 Canadians so far have been awarded the Certificate.

CQ: There is some talk of creating a no-code license in the U.S. which is similar to the Canadian Digital Radio Operator's Certificate. Is this true?

Marcus: The Commission is considering a proposal to create a no-code license in the amateur service. The privileges associated with this license will probably be more general in nature than the privileges associated with the Canadian certificate. The former would provide the means for "electronic experimenters" to further their interest in radio without the need for Morse code certification. Additionally, the Commission's staff is discussing the possibility of creating a digital license such as the Canadians have. This license would be oriented more toward the serious computer hobbyist. The kinds of operating privileges available with these two new licenses would be very different from those available with other amateur licenses. At this time, though, no final decisions have been made regarding new U.S. licenses.

CQ: What kind of code and theory tests might be associated with the examination for the U.S. digital license?

Marcus: Neither of the above mentioned U.S. licenses would require Morse code examination. However, the more privileges a license authorizes, the more rigorous one could expect the examination to be. If the Commission adopts a digital license, I would suspect the required tests to be closely related to those given by the Canadian DOC.

CQ: You mentioned spread-spectrum modulation techniques above. What, basically, is meant by "spread spectrum," and what types of modulation techniques could be used in the amateur service?

Marcus: Spread-spectrum modulation techniques produce signals that have a bandwidth occupancy much wider than the message bandwidth. The basic techniques used are: direct sequence, frequency hopping, time hopping, and linear FM (chirping). All of these modulation techniques could be used in the amateur service,

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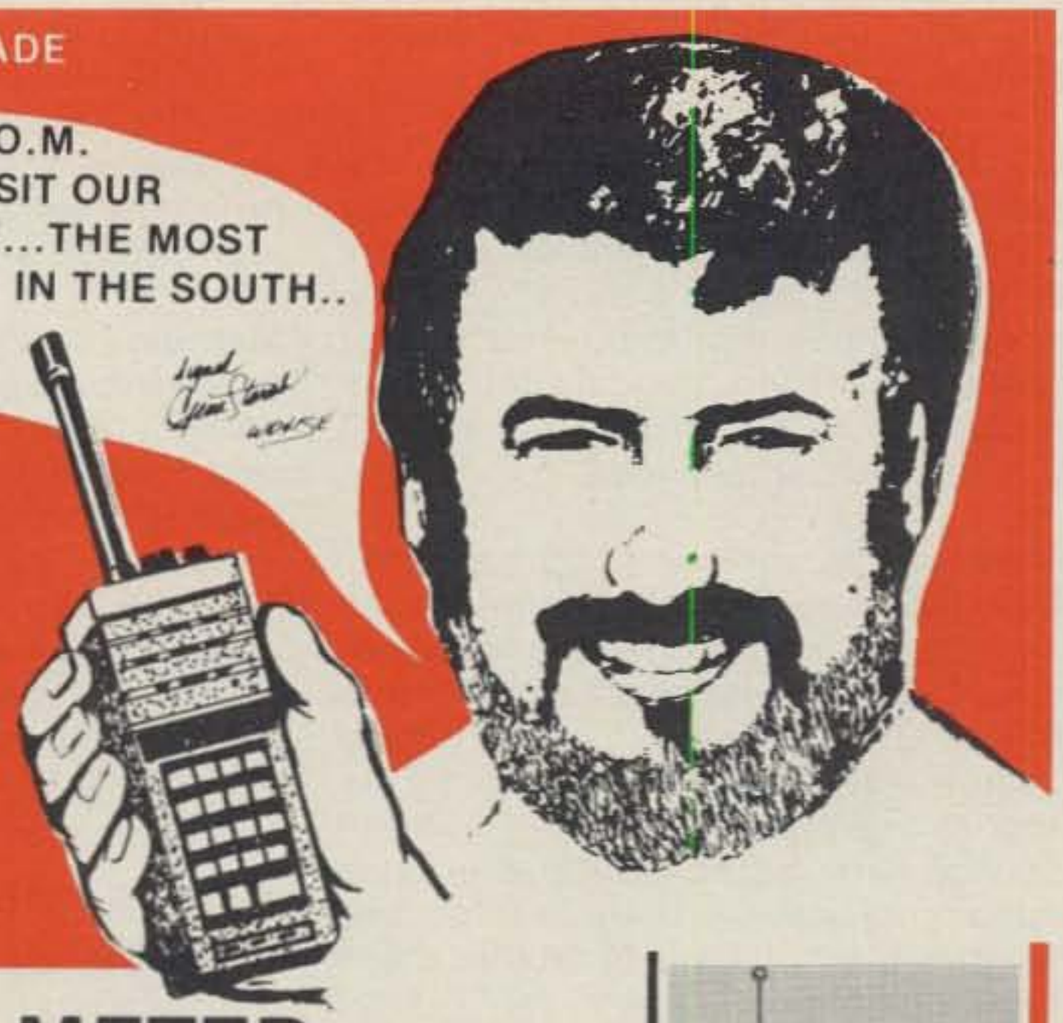

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but only, of course, with the proper authorization.

CQ: Since in spread spectrum a signal (e.g., an audio signal) is spread over a band of frequencies by convolving it with a spreading code, doesn't experimentation and use of spread-spectrum modulation techniques violate the prohibition against coding amateur signals?

Marcus: Yes, the use of spread-spectrum modulation might be interpreted as transmitting a coded signal which would be in violation of Section 97.117 of the amateur rules. In any case, spread spectrum is not an authorized emission in the amateur service. Any authorization the Commission grants for the use of spread spectrum would have to modify these requirements.

CQ: If an amateur wanted to experiment today with spread-spectrum modulation techniques (or with any other advanced communication technique), what would he or she have to do in order to obtain permission to operate in the amateur bands?

Marcus: There are really two avenues open to the amateur who wishes to experiment with advanced communication techniques: one, apply to the Private Radio Bureau for a Special Temporary Authorization (STA); two, apply to the Office of Science and Technology for an Experimental License under Part 5 of the FCC Rules. An amateur STA would be limited to only amateur bands, while we could consider experimental licenses for use in any part of the spectrum.

CQ: Conventional and spread-spectrum systems can coexist in a common band, but only up to a point. That is, it may be possible to overlay several spread-spectrum signals on a band filled with conventional signals. But isn't there a limit at which point the marginal (weak) conventional signals will become lost in the "noise"?

Marcus: It is true that the effect of overlaying spread-spectrum signals on existing bands will be an increase in the r.f. noise level. However, by considering the present loading of a band, and by requiring spread-spectrum experimenters to operate with a low power density, we feel that we can control any adverse effects these systems might have on existing operations.

CQ: Then is it correct to conclude that the use of spread-spectrum modulation techniques can provide some increase in spectrum efficiency, but that the use of such techniques is by no means the solution to crowding problems we observe in several amateur bands?

Marcus: I don't really believe that the solution to overcrowded bands will be as simple as the introduction of one new type of technology into the service. However, by matching the communication needs of the licensees to available spectrum-saving technologies, such as spread spectrum, we should be able to alleviate some of the overcrowding that is now encountered.

"The amateur service is capable of providing the Commission with a vehicle for in-the-field testing of new technologies."

CQ: Del Norte Corporation proposed that the 420 MHz band remain acessible to non-government users of radiolocation systems. Specifically, they proposed to operate (on a secondary basis to the amateur service) a spread-spectrum radiolocation system in this band. Does the Office of Science and Technology look with favor on such sharing schemes?

Marcus: Yes, we do look with favor on "band-sharing" schemes such as you mentioned, as long as they do not interfere with existing users in a band. Again, however, such sharing must be done with the correct choice of power density. In this way, it should be possible for spread-spectrum and conventional communication systems to coexist with little or no interference to each other. Note, by the way, that a successful experiment at 420 MHz might pave the way for amateur spread-spectrum users to operate in bands other than those presently assigned to the amateur service.

CQ: What about the use of narrowband modulation techniques such as the narrowband voice modulation (NBVM) technique described by the ARRL? Has the Office of Science and Technology examined the NBVM technique, and if so, what were its findings?

Marcus: To my knowledge, OST has not looked at the narrowband voice modulation technique described by the ARRL. As you know, the use of this technique is not prohibited by our present rules, and some amateurs are presently using it in their communications. I would like to mention, however, that the Commission just recently adopted a Notice of Inquiry (NOI) on narrowband communication techniques in the Land Mobile service bands. Although this NOI is not specifically concerned with the amateur service, I would encourage interested amateurs to share with us their experience with narrowband techniques by filing comments under PR Docket 80-440.

"The Commission's interest is now focused on spectrum-saving technologies that can increase the effectiveness of that natural resource."

CQ: The Office of Science and Technology is participating in a working group which is examining the problem of 10 GHz radar jammers. Specifically, it appears that the Commission will be moved to modify the amateur rules or the definition of amateur radio (or both) in an attempt to make a distinction between jamming and legal amateur operations. Would you comment on this?

Marcus: First, let me confirm that the Office of Science and Technology is actively participating in an effort to examine the entire matter of the illegal use of legitimate amateur equipment, and the use of equipment purported to be for amateurs, but which finds its biggest market, if not its only market, to be that of the illegal user. The matter of 10 GHz radar jammers falls into the latter category. As you may well imagine, this matter is extremely sensitive, and it would not be prudent to go into any detail while our internal deliberations are underway. Suffice it to say, however, that the matter is being thoroughly investigated with a view toward finding a

"Successful sharing between conventional amateur users and spread-spectrum users in the 420 MHz band might pave the way for amateur spread-spectrum users to operate in bands other than those presently assigned to the amateur service."

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Easy to use, anywhere. Measures 8x2x6", has SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides.
MFJ-945, $74.95, like model 941C but less ant. switch. Optional mobile bracket for either model is $3.

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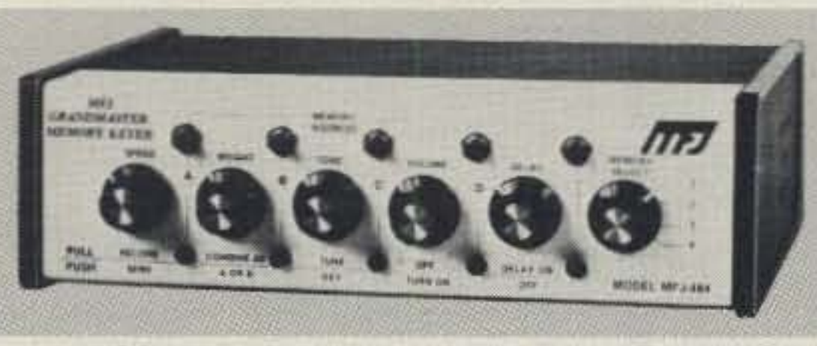

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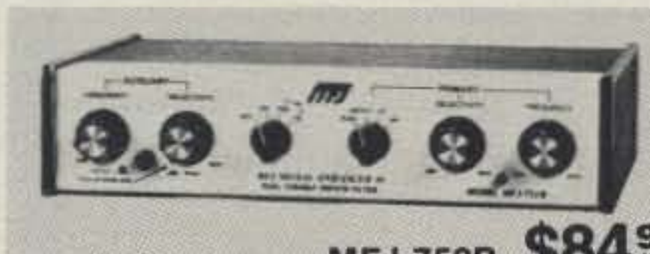

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solution that will address the problem without affecting the amateur service.

CQ: The Commission's Chief Scientist, Dr. Stephen Lukasik, recently attended a meeting in Chairman Ferris' office at which the ARRL and the Commission discussed areas of mutual interest and concern. Can you tell us what Dr. Lukasik's impressions were of this meeting?

Marcus: Dr. Lukasik was favorably impressed with the ARRL's representatives and with what they had to say. There is a move at the Commission today to increase contacts with all segments of the public and the industries we regulate. Meetings such as the one with the ARRL are considered an excellent way for the Commission to get the feedback from spectrum users that it needs to effectively perform its functions.

CQ: What is the feeling in the Office of Science and Technology regarding the amateur service?

Marcus: The Office of Science and Technology views the amateur service as an important resource. Amateurs have historically been active in developing new technologies and in providing the Commission with information that sometimes cannot be found in a laboratory . . . that is, information on how systems perform in the "real world."

CQ: Are we, as amateurs, effective in making our needs known to the Commission? If not, what should we be doing to "get our story out"?

Marcus: I think that the amateur community *is* effective in making its needs known to the Commission. Meetings such as the recent one with the ARRL, the filing of comments on Commission's notices, and personal contacts with staff members in Washington, D.C., and at the field installations around the country, are all effective means of informing the Commission on amateur-related matters. I would also add that the amateur periodicals are well read by members of the Commission's staff. So, this is another way to tell us about amateur activities.

CQ: Any other comments before we close?

Marcus: I would just like to thank you for this opportunity to "speak" to the amateur community through the pages of *CQ*. It is important that there be an exchange of ideas between the Commission and the people who are affected by our decisions.

In Part II of this expanded series we take up the Lo 6 K 39a receiver. Many of the receivers that have survived the war and time are still seeing service by amateurs throughout the world.

German World War II Communications Receivers

Technical Perfection From A Nearby Past

Part II

BY DICK ROLLEMA*, PA0SE

In Part I of this series, we saw some of the ingenious thinking that went into the design and construction of German equipment used during WW II. We pick up where we left off last time with a discussion of the Lo 6 K 39a short wave receiver. The pictures attest to the fabled methodicism of German craftsmanship, and one can only surmise that the accompanying manuals told of the number of people required to either lift or move some of this equipment. Some of it looks like it should have crane hooks welded to the cabinets. -K2EEK

Short Wave Receiver Lo 6 K 39a

The receiver that we are going to discuss now must be the ultimate in tuned radio frequency receiver design. But before we start to describe it we will first explain the type designation, just as we did for the Torn E b in the previous section. "Lo" stands for "Lorenz", the firm that designed and built the set. Lorenz was the German branch of the American ITT concern. The figure "6" means there are six tuned circuits. The "K" means "Kurzwellen," German for short wave. The set came into operational use in 1939, hence "39" in the type number. And the "a," finally, means that capacitors of standard types were used.

The Lo 6 K 39a was used by the German Navy during WW II. Photograph 6 gives you a first impression of this receiver. It cannot be called small, as the Torn E b, with its dimensions of 53.8 cm high, 50 cm wide and 32 cm deep. That is without the shock absorbing feet, on which it was normally fitted for shipborne use. Again, it is built like the proverbial battleship – it was meant for the Navy – and that reflects in its weight, a solid 65 kg (143 lbs). Arthur Bauer, PA0AOB, the owner of the set in the photograph, kindly gave it to me on loan for a practical evaluation and I had to enlist the help of my neighbor, a contractor with bulging muscles, to help carrying the monster up two flights of stairs to my shack in the attic.

I got the original technical manual with the set and the first line in that comprehensive booklet nicely summarizes what it is. In translation it says something like "The short wave receiver Lo 6 K 39a is a five tube tuned radio frequency receiver with six ganged tuning circuits. A sixth tube serves for frequency checking." The radio covers 1.5–25MHz in eight subbands that cover the following ranges according to the specifications:

Range 1: 1.50–2.135 MHz
Range 2: 2.135–3.05 MHz
Range 3: 3.05–4.33 MHz
Range 4: 4.33–6.16 MHz
Range 5: 6.16–8.74 MHz
Range 6: 8.74–12.40 MHz
Range 7: 12.40–17.60 MHz
Range 8: 17.60–25.00 MHz

In practice there is some overlap between ranges. As you see the subbands cover relatively narrow frequency ranges and that, together with the 1:50 slow motion drive on the tuning capacitor makes for very easy tuning, up to the highest frequencies. But more about that later.

The circuit diagram is shown in fig. 7 in simplified form, as presented in the manual. As you see the input is protected by a neon tube. This already indicates that the radio was designed for operation near transmitters, a situation encountered on board naval ships. The lamp is alight.

There are not less than six tuned circuits! Of these the first three precede the first r.f. tube in the form of a triple tuned bandpass filter. This was no doubt another protection of the input

*v.d. Marckstraat 5, 2352 RA LEIDERDORP, Netherlands

tube against the strong signals of near-by transmitters. Further tuned circuits precede the second and third r.f. amplifying tubes and the leaky grid detector with regeneration. Each of the six sets of eight coils occupies a separate screened section of a vertically mounted coil turret, clearly visible in photograph 7 which shows the inner works. The turret is rotated via the crank at the bottom of the front panel through a set of gears. The band-switching action by means of this crank is very positive and imparts a sturdy feeling, like the exclusive automobile door we mentioned in an earlier section of this article. The six sections of the tuning capacitor are divided over two screening boxes, with part of the gear train in between. The unit can be seen at the right in photograph 7. As with the coil turret the shaft is vertical.

The dial on the tuning capacitor is directly calibrated in frequency for each of the eight subbands. There is no danger that the wrong frequency scale can be read because of a circular mask with separate windows for each band which rotates with the coil turret thereby allowing only the frequency scale of the selected subband to be read. In photograph 6 this is the middle one of the three windows in the black mask. The mask also clearly indicates the frequency range and the subband number and even in which direction the crank must be rotated to reach the adjoining subbands. In the photograph subband 5 (5.97 - 9.00 MHz) has been selected. Subband 4 can be reached by turning counter clockwise and number 6 by turning clockwise. Another example of German perfection!

The lower window displays a logging scale and the top window has no glass, which makes it possible to enter pencil marks on the dial.

We already mentioned that tuning is made easy through the slow motion drive and the relatively narrow subbands. But it is made even easier by means of a fine tuning control that varies the tuning of the detector circuit (which determines the tuned frequency on c.w. and s.s.b. with an oscillating detector) plus or minus 3 kHz around the frequency selected by the main tuning control. The tuning range of the fine control is independent of the setting of the main tuning capacitor or the frequency range selected. This could only be achieved with a *coil of variable self-inductance* that is changed with the subband in use; it is designated 74 in fig. 7. If a variable capacitor had been used for fine tuning its influence would be dependent on the total capacity in use. Thus the fine tuning range would be much greater on the high frequency end of a subband than on the low frequency end. The variable coils are operated by a big control knob, the

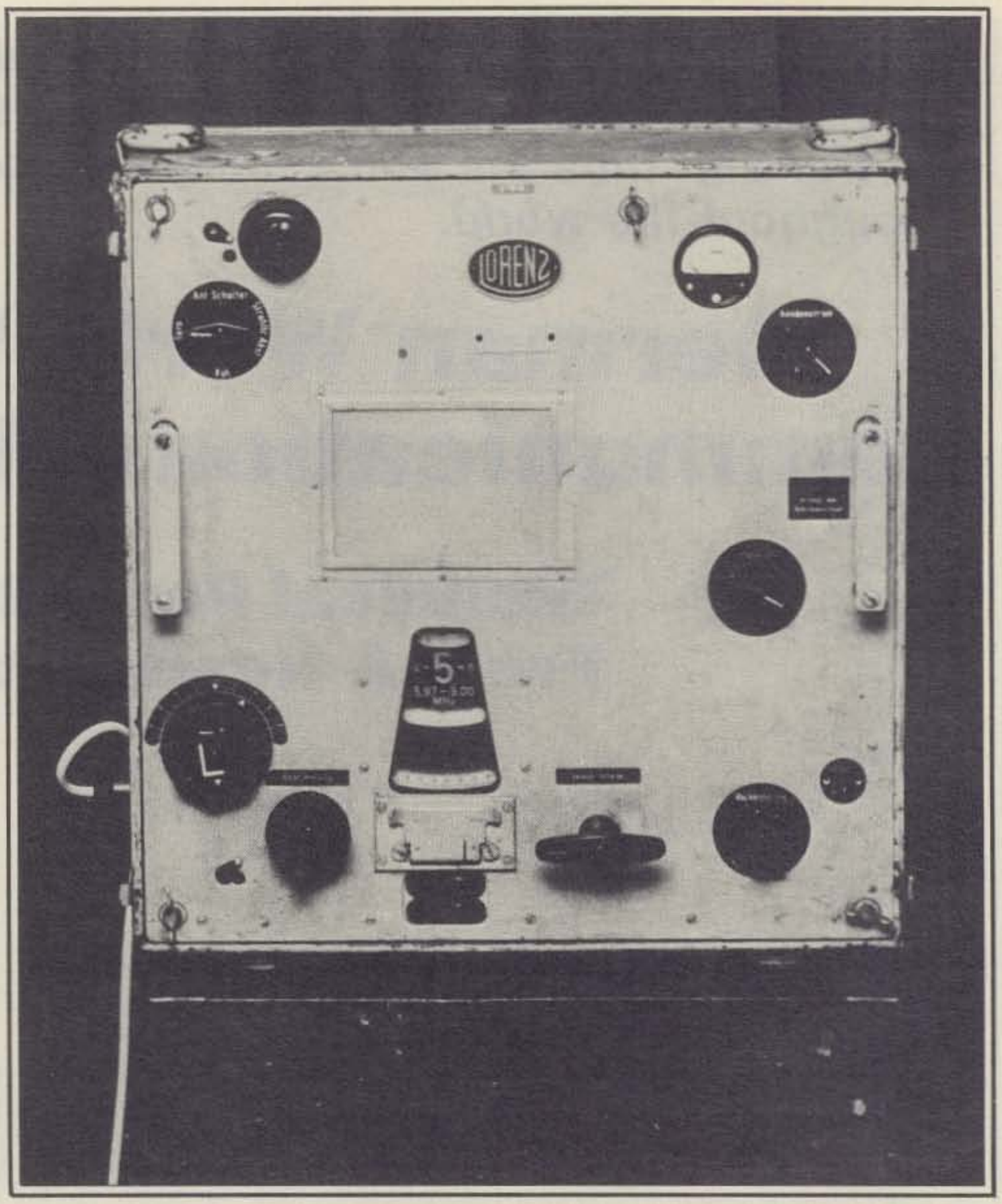


Photo 6- Tuned radio frequency receiver Lo 6 K 39 a. This set features no less than six tuned circuits, all ganged to the tuning control!

outer one of two concentric knobs on the lower left front panel. The inner one marked "L" ("Lautstärke") controls the receiver gain by varying the screen grid voltage of the first two r.f. tubes.

Here, on the subject of gain, we find another of those special measures that makes the operation of this German WW II communication receiver such a pleasure. The impedance at resonance of a parallel tuned circuit is higher when the circuit is tuned to the high end of its tuning range (minimum capacity) than at the low end. This affects the gain of the tube that precedes the circuit. That gain is the product of the mutual conductance of the tube and the impedance of the tuned circuit. The net result is that the stage gain increases when the circuit is tuned from low to high within a subband. As there are three r.f. tubes, each with a tuned circuit following, the effect is aggravated and we would have to adjust the gain control continuously when tuning to keep the gain and signal handling capability of the set the same. Indeed, this would have been a problem were it not for the ingenuity of the designers of the Lo 6 K 39a, who found a clever remedy. If you take a good look at photograph 7 again you will notice a potentiometer at the right between the boxes containing the tuning capacitor. This potentiometer is coupled to the shaft of the tuning gang by means of a set of gears, so it rotates with it. This pot controls the screen grid voltage of the third r.f. tube (not shown in the simplified diagram of fig. 7) in such a way that the voltage becomes lower when the set is tuned towards higher frequencies, so decreasing the gain. This compensation is so effective that the user does not notice any obvious change in receiver sensitivity when tuning within a subband. Neat eh?

The detector features the already familiar smooth regeneration control by varying its screen grid voltage. The detector drives the a.f. final stage via

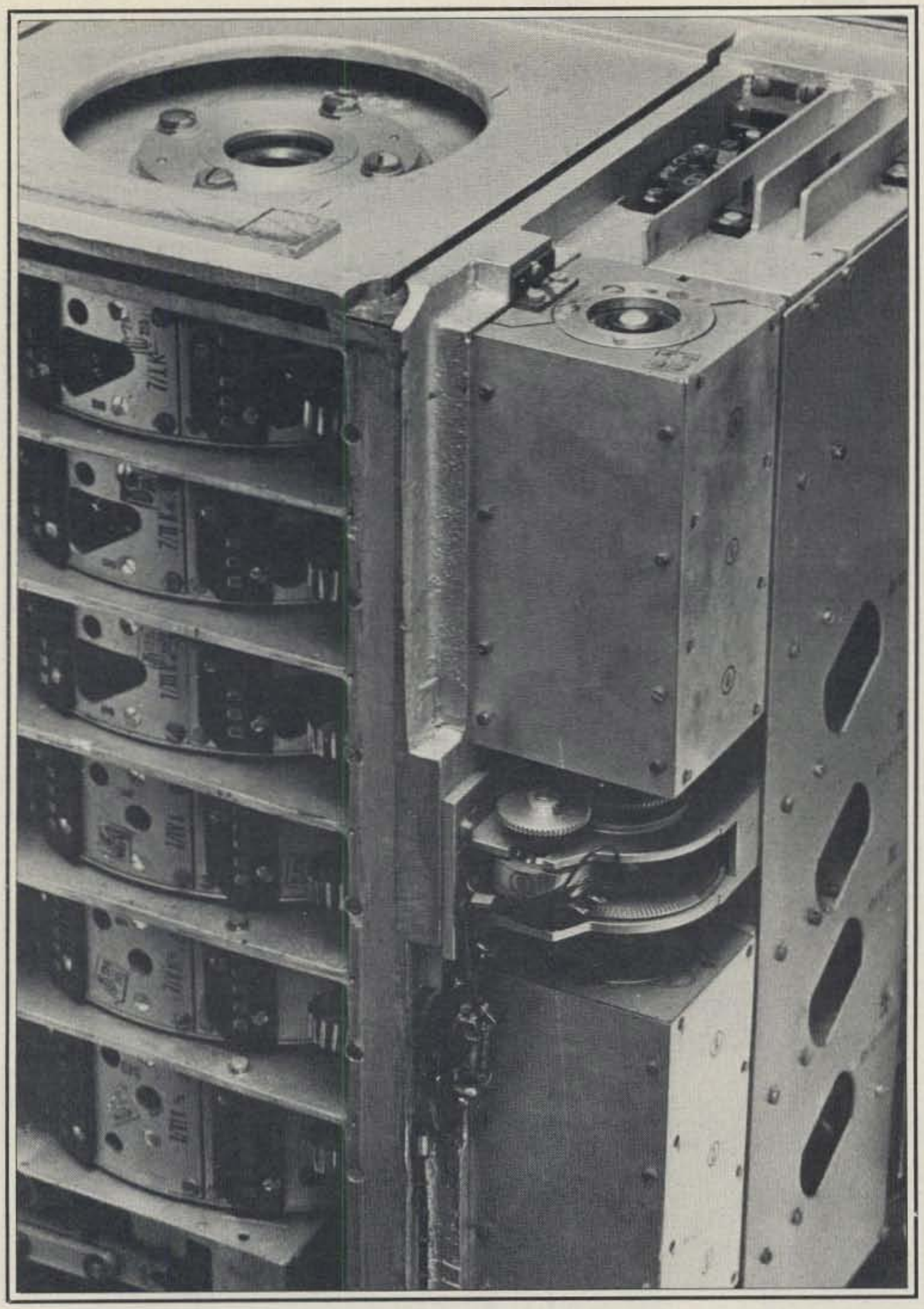


Photo 7- This view from the back of tuned radio frequency receiver Lo 6 K 39 shows the coil turret with six compartments, each of which houses eight coils, one for each frequency range. The two boxes at the right contain the sections of the six-gang variable tuning capacitor. Between the box a pot can be seen that is driven from the gears for the tuning capacitor. The pot varies the screen grid voltage of one of the tubes, in order to keep receiver gain constant when tuning over a frequency range.

an audio filter tuned to 1000 Hz with a 3 dB bandwidth of 200 Hz. Because this is a double tuned bandpass filter its slopes are steeper than for the one in the Torn E b receiver.

The sixth tube is used in a crystal calibrator on 100 kHz.

All tubes are of the same type, an especially designed tube for military applications, a miniature pentode with the type number RV 12 P 2000. This universally used tube has an indirectly heated cathode that takes 0.075 amps at 12.6 volt heater current. The tube goes top first into a holder that completely envelopes it. In order to retract it a special tool is screwed into its base. Otherwise the bottom of the tube is flush with the panel that carries the holder. A photograph of the RV 12 P 2000 appears later in this article.

As you see in fig. 7 the receiver has a built-in power supply with a double smoothing section. The supply voltage for the detector stage is stabilized by a neon tube.

The Lo 6 K 39a is a sophisticated radio in every respect. This reflects

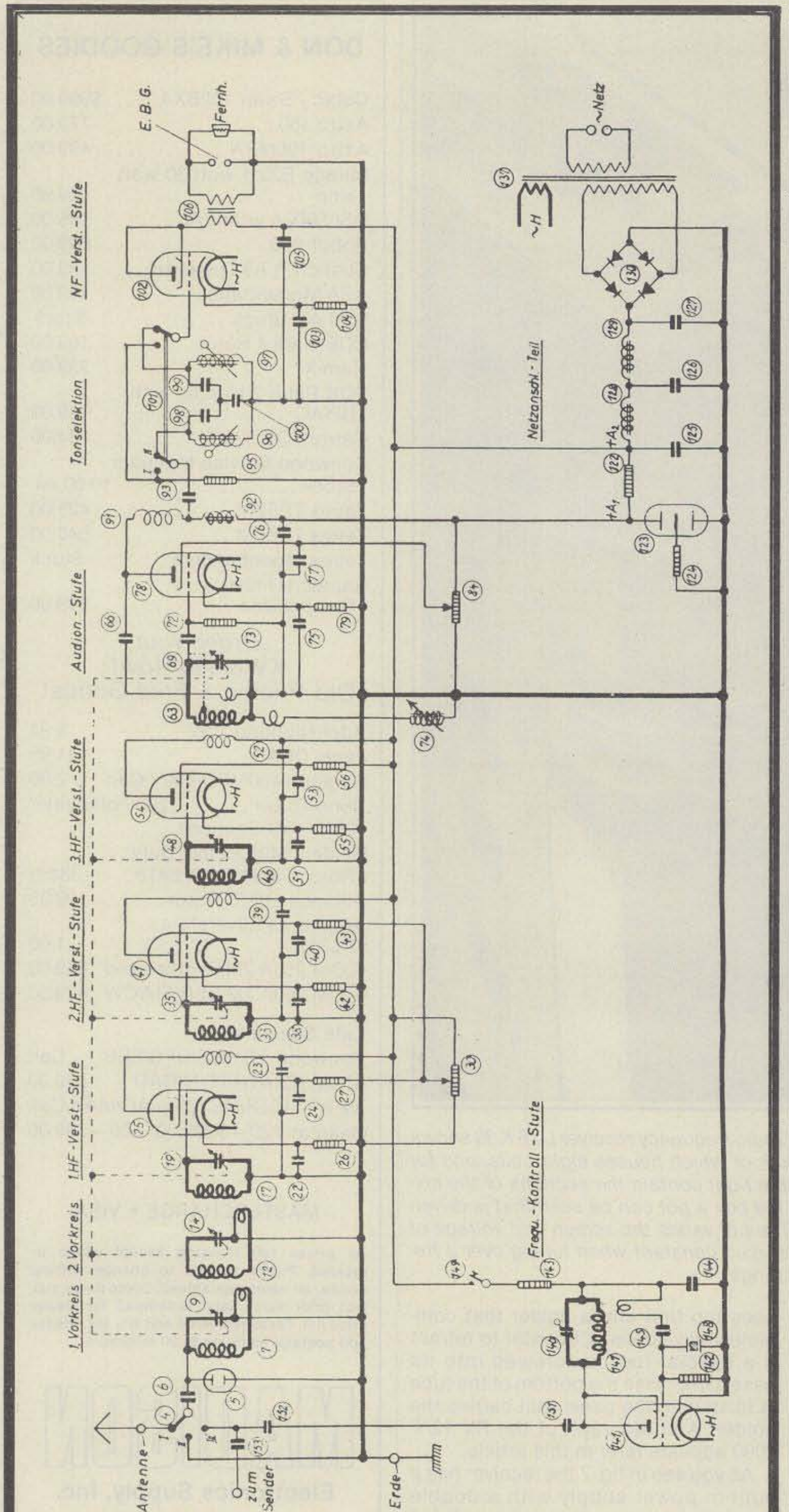


Fig. 7– Simplified circuit diagram of the tuned radio frequency receiver Lo 6 K 39 a.

also in the provision for metering the different stages. Top right in photograph 6 we find the test instrument that features not one, as in the Torn E b, but two pushbuttons. By pushing the yellow button we read the heater voltage and the meter pointer should indicate within a yellow sector on the meter face. The anode voltage can be checked by operating the red pushbutton and the meter should read within a red segment on the meter face. But it doesn't end there. We can also check the *anode currents* of the six tubes. As a preparation to this the controls for gain and regeneration should be turned fully clockwise and the tuning control on "0" (the tuning control effects the screen grid voltage of tube number three, as we saw). Under and to the right of the meter we find a six position switch marked "Anodenstrom" (anode current). It is normally held in an off-position by means of a spring. When we move the switch against the spring into position "I" the meter reads the anode current of tube number 1. If the tube is in normal condition the meter pointer is within a blue sector on the meter dial. The same happens for tube 2 with the switch in position "II". And so on for all six tubes. Speaking of perfection . . .

As could be expected the electrical specification of the receiver is very complete, be it that in the days of WW II some of the electrical characteristics were specified differently from nowadays.

Output is stated as the voltage over a pair of headphones with 5000 ohm impedance at 800 Hz. The receiver noise should produce between 0.2 and 3.0 v, with the gain control at maximum and the detector just in oscillation for maximum sensitivity for c.w. With maximum 0.3 v. receiver noise 2 microvolt input for A1 (c.w.) and 4 microvolt for A2 (m.c.w.) should produce 1 v. output at optimum position of the regeneration control. According to tests made by the author a signal of 0.4–0.8 microvolt generator emf behind 50 ohm internal generator resistance produces a readable c.w. signal.

You probably wonder what sort of selectivity can be expected from a t.r.f. set with six tuned circuits. The specs state the selectivity as follows that at ± 0.85% detuning a 10^3 times increase of signal is required to restore the response from a 2 microvolt signal at 4.62 MHz (signal generator modulated with 400 Hz at 30% modulation depth, mode A2, regeneration control set just before oscillation). We would say that 0.85% detuning causes 60 dB attenuation, which certainly is not bad. There are many more interesting points in the specs but we will leave it at that.

The practical evaluation in the author's shack fully confirmed what

would be expected from the specs. The set had been inactive for many years. Owner PA0AOB did not realign the receiver before it was handed to the author. The only thing Arthur did was to clean the moving contacts of the coil turret and capacitor gang with contact spray. Nevertheless the frequency calibration was found to be remarkably correct. The 100 kHz crystal in the calibrator was spot on. Tuning is as easy as can be, even sideband on 21 MHz, thanks to the fine-tuning control. As with the simpler Torn E b, the set is beautifully quiet. As to be expected the set is at its best on c.w. Again no trace of inter- or cross-modulation was found, not even during night hours in the crowded 40 meter band. And not a single spurious signal or birdie was observed, quite normal for a t.r.f. set of course. But it is a reassuring feeling to know that when a signal is heard you can be sure it is a real one on the frequency the radio is tuned to.

The author remembers that at the test equipment department of the electronics firm, where he was employed some 15 years ago, a Lo 6 K 39a was used to check the purity of the output from a signal generator under test.

(To Be Continued)

Background Notes On Speech Processing And The MFJ-525 R.F. Speech Processor

BY JOHN J. SCHULTZ*, W4FA

Good-Better-Best might well describe the effectiveness of various forms of speech processing ranging from simple a.f. speech compressors to a.f. speech clippers to r.f. speech clippers. There is hardly any argument at all today that the latter form of speech processing, when properly implemented, is among the most effective in terms of real DX audio "punch". Depending upon the comparison techniques used, one can generally state that within tolerable distortion levels, a.f. speech compression will produce a 1 dB increase in average s.s.b. power, a.f. speech clipping will produce a 3 dB increase and r.f. speech clipping will produce a 6 dB increase. There are a lot of "ands", "ifs" and "buts" to these figures, depending mainly on the ability of the design on any given transmitter to tolerate any drastic change in its peak to average s.s.b. power input level as the result of speech processing. Nonetheless, as a relative guide to improved performance with speech processing, the dB figures quoted have been proven correct. As one might well guess, the circuit cost and complexity involved in implementing each form of speech processing rise along with the dB figures.

The MFJ Processor is housed in a very attractive Ten-Tec type cabinet. All needed controls are on the front panel.

R.f. speech clippers can be realized in various forms. In an s.s.b. transmitter, one can introduce a clipper in the i.f. chain, followed by a sideband filter to remove distortion products. Such "internal" r.f. speech processors are becoming more and more common in new h.f. transceivers. However, to add them to existing transceivers usually presents a variety of connection/modification problems, although a few companies do offer modification kits for a few specific transceivers. It is fortunate, however, that one can fully realize the effectiveness of r.f. speech processing by fully external accessory units which basically generate an s.s.b. signal, clip it at an r.f. frequency and then filter it and demodulate it back to a.f. so the processed audio can be fed into the microphone input of any transmitter.

Such accessory r.f. speech processors or clippers are not new. Various forms of them have been on the market for the last 15 years or so, although a lot of advertising copy writing has been stretched to describe audio type processors as being about the same as r.f. type audio processors. The basic problem of course, with building a true r.f. type audio speech processor has been cost. The basic block diagram of a true r.f. type audio speech processor is shown in fig. 1. One has to take a microphone output signal, generate a d.s.b. signal using some form of balanced modulator, filter the d.s.b. signal into an s.s.b. one, clip the s.s.b. signal, filter it again to remove most of the intermodulation products caused by the clipping with another s.s.b. filter, demodulate the s.s.b. signal and then finally demodulate the resultant audio signal. The main cost in building such a processor was usually considered to be the two s.s.b. filters needed. If one used mechanical filters, as some designs did years ago, the filter cost ran well over $100, and the cost of a completely assembled commercial processor at 2-3 times that figure. Obviously at that sort of cost as compared to other ways of boosting signal strength, the r.f. type audio speech processor wasn't too attractive, especially since an investment in a linear or a better

*c/o CQ Magazine

antenna would produce a signal advantage on any mode being used. Besides, years ago one wasn't too worried about the fact that a linear is a terribly inefficient and power consuming way of rising the effective DX "punch" of an s.s.b. signal.

Various ways have been tried to gain the basic advantage of true r.f. type audio speech processing without getting involved in circuits requiring the use of expensive r.f. frequency s.s.b. filters. A U.S. international broadcasting organization did a lot of research in this area in the early 1970's, and they came up with an approach that proved to be quite successful. MFJ has tried the same approach with their product and it also is quite successful. What is the great secret? Actually, nothing all that exciting on the surface. It is true that if one follows the process of fig. 1, one needs two s.s.b.filters. But, the need for these filters to operate at high r.f. frequencies is not all that true. Such filters only have to operate at a frequency that is sufficently high such that the intermodulation products generated by the clipping process can be mostly eliminated in the process of s.s.b. filtering. If two criteria are met, namely that the clipping is not extreme (beyond 15 to 20 dB as defined by an average to peak ratio) and frequency pre-emphasis is used on the incoming audio so the intermodulation products after clipping are mostly in the higher frequency range, the s.s.b. filters need only operate at frequencies of about 20 kHz or more. This type of approach has tremendous advantage in that the s.s.b. filters required become rather simple LC type filters, which are inexpensive and, because of their frequency range, are extremely frequency stable.

The circuit diagram of the MFJ-525 RF Speech Processor is shown in fig. 2. It is a little complicated to fol low through, but it does follow the basic outline of fig. 1. The input transistor stage, a 2N5088, is a high-gain stage to accommodate almost any low/high impedance microphone input. The stage has a significant amount of r.f. input protection to preclude r.f. feedback problems. In fact, it might well serve as an example for anyone needing a really good r.f.-protected high-gain microphone amplifier. This discrete transistor stage is followed by a number of IC stages. The audio is amplified, converted into a balanced form, pre-emphasis added, and fed into a balanced modulator. The balanced modulator has a carrier oscillator signal injected at 47 kHz from LC oscillator stage 6B. The oscillator signal is also routed to a balanced

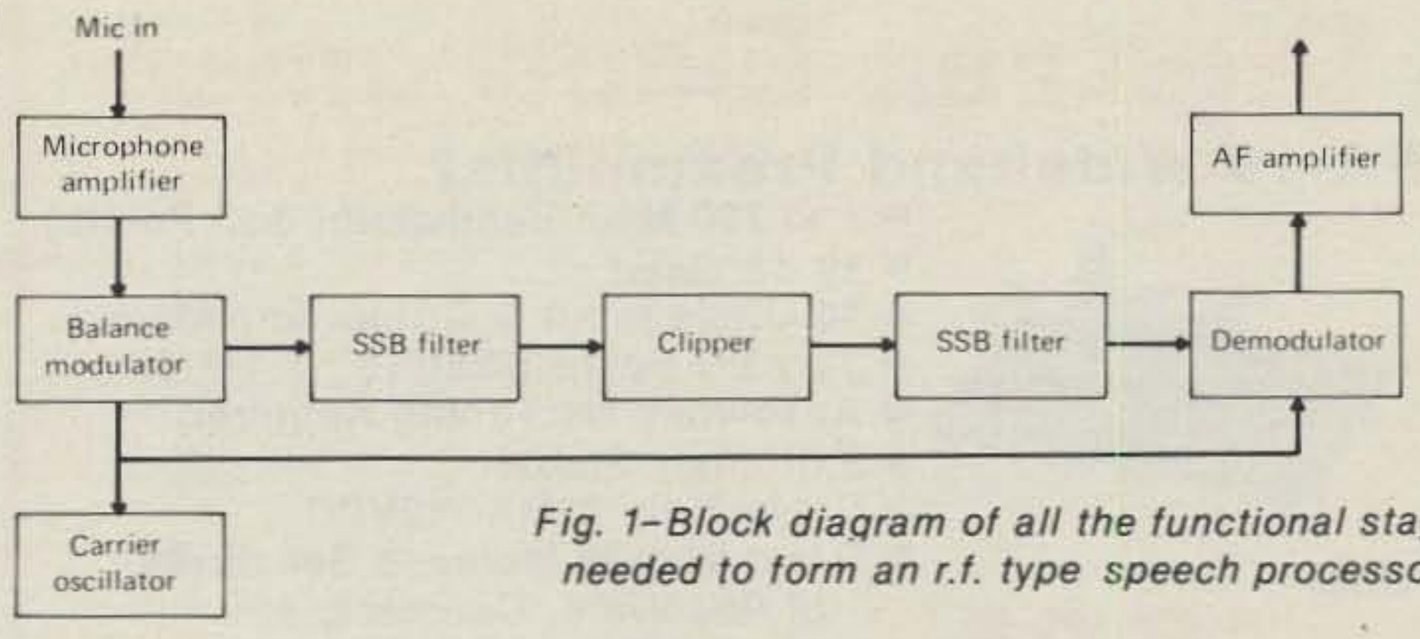


Fig. 1–Block diagram of all the functional stages needed to form an r.f. type speech processor.

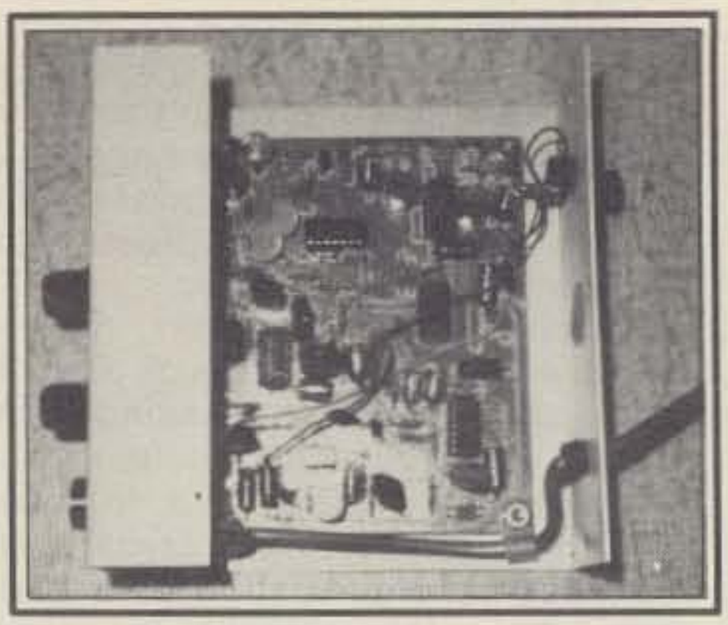
form of mixer used as an s.s.b. demodulator (stages 6A and 6C). The d.s.b. signal itself from stage 3 is routed through stages 5A, B and C where the upper sideband signal is filtered, clipped and filtered again. The audio output of the demodulator, stage 6, is routed through a final IC, stage 7, which provides amplification as well as some low pass filtering. Stage 7B is used to drive a VU meter, which is used to properly set up and monitor the signal level from the processor. The circuitry will operate from any 12-18 volt source since it has its own internal voltage regulator. MFJ does supply a 12 v.d.c. plug-type power supply with the unit. Finally, as one can see from the wiring of the input/output connections, there is a switch provided to bypass the processor when desired. To say the least, the circuitry is very interestingly and professionally arranged.

As can be seen from the front view, the unit is nicely housed in a Ten-Tec type enclosure which measures 6 × 2 × 6 inches overall. All the controls and switches one needs are well grouped on the front panel. If one takes off the top cover of the unit, as shown in the internal view, one sees a large double-sided PC board. There are a lot of nice little points about the construction of the unit such as the fact that all of the IC's, except one apparently high-gain stage, are socketed. The components on the board are neatly aligned and set in place and appear to be of very good quality.

The adjustment of the unit is basically simple, and one will get a good performance out of the unit easily. However, if one insists on squeezing out that last extra ½ dB, a number of precautions have to be observed. The basic adjustment consists simply of whistling into the station microphone with the processor on, adjusting the "compression" control so the VU meter indicates around "0" and then adjusting the output "level" control until the a.l.c. meter on the transceiver being used indicates its recommended value. That's all there is to it, and one will get good results. One can go beyond this simple procedure and squeeze a little more performance out of the unit, but then a monitoring oscilloscope is required. Also, since the unit provides extremely high gain, one then has to start to pay careful attention to the background noise level in the shack. The instructions that come with the processor cover the adjustment of the unit in some detail and give numerous tips on the use of the unit. One of the best ways, by the way, to hear for yourself the general effect of using the processor and the effects of various settings is to use it first feeding an audio amplifier and listening to the output with a pair of headphones. By this method, one can more easily appreciate the sensitivity of the "compression" control setting and the "punch" the processing action adds to speech as one switches the unit in and out of the microphone circuit.

What about results? Well, one might mention first that good speech processors are sort of like good computers. In other words, a poor signal in will produce a poor signal out. Before using a processor, one should be satisfied that one is using a microphone suited to one's voice characteristics and that the audio from one's transceiver sounds "clean" although it may not have all the "punch" one desires.

The processor was tried with modern 100 watt class transceiver having a good a.l.c. system and using a rather poor multiband 10/15/20 meter antenna system. The microphone was a moderately priced dynamic type. The processor was set up by the simple procedure mentioned previously without the use of any special test instruments. Absolutely no problems with r.f. feedback were encountered on any band. Numerous tests were made, mainly with DX and weaker stations. The results obtained consistently confirmed the value of using the processor. At first, a few tests were made trying to compare



A look inside the MFJ-525 unit reveals a large double-sided PC board which contains all the circuitry.

the use of the processor versus using a simple speech compressor. However, this effort was soon abandoned, since the compressor might just as well not have been there because of the overriding effect of the fine a.l.c. system in the transceiver. Using the MFJ processor, reports were generally obtained that the signal was at least an "S" unit better with the processor or that "your signal is not moving the 'S' meter here but your audio is perfectly readable with the processor." When stronger stations were worked, comments were solicited about any possible audio distortion. No negative reports were received, and most stations felt there was no "processed" sound to the audio.

It probably would have been possible to get a bit more "punch" out of the processor, but with an exponential relationship to all the distortion which would have been generated. Using the processor in a conservative manner proved perfectly adequate for all sorts of signal conditions and bought more effective dB per dollar than any other improvement it would have been possible to make in the station setup.

NOTES:
Unless otherwise specified:
1. All resistors are in Ohms.
2. All capacitors are in microfarads.
3. Diodes are 1N753
4. U1 = 741, U2 and U7 = 747, U3 = CD4016, U4 - CD4013, U5 and U6 = CD4007

Fig. 2- Schematic diagram of the circuitry used in the MFJ-525 r.f. speech processor.

Now that you've been following K8BG's series on Basic, it's time to get your feet wet on some actual programs to utilize your computer for amateur radio.

Program For Circular Satellites

BY BUZZ GORSKY*, K8BG

Once I had obtained a computer (Radio Shack TRS-80 Level II, 16K) for research and for amateur teletype, it seemed appropriate to put it to use for some other tasks in the shack. Since I began using the satellites, I have been using AMSAT's orbital calendar and the OSCARLOCATOR to work out which orbits would be above the horizon and to obtain antenna headings. I decided to let the computer tackle that job. While there are several programs around in various languages, there was none in BASIC that worked just the way I wanted, so I have written my own. However, since my solid trigonometry is more than a little rusty, I did refer to some fine articles to obtain the necessary equations and an explanation of their derivation[1, 2, 3]. The Program is shown at the end of the article and will be discussed in detail. First, let's begin with the math.

The following equations are valid for a satellite that is in a nearly circular orbit so that there is a constant radius for its orbit.

These equations, then, would form the heart of the computation for the program. Now we'll take a look at the program itself.

Since the TRS-80 does its trig computations in radians, everything has been converted to degrees. It would have been a little simpler to let all of the computation proceed in radians and convert only the azimuth and elevation angles for output, but since I am more familiar with degree values, I decided to do everything in degrees to simplify debugging. Since pi radians equals 180 degrees, the conversion is relatively simple. Further, since Level II Basic in the TRS-80 does not require the use of the command "LET", all of the LET statements have the LET omitted.

Statements 1-31 set up the required housekeeping and put in the required parameters for the current satellites. Clearly it would be an easy task to change one set of these values or add those for another satellite if required. Statements 29 and 30 list the longitude and latitude for my QTH and would obviously have to be changed for any other location. Statements 50-73 provide the initial user interaction asking for which satellite and which time system will be used. If you wish to use time zones other than EST and EDT, a few statements in the program must be modified; all of these are noted with REM statements. H and X6 are

*712 Hillside Drive, Carlisle, PA 17013

Lat = arcsin(sin(i)*sin(360*T/P) (1)
where Lat = latitude of the satellite (or point on earth directly below it
i = inclination angle of satellite orbit
T = time in minutes since equator crossing
P = satellite period

Long = arccos(cos(360*T/P)/cos(Lat)) + .25*T + R (2)
where Long = satellite longitude
R = Longitude of equator crossing
.25*T accounts for rotation of the earth each minute

D = arccos (sin(A)*sin(B) + cos(A)*cos(B)*cos(L)) (3)
where D = great circle distance (in degrees) from station to satellite
A = latitude of QTH
B = latitude of satellite
L = longitude of QTH minus longitude of satellite

Az = arccos((sin(B) – sin(A)*cos(D))/cos(A)*sin(D)) (4)
where Az is azimuth bearing for antenna (When the longitude of the satellite is greater than that of the QTH, then azimuth is the angle calculated subtracted from 360—i.e., az = 360 – az)

El = 90 – arctan((3957 + h)*sin(D)/((3957 + H)*cos(D) – 3957)) (5)
where El is the antenna elevation above the horizon
H = altitude of satellite
3957 = radius of earth

D1 = arccos(3957/(3957 + H)) (6)
where D1 = the maximum D for communication (When the angle between station and satellite is greater than D1, the satellite is not above the horizon)

Incr = .25*P
where incr = distance in degrees between equator crossings. (7)

counters that will be used later in the program to see whether certain parts of the program have been entered. In essence these counters provide escapes that prevent unneeded computation. For example, once the program begins printing out antenna headings, there will eventually be a time when the satellite will again be below the horizon. X6 and H will show the program that this is so and prevent the program from searching through the rest of the same orbit for the satellite to be above the horizon.

From 100 to 149 the program calculates whether the satellite will be above the horizon on a particular orbit. Since the computer only has one inverse trig function—namely arctan—all other inverse functions must be calculated according to equations that are provided in the user manual. If your computer has arcsin and arccos you can make this and a later section of the program simpler. Simply refer to the equations I have provided in the text. For computation in the program, I have used the following relationships:

arcsin(x) = arctan(x/SQR(−x*x + 1)), where SQR is the square root, and

arccos(x) = −arctan(x/SQR(−x*x + 1)) + 1.5708.

K is merely a dummy variable used to break up some of the longer equations into two steps. The "Z" loop will permit computation for 13 orbits, which in most cases will mean that the last orbit calculated will actually be the reference orbit for the following day. A1 is the constant required to convert from degrees to radians. In step 145 when D is less than D1, the loop is exited and the program advances to the next section. Later, if the user elects to run the program for the next orbit, control is returned to statement 147 to resume the loop.

Statements 200-275 take care of minor computation and the user interaction whenever the program finds that the satellite will be above the horizon. 205-252 take care of timekeeping so that the print statement at 260 can state at what time the indicated orbit will occur. As is the convention among satellite users, this time is the equator crossing time, not the time when the signal will be heard at your QTH. From 260 to 275 the user has the opportunity to have antenna bearings calculated or to have computations made for the next orbit.

If you want antenna computations the program continues with 300-550. Here calculations are done for each minute for the orbit beginning at equator crossing and ending when the satellite passes below the horizon. Azimuth and elevation angles are shown for each minute. For some

Satellite Program

```
 1 Rem Program by Buzz Gorsky, K8BG
 2 Rem Program will calculate which orbits are usable and provide antenna azimuth and elevation angles for any earth satellite in a circular orbit.
 5 Rem satellite parameters
 6 Defint N, M, U, T, Z
10 Dim H (3), I (3), P(3)
20 H(1) = 910: Rem altitude Oscar 7
21 I(1) = 102: Rem inclination Oscar 7
22 P(1) = 114.945: Rem period Oscar 7
23 H(2) = 542: Rem altitude Oscar 8
24 I(2) = 99: Rem inclination Oscar 8
25 P(2) = 103.23: Rem period Oscar 8
26 H(3) = 1060: Rem altitude RS
27 I(3) = 82.56: Rem inclination RS
28 P(3) = 120.3925: Rem period RS
29 S = 81.55: Rem longitude (degrees) of QTH (substitute your own)
30 A = 41.47: Rem latitude (deg) of QTH (substitute your own)
31 R = 3957: Rem radius of earth
50 Print "Which satellite? Enter 1 for Oscar 7"
51 Print "          Enter 2 for Oscar 8"
52 Print "          Enter 3 for RS"
53 Input N
60 Print "Enter time you desire (UTC, EDT, EST)": Rem modify for your QTH
61 Input Q$
70 Print "Enter reference orbit number, time (Hr, Min)"
71 Print "and crossing longitude"
72 Input O1, U1, M1, R1
73 H = 0:X6 = 0
100 Rem computation to see availability
110 K = R/(R + H(N))
111 D1 = (−ATN(K/SQR(−K*K + 1)) + 1.5708)*57.29578
120 For Z = 1 to 13
125 For T = 1 to 60 Step 5
126 O = O1 + Z − 1
130 A1 = .0174533
131 K = (SIN(I(N))*A1))*(SIN(A1*360*T/P(N)))
133 B = (ATN(K/SQR(−K*K + 1)))*57.29578: Rem satellite latitude
134 K = COS(A1*360*T/P(N))/COS(A1*B)
135 C = (−ATN(K/SQR(−K*K + 1))
+ 1.5708)*57.29578 + .25*T + R1 + .25*(Z − 1)*P(N): Rem satellite longitude
136 K = SIN(A1*A)*SIN(A1*B) + /COS (A1*A)*COS(A1*B)*COS(A1*(S − C))
137 D = (−ATN(K/SQR(−K*K + 1)) + 1.5708)*57.29578
145 If D<= D1 then 200
146 Next T
147 H = 0:X6 = 0: Next Z
148 Print "End available orbits"
149 GOTO 570
200 Rem This section entered if an orbit available
205 M = INT(M1 + P(N)*(Z − 1))
206 U = U1
207 If M<60 then 230
210 M = M − 60
215 U = U + 1
216 GOTO 207
230 If Q$ = "UTC" then 260
231 If Q$ = "EDT" then 250: Rem Edit if you change time zones
235 U = U − 5:Rem edit if you change time zones
240 If U>= 0 then 260
245 U = U + 24
246 GOTO 260
250 U = U − 4: Rem edit if you change time zones
251 If U =>0 then 260
252 U = U + 24
260 Print "For orbit number"; O; "At"; U; M;" ";Q$;" Satellite Usable"
265 Print "Do you want antenna bearings?(Y/N)
266 Input X$
270 IfX$ = "Y" then 300
271 Print "Do you want further orbits?(Y/N)"
272 Input X$
273 H = 0
```

```
274 If X$ = "N" then 570
275 GOTO 147
300 Rem determine when to calculate bearings
301 CLS: Print "Antenna bearings for orbit number";O
303 Print "Time", "Azimuth", "Elevation"
304 X6 = 0
310 For T = 1 to 60
311 K = SIN(A1*I(N))*SIN(A1*360*T/P(N))
312 B = (ATN(K/SQR(-K*K + 1)))*57.29578
313 K = COS(A1*360*T/P(N))/COS(A1*B)
314 C = (-ATN(K/SQR(-K*K + 1)) + 1.5708)*57.29578 + .25*T + R1 + .25*(Z - 1)
    *P(N):If C = >360 then C = C - 360
315 K = SIN(A1*A)*SIN(A1*B) + COS(A1*A)*COS(A1*B)*COS(A1(S - C))
316 D = (-ATN(K/SQR(-K*K + 1)) + 1.5708)*57.29578
318 If D< = D1 then 330
319 If H>0 then 550
320 Next T
321 GOTO 550
330 If X6>0 then 350
349 M = M + T - 1
350 M = M + 1
351 If M<60 then 450
352 U = U + 1
353 M = M - 60
354 GOTO 351
450 Rem Az/El output
455 K = (SIN(A1*B) - SIN(A1*A)*COS(A1*D))/(COS(A1*A)*SIN(A1*D))
456 A4 = (-ATN(K/SQR(-K*K + 1)) + 1.5708)*57.29578
457 A4 = INT(A4)
458 If (C - S)>0 then A4 = 360 - A4
460 A5 = 90 - (ATN(((R + H(N))*SIN(A1*D))/((R + H(N))*COS(A1*D) - R)))
    *57.29578
461 X6 = 1
462 A5 = INT(A5)
500 Print U;M,A4,A5
510 H = 1
515 GOTO 320
550 Print "End of usable orbit"
555 Print "Do you wish computation for another orbit?(Y/N)"
560 Input X$
565 If X$ = "Y" then 147
570 Print "do you wish computation for another satellite?(Y/N)"
575 input X$
580 If X$ = "Y" then 50
999 End: Rem Program stores in 3K
```

orbits the screen will fill and begin to scroll off during this calculation. You can get a pause by striking SHIFT and @ at the same time. Then hit the space bar to continue the output. Finally, the last few statements of the program permit the user to obtain data for the next orbit. As noted in the program 3K is all that's required.

There is one part of the program that you may wish to modify. Statement 125 begins a loop where T, time, is incremented in 5 minute steps. I did this for two reasons. Since this part of the program is looking to see whether the satellite is above the horizon, and this is not the section that actually calculates antenna bearings, it seemed a waste of computation time to have computation made each minute. Also with the step 5 setup there will be some orbits where the satellite will be above the horizon for only a few minutes which will be neglected. I consider this an advantage since such orbits provide little reasonable use. However, such orbits may be just what you need for Hawaii or some other desireable DX. So if you wish to have a printout for every orbit accessible for even one minute, just strike the "step 5" out of this statement.

I have been using this program regularly for my satellite activities and have had no problems. However, the Oscarlocator is gathering dust. If anyone would like this program on tape, just send me a blank tape and a s.a.s.e. with enough postage for return of the tape and I will record and verify the program twice.

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Novice

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Worldwide Codes

The June through August 1979 Novice columns provide a good introduction to code for the newcomer to amateur radio. The many advantages associated with the code are described in detail in those issues. That three-part item included symbols for the American, Arabic, Continental, Greek, International (English), Japanese, Russian, and Turkish Morse Codes. Several foreign (DX) readers spotted four errors that crept into those codes. In addition, Hans Schroeder, AE9G, forwarded a copy of the Hebrew Morse Code provided by the DX Editor of Israel Radio. The corrected codes, plus the added code, are repeated in this article for your information. It is permissible to use other than the International (English) Morse Code as long as three requirements are met. First, just known codes can be used. One is not allowed to use a code that is not generally known; such unknown codes are ciphers and they are prohibited on the amateur radio bands. Second, all operators involved in the contact must be willing to use such other code or it cannot be used. Third, all station identification must be made in the International (English) Morse Code. Anyone who wants to know a lot more about code, code practice, and code apparatus is invited to read the June through August 1979 Novice articles in *CQ*. Previous issues can usually be purchased from *CQ*.

This is Elaine Corning, WD4IJY, who is operating from Lewes, Delaware. Her husband is O.B., N4AIG. They use a Kenwood TS-520 Transceiver with a Hy-Gain 18AVT vertical antenna. Most of Elaine's contacts are on the 15 and 40 meter Novice bands. She holds an ARRL code proficiency award at 15 words per minute, plus the rag chewer's certificate (RCC).

Swala K. Abrams, KA8HIL, is an 11-year-old fifth grader living in Yellow Springs, Ohio. She runs a Ten-Tec Century 21 Transceiver with a 10 meter trap vertical antenna. Her first general call to all stations (CQ) was answered by VK3NRB in Melbourne, Australia. Swala was born in Nairobi, Kenya, and her name means gazelle in Swahili. She is thinking about a career in electronics. Her father is Richard P. Abrams, KA8HLE, an associate professor at Antioch College.

2814 Empire Ave., Burbank, CA 91520

The International Morse Code bears that name because it is based on the English language alphabet and English is the internationally accepted language for radio use. There is no mysterious method which allows foreigners to understand transmissions sent in the International Morse Code. If the receiving operator does not understand the language in which the material is sent, he will have to translate it to know the meaning. Morse Codes exist to match several other languages. In addition, some operators still use the American Morse Code, which was orginated by Samuel F. B. Morse and was extensively used in wire telegraphy.

An overline or underline is used to indicate that the code symbol is composed of the indicated simple letters run together. As an example, the end of work symbol is ...-.- with no separation anywhere in the symbol. When this work sign is copied, the operator simply prints SK or SK to indicate the end of work symbol. Obviously, it would be just as good to use VA or VA to indicate this same symbol, and this is done by some operators. In each case, if the code symbols for S (...) and K (-.-) or V (...-) and A (.-) are run together, they form the end of work code symbol (...-.-). The International Morse Code symbols one must know to pass the FCC examination are as follows:

A	·—	Alfa
B	—···	Bravo
C	—·—·	Charlie
D	—··	Delta
E	·	Echo
F	··—·	Foxtrot
G	——·	Golf
H	····	Hotel
I	··	India
J	·———	Juliett
K	—·—	Kilo
L	·—··	Lima
M	——	Mike
N	—·	November
O	———	Oscar
P	·——·	Papa
Q	——·—	Quebec
R	·—·	Romeo
S	···	Sierra
T	—	Tango
U	··—	Uniform
V	···—	Victor
W	·——	Whiskey
X	—··—	Xray
Y	—·——	Yankee
Z	——··	Zulu

	Normal use	Repeated use
1	·————	·—
2	··———	··—
3	···——	···—
4	····—	····—
5	·····	·····
6	—····	—····
7	——···	—···
8	———··	—··
9	————·	—·
0	—————	—

? Question mark	··——··	IMI
, Comma	——··——	MIM
. Period	·—·—·—	AAA
/Slant bar	—··—·	DN
Paragraph/break (or double hyphen)	—····—	BT
End of message	·—·—·	AR
End of work	···—·—	SK
Invitation to transmit	—·—	K

CONTINENTAL CODE

LETTERS		a or å	·—·—·
A	·—	ch	————
B	—··	é	··—··
C	—·—·	ñ	——·——
D	—··	ö	———·
E	·	ü	··——
F	··—·	FIGURES	
G	——·	1	·————
H	····	2	··———
I	··	3	···——
J	·———	4	····—
K	—·—	5	·····
L	·—··	6	—····
M	——	7	——···
N	—·	8	———··
O	———	9	————·
P	·——·	0	—————
Q	——·—		
R	·—·	FIGURES IN ROUTINE REPETITIONS	
S	···	1	·—
T	—	2	··—
U	··—	3	···—
V	···—	4	····—
W	·——	5	·····
X	—··—	6	—····
Y	—·——	7	——···
Z	——··	8	———··
OPTIONAL LETTERS		9	————·
ä	·—·—	0	—————

PUNCTUATIONS AND OTHER SIGNS	
Period	·—·—·—
Comma	——··——
Colon	———···
Question mark	··——··
Apostrophe	·————·
Hyphen	—····—
Fraction bar	—··—·
Brackets	—·——·—
Double hyphen	—····—
Underline	··——·—
Understood	···—·
Error	·····
End of message	·—·—·
Invitation to transmit	—·—
Wait	·—···
End of work	···—·—
Starting signal	—·—·—
Separation signal	·—·—·
*Semicolon	—·—·—·
*Quotation mark	·—··—·

Numerals and punctuation marks are the same in the codes for all languages.

*Not official but in general use.

GREEK

GREEK LETTER	MORSE SYMBOL	
A	·—	Alpha
B	—···	Beta
Γ	——·	Gamma
Δ	—··	Delta
E	·	Epsilon
Z	——··	Zeta
H	····	Eta
Θ	—·—·	Theta
I	··	Iota
K	—·—	Kappa
Λ	·—··	Lambda
M	——	Mu
N	—·	Nu
Ξ	—··—	Xi
O	———	Omicron
Π	·——·	Pi
P	·—·	Rho
Σ	···	Sigma
T	—	Tau
Υ	—·——	Ypsilon
Φ	··—·	Phi
X	————	Chi
Ψ	——·—	Psi
Ω	·——	Omega
HΥ	···—	Eta Ypsilon
ΥI	·———	Ypsilon Iota
OΥ	··—	Omicron Ypsilon
AI	·—·—	Alpha Iota
AΥ	··——	Alpha Ypsilon
EΥ	———·	Epsilon Ypsilon
OI	———··	Omicron Iota

JAPANESE MORSE

(sometimes referred to as Kata Kana Radio Code)

A	KA	SA	TA	NA	HA	MA	YA	RA	WA
ア	カ	サ	タ	ナ	ハ	マ	ヤ	ラ	ワ
I	KI	SI	TI	NI	HI	MI	I	RI	(W)I
イ	キ	シ	チ	ニ	ヒ	ミ	イ	リ	ヰ
U	KU	SU	TU	NU	HU	MU	YU	RU	U
ウ	ク	ス	ツ	ヌ	フ	ム	ユ	ル	ウ
E	KE	SE	TE	NE	HE	ME	E	RE	(W)E
エ	ケ	セ	テ	ネ	ヘ	メ	エ	レ	ヱ
O	KO	SO	TO	NO	HO	MO	YO	RO	WO
オ	コ	ソ	ト	ノ	ホ	モ	ヨ	ロ	ヲ
N		NIGOH	HAN-NIGOH	HYPHEN	PERIOD	BRACKETS	QUOTES	PARAGRAPH	QUESTION MARK
ン		″	•	I	.	()	″	¶	?

RUSSIAN

RUSSIAN LETTER	MORSE SYMBOL	
А	·—	A
Б	—···	B
В	·——	V
Г	——·	G
Д	—··	D
Е,З	·	E
Ж	···—	J
З	——··	Z
И	··	I
Й	·———	Y
К	—·—	K
Л	·—··	L
М	——	M
Н	—·	N
О	———	O
П	·——·	P
Р	·—·	R
С	···	S
Т	—	T
У	··—	U
Ф	··—·	F
Х	····	H
Ц	—·—·	TS
Ч	———·	CH
Ш	————	SH
Щ	——·—	SHCH
Ъ,Ь	—··—	Mute
Ы	—·——	I
Ю	··——	YU
Я	·—·—	YA

HEBREW

א	·—	Ah-leph
בג	—···	Beht
ד	——·	Gee-mel
ה,ו	—··	Dah-let
ז	———	Heh
ח	·	Vahv
ט	——··	Zah-yin
י	····	Heht
כ,ך	··—	Teht
ל	··	Yohd
מם	—·—	Kahf
נן	·—··	Lah-med
ס	——	Mem
ע	—·	Nun
פף	—·—·	Sah-mekh
צ	·————	Ah-yin
ק	·——·	Peh
ר	··—·	Feh
שׁ	·——	Tsah-dee
שׂ	——·—	Kof
ת	·—·	Rehsh
	···	Sheen
	—	Tav

TURKISH

A	·—
B	—···
C	—·—·
Ç	—·—··
D	—··
E	·
F	··—·
G	——·
H	····
I	··
J	·———
K	—·—
L	·—··
M	——
N	—·
O	———
Ö	———·
P	·——·
R	·—·
S	···
Ş	————
T	—
U	··—
Ü	··——
V	···—
Y	—·——
Z	——··

AMERICAN MORSE

A	·—	W	·——	Colon	—·— ··
B	—···	X	·—··	Parenthesis (	····· —·
C	·· ·	Y	·· ··	)	····· ·· ··
D	—··	Z	··· ·	Quotation	··—· —·
E	·	&	· ···	End of quotation	··—· —·—
F	··—·	1	·——·	Colon dash	—·— ·—··
G	——·	2	··—··	Capitalized letter	·· · ·—··
H	····	3	···—·	Small letter	··———
I	··	4	····—	Colon followed by quotation	—·— ·—··
J	—·—·	5	———	Semicolon	··· ··
K	—·—	6	·····	Paragraph	————
L	—	7	——··	Apostrophe	··—· ·—··
M	——	8	—····	Dollar	··· ·—··
N	—·	9	—···—	Cents	·· ·
O	··	0	—	Pound sterling	— ·—··
P	·····	Period	·—·—·—	Shilling	··— —
Q	··—·	Comma	——·—	Percent	· · ··· · ·
R	· ··	Hyphen	—····		
S	···	Question mark	··——··		
T	—	Exclamation mark	·—·—·—		
U	··—				
V	···—				

ARABIC

ARABIC LETTER	MORSE SYMBOL		ARABIC LETTER	MORSE SYMBOL	
ا	·—	Alif	ط	···—	Ta
ب	—···	Ba	ظ	—·——	Za
ت	—	Ta	ع	·—·—	Ain
ث	—·—·	Tha	غ	——·	Ghain
ج	·———	Jeem	ف	··—·	Fa
ح	····	Ha	ق	——·—	Qaf
خ	———	Kha	ك	—·—	Kaf
د	—··	Dal	ل	·—··	Lam
ذ	——··	Dhal	م	——	Maam
ر	·—·	Ra	ن	—·	Noon
ز	———·	Zay	ه	··—··	He
س	···	Seen	و	·——	Waw
ش	————	Sheen	لا	·—···—	Lam-Alif
ص	—··—	Sad	ي	··	Ya
ض	···—	Dad			

Roberto Massimo, I1ZQD, of Torino, Italy, consistently operates the bottom 20 kHz of the Novice 15 meter band weekends to give American Novices a contact and a QSL card. His high frequency (3-30 MHz) station includes a Yaesu FT-101-E Transceiver, Yaesu FL-2100B Linear Amplifier, Mosley MP-33 Beam, and a W3DZZ antenna. He became a licensed amateur in 1978 and had earned the DXCC (100 countries confirmed) award by May of 1980. Massimo has worked 227 countries with 169 confirmed. Naturally, he has an assortment of other operating awards including WAS, WAZ, WPX, and 5BWAC. He asks that the contacts be kept as brief as possible to let him contact the maximum number of Novices. Just give him his signal report plus your name and location (QTH). He knows that most contacts need his card and he will send one. Naturally, most cards are sent through the DX QSL bureau system.

The International Morse code contains many symbols that are not included in the code examination administered to amateur radio license applicants. This code also includes several symbols which are not commonly used by amateurs. Some of the following symbols and work signs are frequently used by amateurs, whereas others are almost never heard on the amateur bands.

Apostrophe	·————·	$\overline{WG}$
Attention	—·—·—	$\overline{KA}$
Best regards	——···——	$\overline{73}$
Bracket	—·——·—	$\overline{KK}$
Closing station	—·—·—··	$\overline{CL}$
Colon	———···	$\overline{OS}$
Distress signal	···———···	$\overline{SOS}$
Dollar sign	···—··—	$\overline{SX}$
Error sign (or)	···—··	$\overline{IMI}$
Fondest regards (between females)	···—— ···——	33
From	—···	DE
General call to all stations	—·—·—·—	$\overline{CQ}$
Hyphen	—····—	$\overline{DU}$
Keep out	————·————	99
Love and kisses	———·———	88
No	—·	N
Period (repeated use)	·—·—	$\overline{R}$
Quotation mark	·—··—·	$\overline{AF}$
Received	·—·	R
Safety signal	— — —	$\overline{TTT}$
Semicolon	—·—·—·	$\overline{NNN}$
Separation signal (between whole number and fraction)	·—·—·	$\overline{AU}$
Underline	··——·—	$\overline{IQ}$
Understood	···—·	$\overline{SN}$
Urgent signal	—··—··——··—	XXX
Wait	·—···	$\overline{AS}$
Yes	—·—·	C
Zero (repeated use)	—	T
Repetition sign	··—··	$\overline{IMI}$

Jim Hammer, KA9GNW, of Monticello, Indiana, is a Novice retread, having held KN9VQM in 1960 and 1961. As KN9VQM, Jim ran a homebrew crystal control transmitter into a dipole. His only crystal frequency was 3746 kHz, but he managed to work 26 states with it, plus Canada and Mexico. Most of his operation as KA9GNW is in the 15 meter Novice band, where he runs a QRP (low power) Heath HW-8 transceiver. His station also includes an Eico 723 60 watt transmitter and a Hallicrafters SX-100 receiver. His antenna is a ground plane mounted 30 feet above ground level. During his first 2 months as KA9GNW, Jim has used his HW-8 to contact 32 states, plus Bermuda, Canada, and Puerto Rico. He is Communications Officer for White County Civil Defense. His homebrew station console can keep his station operable on battery power for as long as 3 days.

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

Some of the stations I've worked recently on the novice bands are: Ed, KA1EHR, Warren, R. I.; Bob, KA2EGO, Milford, New Jersey; Bernie, WB3JRU, Dubois, Pennsylvania; Bob, KA4MBZ, Burlington, N.C.; Jim, KA5CKR, Pine Bluff, Arkansas; Dick, KA6KJW, Crescent City, CA; Paula, KA7FJI, Bremerton, Washington; Lee, KA8FFB, Adrian, Mich.; Terry, KA9DGS, Danville, Illinois; Martin, WD0FMN, Albany, Minn.

73, Bill, W6DDB

Results Of The 21st Annual CQ 160 Meter DX Contest

BY DONALD McCLENON*, N4IN

This event has come of age since we have now enjoyed its 21st anniversary. We continued our incredible streak of hitting the best propagation conditions of the month for another year. Southeastern U.S. stations could not cash in on this the second night, due to a spectacular all-night electrical storm that practically wiped out the band.

The 134 Russian participants in 14 countries made a grand entrance into the contest and swelled the multiplier prospects, particularly in Europe. Altogether there were 60 different countries known to be active. Some good multipliers included C6, CO, EA8, EA9, GI, GJ, GW, HI, HP, J3, J7, KL7, KP4, LU, PJ, PY, PZ, UA2, UA9, UC2, UD6, UF6, UJ8, UL7, UO5, UP2, UQ2, UR2, VK, Y47, ZF, ZL, 4UI, 5WI, 9HI, K3SXA/MM. There was some confusion regarding K3SXA/MM on the ship "Overseas Ulla" Region 2 in the Gulf of Mexico. In accordance with our past policy, he was counted as a DX contact and a country multiplier for everyone who worked him, and all scores were revised to reflect this, if not so claimed.

All 50 states were active, and all Canadian provinces were on but PEI and VE8. The only Newfoundland station, VO1IA, seems to have worked DX only, and does not appear in any W/VE logs. The following heroes provided most of the contacts to their rare areas: Alaska KL7GIH, KL7JEF, NL7C; Alberta VE6AQI; Hawaii KH6CC, KH6IRT; Idaho N7SU; Nebraska KØHA; North Dakota KØALL, WØAUH; Nevada W7XZ; Oklahoma W5EHY, KØJPX/5; Vermont WA1GXE, W1WLW; West Virginia K8OQL, W8LRL; Wyoming W7TO.

The leading worldwide scores were KV4FZ 188,508; K1PBW 175,896; GM3ZSP 139,594; G3SZA 125,611; GD4BEG 123,864; W2YV 95,046; K3WW 93,010; W9ZR 83,860, W2IB 74,266; K3SXA/MM 72,850. Top ten scores in the W/VE Single Operator, DX Single Operator, and Worldwide Multi-Operator categories are shown in the score boxes.

Activity was up considerably from last year, as evidenced by the following QSO figures: K1PBW 555; W9ZR 523; K3WW 479; K8MFO 452; K5GO 443; W2YV 439; WØAIH/9 433; VE3BMV 417; and W2IB 403. Outside W/VE, some of the higher QSO figures are GD4BEG 396; GM3ZSP 395; G3SZA 343; UK2PCR 310; OH6DX 305; KV4FZ 303; RX1DZ 297; YU7BCD 294; OK1DFW and OK2KZR 284. Top QSO leaders in South America/Oceania/Asia were: UV9AX 184; KH6CC 153; YV1OB 131; UD6DFD 113; UA9AFG 106; UA9MR 91; JA5DQH 90; JA7YCQ 46; UL7GW 40; and UA9AED 39.

High multipliers were K1PBW 84; W2YV 73; W2IB and K3WW 71; W9ZR 70; N4WW, K8MFO, KV4FZ all 69; and AA1K 68. DX station leaders in multipliers were KV4FZ 69; GM3ZSP and G3SZA 59; GD4BEG 52; YV1OB 50; K3SXA/MM 47; G3XWZ/A 46; and YU7BCD 43.

Leaders in countries worked were GM3ZSP 35; K1PBW 33; G3SZA and GD4BEG 32; OK2KZR 31; DL3LU, OK2PGF, RX1DZ, UK2PCR all 30; UK2RDX, GM3IGW/A, and YU7BCD all 29.

High W/VE stations in 10-point contacts were K1PBW 123; W2YV 53; K6SE 50; K3WW 44; N4WW 43; W1BB 33; W2IB 30; W3BGN and N6VR 29. DX station leaders in making 10-point W/VE contacts were KV4FZ 244; K3SXA/MM 154; 4U1UN 151; KH6CC 139; G3SZA 111; YV1OB 100; GM3ZSP 89; GD4BEG 84; G3XWZ/A 61.

There were at least 794 DX operators and 1225 W/VE's on, for a total of 2019 participants. We received 189 DX logs and 152 W/VE logs for a total of 341, including the check logs. The following numbers of separate stations were reported active from countries having more than 10 entrants: G 142, OK 134, JA 77, DL 64, UA1 43, UB5 33, GM 21, OH 19, YU 17, SP 14, PAØ 12, UA9 12, F 10. There were 189 or more DX operators who worked at least one W/VE station. These included 39 JA, 37 G, 35 OK, and 17 DL. 452 W/VE's worked at least one DX station.

TOP 10 W/VE SINGLE OP

K1PBW	175,896	K8MFO	70,656
W2YV	95,046	K6SE	69,540
K3WW	93,010	VE3BMV	68,206
W9ZR	83,860	K5GO	66,866
W2IB	74,266	N4WW	64,584

A number of contestants asked for clarification of the scoring system, so here it is for those who may not see the announcement:

All contacts in your own country count 2 points for everyone.

If you are not W/VE, all contacts outside W/VE or your own country count 5 points.

If you are not W/VE, all W/VE contacts count 10 points.

If you are W/VE, all DX contacts count 10 points.

Multipliers are all the DXCC countries *except* W and VE, all Canadian provinces, and all 48 continental US states. KL7 and KH6 are treated as separate countries. All maritime mobiles in the open ocean are treated as separate countries. No one may count either W or VE as a multiplier in addition to the above.

Score is points times multiplier.

We make up a master check sheet from all the known reliable participants in all parts of the world to determine how many calls were active and to facilitate dupe checking. We thus get nearly everyone who made even as few as 10 contacts, even though he did not submit a log. Any reported call not on the sheet goes onto a waiting list to see if others also worked it. If so, it goes into the master. If not, it goes into the "Unique" file. S.a.s.e. mail samplings are made of such calls to verify their participation. Reasonable allowances are made for call errors in QRM and QRN, but this time, several warnings were sent out for "creative logging," which is easy to

* *3075 Florida Ave, Melbourne, FL 32901*

This good operator at WB8HCV made 189 contacts with only 5 watts power.

The many faces of GM3ZSP, third World high score and highest in Europe. Tower and elevated shack used in contest. Left to right—GM4BRM, GM4IPS, GM3ZSP, GM4HBG, GM3YOR, GM3OLK. Two slopers and inverted Vee at 100 feet.

Top Japanese entry, JA5DQH, used this beautiful station layout.

spot. Each unadmitted dupe or phoney contact can result in removing it and 3 others from the score, up to the point of disqualification. If your score shrank very much from that claimed, be more careful in the future.

Top world scorer KV4FZ received the W0AW trophy presented by the Northern California Contest Club and "Friends of W0AW" last year, so this year it goes to runner-up K1PBW. Top U.S.A. scorer K1PBW received the West Gulf ARC Plaque last year, so this year it goes to runner-up W2YV. Top European scorer this year is GM3ZSP, who was multi-op. The next two highest are last year's winner, G3SZA, and GD4BEG, who won it two years ago, so under the 3-year eligibility rule, this year it goes to G3XWZ/A.

TOP 10 MULTI OP

GM3ZSP	139,594	UK2RDX	47,256
YU7BCD	68,843	DL0KF	46,207
N5JJ	56,940	K5RC	43,920
UK2PCR	56,000	N6RZ	42,460
OK2KZR	48,009	WB0UXI	39,960

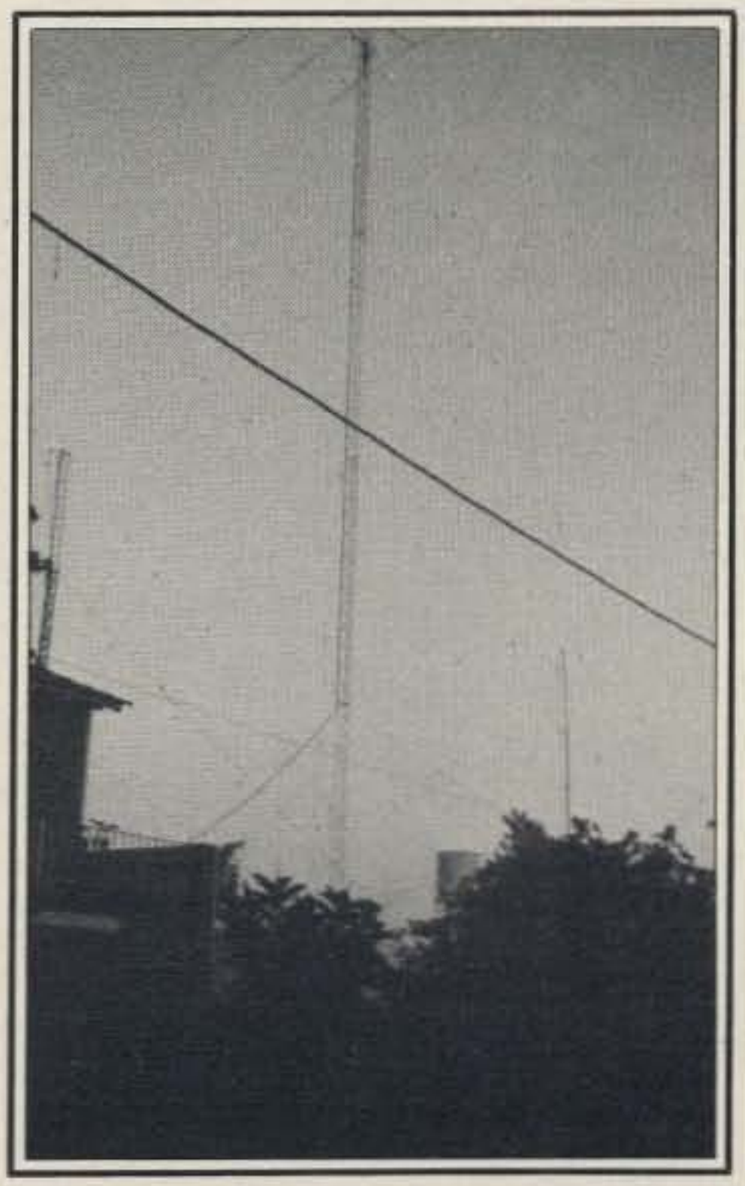
The single and multi-op winners in each state, province, and country for this 21st Annual Contest will receive a Certificate. Those who forgot to send in their logs and missed out on this will have another chance in the 22nd Contest. No matter how small your log, send it in. Your results are interesting to many others all over the world, and you show support for *CQ* in sponsoring the Contest and arranging for the awards. Also please send photos of yourself and your station to share with the rest of us.

Now you can get ready for the next *CQ* 160 Meter Contest the last *full* weekend of January 1981 (Jan 23, 24, 25). Note that it is *not* the last Saturday of January this time, because then it would run into February. Send s.a.s.e. to *CQ* magazine for log and summary sheets. See you on 160.

73, Don, N4IN

Nearly every log showed K0GVB as the first Iowa. Gary keeps improving his station and his score each year.

The originator of that big signal from Montana, K0PP/7, used a 75 foot vertical and a receiving loop.



A big transmitting antenna and a Beverage couldn't overcome the summer static at LU1DZ, whose seasons are reversed from North America.

AA4M entered the single-op class during the contest. The assistant shown must not have contributed.

Number groups after calls denote score, total QSOs, 10-point QSOs, multiplier, and DXCC countries worked. Multi-op scores follow single-op listings.

SINGLE OPERATORS

Connecticut

AA1K	52,088	303	20	68	15
W1WY	18,270	163	10	45	10

Maine

K1NBN	19,044	155	13	46	11

Massachusetts

K1PBW	175,896	555	123	84	33
WB1HIH	15,330	215	1	35	3
W1BB	8,326	49	33	23	10
W1JR	7,380	66	6	41	8

New Hampshire

K1GQ (N1EE Opr)					
	58,752	383	19	64	15

New Jersey

W2FJ	60,192	364	23	66	17
N2IN	2,088	58	0	18	2

New York

W2YV	95,046	439	53	73	21
W2IB	74,266	403	30	71	22
WA2EYA	8,816	116	0	38	2
WA2IZL	4,980	79	1	30	3
K2MN	2,016	48	0	21	2

Maryland

K3ZZ	44,888	314	12	62	13
K3AO	22,896	168	11	54	12
WB3AVN	8,784	82	10	36	11
W3GN	7,560	104	1	35	3
W3FA	3,776	51	2	32	4

Pennsylvania

K3WW (K3WJV Opr)					
	93,010	479	44	71	22
W3BUR	36,366	271	12	57	11
WA3WMG	31,512	239	16	52	13
W3AJS	23,700	217	5	50	7
W3BGN	19,404	115	29	42	15
W3UHP	16,016	170	3	44	5
W3AP	13,020	107	12	42	11
K3YL	5,772	58	5	37	7
W3ADE	5,320	91	1	28	3

Alabama

N4KG	25,908	226	7	51	9

Florida

N4WW	64,584	296	43	69	23
N4IN	38,936	214	25	62	20

Georgia

K4VT	33,480	298	3	54	5
K4BAI	154	11	0	7	1

Kentucky

W4YOK	14,490	161	0	45	2

North Carolina

W4TMR	44,428	339	11	58	12

South Carolina

AA4V	34,132	238	21	53	12

Tennessee

W4DGX	1,260	30	0	21	1

Virginia

K4PQL	45,056	284	17	64	17
AA4M	34,086	263	9	57	11
W4DHZ	32,148	238	11	57	11
AA4FF	28,196	242	6	53	8
K4RS	13,552	110	11	44	10
W4KMS	5,278	79	3	29	5
W4ODP	4,930	81	1	29	3

Arkansas

K5GO	66,866	443	14	67	16

Mississippi

W5GWD	4,620	66	0	35	1

New Mexico

N5RR	15,456	153	2	48	4

Oklahoma

KØJPX/5	26,460	233	3	54	5

Texas

N5XU	21,012	186	5	51	7
WB5FND	17,600	184	4	44	6
W5QF	9,804	106	2	43	4
W5FIX	3,422	55	1	29	3
K5NA	3,100	46	4	25	6
W5SOD	1,932	38	1	23	2
K5RA	1,872	35	1	24	3

California

K6SE	69,540	370	50	61	13
N6VR	44,626	305	29	53	7
AE6U	21,160	154	19	46	7
N6AA	15,928	165	4	44	6
K6MO	14,080	140	9	40	6
AD6D	13,246	123	14	37	6
W6PM	10,944	98	4	48	5
K6TS	7,276	87	5	34	5
WA6EKJ	4,784	88	1	26	3
WD6EWG	2,852	54	2	23	4
AA6EE	24	6	0	2	1

Arizona

W7YS	7,704	103	1	36	3

Idaho

N7SU	18,424	176	3	49	5

Montana

KØPP/7	28,620	250	5	53	6

Nevada

W7XZ	34,944	272	16	52	7

Oregon

W7ULC	24,274	201	7	53	6
W7CB	7,326	103	2	33	4

Utah

N7DF	37,962	305	7	57	8
AF7J	7,600	96	1	38	3

Washington

N7AM	25,944	208	17	47	7
WA7OFH	24,300	169	14	54	8
N7EA	18,540	178	7	45	7
W7BYK	13,104	120	9	42	5
WA7GCI	10,920	128	3	39	5
W1MT/7	7,548	95	4	34	4
W7DRA	832	32	0	13	2
AK7F	440	20	0	11	2

Wyoming

W7TO	2,548	49	0	26	2

Michigan

K8XR	41,104	331	9	56	10
K8NG	25,688	231	4	52	6
N8EA	22,236	186	8	51	9
WB8HCV	18,144	189	0	48	2
/WBVSK	12,330	117	5	45	.

Ohio

K8MFO	70,656	452	15	69	16
K8JK	48,236	333	14	62	14
K8TV	44,880	392	4	55	6
W8YX (KL7JER Opr)					
	24,100	225	4	50	6
K8MN	23,970	215	5	51	7
K8ES	12,936	143	1	44	3
KA8CQI	11,424	119	0	48	2
K8CQ	8,856	100	2	41	4
W8EX	7,488	76	5	39	7
AI8M	7,296	114	0	32	2
N8AXA	224	14	0	8	2

West Virginia

K8OQL	32,560	240	14	55	13

Illinois

K9FD	56,576	398	11	64	12
W9PNE	33,640	238	13	58	12
WD9IIX	12,110	169	1	35	3
W8XU/9	6,696	89	1	36	3
W9ABA	4,356	66	0	33	2

Indiana

W9LT	46,516	353	12	58	11
W9RE	26,656	240	8	49	10
N9GT	22,360	203	3	52	5
WB9GCU	19,200	200	0	48	2
N9RC	8,510	115	0	37	2
N9NS	2,592	40	2	27	4

Wisconsin

W9ZR	83,860	523	19	70	17
WØAIH/9	60,102	433	11	63	11
W9OP	23,400	213	3	52	5
K9DAF	17,568	175	2	48	4

Iowa

KØGVB	37,184	312	5	56	7

Kansas

K5JZN/Ø	20,448	209	1	48	3
WBØISW	13,944	162	1	42	3
WAØTKJ	6,048	80	1	36	3
KØRW	3,472	58	1	28	3

Minnesota

NØBG	37,584	312	3	58	5
KØPK	22,360	207	2	52	4
WØEKS	10,062	109	2	43	4

Missouri

KØJPL	8,424	100	2	39	4
WØHMA	7,918	103	1	37	3
KØRWL	1,872	39	0	24	2

Quebec

VE2WA	3,120	57	2	24	4

Ontario

VE3BMV	68,206	417	23	67	17
VE3INQ	9,196	117	1	38	3

Manitoba

VE4VV	14,570	147	2	47	4

British Columbia

VE7CRU	24,304	228	5	49	6
VE7DXU	4,980	79	1	30	3

Argentina

LU1DZ	124	7	1	4	4

Asiatic Russia

UV9AX	23,296	184	0	26	26
UA9AFG	11,396	106	0	22	22
UA9MR	7,920	91	0	18	18
UA9AED	2,232	39	0	12	12
EZ9LAA	1,776	32	0	12	12

Azerbaijan

UD6DFD	10,735	113	0	19	19

Czechoslovakia

OK1DFW/P	42,194	284	14	34	27
OK1DIJ	36,648	222	23	36	27
OK2BOB	35,980	240	13	35	28
OK1DFF	33,252	227	10	34	27
OK1FCW	31,264	235	6	32	28
OK3CXF/P	30,560	229	7	32	27
OK1MAC	30,240	248	4	30	27
OK3YFT	24,708	215	7	29	25
OL6AWY	24,408	230	0	27	27
OK3CWS	22,272	183	6	29	24
OK1DJK	22,032	204	3	27	26
OK1DWC	20,304	192	4	27	26
OK2PGF	20,241	95	19	39	30
OL6AUL	18,816	206	1	24	24
OL8CLL	17,016	191	0	24	24
OK1DKZ	15,532	184	1	22	22
OL3AXS/P	14,828	181	0	22	22
OK1HAS	12,725	138	1	25	25
OK3TOA	12,628	155	0	22	22
OK1KFQ (OK1JER Opr)					
	12,452	153	1	22	22
OK1DOT	11,820	159	0	20	20
OK1MNW	11,361	149	0	21	21
OK2BEJ	10,659	159	0	19	19
OK1DEY	9,540	135	0	20	20
OK1ASG	9,492	118	0	21	21
OK1DPM	8,660	121	1	20	20
OK2HI	8,127	105	0	21	21
OK2PGS	8,075	124	0	19	19
OK3KYG/P	8,037	126	0	19	19
OK3CPY	7,722	92	1	22	22
OK1MCW	7,596	112	0	18	18
OK2YN	7,448	109	0	19	19
OL8CIR	7,360	100	0	20	20
OK1MIX	7,308	90	0	21	21
OL8CII	7,020	95	1	20	20
OK2SOD	6,783	96	0	19	19
OK1DGE	6,498	104	0	18	18
OL5AWJ	6,480	90	0	20	20
OK2PAW	6,479	103	0	19	19
OL5AZY	6,390	107	0	18	18
OK2PAM	4,736	85	0	16	16
OK2PGU	4,378	32	9	22	18
OL9CJB	4,294	52	1	19	19
OK2BAS	4,284	96	0	14	14
OK1KQH	4,248	58	0	18	18
OK1DDL	3,655	61	0	17	17
OK1AGN	3,248	58	0	16	16
OL1AYV	3,192	78	0	14	14
OK2QX	3,111	39	0	17	17
OL5AXU	3,107	76	0	13	13
OK1AIJ	3,026	50	0	17	17
OK1FBH	3,024	51	0	18	18
OK1FRJ	2,926	67	0	14	14
OK2DGG	2,580	50	0	15	15
OL8CMY	2,196	63	0	12	12
OK1MSB	2,114	41	0	14	14
OL7BAU	2,004	58	0	12	12
OK3CWU	1,856	24	1	16	16
OK1OXP	1,846	47	0	13	13
OK2BQU	1,680	17	0	14	14
OK2BUV	1,680	34	0	12	12
OK1JEN	1,596	35	0	12	12
OK1AVG	1,540	40	0	11	11
OK3CEI	1,490	46	0	10	10
OK2BEC	1,470	22	0	15	15
OL8CMQ	1,107	45	0	9	9
OK1DKH	1,089	47	0	9	9
OL6AYY	762	47	0	6	6
OL8CGI	690	13	2	10	10
OL1AYS	680	32	0	8	8
OK1OPT	525	27	0	7	7
OL4AXM	320	26	0	5	5
OK2BCI/P	270	10	2	6	6
OK1AEH	252	24	0	4	4
OK1AYW	245	14	0	5	5
OL8CNF	70	13	0	2	2
.K2RGC	18	3	0	2	2

Dominica

J70BB (W6KG Opr)					
	2,992	22	16	16	6

England

G3SZA	125,611	343	111	59	32
G3XWZ/A	60,582	227	61	46	26
G3VRW	38,815	235	15	35	28
G3VPS	1,980	48	0	10	10

European Russia

RX1DZ	45,408	297	3	32	30
UA1QBM	13,482	138	0	21	21
UK3AAC	13,400	146	0	20	20
UA3DAK	13,041	135	0	21	21
UA4B1	10,420	112	0	20	20
UK3WAB	9,765	99	0	21	21
UA6YAO	9,633	111	0	19	19
UA1ZBQ	8,113	95	0	19	19
UA1NA	7,276	94	0	17	17
UA3EAL	6,084	73	0	18	18
UA3DNB	4,816	68	0	16	16
UK3SAG	3,906	63	0	14	14
UA1OAI	2,865	43	0	15	15

Finland

OH6DX	50,830	305	3	34	34
OH3KM	9,324	93	0	21	21
OH3JR	5,076	60	0	18	18

France

F8VJ	17,255	77	24	35	19
F3AT	6,524	94	1	14	14
F8EX	1,404	23	1	12	12

Germany, Fed. Rep.

DL3LU	38,045	225	11	35	30
DK6AS	27,680	169	13	32	26
DJ6TK	1,026	27	0	9	9

Hawaii

KH6CC	56,706	153	139	39	10

Ireland

EI9J	16,468	137	8	23	21

Isle of Man

GD4BEG	123,864	396	84	52	32

Japan

JA5DQH	6,240	90	25	15	10
JA3BCT	60	7	2	2	2
JK1LUY	30	15	0	1	1

Kazakh

UL7GW	3,075	40	1	15	15
UL7JCA	1,650	33	0	10	10

Latvia

UQ2PM	19,619	173	0	23	23
UK2GJL	15,136	140	0	22	22
UK2GAB	10,811	115	0	19	19
RQ2GCR	5,640	77	0	15	15

Lithuania

UP2PAP	24,475	197	0	25	25
UP2PCO	2,629	49	0	11	11

Maritime Mobile Region 2

K3SX A/MM					
	72,850	156	154	47	4

Moldavia

UO5AP	15,435	147	0	21	21

Netherlands

PAØLOU	18,694	147	1	26	26
PAØMRN	3,562	56	0	13	13
PAØINE	2,365	46	0	11	11
PAØDIN	1,530	33	0	10	10

Poland

SP3DOI	41,688	219	18	36	27
SP5AD	25,438	226	0	23	23
SP2FAP	25,025	205	0	25	25
SP5IXI	19,910	187	0	22	22
SP9DH	19,205	173	0	23	23
SP6BLV	12,600	123	0	21	21
SP9ADU	7,581	84	0	19	19
SP5BB	4,635	66	0	15	15
SP7ICE	4,590	57	0	17	17
SP9HWN	592	16	0	8	8

Ukraine

UB5ZAL	18,306	144	3	27	26
UB5HAC	18,032	167	0	23	23
UB5BAE	13,620	144	0	20	20
UB5IS	12,380	134	0	20	20
UB5CDX	11,718	120	0	21	21
UB5AAL	11,025	111	0	21	21
UB5AAQ	7,123	91	0	17	17
UB5YE	6,400	89	0	16	16
UT5SY	6,120	74	0	18	18
UT5LF	5,824	80	0	16	16
UB5IIH	4,848	66	0	16	16
UB5JIM	3,936	54	0	16	16
UK5AAP	1,815	36	0	11	11

United Nations HQ, NY

4U1UN (N2KW Opr)					
	48,320	151	151	32	2

Venezuela

YV1OB	57,750	131	100	50	22

Virgin Islands

KV4FZ	188,508	303	244	69	26

Wales

GW3KOR	11,640	117	0	20	20
GW3GWX	3,152	40	0	16	16

White Russia

UC2AAK	31,158	232	0	27	27
UC2OCB	13,040	131	0	20	20

Yugoslavia

YU2OB	37,816	260	8	29	25
YU2RTW	32,967	197	7	33	28

Multi Operators

Massachusetts

WA1UZH	9,310	105	7	35	7

Rhode Island

N1DM	19,536	202	5	44	7

New York

K2GBH	22,932	222	3	49	5

Virginia

N4DW	27,040	236	6	52	8

Texas

N5JJ	56,940	370	17	65	14
K5RC	43,920	314	13	60	14

California

N6RZ	42,460	282	26	55	10
N6VQ	19,170	201	3	45	5
N6MG	18,612	162	9	47	6

Oregon

KB7EJ	30,634	229	15	53	8

Michigan

WA8LSS	4,482	75	2	27	4

Illinois

WD9GGY	16,652	177	1	46	3

Wisconsin

N9AW	14,580	158	1	45	3

Colorado

WØCP	38,864	323	6	56	7

Missouri

WBØUXI	39,960	350	5	54	7

Ontario

VE3ABG	33,550	285	5	55	7

Czechoslovakia

OK2KZR	48,009	284	15	39	31
OK3KFF	32,235	217	17	35	26
OK1KSO	26,505	209	7	31	26
OK1KPU	19,526	188	3	26	25
OK1KZD	9,300	126	0	20	20
OK1OAE/P	8,757	117	0	21	21
OK2KHD	7,224	100	0	21	21
OK2KJU	4,014	53	0	18	18
OK1KTW	3,630	76	0	15	15
OK1KWP	1,100	37	0	10	10

Estonia

UK2RDX	47,256	279	8	33	29

Germany, Fed. Rep.

DLØKF	46,207	204	31	41	28
DLØFJ	20,832	186	2	24	23

Japan

JA7YCO	357	46	3	3	3

Lithuania

UK2PCR	56,000	310	13	35	30

Scotland

GM3ZSP	139,594	395	89	59	35
GM3IGW/A	38,874	228	10	33	29

Surinam

PZØAA	3,040	21	17	16	6

White Russia

UK2AAG	3,855	52	0	15	15

Yugoslavia

YU7BCD	68,843	294	34	43	29

Check logs are gratefully acknowledged from the following:
WV2ZDW, W6TYR, GW3JI, RT5BN, RZ5UWG, UA4FCZ, UA6LEX, UQ2GEI.

Disqualified: W8MVN.

Multi-Op Station Crews

WA1UZH: WA1UZH, WB1FVY. **N1DM:** N1DM, WB1FDY, KA1DUV. **K2GBH:** K2GBH, WA1TWC, C. Sieracki. **N4DW:** N4DW, KB4EX, WB4PAT. **N5JJ:** N5JJ, K5WA, KA5CHW. **K5RC:** K5RC, K5GA. **N6RZ:** N6RZ, WB6SHD. **N6VQ:** N6VQ, N6KT, N6TA. **N6MG:** N6MG, WA6PGB. **KB7EJ:** KB7EJ, W7IXZ. **WA8LSS:** WA8LSS, K8SIA, WB8UVQ, WD8CUQ. **WD9GGY:** WD9GGY, WD9BHK. **N9AW:** N9AW, WD9GUR, WA9??. **WØCP:** WØCP, NØCP. **WBØUXI:** WBØUXI, ABØW, ABØX, AEØK, NØXA. **VE3ABG:** VE3ABG, VE3FAS, VE3GSQ. **OK2KZR:** Not shown. **OK3KFF:** OK3CQW, OK3TMR, OK3YDZ. **OK1KSO:** OK1AEZ, OK1JKT. **OK1KPU:** OK1JDX, others. **OK1KZD:** OK1DHJ, others. **OK1OAE:** Not shown. **OK2KHD:** Not shown. **OK2KJU:** Not shown. **OK1KTW:** Not shown. **OK1KWP:** Not shown. **UK2RDX:** UR2RCN, UR2REZ, UR2RRJ. **DLØKF:** DF3LP, DJ4FZ, DJ4SO, DJ8FR, DK8LE. **DLØFJ:** DJ2EA, DL3UR, DK4VP, DK8LN, DK9LO, DJ3AC, DL4LV, DF5LA, DF5LK, DF7LF, DC4LZ. **JA7YCO:** JA7YCO, JH7FZI, JH7IMX, JA9XBG, JHØCZQ. **UK2PCR:** UP2BBT, UP2BCR, UP2BDF, UP2-038728. **GM3ZSP:** GM3ZSP, GM3OLK, GM3YOR, GM4BRM, GM4HBG, GM4IPS. **GM3IGW/A:** G3IGW, G3BBD, PZØAA, PZ1AC, PZ1AR, JA1PIG. **UK2AAG:** UC2-009105, UC2-009496, UC2-009568. **YU7BCD:** YU7QBC, YU7QOI, YU7QQZ.

Soapbox DX:

This is the first time our station took part in the contest. We thank the Contest Committee. 73 and CU next year!—UK2PCR. Good contest, good conditions. Some W/VE should get better receivers or build better antennas—SP3DOI. We were surprised to work 5 continents during the contest—UK2RDX. Too many "gottaways". Must try harder next year—GD4BEG. Good fun over the weekend; looking forward to next year—GM3ZSP. Many thanks for this contest—UO5AP. Got 15 new countries but really hard to reach USA—OH6DX. First night QRN terrible, second night hopeless. Better luck next year—LU1DZ. Enjoyed the contest after a few years absence. Conditions better the second night but not many W stations seemed to be listening for EU—G3VRW. Look for me on 1852 on weekends. Thank you for the interesting contest—UC2AAK. Amazing signals from W5 and W9 around dawn—G3SZA. Good conditions to U.S.A. second night—OK1KFQ. "Too short" Beverage helps to hear over the noise from nearby 20 kV power line—F8VJ. Poor condx for U.S.A. No W4, 5, 8, 9 heard—JA5DQH. Enjoyed myself in this contest—G3VPS.

TOP 10 DX SINGLE OP

KV4FZ	188,508	YV1OB	57,750
G3SZA	125,611	KH6CC	56,706
GD4BEG	123,864	OH6DX	50,830
K3SXA/MM	72,850	4U1UN	48,320
G3XWZ/A	60,582	RX1DZ	45,408

Thanks contest—UQ2GEI. Sorry short participation this year—F8EX. Conditions much worse than last year. Hope better luck next time—PZ0AA. Overslept the good opening—EI9J. Sorry not enough soup to work the DX. Hope to do better next year—4U1UN. Lots of eastern EU on this time—DJ6TK. K6SE is very strong—JA3BCT. Heard all U.S. areas. Guess the EU big boys smothered me—PA0LOU. First Russian QSOs—YV1OB. Hope to make a more serious entry next year—GW3KOR. Thanks nice contest—UK2GJL. Worked hard first day making transverter. Second day, made my first 160 meter contacts. All countries were new ones! CU next contest—SP9ADU.

Soapbox W/VE:

My 45 foot mast came down in a wind storm a few minutes after the contest was over. My outdoor loop blew off its mount. This is still a most enjoyable event. See you next year—W7XZ. Thrilled to get 7 countries on a 30 foot high dipole in our first contest. Wait till next year!—WA1UZH. Happiness is working KH6CC in a pileup for my first DX QSO on 160—W1MT/7. Excellent EU opening Saturday night, but Murphy covered it with plenty of cloud-to-cloud static discharges which lasted until dawn—K8OQL. Biggest thrill was working Wash. with 2 watts output. Now have 47 states—WB8HCV. Our first try on 160; lots of fun and looking forward to the next one—N9AW. Real thrill to work PY1RO. Lots of east coasters won't dig for my signal—VE7CRU. Conditions seemed slightly poorer than last year, but I did somewhat better. We hit by far the best January weekend—K1PBW. No sigs heard first 15 mins; thought receiver had quit, but then things got going—W4TMR. Took too long an early Sun AM nap, but was happy to get 4U1UN—K0GVB. Conditions poorer than last year, but this is still the best and most fun. Keep up the good work—W3BGN. Two new countries! Thanks to *CQ* for their *always* good contest conditions—W1BB. Thrill raising DL1YD by CQ on my own frequency—AA4M. 99% of operators were a pleasure to work. Hope to have a better ant next year—W5GWD. Hope it's sunspots and not old age, but I try harder each year with less results—K6SE. (*He did lots better this year-Ed*) Can't take those all night hours any more—W1WY. This was my best year in the contest—WA7OFH. Greatest of top band contests. Got my last state and 3 new countries—VE3BMV. Heard YU, OK, PZ, but couldn't get thru—W9LT. My first entry; very good activity—AE6EE. Two frustrated phone ops intentionally operated in window to QRM DX—AA1K. First CW contest. Interesting but hard work—WA6EKJ. Got KH6CC for #50 in 353 days—K8NG. KV4FZ best op in contest. He spent 5 minutes getting my info from a very weak signal—K0PK. Couldn't copy W7 or EU through QRN second night—AA4V. Exciting to have multiplier 4U1UNanswer my CQ—WB1HIH. Maybesome day this station will work the way I want it to. It sure is fun playing with it in the meantime—N6RZ. Picked up lots of new states—AI8M. Been at this for 49 years now—W9ABA. Was not up to par physically, but kept my promises to put Okla on for the contest—K0JPX/5. Rhode Island skunked me again—WA7GCI. Got so groggy I backed up 30 numbers at one point—W3AJS. Fine contest as usual. Couldn't put in much time, but enjoyed it anyway—K4RS. We worked more DX than expected, with two 365 foot phased verticals. Thanks for a super contest!—KB7EJ. Worked some good states and KV4—WD4GGY. Some people don't seem to get my RI state abbreviation. Next year will use bigger antennas—N1DM. Sky continually lit up by lightning all the second night; wiped out all but strongest signals—N4IN. Don't know which was worse, S9 static or earthquakes—N6MG. I'm a new ham here, and had a good time in the contest—N8AXA. Had to QRT due to RFI in a microwave relay tower 2 blocks away—K0RWL. I kept Utah from being rare this year, but / didn't work it—N7DF. Had fun in my first 160 contest. Will be back next year—KA8CQI. Strong EU and midwest sigs but weak to south—K1NBN. Too few stations used the available higher freq portions of the band, and missed WYO. It takes all kinds—W7TO. First time in a 160 contest—W4DGX. Pleased that several DX stations called me—K1GQ. Thrill

Derrick, VE4VV provided 147 Manitoba multipliers with this rig and a 15 meter high vertical.

to work KV4FZ with low power in my first 160 contest—WD6EWG. Man, what I wouldn't give for a Beverage! Trying to copy EU thru QRN is *tough*—K8MFO. Very enjoyable contest. Worked 3 new states and 4U1—VE3INQ. Much quieter here than QTH of last 3 years—AK7F. Almost quit a couple times, the static was so bad—W4DHZ. Too many equipment failures—K5RC. Tnx for a nice contest. Good conditions—N7AM. Saturday night, it sounded like a steak frying contest down here!—N5XU. Best JA opening ever heard, lasted 3 hours—AE6U. New longwire very effective for DX. Sat nite QRN 10 dB over 9. After 48 years of hamming, I get too tired to be competitive—W9PNE. Felt good to work 4 JA's Sat morning—W7ULC. Always an enjoyable contest—W8EX. Hard to work east of Miss. River—K6TS. Worked 5 new states—W1JR. Lots of fun again this year—AA4FF. Worked 3 new states; 3 more to go—K5RA. Next year I will have a receiving loop—W8YX. Enjoyed the contest very much, even tho missed two DX stations heard—WD9IIX. Got my last state for WAS—W7BYK. Worked Nevada for a new state—WB9GCU. Enjoyed the contest even though my time was limited—K0JPL. This is ridiculous! QRN unbelievable plus 30 dB. Taking my fried ears and scrambled brain to bed—N4WW.

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

Antennas

DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

More On Dipoles: Multiband Antennas With Tuned Feeders

In this month's column, author W8FX points out that coaxial cable isn't sacred as transmission lines go. There's still room for parallel feeders when it comes to easily constructed and inexpensive multiband antennas. Read on for theory and construction information on some simple antennas that may have slipped from memory.
—K2EEK

A good antenna is a good antenna, regardless of whether it is fed with coaxial cable, single-conductor line, twinlead, hardline, open-wire feeders, or any other transmission line one can dream up. True, the use of various kinds of feedlines *does* have an impact on antenna operation, but it's mostly on the type of coupling required for proper loading and matching, and to a secondary extent on line loss.

At least since the early fifties, coaxial cable has seemed to be the best and, to many, the "only" way to feed antennas. This is because the cable is easily handled, it can be snaked through a small hole in the house or a window casing, it closely matches the common dipole's feedpoint impedance, and a number of other factors. Coax is also popular because it radiates very little; it provides a convenient vehicle for inserting various devices in the antenna circuit such as s.w.r. bridges, transmit/receive switches and low-pass filters.

Some of these "advantages" pale when we consider antennas other than the simple single-band dipole or beam; the antenna's low feedpoint impedance holds only for the fundamental frequency (or odd harmonics thereof). When coax is used to feed an antenna that isn't operating near resonance—such as an 80-meter dipole used on 40 meters—we run into trouble from the high s.w.r. and the resultant cable loss and transmitter matching problems.

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Two once popular but sometimes forgotten antenna types are useful to the beginner and old-timer alike who want to operate over a wide range of frequencies, not just a single band or two. These are the **Zepp** and the **centerfed multibander**; we'll cover them both.

A Word On Tuned Feeders

The purpose of the transmission line is to provide an efficient path for r.f. to travel from the transmitter to the antenna. The line should not radiate of itself, but rather act as a "conduit."

There are two common types of feed lines used by amateurs—coaxial cable and parallel-conductor line (including open-wire and twin-lead). The most popular by far is coaxial cable, which comes in several impedance designations and which is very convenient to use and easy to handle. Coax is perfectly suited to feeding most single-band antennas, such as ordinary dipoles, verticals and beams, in addition to low-impedance multiband antennas such as trap and multiple dipoles.

Coaxial cable presumes a good impedance match at the antenna. When a mismatch exists, standing waves are produced and line losses increase with higher s.w.r.s. Since the impedance of the multiband dipole will vary considerably from band to band and there is no way to control the feedpoint impedance, coax just isn't suitable for use as a feedline. It *must* be operated in the matched or so-called "untuned" or "flat" mode.

On the other hand, parallel-conductor transmission lines—especially those of the low-loss open-wire type—can be operated almost without regard to s.w.r.; this is because there is very little inherent loss in the line. Thus, the actual feedpoint impedance of the antenna is not too important, since when the line loss is low we don't have to be overly concerned with line matching. Multiband operation is a "natural" for tuned feeder systems: an antenna cut for a relatively low frequency band (say, 80 meters) is operated on higher frequency bands by "tuning" the feeders to the harmonic frequencies, thus the term "tuned feeders."

Tuned-feeder arrangements are most commonly used with center-fed dipoles and end-fed Zepps; these are the two types with which we will be most concerned. However, tuned feeders have been used to feed vertical and vertical ground-plane antennas, as well as verticals that are half-horizontal (L-shaped), slanters and slopers. And, tuned-feeder schemes have been put to good use in connection with several types of beam antenna designs, including some wire

Multiband antennas using tuned feeders inherently have high s.w.r.s, though this is not unacceptable since the transmission line used is normally of the low-loss kind. Impedance transformation to coax is made at the antenna coupler, and a high-quality h.f. wattmeter/s.w.r. bridge is used to make adjustments to the coupler. A dual-reading (forward and reflected power) meter is best, since it allows one to catch any erroneous coupler tuning settings that may reduce forward power while showing low s.w.r. Heath unit shown here handles 2000 watts p.e.p. in two power ranges from 1.8 to 30 MHz. (Photo courtesy Heath Company)

Of interest to the 160-meter buff, this Drake MN7 matching network has an internal feed switching arrangement that allows a conventional 135-foot balanced-line fed doublet to be driven as an inverted "L". The "L" is fed through a 4:1 impedance-matching transformer, with the other half of the antenna acting as a counterpoise. (Photo courtesy R.L. Drake Co.)

beams used on harmonics and multiband V-beams.

Used in conjunction with a wide-range antenna tuner (transmatch), antenna length as well as feeder length isn't too critical. The antenna itself is usually cut for one-half wavelength at the lowest frequency to be used, though good results can be had with flattops as short as one-quarter wavelength, or with half-wave flattops bent to accommodate the available space. The feeder length can be whatever happens to result in the shortest run from antenna feedpoint to hamshack, though certain feeder lengths can give rise to problems with parallel currents flowing, with resultant radiation from the feeders and possible loading problems. If the feedline does radiate, no great harm is done since energy isn't truly wasted: rather, the radiation pattern is distorted. Choosing a feeder run that's along the lines suggested should keep you out of trouble on this score.

A final point: For best results using tuned-feeder antennas, use open-wire line, not 300-ohm solid dielectric cable, such as TV twinlead. Even when using heavy-duty, transmitting-type lines, the losses in such cases will be excessive on those bands where the antenna operates with a high s.w.r. Also, most solid-dielectric cables are weather sensitive, so that changes in climatic conditions (ice, snow, rain, etc.) will cause changes in line characteristics and erratic loading conditions. Stick to *open-wire* lines: attenuation at 10 meters is on the order of 0.1 dB per 100 feet when perfectly matched, whereas RG-8/U clocks out at about 1.0 dB, RG-11/U at 1.15 dB and RG-58/U a whopping 2.5 dB. Ordinary TV twinlead shows about 0.6 dB, but losses rise with high s.w.r. and when the line is wet. "Ladder line" of the 470-ohm type distributed by Dentron Radio and others is a fair compromise that is easier to handle than open-wire line but has only slightly higher attenuation.

In any case, the feeders should be handled with care. Feeder spacing should be kept constant over the line length, the line should be kept well away from other conductors that might be coupled to it, and sharp bends should be avoided. Special care should be taken where the line enters the hamshack. An insulated TV-type feedthrough tube can be used, with a short length of twinlead installed where the feedline passes through the wall. The line should be protected against lightning discharges, as described later.

Enter The Zepp

The "Zepp" or *Zeppelin* antenna is one of the oldest in amateur radio, dating from the times of the gas-filled airships bearing the same name. The classic Zepp consisted of a resonant half-wave antenna that was folded back on itself and suspended below the airship. It was usually fed through a ¼-wave line. In amateur use, the tuned feeders run from the "shack" to one end of the antenna. One side of the feedline is connected to the antenna flattop, while the other side of the feedline is not connected at all except to the end insulators.

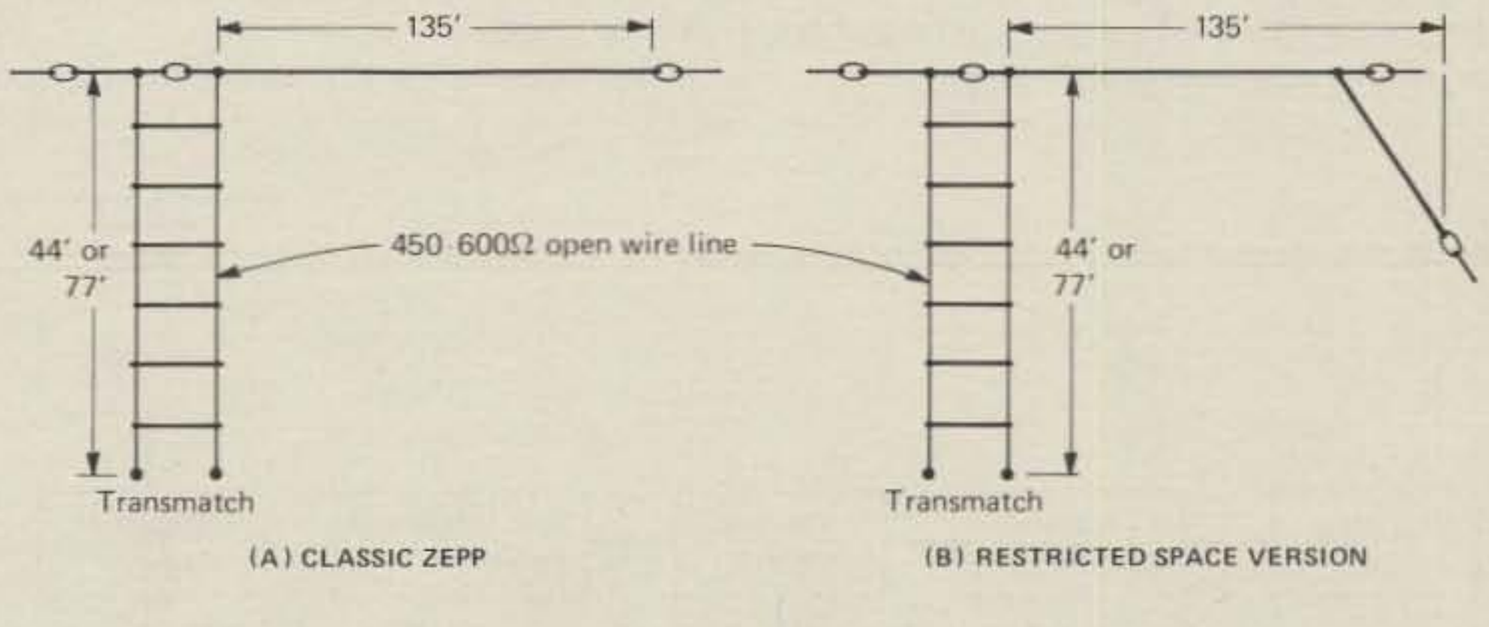
The Zepp is a very practical antenna and one that's convenient to use, particularly if the shack happens to be physically located near one of the end supports of the span. The skyhook becomes a *voltage-fed* antenna, since the radiating portion is some multiple of a half-wavelength and therefore there is always a high voltage present where the feeder attaches to the flattop. This is in contrast to the centerfed dipole antenna, where a low impedance exists at the feedpoint at the resonant frequency and on odd harmonics.

An end-fed Zepp cut for the lowest frequency to be used should give a good account of itself on the fundamental and on higher frequencies. The length of the Zepp should be cut about 5% longer than the free-space half-wavelength because of so-called "end effects" which tend to electrically shorten the antenna's effective length. The formula can be used to calculate the length.

$$L\ (\text{feet}) = \frac{492}{f(\text{MHz})}$$

For operation on 80 through 10 meters, a flattop of 135 feet should be right. If 40 is the lowest band to be used, 67 feet should do the trick. (If you can only install a 67′ flattop and want to operate on 80, you may want to consider tying the two feeders together at the shack and feeding the entire system against ground as a random-wire.)

Since the currents in the two feeder wires do not exactly balance in the Zepp, there is some radiation from the line, though to a certain extent the fields of the two conductors cancel out. Any convenient feedline length can be used. However, to minimize parallel currents which would increase line radiation, use a feeder length that doesn't show resonance effects on any band to be used; a length of either 44 or 77 feet is a good one to work with. The radiation pattern of the Zepp operated on harmonics tends to the cloverleaf, though the *actual* pattern



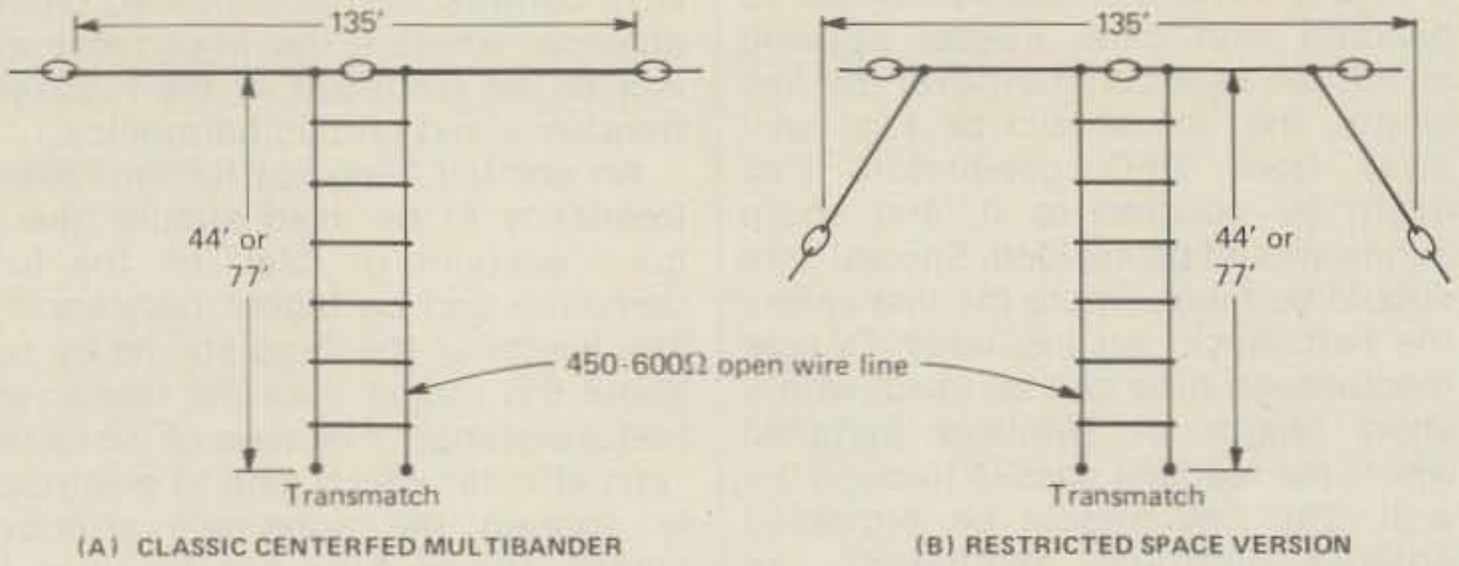
(A) CLASSIC ZEPP

(B) RESTRICTED SPACE VERSION

Fig. 1- Zepp antenna configurations.

The end-fed Zepp at (a) is a popular contemporary version of a very old antenna type. The antenna is usually cut for operation as a half-wavelength at the lowest frequency band to be used and the feeders "tuned" to work as a resonant system on the higher bands. For operation on 80-10 meters, a flattop of about 135′ should do the trick. An open-wire feedline of any convenient length can be used, but a length of about 44′ or 77′ should minimize the possibility of "awkward" loading situations at the antenna tuner or coupler.

If room for a full-size flattop isn't available, the ends can be bent around as at (b), with some risk of undesired directivity effects. The ends can even be bent down with resultant mixed polarization signal characteristics.



(A) CLASSIC CENTERFED MULTIBANDER

(B) RESTRICTED SPACE VERSION

Fig. 2- Center fed antenna configurations.

Shown at (a) is a simple, practical all-band (80-10 meter) antenna designed for use with tuned feeders and an antenna coupler or Transmatch. The antenna shown is basically an 80-meter tuned doublet operated on harmonics for the higher frequency bands. Installed high and in the clear, it's probably the best all-round antenna for multiband use. A length of 135' represents a good compromise, and feeder lengths of 44' or 77' are popular, though almost any feeder length can be used.

If space is a problem, the flattop can be less than ½ wavelength on the lowest band with little decrease in efficiency until the straightaway length reaches ¼ wavelength. If loading becomes a problem when this is done, try increasing or decreasing feedline length.

The flattop can be bent around, horizontally or vertically, if necessary, into almost any shape to fit available real estate, with some loss of effectiveness. Many variations can be used, but try to keep the antenna symmetrical to keep the system in balance. The sketch at (b) shows a typical restricted space version.

will be distorted by feedline radiation. Fig. 1 shows typical end-fed Zepp configurations.

Centerfed Multibanders

For simplicity, efficiency and economy, this is a hard antenna to beat. Though the single-wire may be a shade *simpler*, the centerfed antenna is much less critical as far as matching, tuneup and loading go. In fact, it's probably the best single, all-round h.f. antenna you can erect.

Sometimes known as the "tuned doublet," this kind of antenna is desirable because it's symmetrical. Center feed is much more desirable than end feed for a number of other reasons, including the fact that it usually produces a lower s.w.r. on the transmission line. Even with center feed, the s.w.r. mismatch may be 8 to 1 or more, but this doesn't matter much when low-loss open-wire transmission line is used.

The length of the antenna flattop isn't critical, though some combinations of antenna length and feeder will induce parallel-current flow. As with the Zepp, a flattop length of about 135 feet should produce good results on 80 through 10 meters. Again, feeder lengths of about 44 or 77 feet should minimize possible loading problems. A shorter flattop length can also be used; a 67-foot span and either a 44-foot or 77-foot feedline are popular combinations for all-band work. The antenna span can be reduced but efficiency starts to take a dive. For best results, the antenna should be installed as high and in the clear as possible, with the feedline brought away from the antenna at *right angles*.

If you want to improve the centerfed multibander's balance, you can do so by inserting an r.f. ammeter in each side of the feedline (or moving a single ammeter from one feedline wire to the other), making slight adjustments to antenna length until current readings are the same in both legs. Bear in mind that unsymmetrical placement of the antenna with respect to nearby conductors such as power lines, telephone wires, etc., can cause inherent unbalance.

The center-fed multiband dipole especially lends itself to limited space situations. The ends can be bent around (within reason), and it can be erected in Vee, inverted Vee, and sloper configurations. At least one manufacturer, Dentron Radio Co. Inc. (2100 Enterprise Pkwy., Twinsburg, OH 44087), sells a factory-assembled antenna of this type designed for 160-10 meter operation.

See fig. 2 for some center-fed multiband configurations.

Tuning, Loading, Matching And Harmonics

As indicated, the tuned-feeder arrangement requires the use of an antenna tuner or coupler in order to work into the low-impedance pi-network output of most contemporary tube and solid-state rigs. While practically any type of tuner designed to handle balanced, parallel-conductor lines will do, a wide-range design will practically eliminate loading problems caused by exceptionally high or low impedances that can be presented to the transmitter by oddball feeder or flattop dimensions. Highly recommended are tuners based on the so-called "ultimate transmatch" design pioneered by ARRL staffer Lew McCoy several years ago. Tuner designs based on his original invention are found in the *Handbook*. Most of the fancier commercial tuner models are of this type or close cousins, and can handle practically any matching condition that one might encounter—series tuning

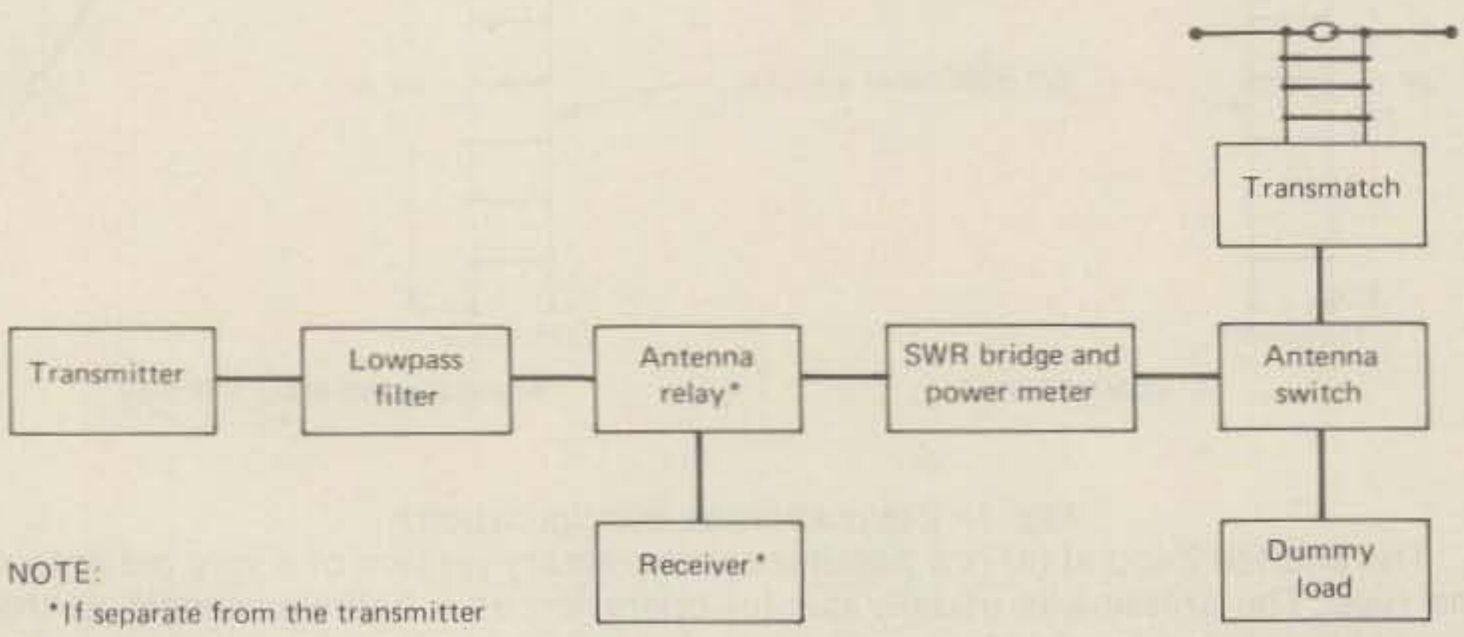


Fig. 3- Multiband antenna feeding arrangements.

The diagram above shows the suggested order in which the various components are connected together in the multiband antenna system fed into the tuned feeders. If a transceiver is used, the antenna relay is eliminated since transmit/receive switching is accomplished internally. Normally, 50-ohm coaxial cable is used to tie the units together, though 70/75-ohm cable may also be used

for low impedances and parallel tuning for high impedances. For good results with tuned-feeders, look for a coupler that will work over the range of at least 25 to 1200 ohms. One containing a built-in balun and a dual-reading (forward and reflected power) wattmeter is an especially useful accessory.

A problem encountered when using any multiband antenna system, including the center-fed multiband dipole and end-fed Zepp, is that of harmonic radiation. All multiband antennas tend to accept power at harmonic frequencies. Normally, harmonic suppression is adequate in modern transmitters, though use of a multiband antenna can cause radiated harmonics to approach the ragged edge of acceptability. However, the transmatch, when properly adjusted, usually eliminates any possibility of excessive harmonic radiation and also has the side benefits of improving receiver-to-antenna matching and reducing image and spurious signal reception.

In those few instances where using a multiband antenna in conjunction with an older transmitter not having adequate harmonic suppression results in harmonics of the fundamental frequency being radiated (with FCC "pink ticket" violation notices a possible result), a series half-wave filter may be indicated. A filter can be homebrewed from designs in the reference handbooks, or, a commercial filter can be found from among Barker and Williamson's line. Several models are available that have lowpass cutoff frequencies just above the highest band to be used.

For TVI reduction, a standard lowpass filter should be installed in the coax line between transmitter and transmatch.

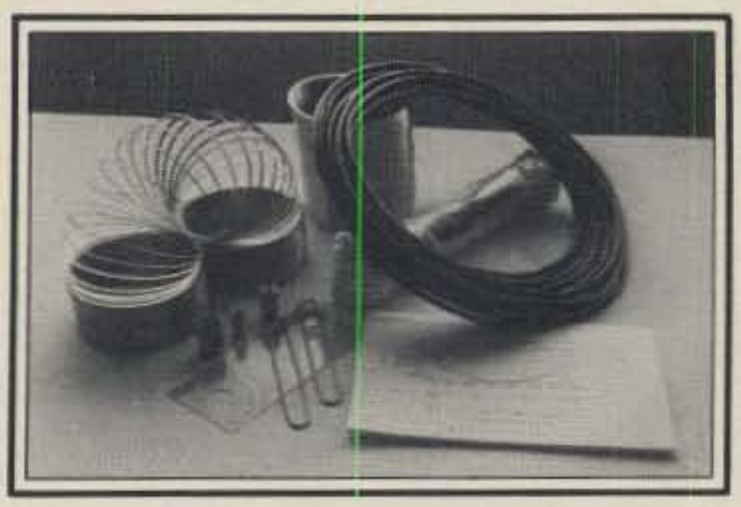
Fig. 3 shows suggested arrangements.

Lightning Protection

When working with dipoles fed with coaxial cable, we tend to assume that lightning protection is automatically taken care of since the cable's heavy braid is at ground potential. However, protection is by no means automatic when using coax, and it's especially questionable when using parallel-conductor feedlines which are high above ground potential and effectively offer no protection to lightning strikes or even static discharges.

Lightning protection is a "must" for either twinlead or open-wire line. Either an arrestor can be used, preferably at the point the feeders enter the hamshack, or the lead-in can be disconnected from the equipment and grounded whenever the rig isn't in use. The arrestor or grounding bar must be connected to a suitable

Antenna Of The Month: The Slinky Dipole Antenna

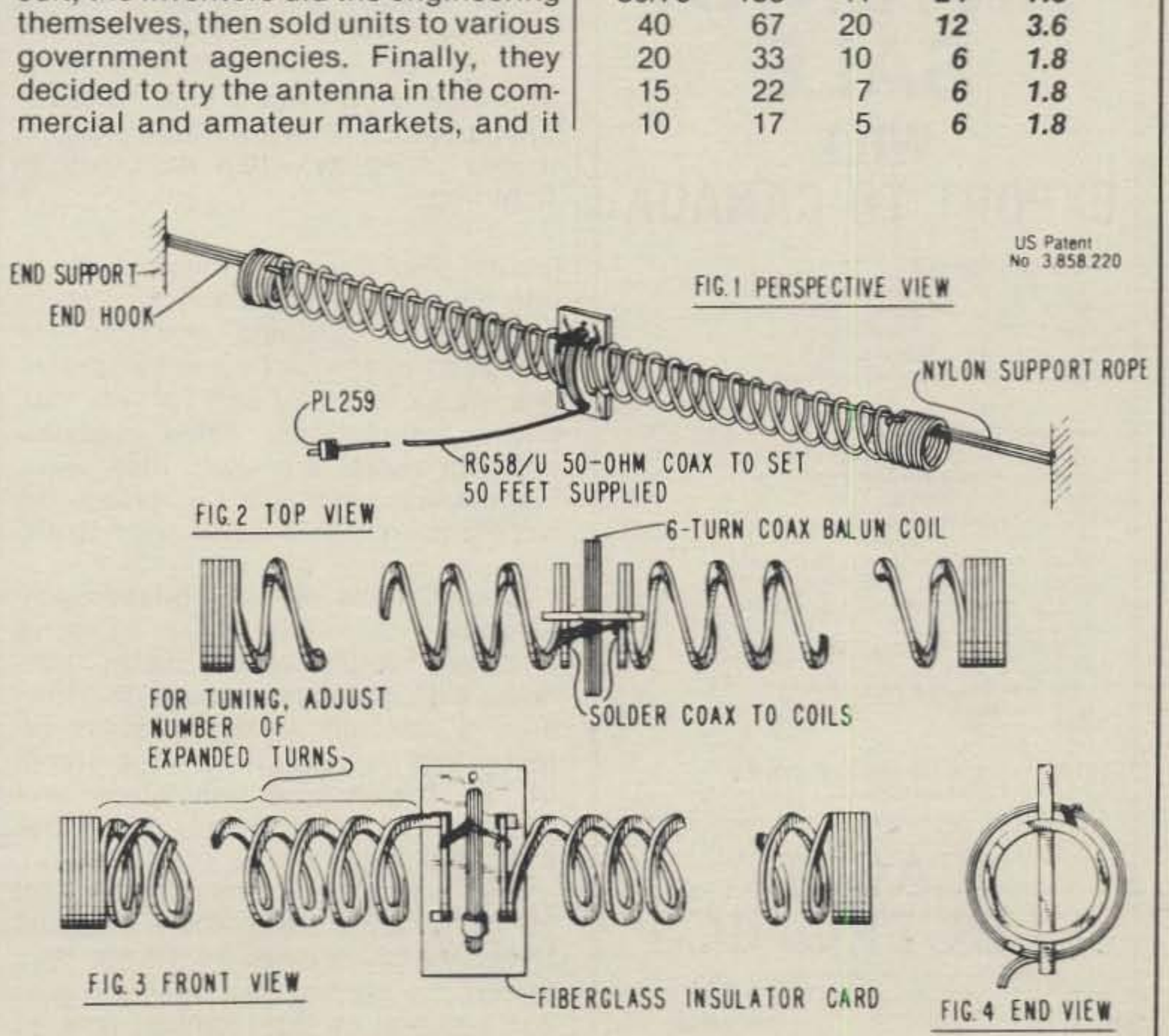


The "Slinky" dipole is a restricted-space, variable-length, electrically shortened h.f. antenna that can be adjusted for use anywhere within the range 3.5 MHz to 30 MHz, including the new WARC bands and the popular MARS, CAP and SW bands. It achieves good single-band impedance match to 50-ohm coax by means of the helical inductive loading provided by the spring structure; its efficiency approaches that of a full-size dipole when properly installed. When adjusted for resonance, the s.w.r for the antenna should be less than 2.5:1 over the 80 meter band and less than 1.8:1 over the 40- and 20 meter bands, with comparable figures on the higher frequencies. A built-in coaxial balun is included, along with the two special Slinky coils, center insulator card, nylon cord, end hooks, 50 feet RG-58/U coax, coaxial connector, and instruction sheet.

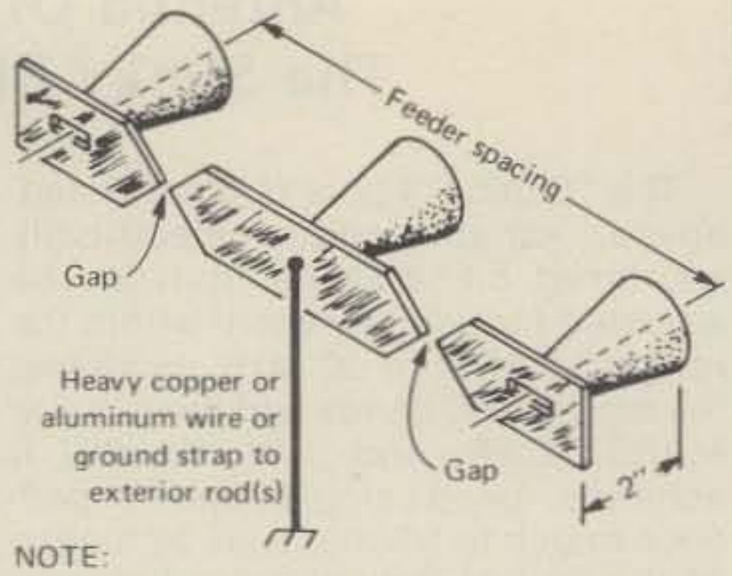
The story behind the antenna's development is an interesting one. The Slinky was invented by Richard Lodwig, W2KK and Sidney Arnow, WA2OPN, in 1973. They approached a large (covert) government agency with the idea, shortly thereafter. They liked the idea, but didn't want to pay for the development effort. As a result, the inventors did the engineering themselves, then sold units to various government agencies. Finally, they decided to try the antenna in the commercial and amateur markets, and it caught on. Today, two versions are available, the amateur version (no. 80-10) and the s.w.l. version (SWL-1), as well as commercial designs. All are basically the same antenna.

The photo shows the main components of the Slinky package. The table shows comparative standard dipole and Slinky lengths, and the diagram shows details of the antenna's construction. The antenna is sold by Teletron Corp., Suite 300, Box 84, Kings Park, N.Y. 11754.

BAND	STANDARD DIPOLE LENGTH		SLINKY LENGTH	
Meters	Ft.	Meters	Ft.	Meters
80/75	133	41	*24*	*7.3*
40	67	20	*12*	*3.6*
20	33	10	*6*	*1.8*
15	22	7	*6*	*1.8*
10	17	5	*6*	*1.8*



Drawing showing details of the SLINKY Dipole Antenna



NOTE:
Adapted from W4ZG's lightning arrester design appearing in the July 1955 issue of *QST*. Also see the current edition of the ARRL *Antenna Book*, p. 271.

Fig. 4- Parallel conductor lightning arrester.

Illustrated is an easy-to-make outdoor lightning arrestor for use with parallel-conductor lines; it is especially suited for use with *open-wire* lines. The objective is for lightning discharges to "shoot the gap" and be passed harmlessly into the ground.

Built from three ceramic feedthrough or standoff insulators and three sections of 1/8" thickness copper or brass bar, the spacing between the axis of the two outside insulators is approximately equal to the transmission line spacing. In practice, the two "gaps" are adjusted just far enough apart so that they don't arc over with full transmitting power applied. Alternately, a heavy shorting bar or even a husky knife switch, installed outdoors, can be used to ground the antenna system when it's not in use. "*When in doubt, ground it*" is a wise old antenna axiom to follow when it comes to lightning!

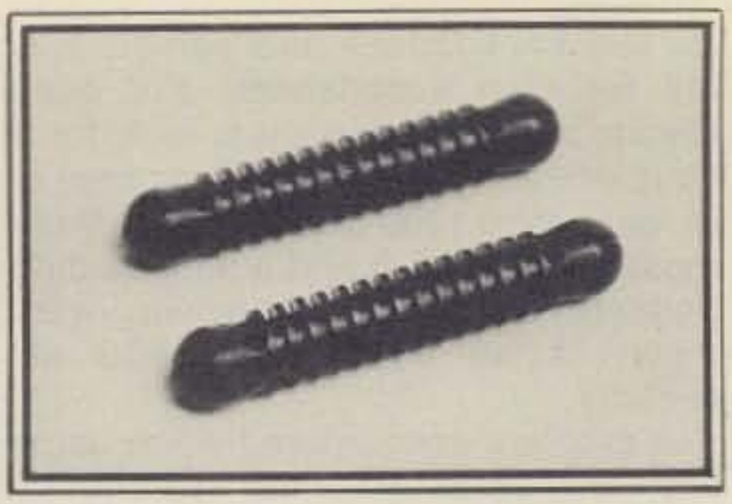
ground point such as a long rod driven into the earth near the shack.

Light-duty lightning arrestors for use with residential TV and f.m. antennas are satisfactory only for very low-power installations. When medium- and high-power are used, they prove inadequate, since the r.f. voltage on the line is enough to cause them to arc over.

I don't know of any commercially available transmitting-type lightning arrestors for parallel-conductor feedlines; perhaps some readers do. However, a very simple but effective arrestor can be made from three standoff or feedthrough insulators and three sections of brass or copper strapping. Fig. 4 shows such a design.

A 4:1 balun transformer can be used at the antenna feedpoint with many types of dipoles (such as the 300-ohm folded dipole) so that coaxial cable can be used as the feedline. This, of course, eliminates the special problems of lightning protection unique to parallel lines. Since most baluns put the antenna at d.c. ground potential, they offer some degree of built-in protection from lightning. And, you can insert a special coax lightning arrestor (such as Cushcraft's "Blitz Bug" or similar devices by Hy-Gain and Radio Shack) in the line that allows lightning discharges to be routed to ground. *However*, using the balun with an antenna fed in the "tuned feeder mode" probably won't work, since the feedpoint impedance will not be a predictable 300 ohms but will vary considerably from band to band, placing a too-high s.w.r. on the feedline. The balun will also waste a small amount of power, usually around 5 to 10%.

Don't let the problem of lightning protection deter you from using tuned feeders. Build an arrester or ground the lead-in when not using it, and be on your way.



R.f. voltages at the ends of the dipole may be quite high. Rugged insulators such as this 7 in. long pair molded from a high-impact plastic material are heavily serrated to increase leakage paths by a substantial amount. (Photo courtesy Hy-Gain Electronics)

Summary

Several months ago we began a discussion of the dipole antenna family. In the first column we covered the basic dipole, harmonic-dipole operation and multiband paralleled doublets, as well as folded dipoles. In the next column, we branched out to cover the Vee and inverted Vee, the vertical dipole, sloper, T2FD, double bazooka, and both double and extended double Zepps.

In this column, we backtracked just a bit to cover a "special case" dipole very well suited for no-frills multiband operation. We also uncovered the Zepp antenna, also popular for all-band work, though not a dipole in the strictest sense.

Next month, we will highlight another historically popular multiband antenna, the *Windom* and its close cousins. And, in upcoming columns, we'll talk about various kinds of trap antennas. See you then.

73, Karl, W8FX

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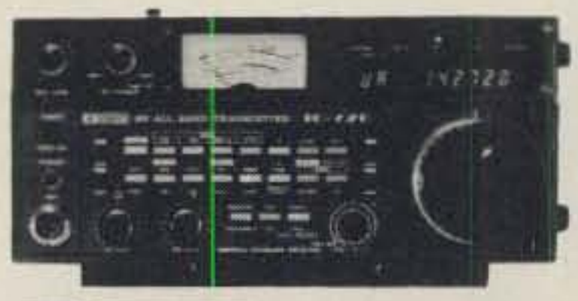
L-7 2KW Linear Amplifier



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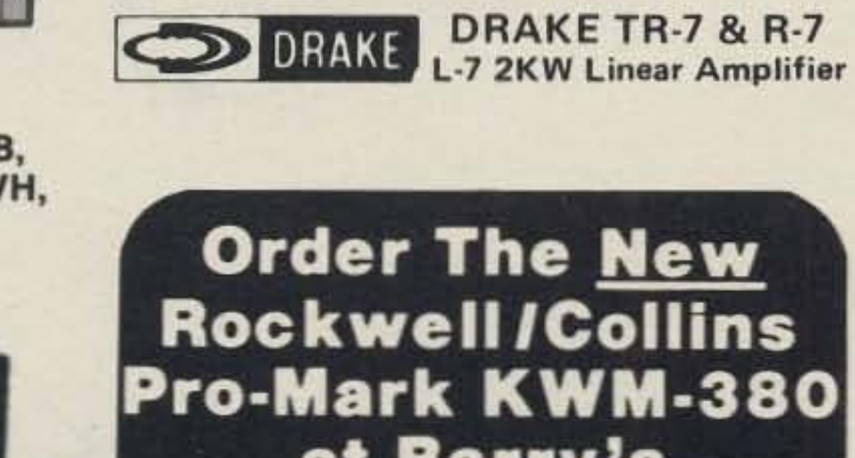

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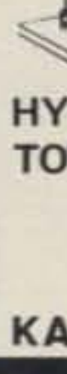
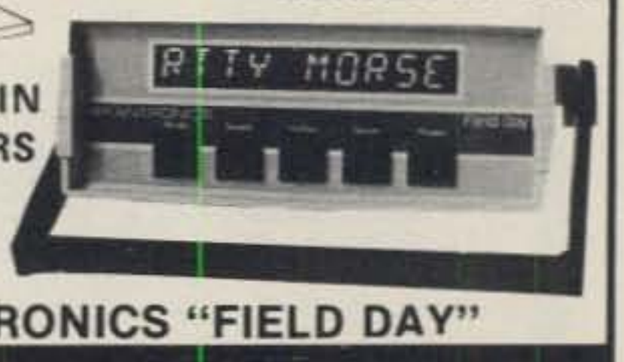
Digital Frequency Counter 0-600 MHz

DENTRON GLA-1000B
DTR-3KA Antenna Tuner DTR-1200L Amplifier
DLR-2000/MTA-3000/Clipperton "L"



HY-GAIN TOWERS



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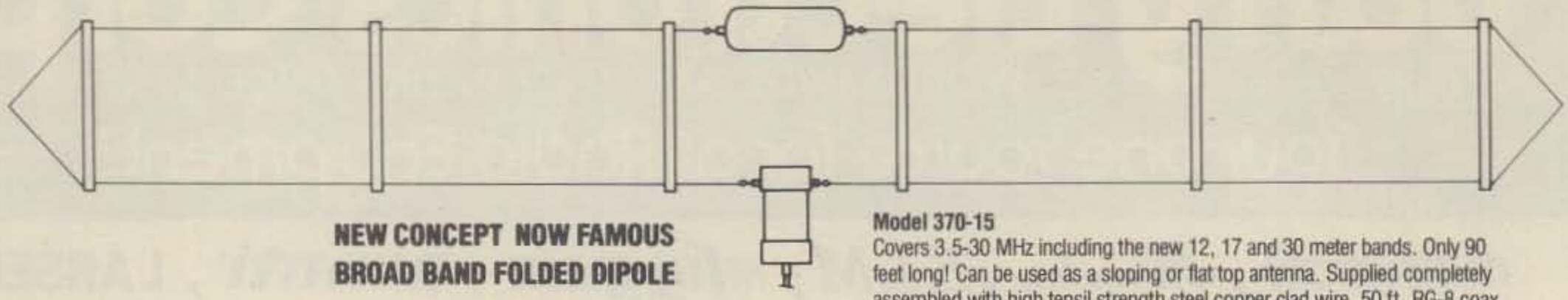


NEW CONCEPT NOW FAMOUS BROAD BAND FOLDED DIPOLE

Model 370-15
Covers 3.5-30 MHz including the new 12, 17 and 30 meter bands. Only 90 feet long! Can be used as a sloping or flat top antenna. Supplied completely assembled with high tensil strength steel copper clad wire, 50 ft. RG-8 coax cable and PL259 connector. Will handle 2.5 KW-5 KW PEP.

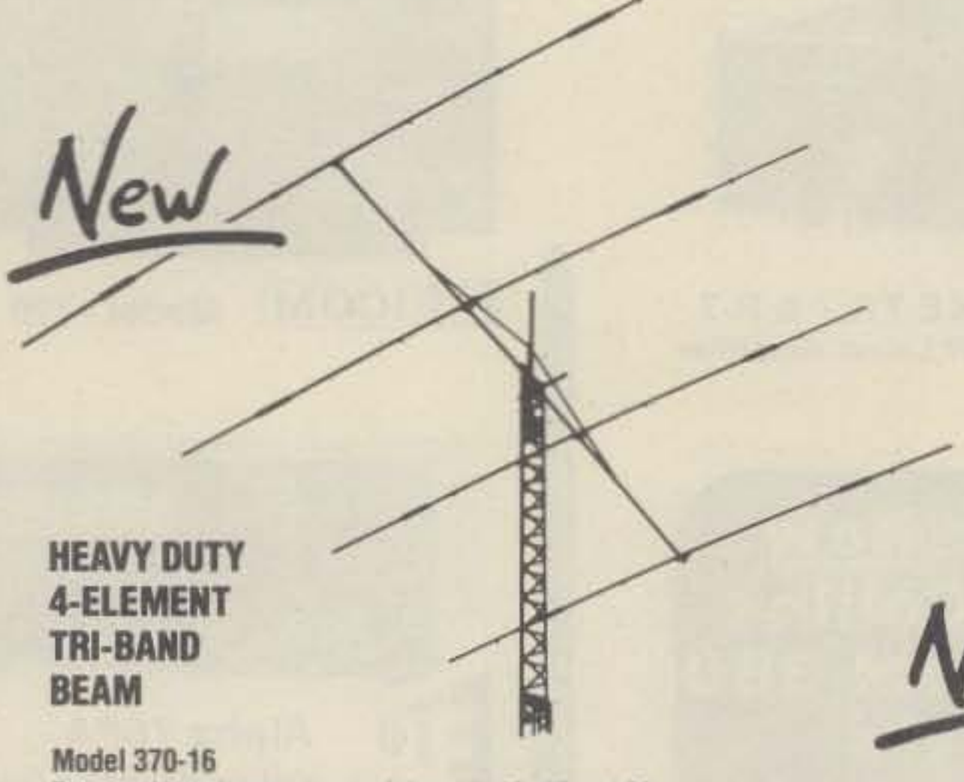
Patent Pending

Model 370-11
FIVE BAND TRAP ANTENNA
80, 40, 20, 15 and 10 meters
1,000 Watts
2,000 Watts PEP
All Band Antenna
One Feed Line

Model 370-12
Same as above, in kit form.

Model 370-13
FOUR BAND ANTENNA
40, 20, 15 and 10 meters
1,000 Watts
2,000 Watts PEP

Model 370-14
Same as above, in kit form.



New

HEAVY DUTY 4-ELEMENT TRI-BAND BEAM

Model 370-16
Four working elements on each band in 10, 15 and 20 meters. The 24 foot boom permits optimum spacing for maximum foward gain and front-to-back ratio. All traps are precision tuned. Rugged reliability assures ability to withstand winds up to hurricane strength.

New

HEAVY DUTY 3-ELEMENT TRI-BAND BEAM

Model 370-17
Three working elements on each band in 10, 15 and 20 meters. The 16 foot boom can be handled by a lighter duty rotor and tower than the TB4HA but still provides excellent performance characteristics. Precision tuned traps are combined with rugged construction.

ANTENNA TRAPS

Weatherproof. Strain test over 600 lbs.
Power-1000 watts-2000 watts PEP
Supplied with complete instructions for antenna wire lengths.

Model 370-1
5 Band Antenna Traps for coverage of 80, 40, 20, 15 and 10 meters in one antenna.

Model 370-2
4 Band Antenna Traps for coverage of 40, 20, 15 and 10 meters in one antenna.

Model 370-5
END INSULATOR
- Space Age Glass Polymer Material
- 1000 lb. Pull Test
- Size 4"L x 1-1/4"D

Model 370-19
TRI-BAND MOBILE
- Tri-bander for 20, 40 and 75 meters.
- Power rated 500 watts PEP.

Model 370-10
PORTABLE WHIP ANTENNA
Tunes the 2, 6, 10, 15, 20 and 40-meter amateur bands, as well as all 40 channels of the 27 MHz CB band. When properly adjusted to the operating frequency, VSWR is 1.1:1. Complete with base loading coils, coaxial feed line, and counterpoise. Power rating is 360 watts CW and SSB.

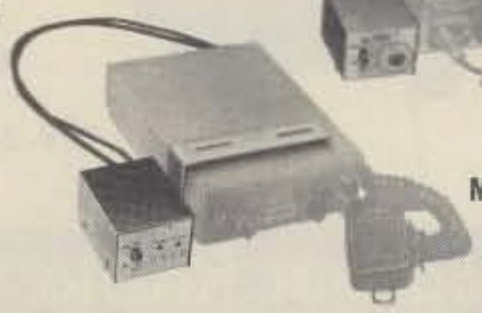
COAXIAL ANTENNA CHANGEOVER RELAY

Model 377

Power Rating	1000 watts CW (2000 watts SSB)
VSWR	Less than 1.15:1 DC to 150 MHz
Power Requirements	0.015 Ampere 48 to 130 volts AC
Connectors	UHF Type SO-239

ANTENNA TUNERS

AT-140
Matches auto antenna to your C.B. rig.



Model AT-200
Matches auto antenna to your 2m Rig.

Model 370-9
PL-259 Connector for use with RG-8 Coax Cable. Mates with SO-239 Connectors. UHF Type.

Model 370-8
50 ft. RG 8 Type coax cable.

Models 370-6, 370-7
ANTENNA WIRE
No. 14 AWG (17/22)
370-6, 70' coil—370-7, 140' coil

Model CC50 Standard

DIPOLE CENTER CONNECTORS

Model CC51 Military Type

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Waterproof, mechanically strong connection between a coaxial feed line and the center of a dipole antenna.

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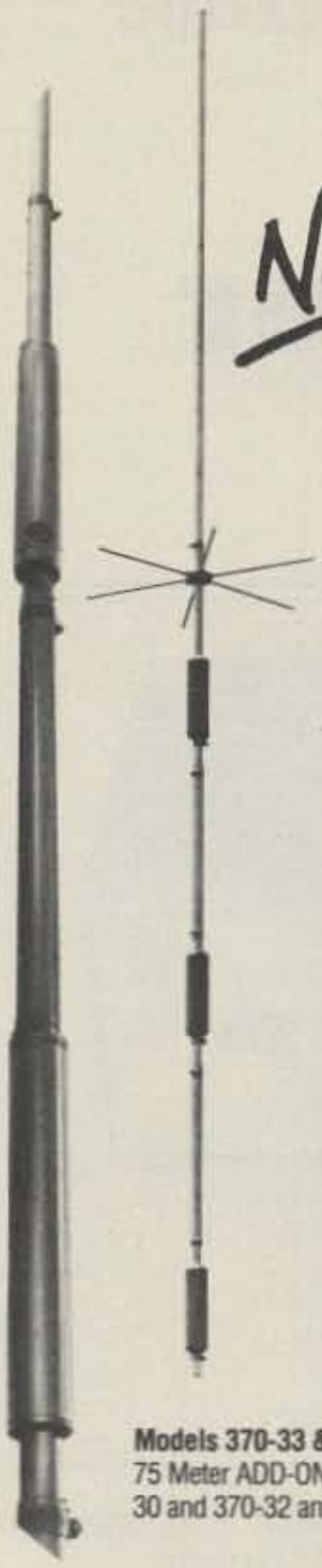


New

VERTICAL ANTENNAS

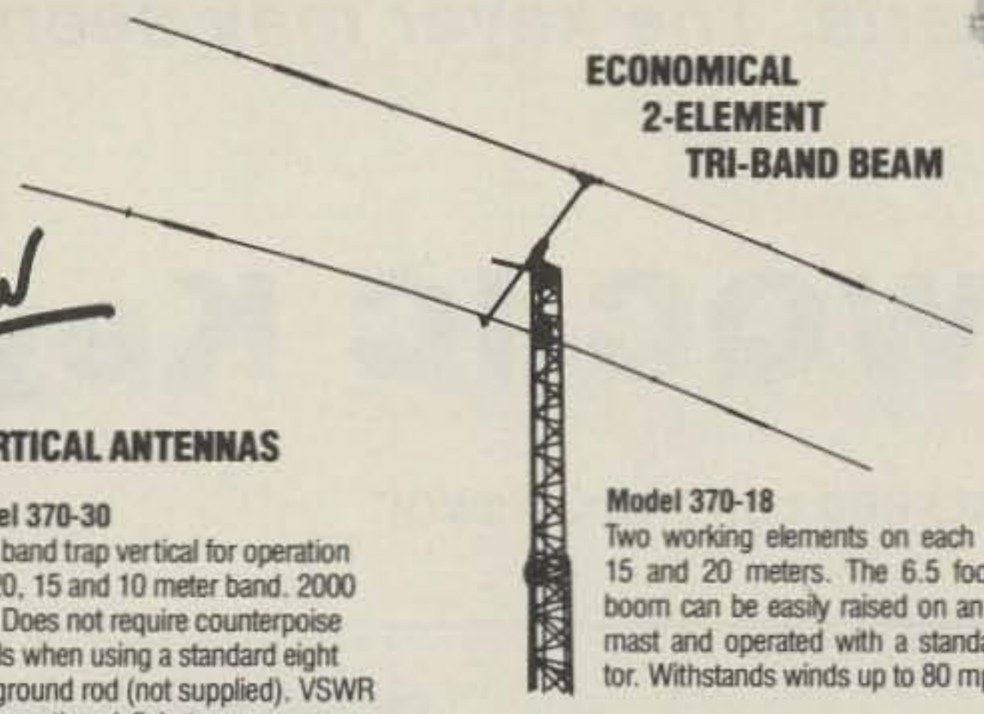
Model 370-30
Four band trap vertical for operation 40, 20, 15 and 10 meter band. 2000 PEP. Does not require counterpoise radials when using a standard eight foot ground rod (not supplied). VSWR not more than 1.5:1 at resonance. Includes slimline traps for use as a "flag pole". Overall length is 21 feet.

Model 370-31
RADIAL KIT-ACCESSORY
For 370-30 and 370-32 Verticals on 10-80 meters. All necessary wire and hardware is included for two ground-plane radials for 10-80 meter band.

Model 370-32
Outstanding performance with this omnidirectional, low radiation angle, trap vertical antenna. Requires small installation space for either roof or ground-level. Hardware is included. Traps are precision set at the factory for maximum radiation efficiency on each band with low VSWR. Heavy duty construction withstands winds up to 100 mph.

Models 370-33 & 370-34
75 Meter ADD-ON Kit for models 370-30 and 370-32 antennas.

ECONOMICAL 2-ELEMENT TRI-BAND BEAM



Model 370-18
Two working elements on each band in 10, 15 and 20 meters. The 6.5 foot aluminum boom can be easily raised on an inexpensive mast and operated with a standard TV rotator. Withstands winds up to 80 mph.

COAX SWITCHES

Power 1 KW-2 KW PEP
Impedance 50-75 ohms
VSWR 1.2:1 up to 150 MHz

Model 593	Single Pole	3 Position with grounding of all unused positions
	Dimensions	1-3/4" high, 5" wide, 3" deep
	Mount	Wall or desk
Model 594	2 Pole 2 Position	
	Dimensions	1-3/4" high, 5" wide, 3" deep
	Mount	Wall or desk
Model 595	Single Pole	6 Position with grounding of all unused positions
	Dimensions	8-1/2" x 3-1/2" x 2"
	Mount	Wall or desk
Model 375	Single Pole	6 position with grounding of all unused positions Axial mounted connectors.
Model 590	Single pole	5 position, non-grounding type switch. Axial mounted connectors
Model 590G	Single Pole	5 position with grounding of all unused positions. Axial mounted connectors.
Model 592	Single Pole	2 position switch, non-grounding. Axial mounted connectors.
Model 376	Single Pole	5 position with grounding of all unused positions. Sixth switch position grounds all outputs. Radial mounted connectors.
Model 550A	Single Pole	5 position switch. Radial mounted connector.
Model 551A	2 Pole	2 position. Radial mounted connectors
Model 550A-2	Single Pole	2 position switch. Radial mounted connectors

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Model 596	Single Pole	3 position with grounding of all unused positions
	Dimensions	1-3/4" high, 5" wide, 3" deep
	Mount	Wall or desk
Model 597	Single Pole	6 position with grounding of all unused positions
	Dimensions	8-1/2" x 3-1/2" x 2"
	Mount	Wall or desk

RADIO FREQUENCY FILTERS

Model Number	Intended Use	Power Capacity (Watts)	Impedance (Ohms)
423	6 Meter	100	50
427	Amateur Radio	1000	50
424	Amateur Radio	100	50
425	TVI Filter	1000	50
426		1000	70
422-15	Amateur 15 Meter	100	50
431-15	Radio Harmonic	1000	50
421-20	Amateur 20 Meter	100	50
430-20	Radio Harmonic	1000	50
420-40	Amateur 40 meter	100	50
429-40	Radio Harmonic	1000	50
419-80	Amateur 80 Meter	100	50
428-80	Radio Harmonic	1000	50
422-2	Amateur 2 Meter Bandpass Filter	350	50

RECEIVING BALUNS

Type	STANDARD IMPEDANCE RATIOS	Freq. Range
RC-780	50 ohms bal to 50 ohms unbal	3.5-30 MHz
RC-781	70 ohms bal to 50 ohms unbal	3.5-30 MHz
RC-782	150 ohms bal to 50 ohms unbal	3.5-30 MHz
RC-783	200 ohms bal to 50 ohms unbal	3.5-30 MHz
RC-784	300 ohms bal to 50 ohms unbal	3.5-30 MHz
RC-785	600 ohms bal to 50 ohms unbal	3.5-30 MHz
RC-790	50 ohms bal to 70 ohms unbal	3.5-30 MHz
RC-791	70 ohms bal to 70 ohms unbal	3.5-30 MHz
RC-792	150 ohms bal to 70 ohms unbal	3.5-30 MHz
RC-793	200 ohms bal to 70 ohms unbal	3.5-30 MHz
RC-794	300 ohms bal to 70 ohms unbal	3.5-30 MHz
RC-796	600 ohms bal to 70 ohms unbal	3.5-30 MHz

TRANSMITTING BALUNS

Power 2.5KW-5KW PEP
Connectors SO-239

Type	Standard Impedance Ratios	Freq. Range
BC-1	50 ohms bal to 50 ohms unbal	1.8-30 MHz
BC-2	50 ohms bal to 200 ohms unbal	1.8-30 MHz
BC-3	50 ohms bal to 300 ohms unbal	3.5-30 MHz
BC-4	50 ohms bal to 600 ohms unbal	3.5-30 MHz

BALUNS
Commercial & Industrial Types

MODELS AVAILABLE

B&W MODEL NO.	INPUT IMPEDANCE (unbalanced)	OUTPUT IMPEDANCE (balanced)	POWER CAPACITY
HFT-1K/50U/700B	50 ohms	700 ohms	11KW Average 2KW PEP
HFT-1K/50U/600B		600 ohms	
HFT-1K/50U/300B		300 ohms	
HFT-1K/50U/200B		200 ohms	
HFT-1K/70U/As Above	70 ohms	as above	
HFT-5K/50U/700B	50 ohms	700 ohms	5KW Average 10KW PEP
HFT-5K/50U/600B		600 ohms	
HFT-5K/50U/300B		300 ohms	
HFT-5K/50U/200B		200 ohms	
HFT-5K/70U As Above	70 ohms	as above	

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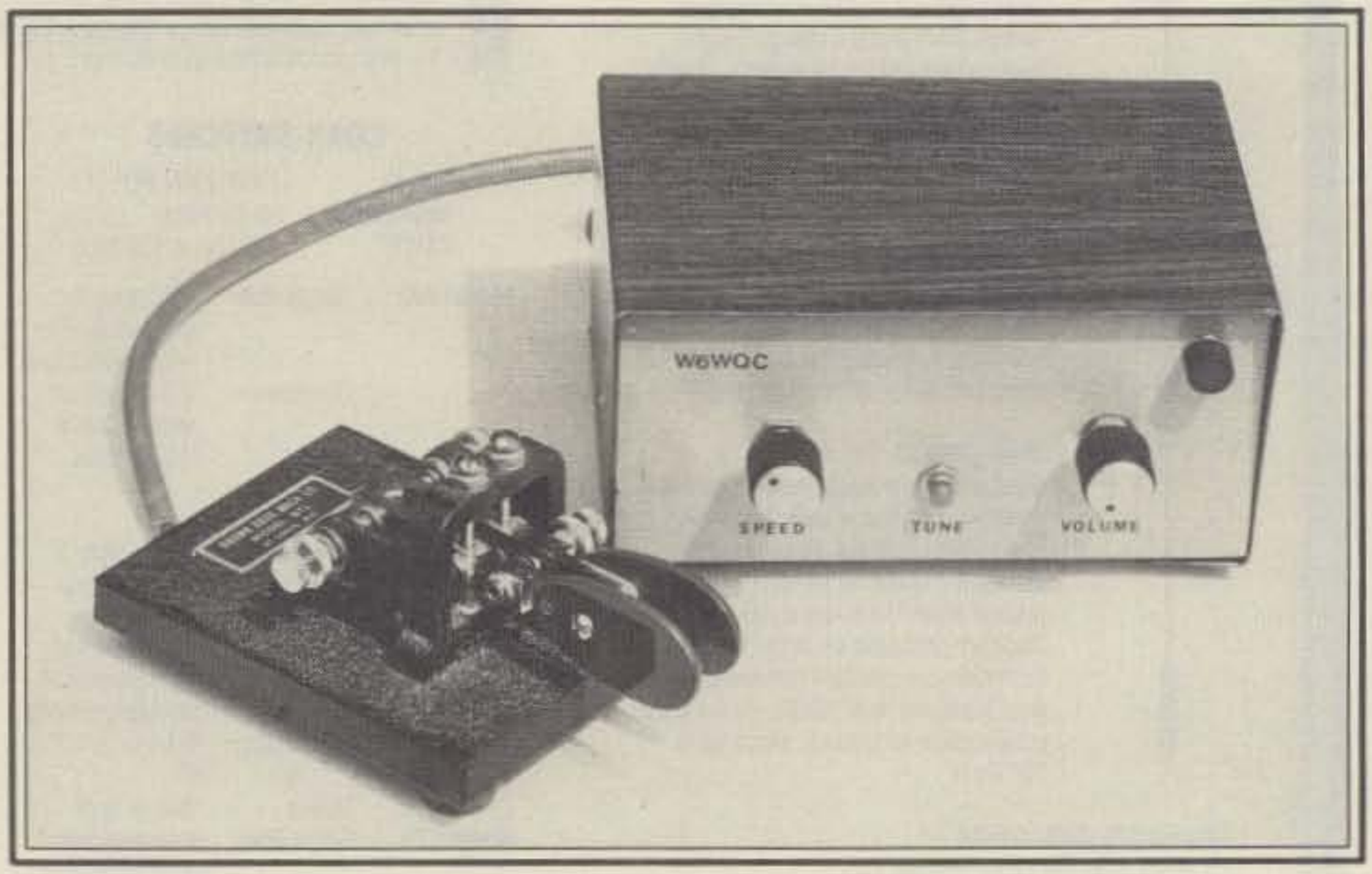
Got some time? Here's a great project you can build with readily available parts. The keyer may seem exotic but the parts aren't.

The W6WQC IC Keyer

BY ALFRED LORONA*, W6WQC



The small neat W6WQC keyer is a nice addition to the shack and compact enough to be used in portable operation via a 9 volt battery.

A short time ago the commercial cw keyer I had used for years gave up the ghost and quit working. Then I discovered that replacement ICs were no longer available. I had to build a new keyer. It seemed like a good idea to use the 4000 series CMOS logic integrated circuits but I could not find a circuit providing all of the features I wanted. The only solution to my problem was to design a new circuit. I decided that the most important design parameters were to come up with a circuit that is relatively simple and to use parts anyone can easily obtain, with particular emphasis on the latter. The circuit is shown in fig. 1. The power supply, transmitter keying and sidetone circuit are shown in fig. 2. The keyer uses 9 ICs including the sidetone oscillator and monitor speaker amplifier. The keyer provides all of the standard features including automatic perfectly timed and spaced self-completing dots and dashes, dot and dash insertion with memory, iambic operation for dual paddle mechanisms and automatic letter spacing. In addition, speed, volume, tone and weight are adjustable. All components were purchased at the local Radio Shack store, so you should have no trouble duplicating the circuit. You can probably obtain parts equally from suppliers, such as MHz Electronics, who advertise in this magazine.

Theory of Operation

The heart of the circuit is U7 which is a 4017 decade counter-divider. It outputs a series of bits sequentially when clocked. The its, which appear as sequentially enabled Q outputs, are used as code elements to form code characters and spaces through proper decoding of the outputs.

Fig. 3 is a block diagram of the circuit and is intended to help explain the operation of the circuit. The counter is used in the following manner. The first bit at Q1 is always used. It is used to form a dot and it is used as the first third of a dash. Q1 stays high from clock time T1 to T2. Q2 goes high from clock time T2 to T3 and so on with the remaining outputs. When producing a dash U1C is enabled, allowing the second and third bits which occur at T2 through T4, at Q2 and Q3, to appear at the output of the decoder at U8C-pin 10. This timing relationship is shown in fig. 4.

Dot and dash generation each have two reset paths. When forming a dot, reset is selected after a one bit space or a reset is selected after a three bit space duration. In the case when a dot is to be followed by another dot or a dash, reset is accomplished at time T3 when Q3 goes high. In the case of a single dot, reset occurs at the end of a three bit space at time T5 when Q5 goes high. Similar resets occur after a dash generation but at either T5 or T7. Each reset also forces the clock to restart via U2B-pin 4 to assure that Q1 goes high immediately to start the next character.

Iambic operation is made possible by the iambic latch U3C and U3D which either sets or resets as determined by which lever is pressed first. Upon reset of a dot or dash storage flip-flop, U6, the latch changes state when $\overline{Q}$ goes high momentarily during reset. If both levers remain closed the latch continues to toggle alternately enabling the dot or dash reset paths.

Flip-flop U6 is used as a conventional storage latch. When the dot lever is momentarily closed, U6A sets and immediately disconnects the dot lever via U3A. The logic low on $\overline{Q}$ allows the clock to start through U1A-pin 3 and also sets the iambic latch U3C-pin 10 high. Simultaneously the last-dot-or-dash-disable, U4A, disables dot reset U8A allowing U5A to reset the dot flip-flop at time T5 after the three bit space. If the dot lever remains closed or if both levers are closed or if there is a dash in storage due to a momentary closure of the dash lever, U4A removes the disable

*415 Edwin Aldrin Circle, Montebello, CA 90640

from U8A and the circuit resets at time T3 when Q3 goes high.

Clock waveform and duty cycle are not critical. The clock is not free-running but is started each time the dot or dash levers are closed. A peculiarity of square-wave oscillators constructed using logic gates is that the first cycle is of longer duration than the succeeding cycles. The series 47 K resistor and the diode connected from the junction of the 47 K resistor and the speed control pot and U1B-pin 5 prevents the first cycle from being too long.

Weight control is achieved by charging a .1 mf capacitor during the formation of a dot or dash when U1D or U1C goes low. The capacitor slowly discharges through the 500 K weight control pot. The voltage on the arm of the pot is used to delay transfer of the keyer output at U8C and effectively varies the keying weight.

I recommend wire wrap for projects of this type. I used a pre-drilled phenolic perf board with .100 inch by .100 inch hole spacing (RS # 276-1395), microcircuit push-in terminals (RS 270-1392) to mount the capacitors, diodes and resistors and

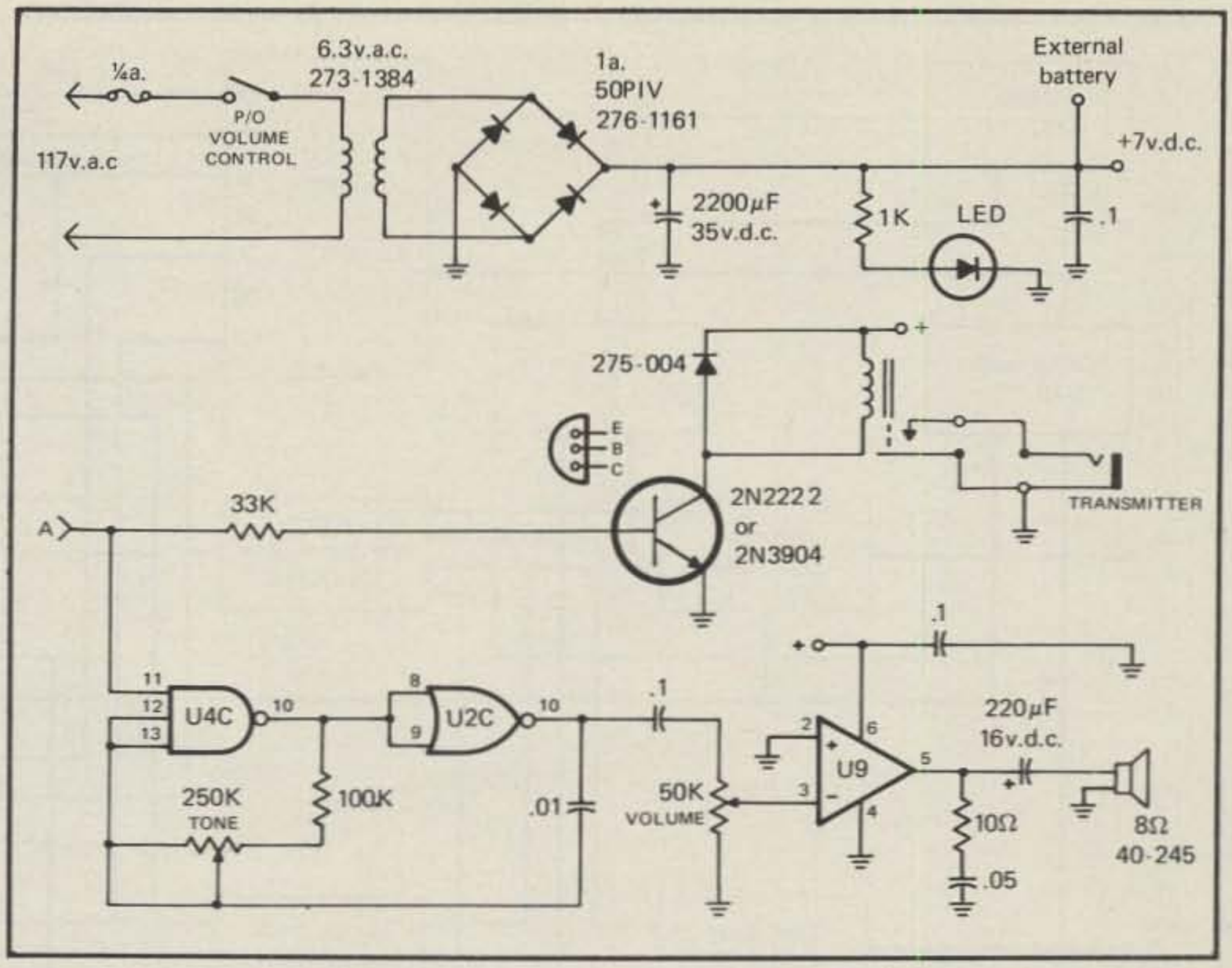


Fig. 2– Schematic of the power supply, keying and sidetone circuits. All resistors are ¼ watt. U9 - LM386.

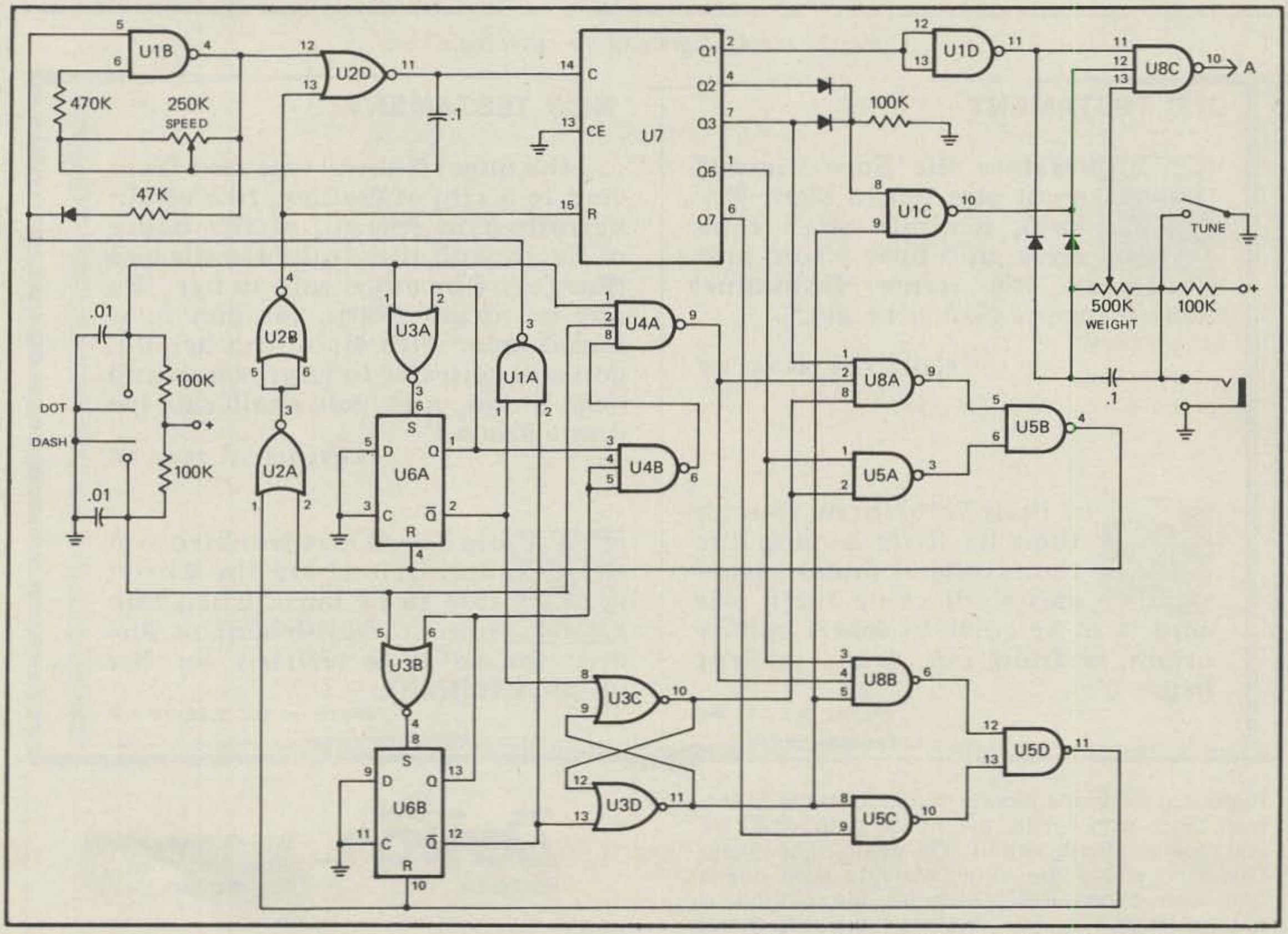


Fig. 1– The schematic of the keyer logic. All resistors are ¼ watt. U1, U5 - 4011. U2, U3 - 4001. U4, U8 - 4023. U6 - 4013. U7 - 4017.

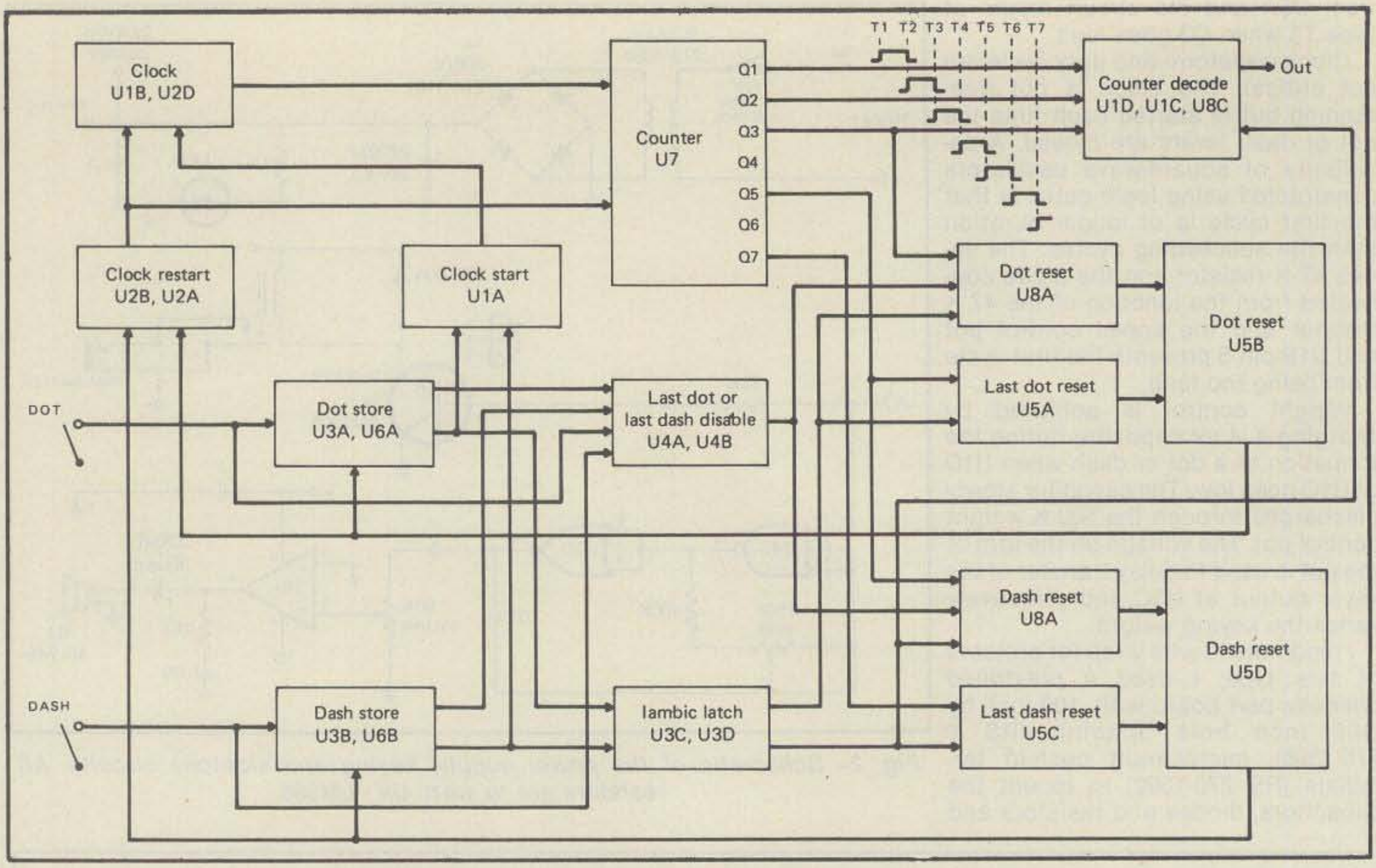


Fig. 3- Block diagram of the keyer logic.

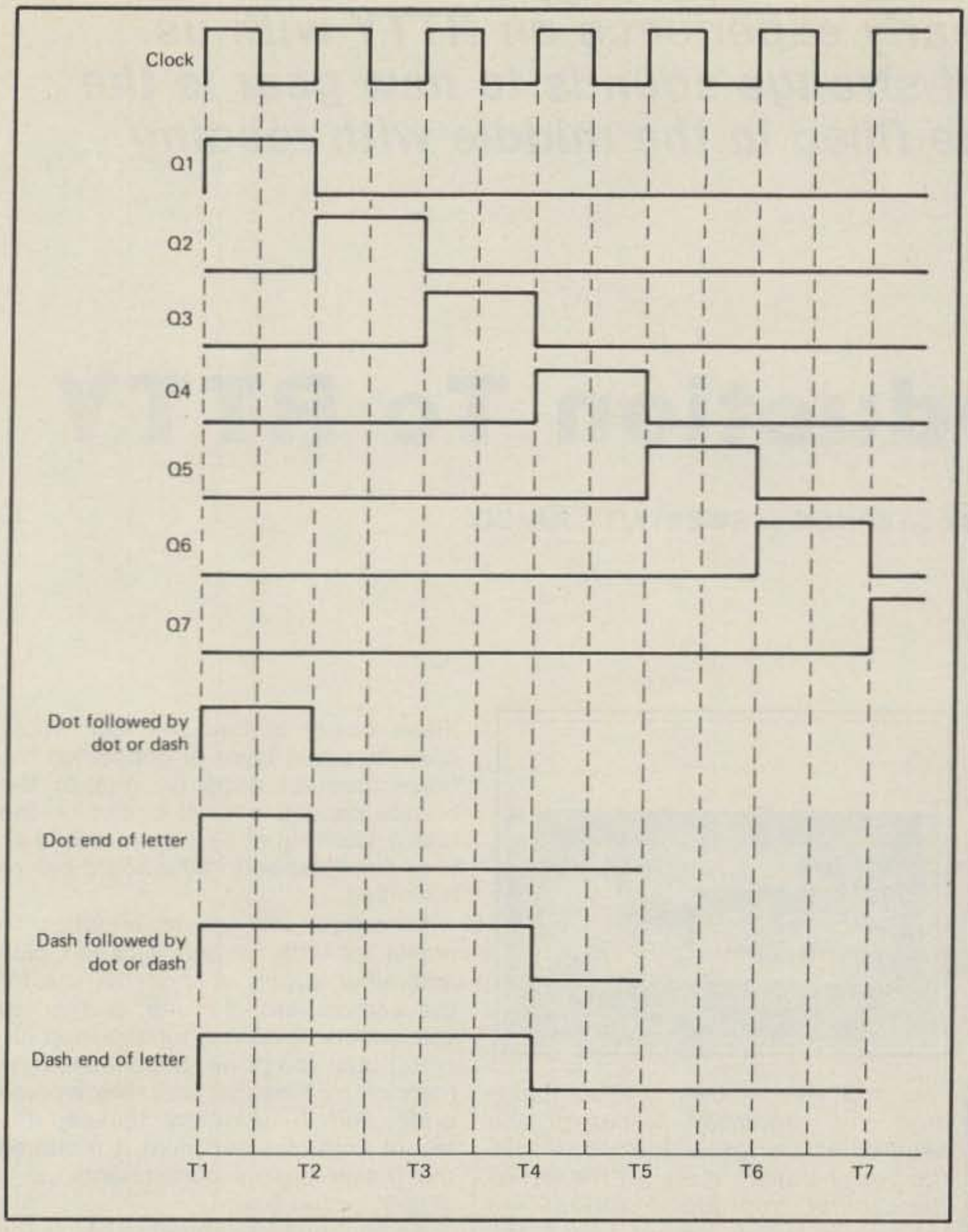


Fig. 4- The keyer timing relationship.

wire wrap IC sockets. Insert the socket pins through the holes in the perf board and hold them in place with a spot of glue on the underside of the socket where it comes up against the perf board.

On the 14 pin dip sockets, wire pin 7 to ground and pin 14 to +7 volts. The 4017 counter requires a 16 pin dip socket. Connect pin 8 to ground and connect pin 16 to +7 volts. The power supply is as simple as can be and requires no regulation or heavy filtering. Alternately you can use a 9 volt battery for field and portable operation. The circuit works with a supply voltage of from 3 or 4 volts to 16 volts. The standby or quiescent current drain is only 3 milliamperes and the key down current drain is about 20 milliamperes from the battery. The series diode in the power supply prevents the LED power on indicator from placing an additional drain on the battery.

U9, the speaker amplifier, requires an 8 pin dip socket. However, if you use a 16 pin socket, the remaining 8 pins can be used to mount the plug-in bridge rectifier. The bypass capacitor on U9-pin 6 should be located close to the socket.

There are no critical parts used and most of them can be found in the average junk box. All diodes are general purpose silicon, such as the 1N914. All resistors can be quarter watt. Observe normal anti-static handling procedures when inserting the ICs.

Conclusion

The keyer is economical in parts count, is very easy to build and in smoothness and ease of operation surpasses the commercial keyer which it replaced. It is also ideally suited for portable operation.

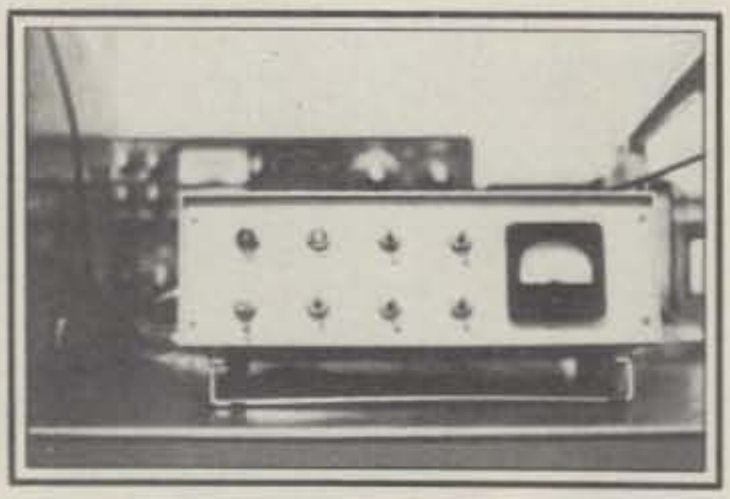
AA4BG shares his early experience on RTTY with us. From the extreme of strange sounds to new gear is the logical transition. He filled in the middle with reading and building.

My Introduction To RTTY

BY STEPHEN J. SWEETKO*, AA4BG

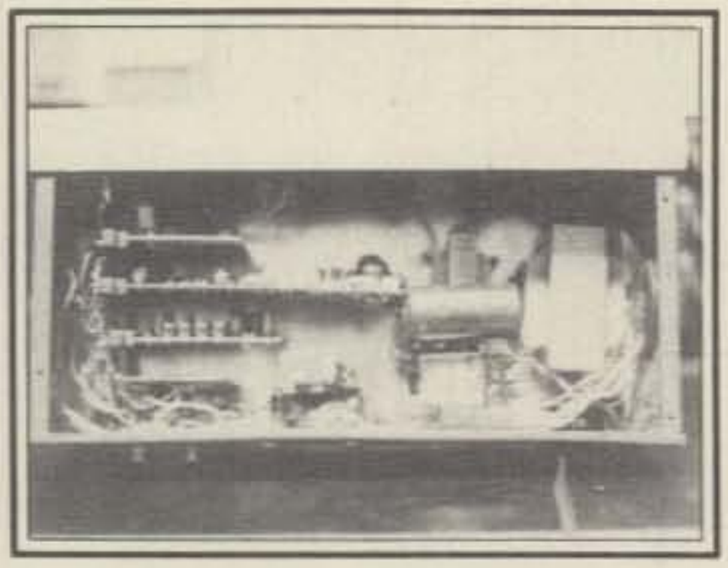
The strange sounds radiating from my receiver caused me to sit up and take notice. I realize I'm new to the hobby and my license is only a few months old, but surely the sounds I heard must be UFO's communicating. Excitedly, I phoned Bill, who's been licensed for quite some time, to tell him of my unusual discovery. He started to laugh very hard. In between chuckles, Bill told me that my UFO discovery was actually an RTTY transmission being exchanged.

Although my first exposure to RTTY was humorous, my curiosity grew even stronger. I gathered all the literature I could find on the subject of RTTY. As I read each article, my desire to have an RTTY station became greater. Finally, I felt I had enough information to assemble a station.



This front view shows the commercial appearance of the terminal unit. Top row, left to right: power pilot light, standby pilot light, limiter switch, and tune switch. Bottom row, left to right: power on-off switch, standby switch, auto-start motor switch, and auto-start delay switch. Also shown at the right of the cabinet is the tuning meter.

* 422 Aztec Drive, Carol Stream, IL 60187



This top view shows the compactness and organized layout of the cabinet. At the right of the cabinet are the power transformers. At the left of the cabinet, from top to bottom, are the power supply circuit board, the DM-170 demodulator board, the FS-1 audio frequency shift keyer board, and the PS-170 preselector board.

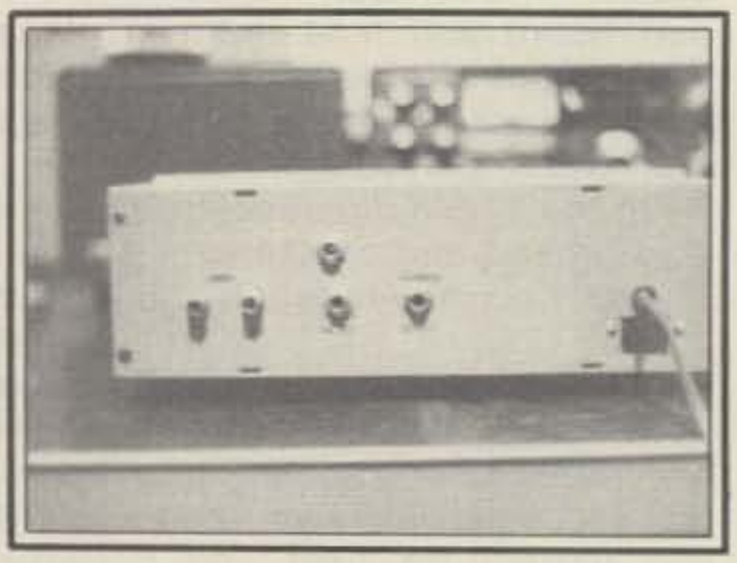
Two difficulties immediately became evident. The first was where to get a machine, and the second was what type of terminal unit to use. Fortunately, the machine, a Model 15, became available through a friend. The second problem, finding a suitable terminal unit, is the basis of this article.

After reading many advertisements and critiques about the various terminal units available, I decided to build a complete station around the Flescher kits—DM-170, FS-I, and the PS-170. They are reasonable in cost, easy to assemble, and perform well on the crowded ham bands.

The instruction sheets included with the kits were quite thorough, easy to understand, and easy to follow. However, I did make one modification to the DM-170. By replacing the fixed-tuning resistors with pots, I found the filters easier to tune. As luck would have it, a thin layer of copper on the finger contact edge on one of the boards caused a short circuit on the board. Consequently, I spent nearly an hour troubleshooting the board before it worked.

I needed two power supplies to power the terminal unit, a 15 volt, plus and minus supply at about 100 ma, for the demodulator circuits, and a 150 volt supply at 30 ma for the loop circuit. I built the power supplies recommended by Flescher and they worked quite well. In addition, to keep the layout compact and neat, I mounted the power supply components on a plug-in circuit board.

An economical cabinet to house the terminal unit was purchased from Radio Shack. It has a modern and professional appearance.



This back view of the terminal unit shows the external connection jacks. From left to right are the audio input jack, c.w. key jack, and the current output jack. Also, the unlabeled jack above the c.w. key jack is the scope monitor jack. Finally, note the a.c. plug under the line cord. This plug is where the model I5 gets its power.

The finished unit is being tested under the watchful eye of Billy Loyd, WD4HCC.

The remainder of the parts—switches, pilot lights, connectors, meters, etc.—came from my junkbox. It sure is amazing the junk one accumulates after becoming an amateur.

Before drilling the cabinet, I made a front and back panel layout (template) on a piece of paper. After finding a balanced layout, I temporarily fastened the paper to the panels, thereby assuring the accuracy of the holes. I then carefully drilled the panels. In order to give the finished cabinet a commercial look, and prior to mounting any of the parts, I labeled the panels with dry transfer letters.

Assembling the terminal unit required imagination to get the parts to fit in the cabinet. The circuit board sockets were mounted vertically to an aluminum angle and the angle was fastened to the bottom of the cabinet. Similarly, the power supply transformers and a terminal strip to hold miscellaneous parts were mounted to the bottom of the cabinet. Also, I glued a small sponge between the circuit boards and the cabinet bottom to prevent the boards from vibrating out of their sockets. Finally, I did the interconnection wiring following straightforward procedures.

After completion, I hurriedly connected the terminal unit and the Model 15 to my rig. Everything lit up and seemed to be working fine. As I slowly tuned across the band, I heard the strange sounds that caused me to go through all this effort. As I tuned through the signal, the meter on the terminal unit read higher. When the meter peaked, I stopped tuning and placed the terminal unit stand-by switch to "run." Just like magic, the Model 15 started printing. For the first time since beginning this project, I came to realize that all the time, work, and money was more than worth it. Because, right before my eyes, a whole new mode of communicating was opening up for me.

In conclusion, if you have never tried RTTY, and you are curious about the strange sound you hear hovering around 14.090 MHz, beg, borrow, or build up some gear and tune us in. See you on the green keys. 73

a regular feature by
THEODORE J. COHEN, N4XX

dateline... Washington, D.C.

THE INS AND OUTS OF THE WASHINGTON SCENE

Judge Reverses Ruling On Pay-TV Suit

In a major decision affecting the pay television industry and those who would pirate its signals, a federal judge reversed a lower court's ruling and issued a temporary restraining order against two men who were producing and selling television decoders.

Following the federal judge's ruling, the U.S. Attorney's office filed a three count "misdemeanor information" against the two men. Count I of the information alleges that the defendants conspired to assist unauthorized persons to receive and use the encoded (television) signal. Count II alleges that they offered the decoding devices to the public without having first obtained FCC approval for the decoders. Count III alleges that the defendants made the equipment available to the public on a purchase basis; this is contrary to FCC regulations which require decoding equipment used in conjunction with subscription television to be leased and not purchased.

The maximum penalty for each count is up to one year imprisonment and/or a fine of up to $10,000.

Amateurs and other do-it-yourselfers who strive to pirate signals broadcast by pay-TV broadcasters and common-carrier users such as those in the Multipoint Distribution Service (MDS) are cautioned that their actions may leave them open to civil and federal court actions.

Amateur Computer Network Under Development

It is a virtual certainty that an amateur computer communications network will come into existence during the 1980s. The Washington-based Amateur Radio Research and Development Corporation, known as AMRAD, is now working on the creation of such a network; it is called AMNET.

AMRAD believes that there should be an organized exchange of networking concepts, development of compatible protocols, encouragement of experimentation, and identification of resources for use in a network connecting amateurs, computer hobbyists, and other (e.g., deaf persons who use teletypewriters). Accordingly, the purpose of the AMNET 'internet' is to tie various amateur digital networks together by means of 'gateways' which will translate information from one network to another.

If you want to be involved in AMNET, contact:

Mr. Paul Rinaldo, W4RI
President, AMRAD
1524 Springvale Avenue
McLean, VA 22101
Telephone: (703) 356-8918.

AMRAD is particularly interested in hearing from individuals or groups able to participate in AMNET projects as well as from those who can serve as area liaison officers.

Government Mounts Action Against Manufacturers Of CB Amplifiers

As part of their stepped-up program against the manufacturers of illegal CB amplifiers, U.S. marshals, in cooperation with the FCC's Field Operations Bureau (FOB), seized the inventories of two major CB manufacturers. Using search warrants, the marshals seized over 400 devices manufactured by Majestic Communications of Memphis, TN. Marketed under the MACO brand name, the devices included assembled amplifiers as well as amplifier kits. In all, equipment valued at over $150,000 was seized in the late-summer raid.

Also raided in late summer was DNA Manufacturers of Scottsbluff, NB. Again, using a search warrant, U.S. marshals seized 44 fully assembled amplifiers valued at $12,000.

Additional raids on the manufacturers of illegal CB amplifiers are anticipated as the Government cracks down on those who would violate the Commission's ban on so-called "10-meter amplifiers."

Radio Jammers Charged

During most of 1980, the FCC's San Francisco Field Office has been investigating complaints of improper operation by users of the Grizzly Peak Amateur Radio Service repeater station WB6AAE/R. Using mobile direction finding equipment, the sources of the transmissions were found, among other places, in Stockton and Sebastopol, California. According to Jeffrey Young, Chief, Investigations Branch (Field Operations Bureau), amateurs who jammed the Grizzly Peak repeater have been issued Official Notices of Violation alleging violations of one or more of the following FCC Rules:

- Transmitting signals which were not identified by call sign at the beginning and end, or at least once every 10 minutes
- Transmitting unidentified signals
- Transmitting malicious interference
- Operation of a Novice Class station on a frequency not authorized for that class of license
- Failure to identify the station by transmitting the assigned call sign
- Transmission of a false call sign

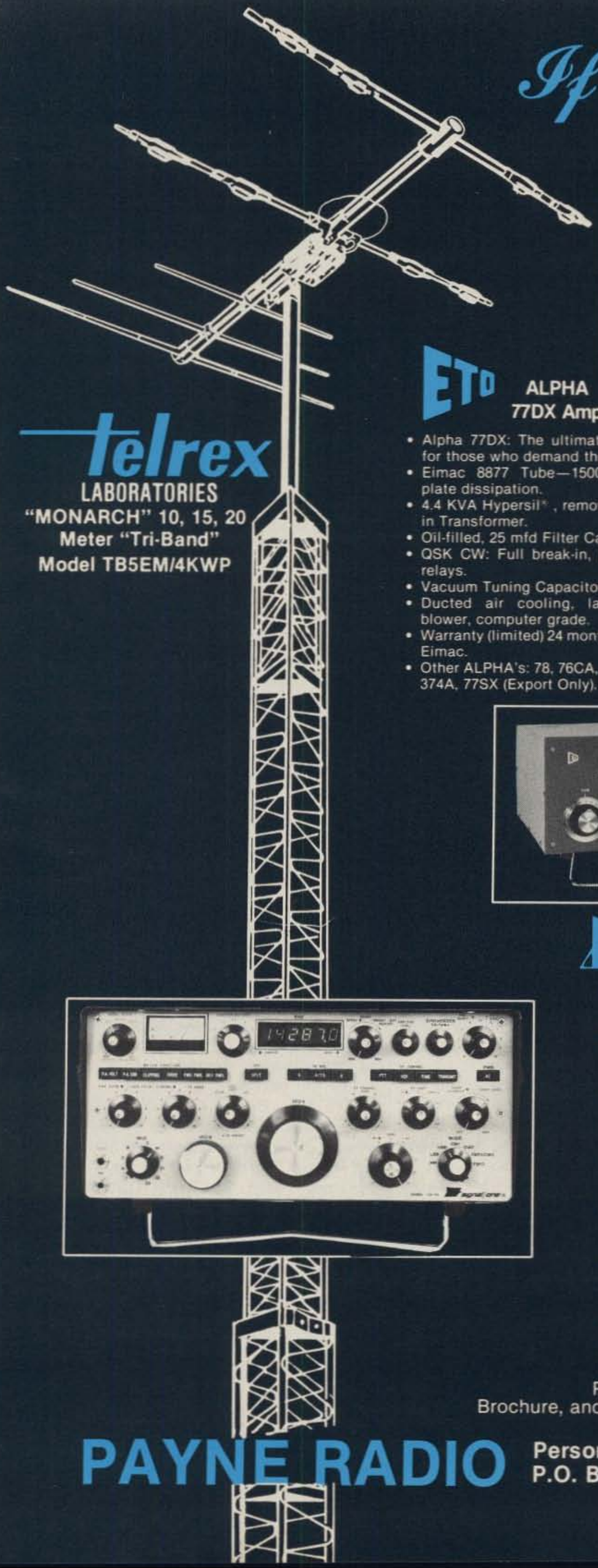
Further actions in the matter of jamming to the Grizzly Peak repeater may have already been taken by the time this column goes to press.

• •

Steve Thompson, N4TX, contributed portions of the material in this column. Your Washington editor joins the *CQ* staff in extending to amateurs everywhere a Joyous Holiday Season and a Happy New Year.

**8603 Conover Place, Alexandria, VA 22308*

If You Want The Finest



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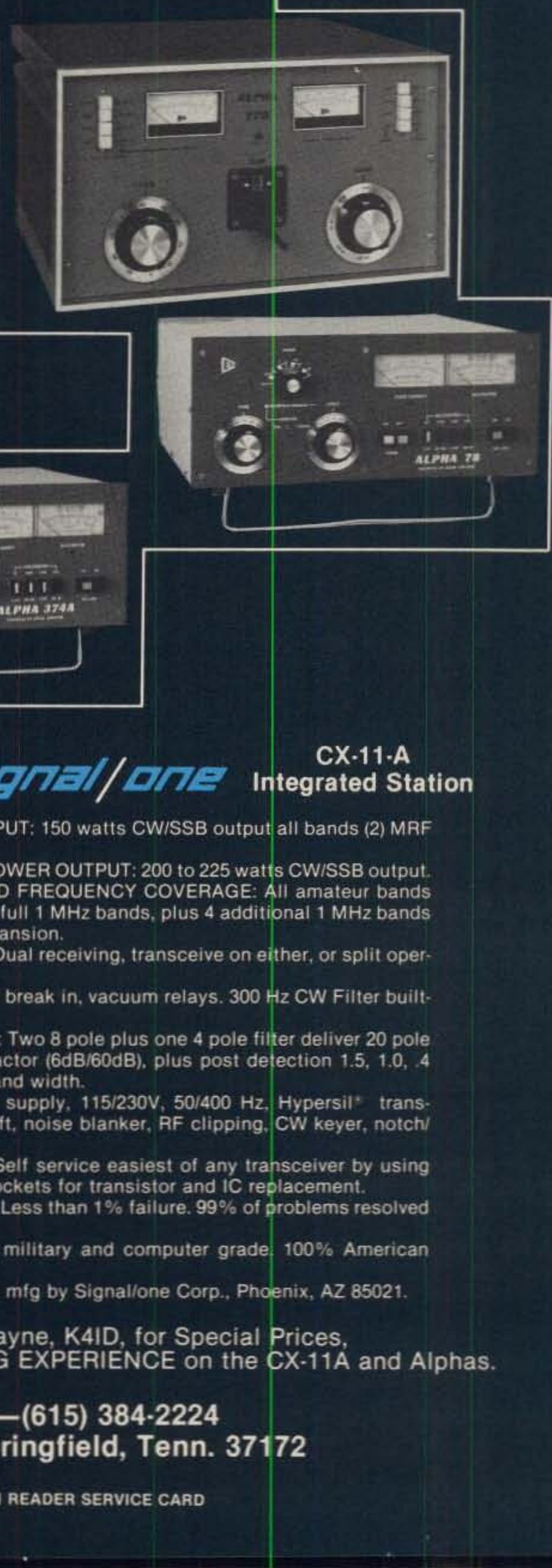

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CIRCLE 90 ON READER SERVICE CARD

Unless you've got the rules that people work with, you don't have a good repeater. But what's more important, the rules or the emergency situation you may be faced with?

Wait For The Beep!

BY EDWARD D. HESSE*, WB2RVA

"Like I said, Ernie, we've got a pretty good repeater here in Bugville."

"I agree, Joe. We've got a good group of guys and good rules. Unless you've got rules that people work with, you don't have a good repeater."

Break

"Yeah, standby, breaker. That's the ticket, Ernie. Unless you've got rules that people work with, you don't have a good repeater."

Break

"Breaker, you've been acknowledged. Sheesh—some people. By the way, breaker, on this repeater you use the word 'break' only when you've got some important traffic to pass. Right, Joe?"

Break-break

"Yeah, and you use 'break-break' only when you've got *very* important traffic."

"And furthermore, breaker, you just don't say 'break'. You use your call letters. Do you copy that?"

Gentlemen, this is WB2QRM with priority traffic. Is there a base station on frequency?

"WB2. . .MRQ, I think it is, Whiskey Baker Two Mike Romeo Quebec? Is that the call?"

"Ernie, you've got it wrong. It's QRM—Queen Roger Mike. Is that right, breaker?"

That's a roger, old man. QRM—Quietly Rolling Merrily. Are you a base station? We have a situation here on the road that needs some help.

"Hold on, old man—first things first. We have rules on this repeater, and you just broke two of them."

Sorry old man, but we do have a problem here on the Bugville Parkway. Do you have a phone handy?

"Sure do—this is a first-class station. But we don't allow transients to phone-patch on the repeater. Anyway, the first rule you broke is using the word 'roger'. You really meant 'affirmative' and I know that, but I thought I should call it to your attention. Second—we prefer that you use standard phonetics, not the ones you used. Else you wind up with some characters being known as 'Always Getting Stoned' or 'Not Tonight Josephine'—junk like that, like CB. Do you roger that?"

Yes, that's a QSL. Now about this roadside emergency, could you call the police for me?

"There you go again—breaking another rule. Maybe you 'QSL' on c.w., but you 'roger' on voice."

"Ernie, you're fantastic—you know *all* the rules! By the way, we've got to identify—10 minutes are up. This is WB2QST."

"Thanks for reminding me, Joe. This is WB2QRP. Now, breaker, QRM I think it is. Didn't write it down. The other thing I want to mention is your use of the word 'emergency'. Is this 'emergency' or 'priority'? There's a difference, you know."

WB2QRP, this is WB2QRM. Sorry, old man, I think the handle is Ernie. The handle here is Jack. We're on the Bugville Parkway, jsut a little west of exit 24. A car has gone off the road and hit a tree. Could you call that in?

"Okay, Jack, copied all that. By the way, that's a nice sounding rig you got there. You agree, Joe?"

"Yeah, Ernie, sounds good. A little over-deviated, though. Can you back off the mike, Jack?"

Okay, Joe. Say, can either one of you make a call to the police? There are people in the car and they don't seem to be moving.

"Okay, Jack, let me get a pen and paper and we'll take care of you. Stand by."

"While Joe is looking for a pen, Jack, I want to remind you to wait for the 'beep' on the repeater. You missed it a few times and we could have timed out. I know you're new on the repeater and don't know all the rules, but please wait for the beep."

"QST is back. Okay, Jack, nice and slow now, don't get excited and shout or anything like that. What's the situation you want to report?"

On the Bugville Parkway, eastbound about an eighth of a mile west of exit 24, a car went off the road and hit a tree. There are people inside who may need help. QSL? WB2QST, this is WB2QRM.

"Jeez, Jack, there you go again with the c.w. stuff—QSL!"

"And don't forget, Joe, he doesn't have to ID with both calls—only his own. Tell him."

"Well, you did that pretty well, Ernie. Okay, Jack, I know you're new and a little excited so we'll forget that. Okay, that's the Bugville Parkway, eastbound a little west of exit 24. Roger. Are the people inside the car injured? Gotta know so we can get an ambulance."

*2134 Decker Ave., North Merrick, NY 11566

All right, let me get out of the car and see. I've got a hand-held unit I can take with me. Stand by for a moment.

"Standing by. Say, Ernie, while we're waiting, which number do we call for the Bugville Parkway? Is that parkway police?"

"Could be, Joe, but it might be state police, too. I see a lot of their cars on the parkway lately."

QRM back. How's my signal holding up on this HT?

"Jack, it's kinda noisy. Not full quieting, only about 85 percent. On this repeater, we prefer that you have a clean signal, not noisy like yours is right now."

Sorry, Joe, but I had to get out of the car to check the other car's occupants.

"And you're not waiting for the beep, either. Slow down, Jack. I know you don't handle traffic like this every day but you gotta be calm. Can you boost that thing to higher power?"

I think I've got a fresh battery pack in the car. Shall I get it?

"Might be a good idea. While he's doing that, Ernie, about the phone number to call. Yeah, I've seen the state cops, but I see the county mounties on it, too. Maybe I should call them."

How's this signal now? Got a new battery pack in the rig.

100 percent, Jack. Now check out the car and let us know if the people in it need an ambulance."

"Hey, Joe, what if they do need help? What number is that?"

"Don't know offhand. Maybe the police handle that, too?"

Gentlemen, the people in the car are injured and will need help. WB2-QRM here.

"Ernie, do you have a number for the ambulance?"

"WB2RVA with information."

"Go ahead, RVA."

Just tuned in to the QSO, Joe and Ernie. I've got the phone number of the ambulance service. What's the problem?"

"Good morning, Ed. We've got WB2QRM, Jack, out on the Bugville Parkway with a situation that needs to be called in. Jack, do you copy Ed?"

Sure do. Ed, can you call in an emergency situation?

"Well, hold on a moment. I'd like to help, but we have some rules on this repeater. First off, you didn't wait for the beep . . ." ▣

CQ DX Tip

—Another rule of thumb: Point the antenna along the sunrise-sunset line, or at right angles to this line. —*W4MB*

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(VFOs for TS-830S, TS-130 Series, and TS-120S are compatible with all three series of transceivers.)

SP-230 TS-830S VFO-230 AT-230

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PS-30 SP-120 TS-130S VFO-120

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The Printed Word: new reading material

Tini-DW Multi-Switch® Switches Brochure. An 8-page brochure in full color describing Tini-DW Multi-Switch® switches with 10 mm and 15 mm centers is available from Switchcraft, Inc. Switching functions, material specifications, and terminations are described. Special features including available pushbuttons, legends, and the new Switchcraft "Flip-Flop" pushbuttons are also covered. The switch has been designed for applications where size, low cost, and reliability are prime factors as in analog and digital computers, analyzers, transmitters and receivers, and more. For further information or a copy of the brochure (NPB-349), write to Switchcraft, Inc., 5555 No. Elston Ave., Chicago, IL 60630, or for more information, circle number 111 on the reader service card.

Heathkit Electronics Catalog. A 104-page Heathkit catalog is available and features nearly 400 build-it-yourself kits in amateur radio, microcomputers, test equipment, audio, automotive, and television. New kits include power supplies, frequency counters, digital depth sounders, weather instruments, and audio components. In addition to electronic kits, the catalog also highlights new computer software and self-instructional educational courses. The software includes word processing and Microsoft™ Fortran programming systems. The courses cover Cobol language programming, microprocessors, and electronics for the hobbyist. For a copy of the free catalog, contact Heath Company, Dept. 350-420, Benton Harbor, MI 49022, or circle number 113 on the reader service card.

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CIRCLE 1 ON READER SERVICE CARD

BY WILLIAM I. ORR*, W6SAI

Charley is a story of amateur radio and a long-remembered friendship centered around an antique Western Electric transmitting tube. It all happened around 1933.

Charley

Charley was a very popular guy. I mean, all the young hams in my high school really loved him. He was the repository of all knowledge regarding ham radio and a consultant teacher and hand-holder for the beginning amateurs in our little town. Got a problem with your radio? Or even a homework problem? See Charley.

Charley was about 27 years old, sort of thin and slightly bald on top. He was a radio service man. Our parents looked upon him as the town ne'er-do-well.

Charley drove around town in a Model A Ford panel truck. The side panels looked like mahogany and shone in the sunlight. Charley was proud of his fine truck and made sure it was always clean and sparkling. He especially liked the gold letters on each side that said *Western Electric Sound System for Theaters—Maintenance and Repair.* And he liked the emblem of a loudspeaker with his ham call letters coming out of it. He had painted that on the truck panel just below his name.

About once a week he would wheel past the high school about closing time and blow "H-I" on his horn. Every ham in school (there were five of us) would come running out to Charley's truck to take part in the fun. Charley would answer all our questions and for a few frantic minutes there would be a miniature flea market as Charley sold us bits and pieces of old radio gear for nickles and dimes. After a lot of shouts and general confusion, Charley would drive off.

About once a month, however, an event occurred that remains burned into my memory even now. Charley would choose one or two kids who would hop on his truck. Off they would go, headed to the local movie theater, leaving the rest of the kids to mope about or perhaps dust up a game of baseball with non-amateurs.

The Movie House

If you were lucky, as I was on this day I'm telling you about, you'd be going with Charley up the street to the local movie house which had recently installed "talkies." Charley was the maintenance man for the *Western Electric* sound system.

The "fifty watter" Hartley transmitter of 1933. The original tube obtained from Charley is a Western Electric 242-A, equivalent to the 211. The transmitter operates in the 40 meter band with a plate potential of 1000 volts. Plate tank circuit is at left, the coil wound from one-quarter inch soft copper tubing. All components are securely mounted to a white pine board with wood screws. Transmitter draws about 120 ma plate current (120 watts input). Power output is about 65 watts. The little transmitter gives a good note when run from a power supply having good regulation. (QSL cards courtesy of W9JUV.)

*48 Campbell Lane, Menlos Park, CA 94025

Charley usually arrived about two hours before the evening show started. With a master key he'd open the basement door and we'd all troop into the blackness. Pretty soon he'd find the light switch. We'd never been in the movie basement room before and it was a big thrill just to be there. It was a real basement, below the ground. The wall and floors were damp cement and mysterious pipes and wires ran about to unknown destinations. To a bunch of 14-year-old hams, it was all very exciting.

In one corner of the basement, which was filled mainly with dusty, empty cardboard boxes and other refuse, squatted a black motor-generator set. Right above the m.g. was an impressive marble control panel with huge meters on it and some black-handled, copper knife switches. Charley closed one or two switches, the single overhead bulb in the ceiling dimmed and the motor-generator set started up with a rumble. The meters sprang into life and Charley explained that the m.g. provided low voltage, direct current for the two movie projectors upstairs in the theater.

Once the m.g. set was running to Charley's satisfaction, he would oil it in various vague spots, closing a final knife-switch. His last task was to unlock the door to the theater itself. Passing through the door, we kids found ourselves backstage, behind the movie screen. Used to seeing thrilling Tom Mix cowboy shows, or perhaps a blood-curdling Lon Chaney mystery on the screen, this backstage view was a mystery to all of us. The only objects visible through the dim light were two large, dusty speakers. Charley paused at them long enough to turn on the a.c. operated field supply and to listen to the faint hum that indicated that all was well.

He next led us past the inoperative pipe organ, which had most of its tubular appendages removed, up one aisle of the silent movie house, and to the rear of the balcony. On the back wall of the building was a metal ladder leading up to the projection room. Charley scrambled up the ladder, hitting his head a nasty crack on the trap door above him. It was but a minute's work to unlock the door and hop into the projection room. We kids followed avidly.

The Projection Room

This was a whole new world that we took in with an excited glance. At the side of the long, thin room, peering out of rectangular holes cut in the outer wall were two huge, black movie projectors. These monster machines had two film cartridges above and below a magic-lantern-type device that rested on a massive pedestal. A lot of cables ran around the floor. On the far wall of the room was a tiny workbench with a film-splicing gadget on it and various rolls of film in disarray. Opposite the projectors were two large relay racks full of interesting equipment, meters and a large number of radio tubes, big and little.

Charley strode over to the racks and quickly turned on the audio gear. Wow! Green and red lights sprang on and all the tubes lit up! Some of the big tubes were awesome. We knew they were "fifty watters" because we had seen them in other affluent ham stations. But for a high school kid on a twenty-five cent a week allowance to own a fifty watt tube? Impossible. We could only look and yearn for the unobtainable.

Satisfied that the audio system was working, Charley went to a projector. He opened a door in the magic-lantern portion of the machine and carefully adjusted two pencil-shaped electrodes. Then he snapped the door shut, briefly adjusted one electrode and started the projector motor. Suddenly a brilliant shaft of light shot out of the projector, aimed at the movie screen far below us. The arc lamp hummed like an angry bee.

Charley turned the projector off for a moment, grabbed a nondescript roll of movie film and magically threaded it through a maze of gears in the projector. He snapped on the controls, struck the arc lamp. Quickly, the film moved along and the empty theater was filled with music. The screen was alive with a talking picture!

"Talkies" were new and novel enough to awe even the most sophisticated teenager. The effect upon us was overpowering and to be *right in the room* with the projector was a magic moment. We gazed through tiny, square peep holes into the empty theater and saw dancing figures on the white screen at the far end of the long room. It was something I'll never forget.

Charlie listened to the sound from the screen with the ear of a connoisseur. He asked each of us in turn what we thought of the sound. Was it blurred? Was it distorted?

We sensed the moment of truth was at hand. Somberly we all agreed that the music *did* sound distorted, Perhaps something was wrong.

There was a long, agonizing pause. Charley squinted at the amplifier racks and slowly blew cigarette smoke at the discredited equipment. Finally, he reached over and turned off the movie projector. Then, he said, "I know what the problem is. These 50-watters are flat. Hand me my repair case." We

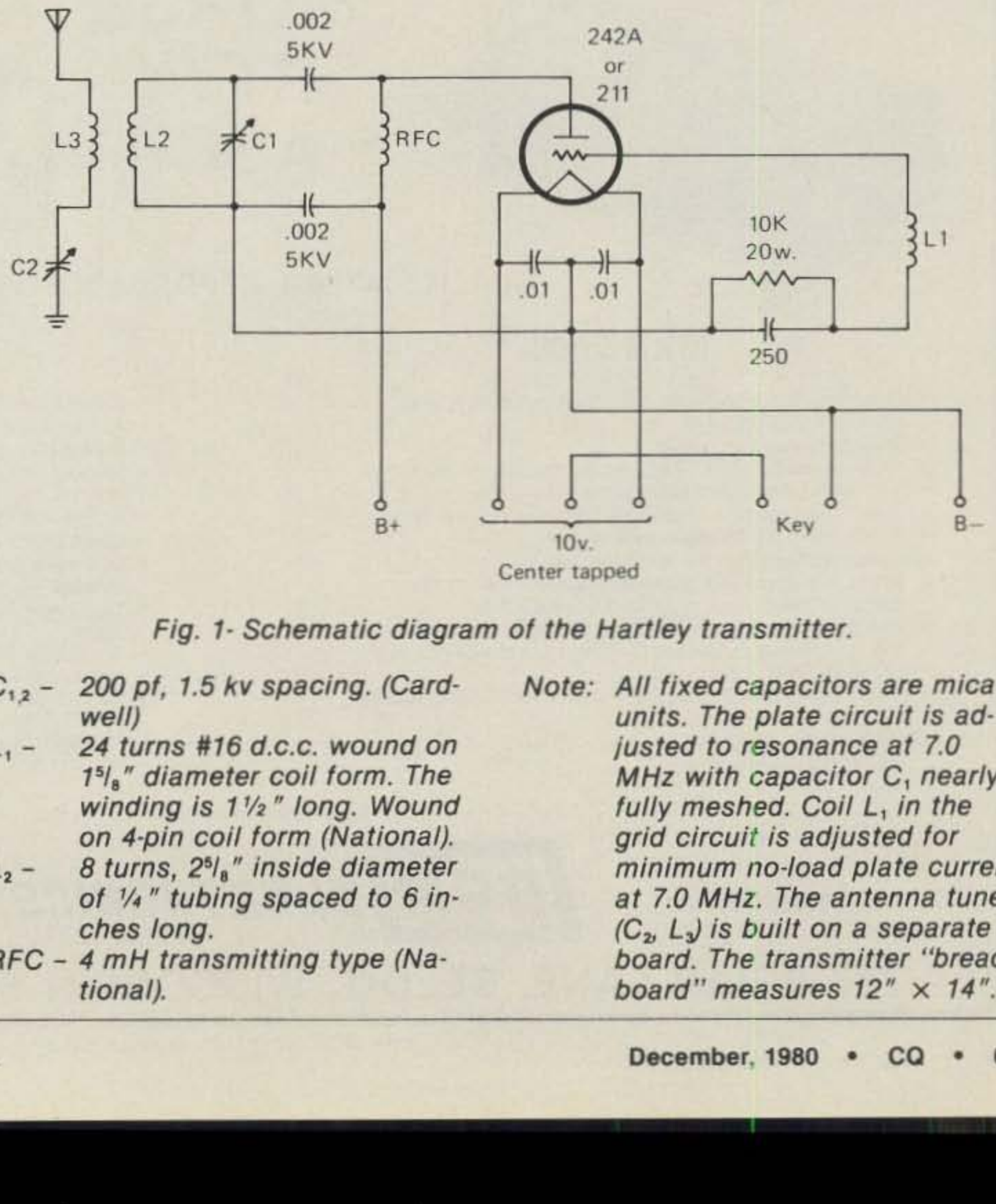

Fig. 1- Schematic diagram of the Hartley transmitter.

$C_{1,2}$ – *200 pf, 1.5 kv spacing. (Cardwell)*

L_1 – *24 turns #16 d.c.c. wound on 1⅝" diameter coil form. The winding is 1½" long. Wound on 4-pin coil form (National).*

L_2 – *8 turns, 2⅝" inside diameter of ¼" tubing spaced to 6 inches long.*

RFC – 4 mH transmitting type (National).

Note: All fixed capacitors are mica units. The plate circuit is adjusted to resonance at 7.0 MHz with capacitor C_1 nearly fully meshed. Coil L_1 in the grid circuit is adjusted for minimum no-load plate current at 7.0 MHz. The antenna tuner (C_2, L_3) is built on a separate board. The transmitter "breadboard" measures 12" × 14".

would knock each other over in our eagerness to do his bidding. Other hams had hinted at what would come next and we were excited at what was about to happen.

Charley extracted a pair of boxes from his repair kit, slit the tape on one end of each and extracted new, gleaming 50-watt tubes. As soon as the amplifier tubes had cooled off (which seemed like eons to us) he removed the tubes and inserted the new ones in the sockets.

"These old tubes are no good," he remarked, as he looked about him for a wastepaper basket. Our hearts were pounding in our throats. Finally Charley smiled and tossed a tube to each of us, saying, "Well, I don't see any wastepaper basket up here. Why don't you take 'em along and throw them away when you get home?"

Excited and trembling we carried our treasures down the shaky ladder, back through the theater, out the basement door and into Charley's truck. The little ritual was over. We were on our way home, each ham proudly clutching a gift that was otherwise unobtainable—a genuine, workable 50-watt transmitting tube! The world was ours.

The Transmitter

Before we bade Charley farewell, he gave us a circuit diagram for a simple one-tube transmitter. Now followed weeks of scrounging, trading and trying to earn additional money by performing chores around town. Slowly we gathered transmitter parts to build Charley's circuit, which he assured us was a sure-fire Hartley oscillator.

The transmitter was easy to build. Copper tubing came from a defunct refrigeration unit in the local dump yard. Six 201A receiving tubes were swapped for a bigger socket for the 50-watter. An old broadcast capacitor was torn apart and double-spaced for the tuning capacitor. And the whole rig was built up on a breadboard.

The big problem was the power supply. Through the kind efforts of Charley, three or four such transmitters were under construction, but the one thing Charley couldn't help us with was the high voltage supply.

As luck worked, I was the only one to solve that problem and to get my transmitter on the air. A wonderful solution came about. One of the older hams in town was going away to college and he rented me his power supply for a dollar a month!

By the end of summer vacation the transmitter was finished, the antenna erected to the rooftop and the power supply in action. The winter DX months were ahead. And Charley, good old Charley, was the one to thank for the great adventure that lay before this high school lad, an adventure that was to shape his future life and eventual career in electronics.

• • •

A lot of water has gone over the dam since those dear, dead days of long ago. I still have Charley's 50-watter in my antique tube collection. I occasionally wondered what had become of the good samaritan of my high school years. Was he still alive? On the air? How could I find out?

Over the years, preoccupied with other things. Charley had slipped to the back of my mind, except for occasional periods of introspection. Until a few weeks ago.

I was on twenty meter sideband and had just completed a QSO with a newly-relicensed ham. He told me he'd been off the air for many years, had lost his old call and was now back on with a new call and renewed enthusiasm. He was retired and had time to rag-chew and work plenty of DX. His name was Chuck.

We had a great QSO and I looked forward to talking with him again. He was an amusing conversationalist, one of those hams who you enjoy passing time with.

"Quite a fellow," I thought. I would make it a point to talk with Chuck again.

A day or so later an alarm bell went off in my mind! Was this Chuck the same fellow as Charley, my boyhood mentor? Our recent conversation flashed through my thoughts. No question about it—*this guy was Charley*! I had located him after forty-five years! I was positive this was my old friend. A quick check in a new Callbook confirmed the fact. But Chuck was nowhere to be found. I combed the band for a few days and even tried to reach him by long-distance phone. No luck. Finally, in desperation, I decided to write Chuck a letter, recalling my childhood adventures with him—this wonderful fellow who provided friendship, knowledge, advice and free transmitting tubes to his little chums.

The letter was dispatched and a few days thereafter I received an answer. It was from Chuck's widow. Chuck had succumbed to a massive heart attack a few days after our contact. He had remarked to his wife that the ham he'd recently spoken to on the air reminded him of a kid he'd known a long time ago when he was in the theater sound business. And he'd hoped to catch this station on the air in the next day or two.

It was a sad letter. Fate had stepped in. I had found Charley and now he was gone. There would be no QSO's by Charley with the little kid who had grabbed the 50-watter years ago in the dusty theater projection room. All that were left were the memories of Charley, his kindness, and the old 50-watter sitting in a replica of the first high power transmitter built so long ago when the sunrise was bright and promising, and the world ready to QSO in the long, dreamy summer days locked in my memory. ◻

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UG-255/u	BNC Male to SO-239	5.00
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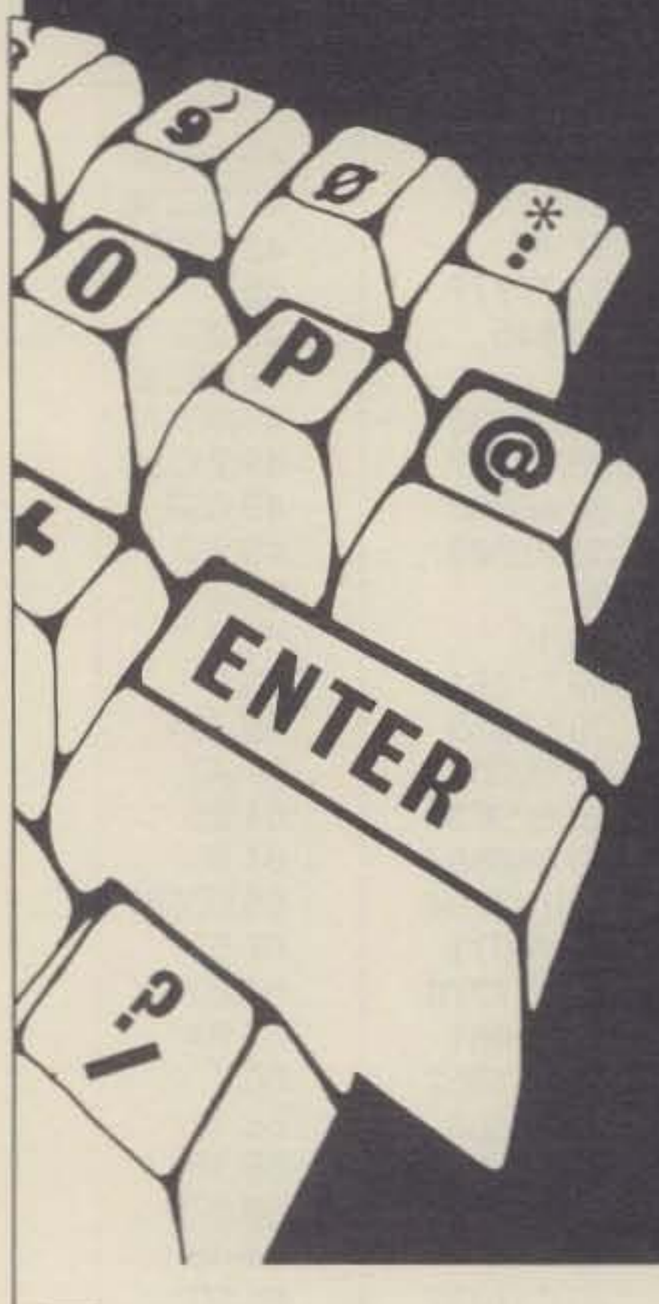
CIRCLE 130 ON READER SERVICE CARD

Following up on DOS, we examine the control that can be obtained over a system with adequate knowledge of the system.



INTRODUCTION TO BASIC

A Computer Programming Language

Part XII—Automatic Keyboarding

BY BUZZ GORSKY*, K8BG

This installment will describe a technique for providing for a particular start-up sequence for **DOS** (Disc Operated System). The technique could also be applied to level two machines, but would not be as automatic. I'll begin by describing a problem which this technique seeks to solve. I use the **MISOSYS** version of the editor/assembler and use a machine language printer driver routine to run my ancient model 15 printer. Thus each time I run the editor/assembler, I must first load the printer driver, and then run the assembler and answer the memory size query to protect the printer routine. It seemed that there should be a way to get all of that done automatically when running the disk that has those programs. TRSDOS® (my version is 2.3) does have an **AUTO** provision which will run one program upon booting (that is, calling the operating system for the first time) a given disk, but clearly that is too limited for this problem, since only one operation can be performed automatically.

A similar problem finally provided the stimulus for solving the problem. I have a system of BASIC programs which my wife uses for research data files. When these programs are run we use **VERIFY** from DOS to provide for verification of disk writes; we also load a printer driver routine, and then the system must call basic, and we have to answer the initialization questions and finally run the BASIC program. I wanted a program that could be called up with the AUTO command to take care of the entire initialization sequence.

When the machine is running, in DOS or BASIC, and is waiting for some input to tell it what to do, the operating system is running a keyboard routine repeatedly looking for input. In most cases, input goes to the screen and is not acted on until the enter key (character 13D) is sent. There is an area in memory called the keyboard device control block. Locations 4016H and 4017H contain the address **(LSB, MSB)** of the keyboard routine, and the operating system looks in this location to see where the routine is so that the keyboard can be called. Therefore, if a machine language program replaces the contents of 4016H with the address of another routine, when the operating system wants to call the keyboard, the other routine will be called instead. In this case the routine will then issue letters, one at a time, until the last letter required is issued, at which time, the normal keyboard driver routine address is restored to 4016H.

The routine is very simple. To make the system fully automatic this routine is called by the AUTO command so that it is run when the system is booted. I have written the routine to go into a "middle" area of memory so that it does not interfere with my printer driver which goes into high memory or the editor/assembler which goes into low memory. The routine shown is the one I use for the research program: it will set VERIFY, load and run the printer driver routine, call BASIC, issue 'enters' for the initiation dialogue, and then run the BASIC program called **"SUE/BAS".** The routine to take care of the editor/assembler and printer driver is the same except that the MSG portion of the program has the appropriate text for entry.

When the program is first called by DOS it takes what is in 4016H, the keyboard routine address, and saves it in memory **(KBD)** via the **HL** register. It also loads the address labelled **NEXT** with the address of the first character to be sent, labelled MSG. 4016H gets the address of the new "keyboard" routine, called **AUTOKEY.** The program then returns to DOS.

When the keyboard is next called, the **KEYMOD** routine will be called instead. Here **HL** is pushed on the stack to save anything that might have been there when the call was made. Then the HL register gets the address stored in NEXT. The contents of that address are checked to see if a zero is

*712 Hillside Drive, Carlisle, PA 17013

```
                    00100  ;AUTOMATIC KEYBOARD SYSTEM
                    00110  ;BY BUZZ GORSKY K8BG
                    00120  ;WRITTEN FOR 48K 2.3 TRSDOS
D000                00130          ORG     0D000H      ;MIDDLE OF 48K SYSTEM
D000 2A1640         00140  LOAD    LD      HL,(4016H)  ;STORE CONTENTS OF 4016H
D003 2227D0         00150          LD      (KBD),HL
D006 2115D0         00160          LD      HL,KEYMOD   ;LOAD NEW ADDRESS
D009 221640         00170          LD      (4016H),HL  ;INTO KEYBD DCB
D00C 2129D0         00180          LD      HL,MSG      ;STORE ADDRESS OF NEXT
D00F 2225D0         00190          LD      (NEXT),HL   ;CHAR IN NEXT
D012 C32D40         00200          JP      402DH       ;BACK TO DOS
                    00210
D015 E5             00220  KEYMOD  PUSH    HL          ;SAVE CONTENTS OF HL
D016 2A25D0         00230          LD      HL,(NEXT)   ;GET NEXT CHAR AND SEE
D019 3E00           00240          LD      A,0         ;IF IT IS A 0
D01B BE             00250          CP      (HL)        ;IF SO GO TO OUT
D01C 282C           00260          JR      Z,OUT
D01E 7E             00270          LD      A,(HL)      ;OTHERWISE OUTPUT CHAR
D01F 23             00280          INC     HL          ;AND STORE NEXT ADDRESS
D020 2225D0         00290          LD      (NEXT),HL
D023 E1             00300          POP     HL          ;RESTORE HL AND
D024 C9             00310          RET     ;RETURN
                    00320
0002                00330  NEXT    DEFS    2
0002                00340  KBD     DEFS    2
D029 56             00350  MSG     DEFM    'VERIFY' ;TEXT TO BE SENT
     45 52 49 46 59
D02F 0D             00360          DEFB    13 ;13      IS ENTER
D030 54             00370          DEFM    'TTY'
     54 59
D033 0D             00380          DEFB    13
D034 42             00390          DEFM    'BASIC'
     41 53 49 43
D039 0D             00400          DEFB    13
D03A 0D             00410          DEFB    13
D03B 0D             00420          DEFB    13
D03C 52             00430          DEFM    'RUN "SUE/BAS"'
     55 4E 20 22 53 55 45 2F
     42 41 53 22
D049 00             00440          DEFB    0           ;SIGNIFIES END
D04A 3E0D           00450  OUT     LD      A,13 ;ISSUE FINAL ENTER
D04C 2A27D0         00460          LD      HL,(KBD)    ;RESTORE DCB
D04F 221640         00470          LD      (4016H),HL
D052 E1             00480          POP     HL
D053 C9             00490          RET
                    00500
                    00510
D000                00520          END     LOAD
00000  TOTAL ERRORS

KBD     D027    KEYMOD  D015    LOAD    D000    MSG     D029
        NEXT    D025
OUT     D04A
```

stored there. Zero would indicate that that is the last character and the program would branch to OUT. If the entry is non-zero, it is loaded into the A register, HL is incremented and the value saved in NEXT, and the original HL value is popped from the stack before the return from the call. This sequence will continue each time the operating system calls for keyboard input. Each of the characters entered following **MSG** in the program will be sent to the operating system as if it had come from the keyboard. Eventually the NEXT address will point to a zero byte. When that happens the routine will branch to **OUT.** There the correct final keyboard byte is loaded into A, and the original keyboard address is returned to 4016H. After HL is restored there is a final return from this routine.

Let's take a quick look at the text that the program will provide. MSG begins with V E R I F Y, then there is a 13. That will be the 'enter' to get the VERIFY command acted on by DOS. Then the **TTY** command runs the TTY program, which loads the driver into high memory, loads the printer **DCB** with the driver address and loads **TOPMEM** (4049H) with the driver address so that BASIC will not over-write the driver. The 13 causes this command to run. Then BASIC calls the basic program. Now there are 3 13s. The first is to get BASIC called, the second answers the **HOW MANY FILES** question (just like hitting enter) and the last answers the **MEMORY SIZE** question. Then RUN "SUE/BAS" will run the basic program. A zero is in memory instead of the final 13 to indicate the end of the routine. The last 13 is issued from the OUT portion of the program.

I have written this routine as part of an initialization sequence, but it could be written for any situation where you know that a certain set of keyboard input will be required. I wish to thank Dave, WB8TMR, who gave me the idea of how this task could be accomplished based on a program he had run as sort of linking-loader. I hope that you will find the concept useful too.

The S-F Amateur Radio Services TTY-48 RTTY Radio Desk

BY ALAN M. DORHOFFER*, K2EEK

Last winter on a trip to visit HAL Communications I saw an interesting operating desk being used there which subsequently showed up as part of their display at a Hamfest I attended. I was told it was built for them by S-F Amateur Radio Services in California and that the man's name was George Sanso. When I returned, I called George and found that this new desk was being added to a line of operating desks he made. I met George a few weeks later at the Dayton Hamvention and watched him put one together for his display. It's a very neat, efficient package that will hold an entire station in a small amount of room.

First, I can't say that I'm as fast as George in putting one of these desks together; it took me about 2½ hours. He's had more practice and can do it in about half that time. It does dress up a shack though and puts everything where it should be.

I opted for the model TTY-48 desk, which has 48″ shelves. You will note that the configuration also will accommodate computer hardware as well as RTTY equipment, so the choice of use is yours. The desk arrives via UPS in two large cartons, ready to assemble. The first thing you notice as you unpack the cartons is the weight; this thing is heavy. The second thing you notice is the finish on the wood; it looks good. The desks are available in walnut or teak oil stain with a satin finish top coat. The wood itself is a high density ¾″ birch plywood. The metal loops at the ends are a rugged 1″ square, 18 gauge steel. It's designed to be strong.

After you've spread the parts out and identified them from the drawings, you're ready to assemble. The only tools you'll need are a screwdriver and a hammer. A Yankee® type screwdriver would be a definite asset here. You will need the hammer to set the tee nut fasteners in their appropriate holes. They are used with socket head bolts to secure the metal supports to the shelves. A wrench is supplied with the kit for this purpose. The remainder of the desk is assembled with wood screws. The side panels of the desk are routed to match the shelf parts so that a perfect fit is assured.

The TTY-48 desk loaded with gear. You can even put a linear on the top shelf.

During construction I would recommend that you use a flat hard surface to hammer in the tee-nut fasteners. I gave one of the bottom runners a good whack on a shag rug and it split. It was one of those things that I saw coming but couldn't stop. Anyway, they understood and sent out a replacement right away.

As you can see from the photo, the left hand section accommodates the keyboard and video display easily. There is a cable hole in the partition to the immediate right for easy access to the transceiver. The shelf holding the transceiver is angled down 15° so that all controls face up towards you. There is a desk area with a shelf below for log, QSLs or callbook. It's a utility area. The two shelves above can hold just about anything. The lower one comes with a 1″ square, 18 gauge steel support so that heavier things can be placed on it. A good idea would be to order a second one for the top shelf, too.

The overall dimensions of the TTY-48 desk are 50″ high, 51″ wide and 30″ deep. The keyboard shelf area is 16″ wide. The two top shelves are 48″ wide. The desk is rated to support over 200 pounds of equipment. As you can see, there is a lot of open room available so as not to close in the operating room. Two steel tubing braces are added for extra strength and to prevent sway.

S-F Amateur Radio Services also offers this desk in a smaller 36″ version and their regular straight across model without the RTTY feature. The quality of materials is very good, and the completed desk does enhance the shack. All of the metal supports are coated in black satin enamel for a finishing touch.

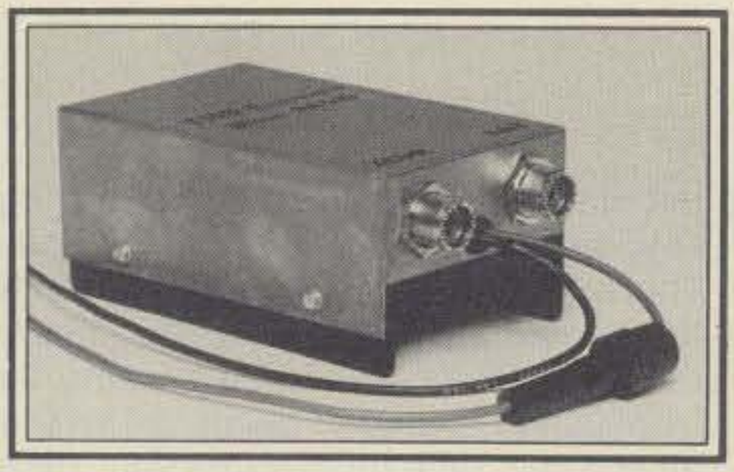
The TTY-48 desk sells for $219.95 in either finish (walnut or teak). It is priced FOB Culver City, California and has a shipping weight of 70 pounds.

If you're looking to add a little style to your shack and simplify your life, then you should take a closer look at this product.

For further information write to S-F Amateur Radio Services, 4384 Keystone Ave., Culver City, California 90230 or circle number 99 on the reader service coupon.

* *Editor, CQ*

CQ SHOWCASE



THS Electronics V.H.F. Power Amplifier

The PA 1-10 is a solid state v.h.f. power amplifier designed for fixed or mobile operation. It operates class C for f.m. only. It provides a nominal 25 watts output for 3 watts of input over the entire 4 MHz of the 2 meter band plus or minus 1 MHz for Mars or CAP operation. TR switching is accomplished by diodes and quarter-wave stubs which are a.c. coupled to ground.

The design uses rugged balanced emitter r.f. power transistors to ensure long life and high s.w.r. protection. Frequency range is 143-149 MHz. Size is 5″L × 3″W × 2¼″H; weight is 1 lb. For more information, contact THS Electronics, Rt. 1 Box 195, Greene, NY 13778, or circle number 101 on the reader service card.

Circuit Electronics Tail Chopper

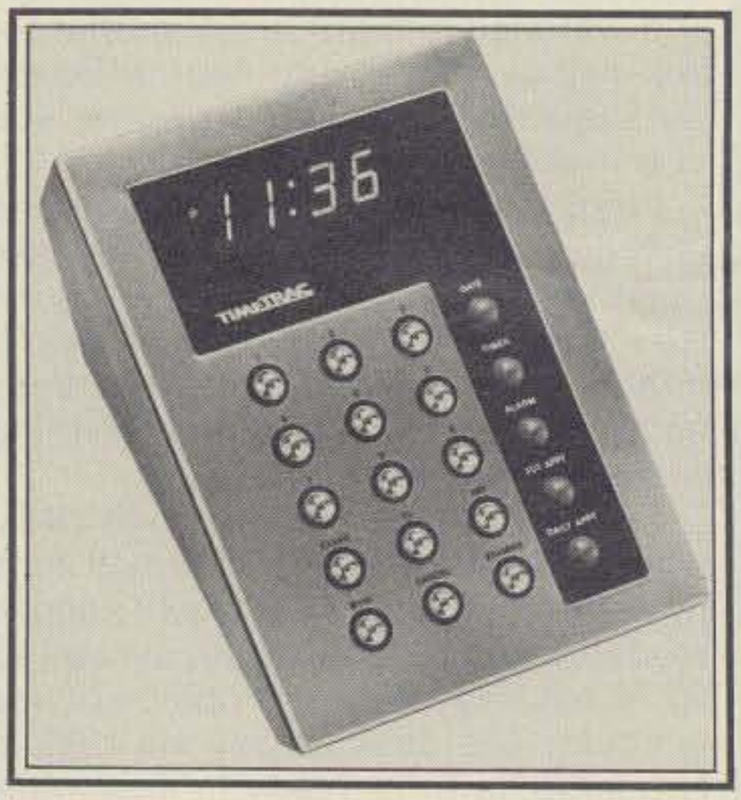
Circuit Electronics has introduced a repeater "squelch tail eliminator" called the Tail Chopper. There are three models: the TC-2000, TC-2100, and TC-2200, all of which use temperature compensated operational amplifiers and digital logic. The units also feature 5-turn control and LED indicator for maximum sensitivity. They maintain normal squelch hysteresis to .1 microvolt.

The TC-2000 is a plug-in module to the rear of Regency's U1OR u.h.f. repeater, a simple installation one wire hookup. It eliminates squelch temperature problems, and existing squelch can remain functional. The TC-2100 is a universal module that can be connected to most repeaters to eliminate squelch tails. The TC-2200 PC board assembled with instructions may be mounted inside repeater receiver or mobiles. For more information, contact Circuit Electronics, Inc., 621 Bishop, Salina, KS 67401, or circle number 109 on the reader service card.

AEA Iambic Electronic Keyer

The AEA Model CK-1 Iambic Electronic Keyer incorporates all of the features of the AEA MorseMatic, with the exception of the trainer and beacon modes. The CK-1 also has two pre-set speeds for fast recall and a stepped variable speed control for fast contest operation. Speed range is 01 to 99 wpm in one wpm increments. The unit operates from 12 volts DC (plus or minus 3 volts DC), and an optional AC adapter is available.

The keyer has a flexible automatic serial number generator, and memory has a strorage capacity of approximately 500 Morse characters. If a mistake is made loading the message, it can be corrected through the edit mode. It features independent dot and dash ratio adjustment. The unit also features an automatic tune mode. For more information, contact Advanced Electronic Applications, Inc., P.O. Box 2160, Lynwood, WA 98036, or circle number 103 on the reader service card.



Time-Trac Appointment Clock

The Time-Trac is a microcomputer-controlled appointment clock that tells the time, date, and year, plus holds up to 30 appointments in memory. It sets daily appointments for the next 23 hours 59 minutes, and future appointments up to one year. There is a dimmer switch for display, and quartz crystal clock.

The unit plugs into any wall outlet and has a sleek, modern styling. For more information, contact Hal-Tronix, P.O. Box 1101, Dept. C, Southgate, MI 48195, or circle number 108 on the reader service card.

a monthly feature by

JOHN A. ATTAWAY, K4IIF

DX

NEWS OF COMMUNICATIONS AROUND THE WORLD

I would like to begin this column on a personal note, as it will be the last I will write as your DX Editor. The pressures of job and family responsibilities have become such that I no longer have the time to write the thorough type of DX column that I feel the *CQ* DXer deserves. Rod Linkous, W7OM, faces the same problems and is not able to assume responsibility for writing every column. Rod will continue to serve as Assistant DX Editor and write every third column.

Rod and I have always tried to give you the best DX column available in a major monthly amateur radio magazine. In order to ensure that this tradition is continued, I asked Dick Ross and Al Dorhoffer to permit me to choose my successor. They agreed, and I am delighted beyond measure to announce that your next DX Editor will be Mr. Hugh Cassidy, WA6AUD, former editor and publisher of the *West Coast DX Bulletin*.

Since I first entered the DX scene as Editor of the *Florida DX Report* in the early 1960's, I have read every major and minor DX publication worldwide, many in different languages and some even using different alphabets. I can safely say without fear of contradiction that no writer approaches Hugh Cassidy's thoroughness and accuracy in reporting DX news and his ability to entertain DXers. Effective with the January 1981 issue of *CQ* you will have a great column by a great DX writer.

You haven't gotten completely rid of me yet! I will remain as Chairman of the *CQ* DX Awards Advisory Committee which I founded 14 years ago as the first Committee of active DXers to guide a major worldwide DX program, and someday, when Hugh decides to step down as DX Editor, I hope that I will be in a position to become your DX Editor again. I also hope to contribute articles to the magazine from time to time. Meanwhile, the Cassidy-Linkous team is the very, very best. Enjoy them!

John A. Attaway, K4IIF

Gary Dixon, Sr., K4MQG, and son Gary, Jr., KA4HVI, at their home in Charlotte, N.C. K4MQG was the first U.S. operator, and the second worldwide, to earn 5-Band WAZ.

More On Gary Dixon's Five Band WAZ

Gary Dixon, K4MQG, of Charlotte, North Carolina was the first North American to qualify for 5-Band WAZ. Gary has been well-known to DXers for the past 15 years both for his service as a QSL Manager as well as activity on 80-10 meters. He started the DX chase in 1957 at the age of 16, and by 1959 had earned his DXCC working only 15 meters with 75 watts a.m. Next to working DX on 80-10 meters, Gary finds that meeting fellow DXers in person is the most interesting aspect of the hobby.

Gary's current country total is 342, and he now holds all the various 5-Band awards from *CQ*, the ARRL and the IARU, including 5-Band WAZ, 5-Band DXCC, 5-Band WAS and 5-Band WAC. A short break in DX activity while he did a tour in the armed services in the mid-60s caused him to miss XZ, Burma and BY, China, the only 2 countries which he still needs.

The operating station used by K4MQG for the past 15 years is a Heathkit SB101 with an external LMO. He has tried most of the latest rigs available but feels that none of them compare with the SB101 on 75/80 meters where he currently has confirmed 242 countries. The antenna farm at his Charlotte QTH consists of Wilson Mono Banders for 10, 15 and 20 at about 65 feet, two half-wave slopers for 40 meters and three quarter wave slopers for 75 meters. All antennas are fed with a single heliax feed line with a remote coax switch on the tower.

Gary was very pleased when *CQ* came out with the new 5-Band award, but thought he would never qualify for it due to the seemingly impossible task of working zone 23 on 75 meters. When the zone chase started on Jan. 1, 1979, he began by working stations on 10 meters and then asking them to QSY to 15 and 20 followed by later evening schedules on 80 and 40. This procedure worked very well as it had previously for his other 5-Band awards, and by March 1979 he had reached the first plateau and submitted QSL's qualifying him for certificate #6.

In May of 1979, tragedy struck the Dixon family when Gary lost his wife of 16 years, Gail. Following her untimely death, he and his two sons, Gary, Jr., KA4HVI, age 13, and Ray, age 9, visited Jordan in July and August courtesy of JY1 and Alia Airlines. They were also guests of Clyde and Carolyn Huddleston in Jordan and Cyprus, whose calls are JY9DI, JY9YL and 5B4DI and 5B4HA.

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CIRCLE 31 ON READER SERVICE CARD

Larry Woods, ZF2CX, of Bodden Town, Grand Cayman. Larry moved to Grand Cayman from Texas where he held the call N5BCF in August 1979 and teaches at Cayman Islands High School. The school now has a club station, ZF1HS, of which Larry is the sponsor. He will be in ZF-land until July 1981.

After the summer months were over and the low frequency bands began to improve, word came that U0Y would activate zone 23 on all bands. During November 1979 Gary was able to work U0Y on both 80 and 40 meters, the QSO's he had feared he would not achieve in his lifetime. Those contacts really pumped life into his chase for the award, and the last zone was finally worked on April 11, 1980 when he worked John, 8Q7AL, on 40 meters just hours before he went QRT. All confirmations were finally received and submitted to Leo Haijsman, W4KA, in early June. Gary officially received 5-Band WAZ Plaque # 2 on June 7, 1980, just in time to forget about late night QSOs, schedules and QSL's, because he married again on June 14.

Gary and his new XYL, Carol, are both employed at Celanese Corporation in Charlotte, North Carolina where he is Manager of Telecommunications Services. Carol's son Ken is 12, so with three sons Gary will have an abundance of tower climbers for years to come.

Gary and Carol are building a solar home in Fort Mill, South Carolina, ten miles south of his former "Hot DX QTH" in Charlotte. Hopefully, the new QTH will also have good DX properties, but he feels that no location will ever equal the one in South Charlotte.

5-Band WAZ Standings*

Plaques have been won by the following stations:

1, John Devoldere, ON4UN
2, Gary Dixon, K4MQG
3, Kent Svensson, SM4CAN

The top 10 contenders for the next plaque are:

AA6AA - 199 Zones
N6DX - 191
W8GT - 189
SM0AJU - 189
N4WW - 186
K7UR - 183
WA4JTI - 180
DL3RK - 180
W1NG - 178
VK6HD - 177

* *As of Sept. 1, 1980*

Amateur Radio in New Zealand

Information for this month's feature is provided by Mr. Arthur E. Law, ZL2HE, DX Editor of *Break-In*, the official New Zealand amateur radio magazine and a member of the Council of N.Z.A.R.T.

"The national body for amateur radio in New Zealand is the New Zealand Association of Radio Transmitters, Inc., commonly abbreviated NZART. The association has an elected council who hold office for a minimum term of 2 years. There are 5 councilors in each of ZL1 and ZL2, and 2 councilors in each of ZL3 and ZL4.

"The president of NZART is also chosen by election. The present president is Mr. Arthur Godfrey, ZL1HV, a man of many talents and a born leader whose encouragement to beginners is everything. His training ability has done much for the ZL ham scene and greatly increased the membership of NZART. He has visited all 80 clubs that form the association, thereby advancing the good and well-being of

CQ DX Awards Program

S.S.B.

902	W5URN	909	S8AAP
903	KBØOE	910	I8LEL
904	K8LDS	911	WB6SHL
905	WD5HUH	912	WB3HPJ
906	WB6RXW	913	K6SD
907	WA2UDT	914	XE1J
908	WAØTKJ		

C.W.

451	4Z4DX	453	I5BDE
452	K1WJ	454	WB6SHL

S.S.B. Endorsements

310	WA2EOQ/317	275	WAØTKJ/275
310	I5WT/313	250	4Z4DX/271
310	W3GG/313	250	KB8JF/250
300	XE1J/300	200	K6SD/224
275	I8LEL/283	150	WB6SHL/167
275	WA4LOF/277	150	OK1DVK/150
275	WA6TOO/277	3.5/7 mHz	WAØTKJ

C.W. Endorsements

310	W9DWQ/316	150	I8BDE/173
250	G3KDB/251	150	WB6SHL/153
150	K1WJ/182		

The total number of active countries as of deadline was 319. Complete rules and application forms for the *CQ* DX Awards 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 USA.

amateur radio in New Zealand, personal contact always being a stimulus for morale.

"Others who play important roles in the ZL scene include Fred Johnson, ZL2AMJ, our Post Office Laison Officer. Fred is the go-between man with NZART and the New Zealand Post Office, who are our equivalent of the U.S. Federal Communications Commission in matters of communication and the licensing of same. Prior to WARC 79, ZL2AMJ had a leave of absence from his governmental job so that he could be part of the team involved with preparation of material for Geneva. While at Geneva, Fred represented amateur radio very ably and carried out his delegation's assignments with distinction.

"Although Fred was amateur radio's voice for New Zealand at Geneva, we were extremely pleased to see our senior citizen Tom Clarkson, ZL2AZ, also asked to serve as an advisor to IARU for the WARC conference.

"Since the conclusion of the conference, ZL2AMJ has been involved with the restructuring of the *ZL VHF Band Plan*, particularly the top 2 megaHertz of the 2 meter band. The repeater system is gradually being changed from 700 kHz split to 600 in the upper part of this band.

"Of great interest to those many readers interested in DX and Contests is the role of Jock White, ZL2GX, who heads this important area for NZART. If you have seen any of the ZL award certificates, you would be impressed by their high quality. Jock was the first person ever to confirm 300 countries. He is also recognized by *CQ* magazine

These are the fellows who publish QRZ DX *down in the Texas Territory. That is Gray on the left and W5RBO on the right. (Photo courtesy WA6AUD at the Fresno DX Convention)*

as the South Pacific checkpoint for their awards. It is a great shame that other organizations do not follow the lead of *CQ* magazine in this regard. With the world trend toward increasing inflation, costs must be reduced in order that our amateurs may achieve their awards, and through the use of checking officers throughout the world, definite savings can be achieved.

"Bruce Durdle, ZL2BAM, is Novice Radio Training Manager for NZART and is in charge of providing training aids, such as Morse code tapes to help members with their code, and other assistance to clubs, enabling them to maintain classes at a high standard. Bruce also prepares a monthly column in *Break-In* which in-

cludes examination material.

"Another very important person is our QSL Manager, Joe Reed, ZL2AH, who does an excellent job with the assistance of the club members from Upper Hutt. Don Robinson, ZL2QX, is the OSCAR and AMSAT coordinator for ZL. NZART recently gave a $1000 donation to AMSAT to help offset the Phase III loss.

"Our man behind the Intruder Watch is Bob, ZL1BAD, who is the sole operator of ZL6IW, which he uses only when contacting his counterparts in the Intruder program. The women's organization in ZL is the Women's Amateur Operators Club, known as WARO, which makes a big contribution to the well-being of NZART. WARO leadership is provided by Biny Owen, ZL2AZY, with Lesley, ZL1BOR, as Secretary/Treasurer. The Amateur Radio Emergency Corps (AREC) is run by Ron, ZL2GQ, with all column comment being made by Jim, ZL2BHF. This group covers Civil Defense and Search and Rescue as they apply to the ZL scene. The VHF scene is managed by Vaughan Henderson, ZL1TGC, who does a great job and writes an excellent column for the magazine *Break-In* which I have mentioned several times and is our official journal. It is a monthly publication put together by the Christchurch Editorial Staff, Peter, ZL3NH; Bruce, ZL3ABJ; plus ZL3AFV and ZL3SL.

"Coupled to the monthly effort is a very full *Call Book* which is published annually with just about everything you would want to know, including how to get a license to operate in ZL, the type of amateur radio licenses issued in New Zealand, an NZART information section and data on other types of broadcasting activity in ZL outside the amateur radio field. The subscription to *Break-In*, complete with *Call Book*, is ZL $17.00 for overseas membership. It can be obtained through the General Secretary, George Blackwell, ZL3NT, c/o NZART headquarters, Box 1459, Christchurch, New Zealand. *Break-In* has a very high rating when compared with other overseas publications.

The DX Scene

"As NZART DX Editor to *Break-In*, I (Arthur Law, ZL2HE) have the task of encouraging DX participation by the ZL fraternity, not that it takes much to do that. The DX Editor records and collates the DX news that has occurred for the past month into a DX column. Quite frequently there are details about a forthcoming DXpedition and there is always QSL information to be presented. The ZL group is always keen to participate in DX in all ways and modes. Photographs are always needed for the DX column as they frequently provide a stimulus to s.w.l. or beginners. One photo can do so much to tell the story about some far off DX location.

"Quite a large number of DXpeditions take place around the world each year, many coinciding with a particular contest such as the *CQ* Worldwide or the *CQ* WPX. Others appear unannounced and some take place after a lot of talk and buildup. Many are highly touted then never appear because of transportation difficulties, inability to obtain a license or uprisings occuring within the target country. These are all problems for the DX Editor, particularly when he only goes to press monthly.

"In publishing QSL information, one is quite often confronted with different QSL Managers or QTHs for a DXpedition. This can be very frustrating for DXers and DX Editors alike, particularly when you QSL to a manager umpteen thousand miles away and then find a week or so later that it was incorrect. Our philosophy to the new DXer is to QSL via the Bureau, because if he doesn't he will soon be broke or else give up on DX.

"In association with the DX column we have the weekly ZL DX Net which takes place every Friday at 0800 GMT

The WAZ Program

10M Phone

70...JR6EFE
71...JA6QZ
72...W2BAI
73...WA8QIY
74...DL7AA

20 M Phone

320...JA1MDK
321...WB6WCW
322...VK6YL
323...IØSGF
324...HB9BGN

15 M Phone

64...WA2AUB

40 M C.W.

18...JA1DUH

20 M C.W.

119...JA1MDK

15 M C.W.

37...JA3BEY
38...KØCD

All Band WAZ S.S.B.

2000...N7NA
2001...K6SD
2002...W9KBV
2003...KZ5OJ
2004...KA5BML
2005...K5BTS
2006...WA6VHZ
2007...WB6CDM
2008...W5TKV
2009...K8TMK
2010...6Y5DA
2011...G4BYK
2012...GM4FIW
2013...DF3AR
2014...I8AGD
2015...HB9AHD
2016...WB3ICM
2017...WA9JWL
2018...LU8CW
2019...S8AAP
2020...WA5MLT
2021...KB4BW
2022...K6YCM
2023...AK1A
2024...W8WOJ
2025...WB7PTZ
2026...GM3GRX
2027...ZL1BQD
2028...VS6AG
2029...JA8NEN
2030...JA6IP
2031...DF6CY
2032...K6LIK

C.W. and Phone

4890...JE1GMM
4891...JA5BSQ
4892...N2DH
4893...W6MUS
4894...DL7XS
4895...DK6OR
4896...DL7RT
4897...G5PQ
4898...DK3OI
4899...AI9R
4900...JA3EBU
4901...OZ7MP
4902...G3YRM
4903...W4RW
4904...WA6YQW
4905...JA1AUC
4906...N6YI
4907...KG4F
4908...K7PM
4909...JA6LCJ
4910...JA7AXB
4911...N6HL
4912...VK2NM
4913...JA3DBD
4914...KA5AAC
4915...EA1SQ
4916...AA4AK
4917...K3RL
4918...WA8EUK
4919...G4BUE

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 $5.00.

on 3.6 MHz. ZL2HE and Ivor, ZL1AGO, act as MC during the net's hour-long session. It is open to anyone whether beginner or one of the 300+ country fellows. From time to time DX stations check in with the net and among those logged recently are PY1ZAE, VK9ZG, VK9NI, YJ8OT, 5W1BZ, 5W1AU, ZL1AA/K, several VK's and other nearby Pacific islands. Notable ZL's such as ZL3GQ, ZL1HY and ZL1BOQ share their valued comments with regular checkins which include ZL1AMM, ZL1AMN, ZL1AAS, ZL1KD, ZL1AZV, ZL1AXX, ZL1BIL, ZL2HP, ZL2ACP, ZL2AAG, ZL2AFT, ZL2AHC, ZL2BEM, ZL2BCO, ZL4AW, ZL4LZ and many listeners as well. The MC usually asks the checking stations to quote their QSL requirements and to list the interesting DX worked during the past week. The DX Editor has the North American and DX *Callbooks*, supplemented with many DX news sheets, to assist with QSL addresses. The news sheets received include *DX News* from RSGB, *QRZ DX*, *Long Skip*, *The DX Bulletin* and the *Long Island DX Bulletin*. DX information given in these publications is read to the assembled Net and a couple of computer QSL printouts are available to help. ZL's are keen followers of DX and the DX contests, and they especially like WAZ, 5-Band WAZ, WPX and DXCC. There are no elected DX groups in New Zealand, although one very informal set of DXers meet socially in the Auckland area from time to time.

"The 3 new bands at 10, 18 and 24 MHz, which came out of the WARC 1979 Conference, are a very long way from amateur utilization in Region Three. In Manila in 1982 the Region Three directors will meet to decide how best to administer these 3 very small bands. This applies to mode, will contests be permitted, how about RTTY and SSTV, etc. Some feel that high speed c.w. is the answer. Whatever the result, it will be worth the wait. If we are to maintain our bands in the future, we must assist others to join our cause. Greater inter-

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ Master Prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or to confirm present total. If no up-date, file will be placed into "inactive" until next up-date. No fee required for addition to Honor Roll.

MIXED

1920	F9RM	1577	YU7BCD	1325	N2AC	1139	K6ZDL	918	W6ANB
1902	YU2DX	1575	W2NUT	1307	N9AF	1130	WØSFU	914	N6JM
1842	K6XP	1538	PAØSNG	1287	N4NO	1129	N6FX	902	K6DT
1814	K6JG	1538	W4BQY	1286	AA4A	1126	K5DB	852	SM3EVR
1805	W4WV	1536	W7LLC	1275	N6AV	1114	WA1JMP	851	K8CH
1711	VE3GCO	1525	DJ7CX	1260	I2PHN	1098	JH1VRQ	758	UA3FT
1687	W2NC	1514	W9DWQ	1212	YU1AG	1010	IN3ANE	753	N3RL
1653	W3PVZ	1496	K5UR	1179	YU7ODS	1008	WA2AUB	700	I2MQP
1626	N4UU	1424	N6CW	1168	I6SF	1002	PA2TMS	690	KL7AF
1610	ON4QX	1350	KE4I	1155	W8CNL	950	PY4OD	668	N8II
1604	N4MM	1335	N6JV	1151	UK3AAO	950	K8LJG	644	DK7XX
1600	K2VV	1332	W9FD	1146	DL1MD	920	WØIUB		

S.S.B.

1828	F9RM	1300	K2VV	1102	AA4A	950	JH1VRQ	821	CT1UA
1708	IØZV	1300	PAØSNG	1100	N2SS	932	W6YMV	804	WA2AUB
1684	IØAMU	1288	K5UR	1017	DL1MD	909	PY3BXW	770	N2AC
1637	K6XP	1268	YU7BCD	1016	WØYDB	908	IØMBX	759	ZP5RS
1600	W4UG	1255	I4ZSQ	989	DJ7CX	890	N6FX	718	I6NOA
1548	K6JG	1225	ZL3NS	989	OE2EGL	888	W4BQY	706	WA2FKF
1532	K2POA	1207	W9DWQ	967	PA2TMS	881	N4NO	657	I5AFC
1440	I8KDB	1176	N4UU	962	OZ5EV	870	YU1AG	633	N3RL
1428	N4MM	1105	WB2NYM	962	YU7ODS	851	W2NC	602	YU3APR

CW

1557	W8KPL	1288	YU7BCD	1140	N4MM	912	N6FX	750	JH1VRQ
1505	ON4QX	1234	W9FD	1123	N4NO	886	LZ1XL	745	DJ3LR
1492	W2NC	1233	G2GM	1067	VO1AW	851	KH6HC	709	DL1MD
1434	DL1QT	1175	DJ7CX	1062	WAØKDI	834	VK4SS	700	K8LJG
1418	K6JG	1166	N2AC	1013	K6ZDL	827	JE1JKL	679	I1YRL
1357	K6XP	1165	W4BQY	989	YU1AG	808	I5IZ	658	EA2OP
1344	N4UU	1160	K5UR	928	I6SF	802	PY4OD	612	WA2AUB
1336	WA2HZR	1150	W3ARK	925	YU7ODS	777	YU3APR	607	I1TLA
1301	N6JV	1150	K2VV	914	W1WLW	756	SMØGMG		

No - 87-88

national understanding between people of the world helps break down world tensions and aids humanity."

ZL—The Country

"Aotearoa, the Land of the Long White Cloud, is the Maori name for New Zealand, a beautiful country about the size of Japan, Italy or England. It is composed of three main islands, North, South and Stewart Island, of which the South Island is the largest. New Zealand also has three off-shore island groups, Raoul in the north, Chatham to the east, and Auckland/Campbell in the far south, all well-known to DXers. The country is long and thin, lying midway between the equator and the south pole and 1200 miles east of Australia. The population is 3.25 million, of which

Left to right are my good friends Jukka, OH1BR/OH2BR and Miika, OH2BAD, who authored the Radio Amateurs Conversation Guide. *This book has been very helpful to the DX Department staff in providing commonly used phrases in English, German, French, Italian, Spanish, Portuguese, Russian, Russian phonetic and Japanese. More recently they have started "minor language" supplements and we have these for Swedish and Finnish. Tape cassettes are available to help with pronunciation. Sales of the book and tapes are handled in the U.S. by Wayne Gingerich, W6EUF, 2301 Canehill Ave., Long Beach, CA 90815.*

70% live in the North Island. New Zealanders are a united people including native Maori, early settlers from Europe and the more recent Polynesian migrants. The culture is a blend of Maori-tanga with European and Pacific customs. New Zealanders are frequently called Kiwi's (Key-we's) and our sportsmen are well known for their silver tern on a black uniform which leads our rugby footballers to be known as the All Blacks. To you DXers, we are ZL's, a race of people well known for our hospitality and generosity.

"The economy of New Zealand is based on agricultural exports to the world markets. Chief products are lamb, beef, wool, cheese, dairy products, timber, fruit and stud stock, with fish, coal, textiles and carpets also making significant contributions. New Zealand is blessed with two of the finest farming universities in the world, and our farmers are very efficient in their production. We farm without subsidies or government payments.

"New Zealand is a constitutional member of the British Commonwealth, with a Governor-general acting on behalf of Queen Elizabeth II.

"As ZL's are known for their sporting abilities, the outdoors are a source of great enjoyment. Football, horse racing, trotting, hockey, tennis, cricket, baseball, soccer, yachting, mountain climbing, hiking and skiing are among our popular sports. It is possible to catch a trout, a deep salt water marlin and shoot a deer, all within a day's time. With a climate ranging from semitropical in the north to cold in the south, a wide variety of flora and fauna abound. There are no snakes, but harmless reptiles such as lizards can be found, some of which are said to be hundreds of years old. There are some 80 different types of birds, the most notable of which is the Kiwi, a ground-living, sightless bird which smells out its food along the forest floor. This is the bird featured on the New Zealand Coat of Arms.

"Three main volcanos dominate the center of the North Island. At Rotorua, boiling mud pools, geysers, steam and gassy fumeroles are frequently found in the city streets. It seems as though the place is sitting on hell. Nearby at Wairakei, steam from the underground cauldrons is released to generate electric power. Power projects also abound along the swift flowing rivers so we have no need of nuclear power." CQ

The WPX Program

Mixed

859...I1ZQD
860...OE1WO
861...K9JS
862...AI9R
863...I1RJP
864...JA1EF
865...JA1JXR

S.S.B.

1305...OE8EPK
1306...KØMOL
1307...SM6JAO
1308...JA6IP
1309...OK2PDE
1310...W6TPC
1311...G3UVZ
1312...N4AYJ

C.W.

1998...OE1WO
1999...EA1VM
2000...PY2BTR
2001...DL3GK
2002...K4BQZ
2003...VE7IG
2004...PAØLUS

WPNX

183...KA7AIG
184...KA2CRU

VPX

205...OK1-20897

Endorsements

Mixed: 400 I1ZQD, OE1WO, AI9R, JA1JXR. 450 W5SG, W2YWK. 500 K9JS, JA1EF, KB8EC. 550 W8LKG, WDØEPE, I1RJP. 600 K7AGJ. 800 DJ8WD. 850 VE7IG. 900 WØIUB. 1000 YU1OBA. 1300 YU1AG. 1700 W2NC.

SSB: 300 OE8EPK, G3UVZ, N4AYJ. 350 SM6JAO, W6TPC. 400 WB4UBD, W6YMH, OK1AVE. 450 WB9TIY, JA6IP. 500 KØMOL. 600 IØPSB, WA7OBH. 650 I8LEL, EP1TY. 750 VE7IG. 850 YU1AG. 800 N6FX. 1550 K2POA.

CW: 300 OE1WO, PY2BTR, K4BQZ, N2AGM, PAØLUS. 350 EA1VM. 400 DL3GK, VE7IG. 650 K6YK. 800 JE1JKL, JA2IU. 900 CO2OM. 1000 SM5CMP.

15 meters: WD9DCL, WA7OBH, I1RJP, JA7ARM.
20 meters: WDØEPE, KØMOL.
40 meters: KL7AF
160 meters: WØIUB
Asia: W8LKG, WDØEPE, JA7FAI, JA3XRC, JH5FQO, I1RJP, DF4ZL, JA2KVD.
Europe: WDØEPE, JA9FAI, I1ZQD, OE1WO, OE8EPK, KØMOL, I1RJP.
No. America: WB7QEL.
Oceania: KØMOL, JA2KVD.

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

QSL Information

A7XGI - Via DL2MY
A35AM - To W6PYV
C5ACC - c/o KB4GQ
CE1BLL - Via WB4LFM
CR9A - To WB2KXA
FGØFOR/FS - c/o W1XK
FK8DO - Via N4TN
FM7WS - To F2BS
FO8DP - c/o N7RO
FPØFOM & FPØFON - Via W1IHN
FWØDD - To VE3ODX
G3JKI/5A - c/o F6CYL
GU5AEG - Via DJ5NX
H44BP - To VK4WIZ
HH2VP - c/o N4XR
HZ1AB - Via K8PYD
JY5MB - To WA4HNL
KG4WC - c/o K4EXA
OX3CO - Via WB3KGY
P29LB - To WB2FLB
ST2FF/STØ - c/o OH2MM
TG9ML - Via K5BDX
TG9XGV - Via K4CLA
TU2IN - To K3HBP
VP2MBV - c/o WD4GXT
VP2MFL - Via K5BDX
VP2MH - Via W8HM
VP2MX - To VE1ASJ
VP5BH - c/o WB5OPM
VP5WJR - Via WB5UEP
VQ9CT - To W6IMX
VQ9SL - c/o W2HHT
XT2AU - Via WA1ZEZ
YK1AA - To DJ9ZB
ZB2EO - c/o K3MNW
ZF2BN - Via W4HET
3B8DB - Via K5BDX
3D2ER - To W5RBO
4A4MDX & 4B4MDX - c/o XE1OX
5W1BT - Via WA6AHF
5W1CS - To K5YY
6W8JI - c/o WA4VDE
9G1SD - Via WAØUOX
A9XCX - Bob McCreedie, Box 702, Manama, Bahrain.
CEØAC - Via CE3YY, Box 2115, Santiago, Chile
FO8GL - c/o Post Office, Piputa, Rangiroa Island, Taumotu, French Polynesia
HC8EE - Via HC1MM, Maria Dorsch, Pinto 626, Quito, Ecuador
HL9WP - Frank Longeill, 257 Signal Company, APO San Francisco, CA 96271
HR1RMG - To Rene, Box 640, Tegucigalpa, Honduras
HS1AMM - U.S. and Canadian amateurs QSL to VE3GCO
OH2AP/OJØ - Via Box 90, SF-04401, Jarvenpaa, Finland
TU4AV - QSL W4MGN's operation to W2SQT
TY9ER - Cards for July 1980 expedition by W4MGN go c/o N2OO.
VK9NL - P.O. Box 103, Norfolk Island, 2899 Australia
VQ9JW - To Joy A. Wilson, KA3EDN, 2931C Second Army Drive, Ft. Meade, Md. 20755
ZD8TC - From 11/01/80 via N2CW
5V7HL - To Ted, P.O. Box 8062, Lome, Togo
6T1YP - QSL the June 18-23, 1980 operation to OH2BH
8Q7AY - To Hans, Embudu Village, Republic of the Maldives

QSL Information Wanted: C31SW & FM7BL, May 1979; HV1AK, May 1970; HZ1AU and JE1OMO/HP7, March 1976; K5YMY/TJ2 and KM6DQ/HK6, May, 1970; LZ7A and OG4AB, October 1978; PP7AF and PV8GS, 1971; PR7LI, September 1978; TI3BVF, 1974; TL8PD and TT8AA, 1965; VB3KRK, March 1978; VK9NW, 1979; VP1AD and WT1ITU, May 1974; ZA1AA, June 1967; 4X1XF and 5A3TB, March 1980; 7Q7AA, 1978 and 9J2DI, December 1978.

a monthly feature by
A. EDWARD HOPPER, W2GT

Awards

NEWS OF CERTIFICATE AND AWARD COLLECTING

The December "Story of The Month as told by Don is:

Don Ronk, WA6WCG
All Counties #263 1-14-80

From the earliest days, the mystery of radio had a strong attraction for me. I was always tinkering, but never accomplished anything until high school days. I found a diagram of a receiver and a transmitter in the school library and proceeded to build them as a physics project. They worked, crude as they were, with some tinkering and stuff. My neighbor, a mile away, was in my class and built the same sets, battery powered with wind power from the windmill in the yard and a generator from an old Dodge. We lived in western Nevada, by the way, with no power lines running around the countryside, this being in 1928.

"One day a car drove into the yard and a gentleman explained to me that I needed a license to operate, and that a spark gap transmitter was taboo at that late date. He was a nice fellow and he started me off on the right foot with a diagram of a transmitter using tubes. After some struggle I was on the air again with a battery powered set and a long wire antenna running from the house to the windmill tower.

"College plus a career in the Navy and a family of four children caused me to drop radio for a long time. But later, when I walked into the shack of Don Leal, K6ACU, he got me interested in the hobby again and got me started toward a new license.

"At the age of 60 plus, it was a struggle to learn the code, but I finally made it with the aid of K6ACU and some other friends who were also taking the course at night school in Santa Cruz.

"I was licensed as WN6AAI in 1970, but as I was Master in my lodge of Masons, I had no time to study and that license lapsed after one year. After I was out of the Master's chair, I passed the exam and became the proud possessor of WN6WCG.

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

Nice radio room and Don Ronk, WA6WCG.

"In 1973 I upgraded my license to General, and in 1975 I passed the exam for Advanced. I had a stroke on Christmas day of that year and that laid me low for about three months.

"After getting back on my feet and being able to operate again, I made contact with some stations who got me started in County Hunting. I lost a log book covering that period, so I do not know their calls.

"In April of 1976 I really started chasing Counties, and the first thing I knew I was into it with a "coloring book" from W6CCM and a wall map from Bill in Pennsylvania. It was a godsend, as about that time I was recovering from the stroke and it was good for me to have that kind of interest. I was also beset with a speech difficulty, which precluded long, difficult conversations at times.

"Thanks to *all* for their generous help."

Awards Issued

Betty Coleman, W4EHN waited until she had them all and sent for USA-CA-500 through USA-CA-3000 endorsed All 20, All S.S.B., All Mobiles, and All Counties endorsed All Phone.

Larry Sitton, WB7AYN added All Counties to his nice collection.

Paul Schuett, WA6CPP also added All Counties endorsed All S.S.B. to his fine collection. (Thanks for that nice letter full of interesting data; wish we had room to use it in this column—Ed.)

Hal De Voe, KL7MF, who was one of the original 26 who received the *first* USA-CA Certificates in October 1961, finally found time to complete All Counties and get to the necessary paper work. (Other members of that famous 26 who are still active on the CH Nets or other amateur activities include K2PFC, W0MCX [now W0BK], DL9PF, W8WT, W5AWT, and W4WSF. Excuse me if I left anyone out or forgot his/her new call—Ed.)

Vivian Scott, WD0EMS (*E*arly *M*orning *S*unshine) found time to add USA-CA-1500 and 2000 endorsed All S.S.B., All 14, All Mobiles; USA-CA-2500 endorsed All S.S.B. and USA-CA-3000 endorsed Mixed.

Clem Lambert, WB1DQA picked up USA-CA-1500 endorsed All S.S.B., All 14, All Mobiles.

Harold Griffin, N4OA acquired USA-CA-500 and 1000 endorsed Mixed.

Henry Zimmerman, KB7W claimed USA-CA-500 and 1000 endorsed Mixed.

USA-CA-500 Certificates endorsed All A-1 were issued to:

Harold Moreau, VE2BP

James Howell, KA4EBW (also QRP)

Emil Hlom, OK1AEH.

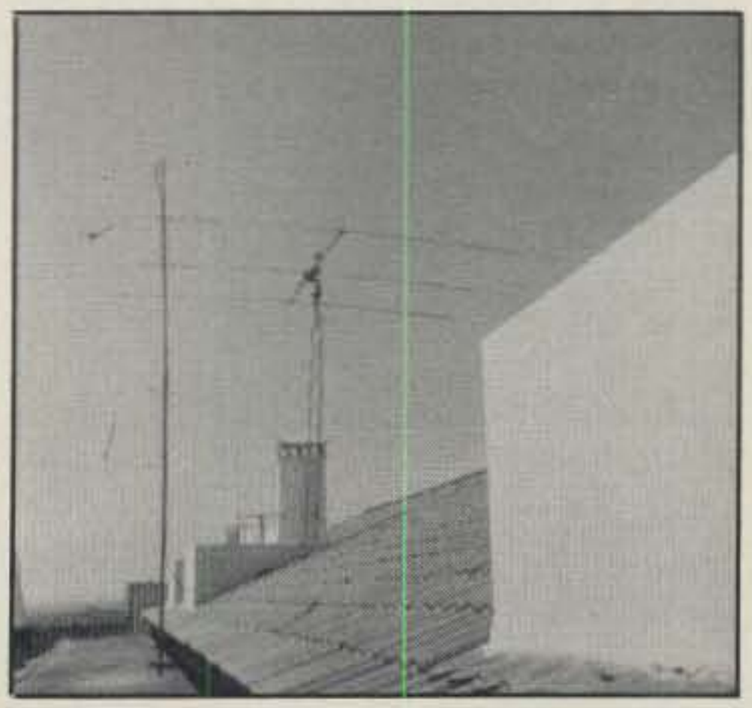
USA-CA-500 Certificates endorsed All S.S.B. were sent to:

Marianne Vander Zanden, AE9X

Jan A. Van Der Rijt, NL-4276, #1 Award to an SWL in The Netherlands

Richard Connolly, K0RDJ

Karl Kneidinger, OE5CA gained USA-CA-500 endorsed Mixed.



Antennas at Adilio, CT1RM.

Special Honor Roll
All Counties

#297 Edith M. Coleman, W4EHN 8-25-80.
#298 Larry L. Sitton, WB7AYN 8-25-80.
#299 Paul Schuett, WA6CPP 8-25-80.
#300 Harold D. De Voe, KL7MF 8-27-80.

Awards

Christmas Florida Certificate: The Indian River Amateur Radio Club of Cocoa, Florida will be operating from Christmas, Florida during this coming yuletide season. The dates will be December 20 through December 27. Operating times generally will be from 1400Z to 2000Z daily. The town of Christmas, located on the East coast of Florida, welcomes many visitors each year from around the U.S. Christmas is celebrated each and every day of the year. There are fully lighted Christmas trees, wreaths, and decorations, along with Santa and his helpers. The Indian River Amateur Radio Club, as a celebration of its 26th year of organization, will use the club call sign, W4NLX/4. A special handsome 8½ × 11 certificate will be available to all worked stations. This certificate depicts some of the aspects of Christmas in Florida. Arrangements have been made to have a special cancellation at the U.S. post office for

The PACW Award (PY8's).

this award. Please send a large s.a.s.e. for the certificate. Operating frequencies on s.s.b. will be 7.280, 14.280, 21.380, and 28.680. On c.w. the club will operate up 60 kHz on the 40, 20, 15, and 10 meter bands. Also, the 146.34/94 repeater will be active for local contacts. QSL to the Indian River Amateur Radio Club, W4NLX, P.O. Box 105, Christmas, Florida 32709.

Henry Morgan Award: The HKØDX Club Award is issued to any licensed radio amateur and SWL. Needed are 21 points; a contact with a member of HKØDX Club counts 3 points, and contact with a station located in San Andres & Providence Islands counts 1 point. Send complete QSO data and 10 IRCs to: HKØDX Club Award Manager, HKØCLS, Salo Tesone, P.O. Box 392, San Andres Island, Columbia. QSOs must be dated on or after November 1, 1977.

Sir Henry Morgan (1635-1688), English buccaneer and Lt. Governor, was born in Wales. He was kidnapped as a young boy in Bristol and sold as a servant in Barbados. Later, going to Jamaica, he joined a band of buccaneers, and in 1666 was in command of a ship in an expedition led by Edward Mansfield, which captured the Island of Providence or Santa Catalina from the Spaniards. Mansfield was killed in the expedition and Morgan succeeded him as "Admiral" of the buccaneers. Commissioned in 1688 by Sir Thomas Modyford, Governor of Jamaica, to seize some Spanish prisoners for information purposes, Morgan destroyed Puerto Principe in Cuba and Porto Bello on the Mainland. He later

USA-CA Honor Roll

3000		1500		500	
WDØEMS	322	WB1DQA	495	N4OA	1501
W4EHN	323	WDØEMS	496	VE2BP	1502
2500		W4EHN	497	KA4EBW	1503
WDØEMS	383	1000		KB7W	1504
W4EHN	384	N4OA	618	AE9X	1505
2000		KB7W	619	W4EHN	1506
WDØEMS	439	W4EHN	620	NL-4276	1507
W4EHN	440			OK1AEH	1508
				OE5CA	1509
				KØRDJ	1510

BLUE LAKE AWARD
SOUTH EAST RADIO GROUP

The South East Radio Group has pleasure in granting this certificate

to

who has complied with the conditions under which this award is granted by contacting the required number of members.

Mode

Award No. Date

Awards Manager President

SERG: MOUNT GAMBIER, SOUTH AUSTRALIA
P.O. Box 1103, Mount Gambier, 5290

Blue Lake Award (VK5's).

sacked the Venezuelan coastal towns of Maracaibo and Gibraltar and sank three Spanish men-of-war at the entrance of Lake Maracaibo. On his return he was named "Commander in Chief of all ships of war" of Jamaica. In 1670 he ravaged and retook the Island of Providence. The following year, in one of the most brilliant actions of its kind, Morgan seized the whole of Spanish Panama, including Panama City, where he took enormous treasures. In the meantime, however, peace had been signed between England and Spain and both Modyford and Morgan were put under arrest. But Morgan soon gained the King's favor and in 1674 he was knighted and named Lt. Governor of Jamaica. Because of his continued sanction of privateering and other bad conduct, he was relieved of the post as Lt. Governor in 1683. He died on August 26, 1688 in Port Royal. Although he has always been termed a buccaneer, most of his expeditions were legally commissioned by the Governor and were directed exclusively against powers with which England was at war. (Note—I believe they still search for his buried treasures—Ed.)

Oh yes, members of the HKØDX Club include HKØBBF, HKØQA, HKØBKX, HKØBDW, HKØCOP, HKØLF, HKØCLS, and HKØAZW.

PACW Award: This is sponsored by the "Para Grupo of CW" for all amateurs who have worked two (2) different members of the group (c.w. mode only), and QSOs after January 1, 1980 are valid. Send complete log data including call, date, time, band, and report and 10 IRCs. Do not send QSLs, but instead send a certified list, certified by two other amateurs or a Club Officer, and send your personal QSL. Same rules apply to SWLs. Send to: PACW, P.O. Box 203, 66.000 Belem Para Brazil. PACW members include: PY8AA, PY8ACR, PY8ACS, PY8AFH, PY8BL, PY8DP, PY8EL, PY8FI, PY8HP, PY8JS, and PY8ZLC. Thanks to Fred, PY8ZLC/K4LC for this data.

Blue Lake Award: This Award is offered by the South East Radio Group, located in Mount Gambier, South Australia. The object is to create an interest between radio operators throughout the world and the southeast of South Australia. It is available to any amateur who establishes two-way contact with five (5) South East Radio Group Members. All amateur bands and modes are permitted; crossband operation is not permitted. Send full log data including date, time, frequency, call, and mode. Cost is $1.00 or 5 IRCs. Send to: The Awards Manager, S.E.R.G., P.O. Box 1103, Mount Gambier, South Australia 5290. Oh yes, contacts made on or after 1 January 1980 are valid for the Award. Thanks to Len, VK5ALC for the data.

Notes

Although this is being written in September, may I wish you all the very very best of Christmas Seasons, Cheer, Good Health, and Happiness, and sure hope Santa brings you all the QSLs and new equipment you desire.

73, Ed, W2GT

CQ's VHF/UHF antenna maven descends from his usual ionospheric-tropospheric perch all the way down to the BC band with a project for salvaging those now-valuable old radios.

Heating Up Old Standard Broadcast Sets

BY T. E. WHITE*, K3WBH

Return with us now, friends, to those thrilling days of yesteryear when my "Don Winslow of the Navy" anchor stamp with personalized initials was new, and my Tom Mix/Ralston Purina Morse code sender was clicking along.

You may not be able to afford a classic car, but classic radios are "in." Haunt those garage sales, OM, and grab that old Crosley or Fada and thrill to BC DX as your father and grandfather did!

Here are the hints, for the Novice especially, on (1) souping up sensitivity of console and larger table sets with transformer power supplies, and (2) making SAFE and performance-improving modifications to a.c.-d.c. "kitchen table" radios.

Today's consumer a.m.-f.m. transistor radios are absolutely terrible in a.m. performance. Accurate tuning is impossible; sensitivity and selectivity are abysmal. But those old-time honest-to-God *tube*-type sets with "really big" dials, separate mixer and oscillator stages, battleship-construction *condensers* and conservatively rated (by today's standards) components will get you that DX BC station every night.

While the FCC has announced the eventual demise of historic "clear channel" assignments and even hatched a plot to narrow the 10 kc separation *(we're talking old times here so it's kc, not "kHz")*, it'll be a long time coming, so BCL DXing is still worth it.

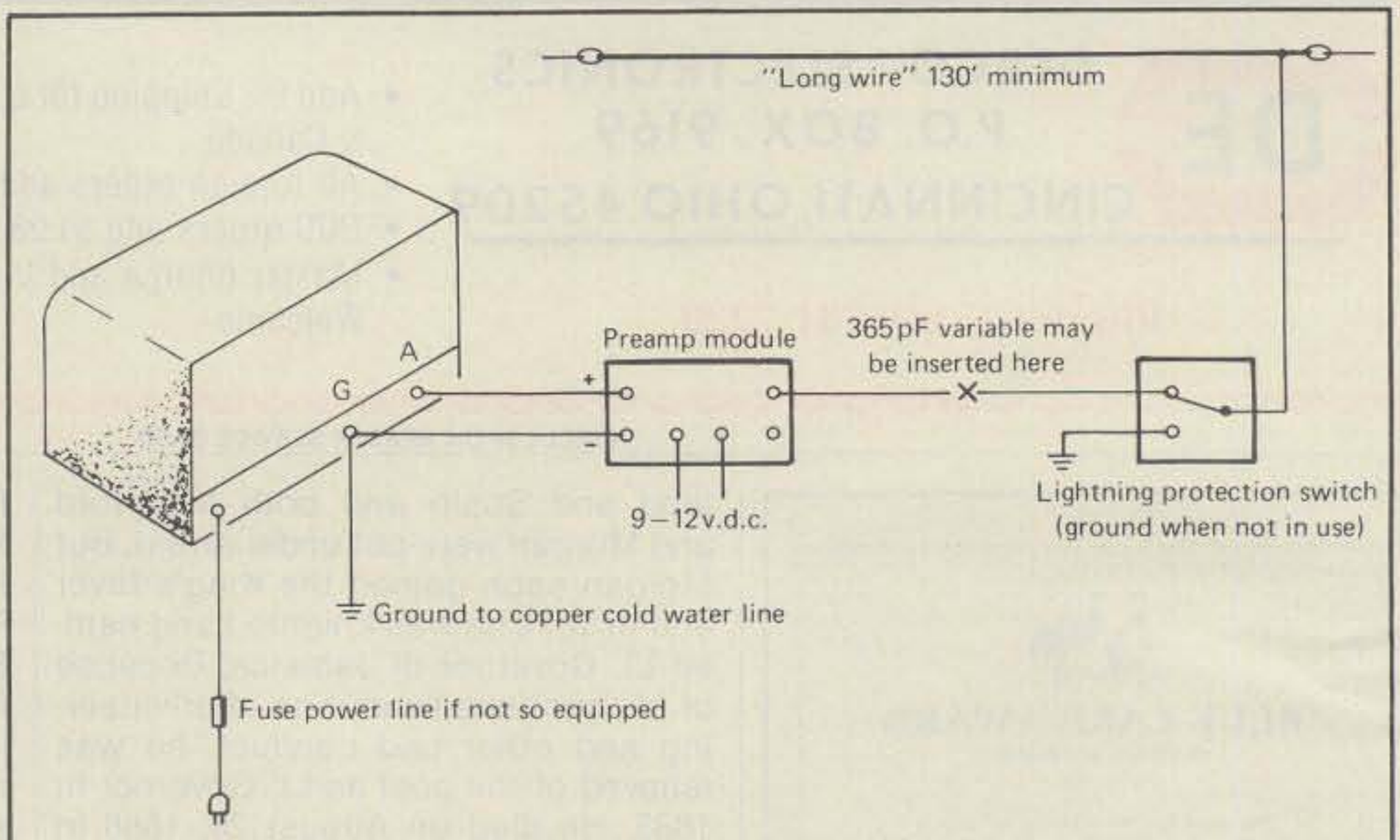


Fig. 1– Simplified method of improving the r.f. section and stringing up an aerial.

AC-only Sets

The console and table sets of the mid-to-late '30s and eve-of-war period

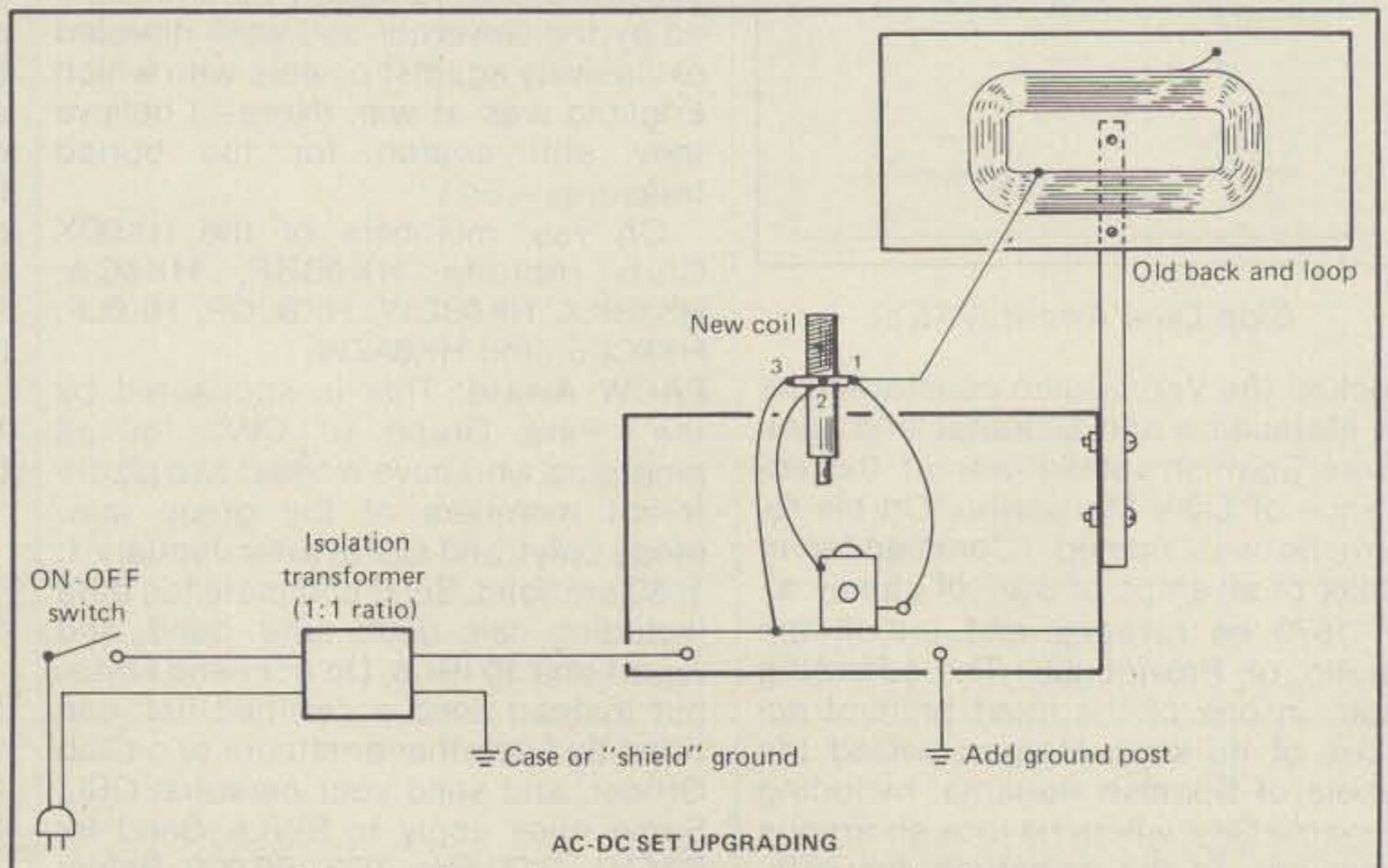


Fig. 3– A.c.-d.c. set upgrading techniques.

*36 Lake Ave., Fairhaven, N.J. 07701

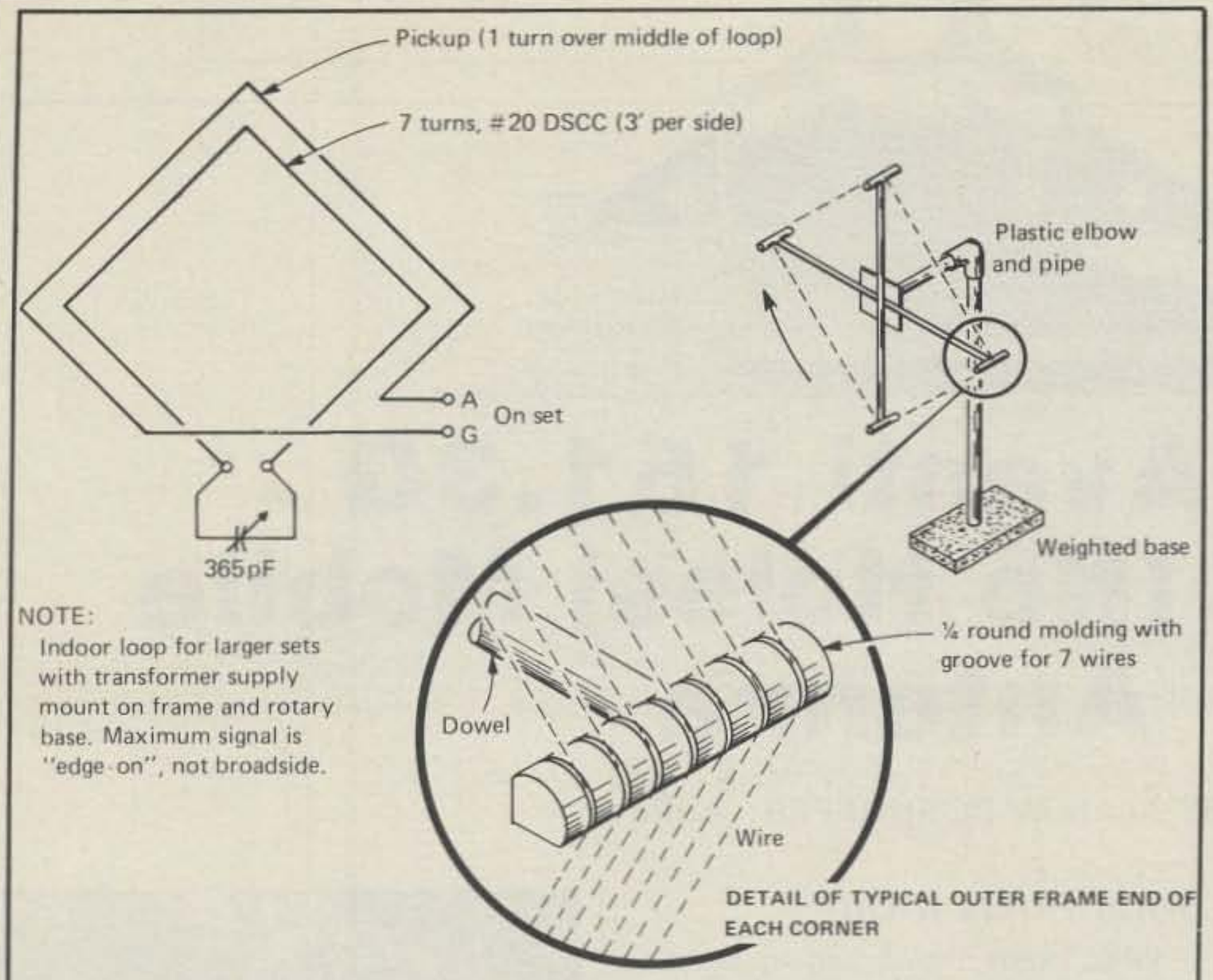


Fig. 2– An indoor loop antenna for those early BC sets.

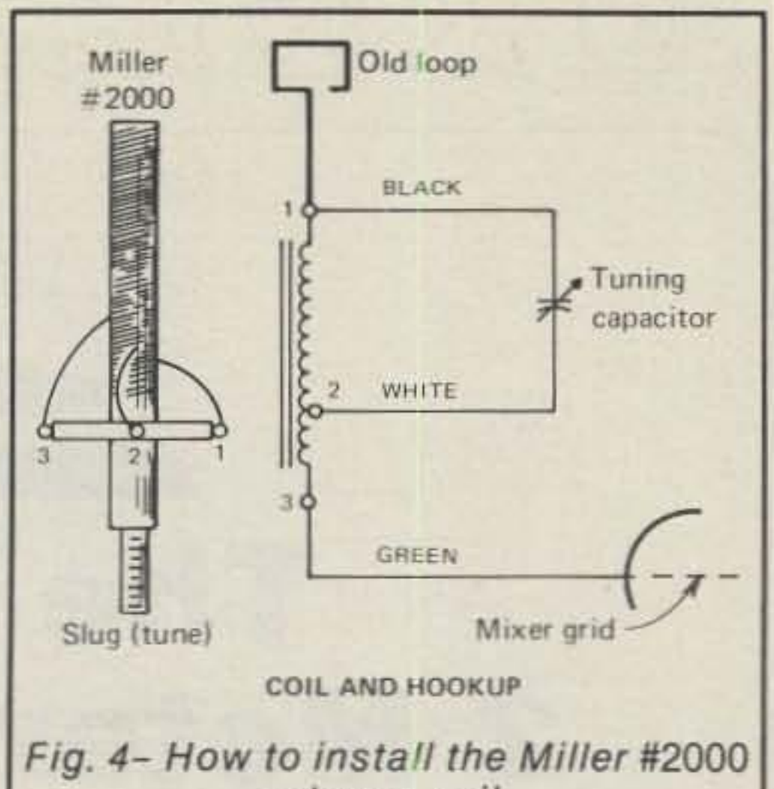


Fig. 4– How to install the Miller #2000 antenna coil.

are the ones most worthy of heating up. We're not talking here of Atwater Kents. I had a 1938 Crosley with a.m. plus 3 SW bands, rear apron connections for phono and even one labeled "television," which I foolishly junked years ago, as we foolishly threw out the Tiffany lamp over the dining room table. Who would've thought...?

If you can find such a gem of purest ray serene, first give it a smoke test on a fused line. If nothing smells or touches hot, then clean, clean, clean. Restring dial cord. Clean dial and window. Tweak *condenser* trimmers and i.f. transformers. Check the possibility of substituting "Tubesters" (solid-state plug-in replacements for tubes) where available. Replace small tuning knob with the largest spinner that will fit.

Then wire up an improved r.f. section as in fig. 1, using a little International Crystal or Digitrex preamp. Run the longest long wire, suitably lightning-protected, to the farthest point in the backyard you can reach. (If you don't have at least 130', forget it...use an indoor loop or ferri-loopstick.)

Small AC-DC Sets

These were DANGEROUS. The chassis is above ground! An isolation transformer is mandatory (see fig. 3). Make sure an on-off switch is in the hot side of the primary lead. Don't turn the set's volume control on-off. Leave it on.

These little sets were all built to what was called the "All American Five" circuit, regardless of manufacturer. Bill Halligan at Hallicrafters marketed one. They had 5 tubes: 12AV6, 12BA6, 12BE6, 50C5, 35W4. The best and one of the last made, if you can find it, was the Zenith chassis no. 5FO5. It is capable when juiced up as per figs. 3 and 4 of amazing night-time DX reception and can be tuned to a DX station only 10 kc away from a local without QRM.

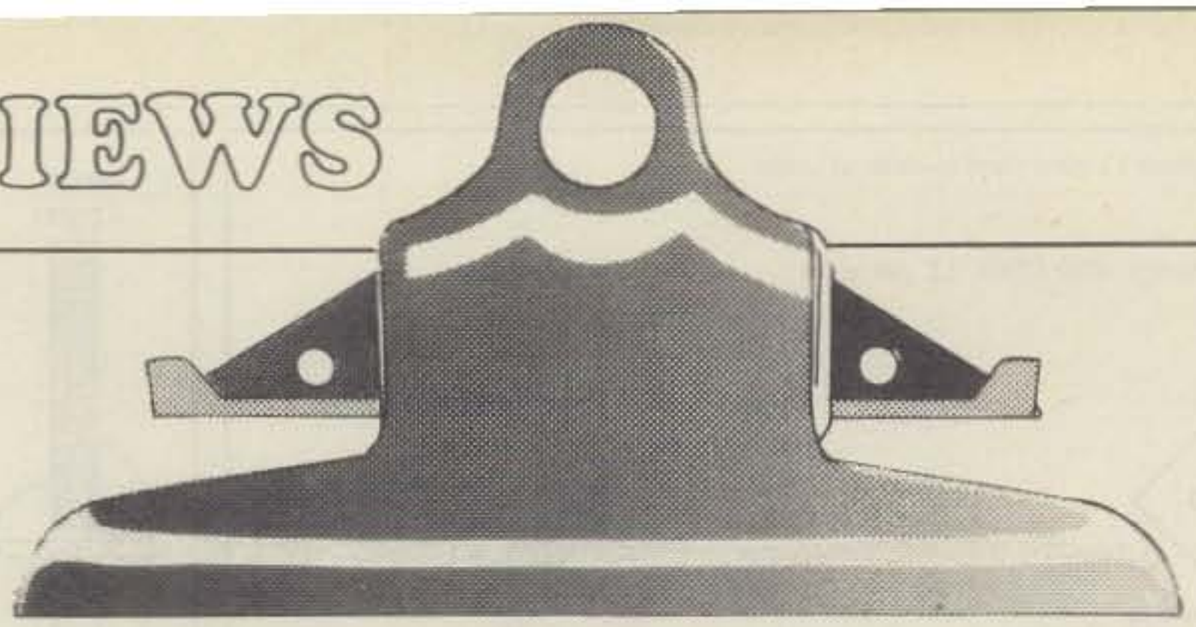
After buying a Miller #2000 antenna coil, remove the back cover with its glued-on loop and save it. The now-open back will permit proper cooling.

Remove the 3 wires, usually white, black and green, from the *condenser* and loop. Take off the *condenser*, clean and lube it. Discard the insulating spacers and remount the *condenser* directly on the chassis. Replace weak tubes (or see "Tubesters" above). Radio Shack still sells a 5-tube package for these sets. Add a ground post to the rear apron.

Reconnect the r.f. wires as shown. Don't fool with the oscillator section (small rotors) of the *condenser*. Mount the Miller through a hole drilled in the cabinet top, away from metal such as the capacitor can. Tune the slug for max at about 800 kc using non-ferrous alignment tool.

Mount the old back with loop on a piece of 1 × 1 and to the cabinet. Connect the inner end of the loop to coil terminal 1. Leave the outer end free. This is now not a directional loop. It merely adds capacitance and signal strength. Signal pickup will be omni-directional.

So we now have two ways of BC DXing, on the old living room floor model or the bedside bantam. Who needs a $1000 commmercial receiver? Some day the old radio you fixed up for a few bucks may be worth almost that! By the way...if you run across an RCA model ACR-111, send me a mailgram.



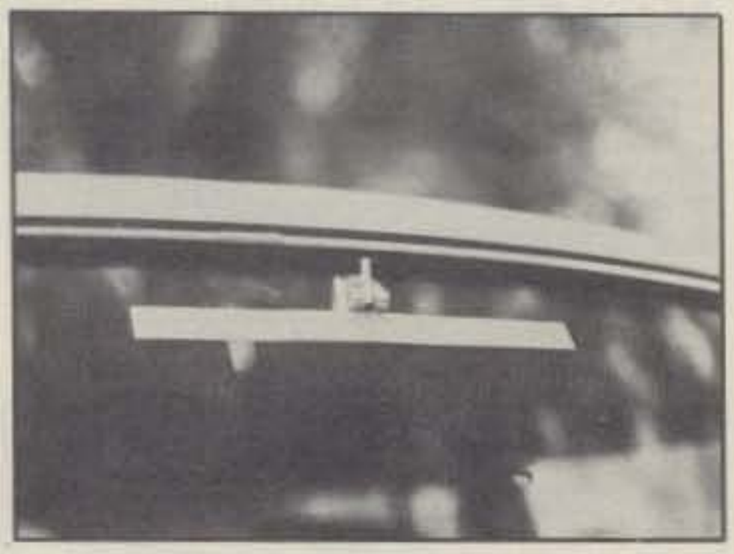
The Avanti 151.3G 2 Meter (No Holes) Mobile Antenna

BY ALAN M. DORHOFFER*, K2EEK

The first thing that grabs your attention when you see the Avanti AH 151.3G 2 meter antenna is the thought that perhaps it's only a gimmick. It certainly is a curious concept, and a "through the glass" antenna draws crowds for Avanti at Hamventions and inevitable questions to owners by fellow amateurs. What holds it on? How does it work? Can you get it off? What's in the little black box?

The classic selling feature of the antenna is that it can be installed on a car without drilling any holes in the vehicle. It is an end-fed ½-wave omnidirectional antenna with a manufacturer's claim of 3 dB gain. Does it work? A definite yes and a definite improvement over the rubber ducky on my HT from within my van.

Rather than go on describing the characteristics of a stainless steel whip about 30" long, I'd like to get right to the interesting stuff. First, the quality of the components seems excellent, and the physical design of the mounting system is quite professional.

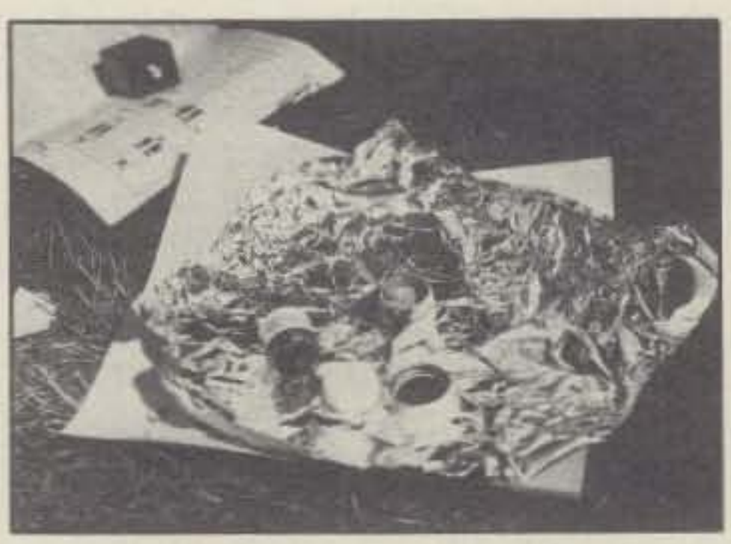


The cardboard support holding the mounting plate in place.

* Editor, CQ

What Holds It On?

What holds the mounting plate to the windshield is an epoxy mixture that you mix and apply to the plate. The location for mounting the plate is determined by the instruction sheet. Once that is established, a simple cardboard support is secured temporarily to the windshield by two double-sided self-sticking sponge spacers. Next you mix the contents of one jar with the contents of the other



The two jars of epoxy carefully blended by toothpick on aluminum foil. The little black box and instruction manual are in the background.

jar to produce a gray substance which you apply gingerly to the underside of the mounting plate, trying not to get any on yourself or your clothing. Next you place the mounting plate on the windshield where the bottom rests on the cardboard support. At this point, if you're like me, you go into the house and have a cup of coffee for about twenty minutes while the epoxy sets.

After your caffein fix, you thread the whip into the mounting plate and adjust its attitude via the side angle adjustment screws. You've got about 180° of latitude in adjustment, but up

The whip mounted in a position of function.

is up. The little black box is next. Actually, within the black box is an LC system with a fixed coil and a capacitor that varies with compression created by an adjustable plastic screw. Back to the good stuff. The black box is secured to the inside of the windshield by double-sided self-sticking tape. Just peel back the protective paper and apply to the windshield "over" the corresponding area taken up with the mounting plate. Next secure the thin grounding wire and lug to the metal portion over the windshield. It should reach one of the mounting screws for the sun visor.

Connect the coaxial cable to the small fitting on the little black box and run the cable around the headliner and down to where you'll need it. Avanti supplies self-sticking cable clamps for this purpose, but you may want to use something a little more positive for this purpose. Remove the cardboard support, throw away the excess epoxy and dig out (or borrow) an s.w.r. indicator. The s.w.r. adjustment is that plastic screw I mentioned earlier. With the s.w.r. indicator inline, simply adjust the screw for minimum s.w.r. readings. You can also trim the height

The little black box on the other side of the mounting plate. The instruction manual rests below on the dashboard.

of the whip for use within specific frequency ranges. Remove the indicator (don't forget to return it), connect the rig and away you go.

How Do I Get It Off?

Most amateurs worry about the long range problem of selling their cars to non-amateurs in the future. We do worry about having a hole in the body that once housed an antenna mount and what to do with the hole. Rather than just leaving the mount in place and getting another one for the new car (which is usually the case) we worry about the cost of body work and paint jobs. Well, Avanti has taken the worry out of being an amateur. The self-sticking black box can be pried off, and the epoxy-held mounting plate can be removed with heat. Just hold a small soldering iron on the mount and it will soften the epoxy. Avanti also can supply you with additional epoxy mixture for your new car at a modest cost.

Conclusion

The Avanti AH 151.3G 2 meter antenna is a novel approach to operating mobile or even for an apartment window for that matter. It does work, and it does indeed solve some of the problems of being an amateur, while at the same time being an interesting conversation piece.

The AH 151.3G antenna sells for $33.95. It comes complete with coaxial cable and connector. The connector is a standard SO-239, so you'll need an adaptor to BNC for HT use. For more information you can write to: Avanti Communications Inc., 340 Stewart Ave., Addison, Illinois 60101 or circle number 100 on the reader service coupon.

a monthly feature by
ADRIAN WEISS, K8EEG

QRP

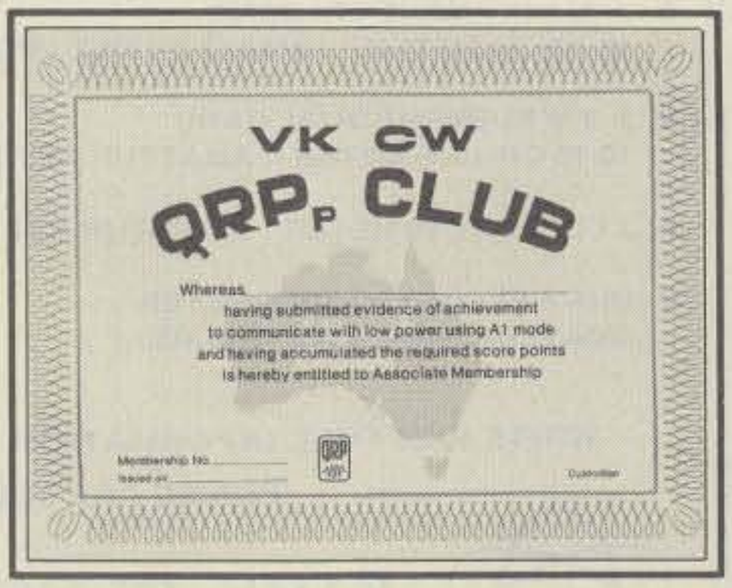
THE ART OF VERY LOW POWER OPERATING

Viking 3X5 Clarifications, Operating News

It is not difficult to understand why several clarifications are needed with respect to the Viking 3 × 5 QRPp 20 meter transceiver article published in the May and August 1980 issues of *CQ*, considering the complexity of the project. As yet, we have not detected any actual errors, but several points "slipped by" the editors and author in preparation of the feature. The following will clarify matters.

1. Transmitter Pi-net Values. The schematic on p. 26, May 1980 *CQ* shows the proper values for the pi-network. However, the p.c. board template and overlay on p. 16, August 1980 issue, shows pi-network values for 80 and 40 meters. The artwork here is a duplication of previously published work in an earler article on the transmitter design. The actual Viking 5 transmitter circuit will operate efficiently and stably on all bands 80-10 (possibly 160, although it has not been tested on that band). Hence, ignore the pi-network values shown on the p.c. template overlay and use the values as shown on the schematic. While the receiver has not been scaled to 80 or 40 meters, it will in all likelihood perform excellently on those two bands with the proper scaling of the input tank network consisting of L1-L2-C1. If the builder desires to modify the transceiver to those two bands, he may attempt this modification with high probability of success. The original Viking 5 article appeared in *CQ*, Feb. 1979, while the v.f.o. circuit appeared in *CQ*, April 1979.

2. Transmitter Q4 base-emitter .001 bypass. Again, the duplication of the earlier artwork allowed a component to remain which does not appear in the Viking 3 × 5 schematic in the May issue. That component is the .001mf bypass capacitor connected between the driver transistor (Q1, p. 16) base and emitter. This capacitor must be omitted when the transmitter is driven by a v.f.o., while the capacitor must remain in the circuit when crystal control is used. Likewise, the 470pf and crystal shown in the overlay template of p. 16 are to be omitted in the 3 × 5. The schematic of p. 26 in the May issue is the final authority on parts and connections.



VK CW QRPp Club membership certificate.

3. P.C. Board Template Outlines. It is amazing that the mere addition of a black line showing the edges of the p.c. board templates on p. 16 and p. 18 can so utterly confound the careful and precise effort expended in designing and artistically producing the template! Of course, a few moments of close inspection by a prospective builder would serve to make clear that among the circuit elements "grounded" by the black edge outline are the antenna, audio output, v.f.o. tuning circuit, IC2 output-Q6 input, and last, but not least, the main B+ buss!!! In other words, the template as shown basically is a closed loop short circuit! This would be a good place to note to all prospective homebrewers that a p.c. template must be studied closely and compared to the schematic. To clear up the problem, let us begin with the transmitter p.c. template on p. 16. The only edge-line which actually represents copper foil is that strip immediately above the "(B)". This can be seen by a quick glance at the gray overlay template. All other edge-lines must be omitted. All "white spaces" which separate pads leading to the board edge must continue beyond the board edge. Incidently, have you noticed that the capacitors shown at the lower left sector of the overlay template are not indicated by the schematic of p. 26, May 1980, issue? A single 60pf trimmer is positioned as the lowest capacitor shown in the overlay. A third correction should be noted. Since the transmitter board consists of double-sided p.c. stock, and all parts are mounted on the etched side with the "underside" functioning as a common groundplane, it is wise to drill holes for the groundleads of several components to establish an electrical path between foil-side ground pads and underside common groundplane. This can be done at the 0.1mf Q1 emitter bypass capacitor, at the ground end of the 0.1mf RFC2 bypass capacitor, and at the L2-L3 common ground connection. This approach ensures the shortest possible ground paths for circulating r.f. ground currents and is an aid to achieving stability.

Next, the receiver template of p. 18 can be corrected. There is only one edge-line that indicates a ground-foil and that extends upward from the bottom left edge 4 cm (1.5 in.) and ends just below the rectangular vertical pad which serves as connection point for R25-C38-D2-RFC1. From the 4 cm point to the top of the board, all white spaces extend beyond the board edge. Similarly, all white spaces along the bottom edge of the board should continue beyond the edge indicated by the edge-line. Likewise, along the right edge, all white spaces should extend beyond the edge from a point about 1.9 cm below the top right corner. The top edge of the board is correct as shown. Finally, receiver template, as shown, is just a bit too large for the standard LMB-139 5.5 × 3 × 1.25 in. box used in the project. The box will accept a depth of about 3 1/32 in. The template should be trimmed at the top edge by removing about 1/16 in.,

**83 Surburban Estates, Vermillion, SD 57069*

and if further trimming is necessary, about 1/32 in. can be sacrificed at the bottom. The top edge allows for the greatest amount of trimming. If it is necessary to trim the top edge to the extent that the foil edge above the foil strip whose ends serve as connection points for C3-R3 is removed, simply run a jumper wire from the top right ground foil to the top left corner ground foil. Incidentally, the parts of the receiver-v.f.o. section are mounted on the side of the p.c. template opposite the foil side. In other words, we are looking at the bottom, foil side of the p.c. board, and the parts are mounted on the other side of the page. Single-clad p.c. stock is used.

While the above artwork problems should have been eliminated before publication, they unfortunately escaped attention. Hopefully anyone who attempted to construct the unit will have detected the errors. Otherwise, disaster will have resulted. We apologize for the problem. It has been about a year-and-a-half since the unit was constructed, and to this point, it has performed flawlessly. I managed to take it along on camping expeditions "squeezed" into a heavy concentration of summer energy on putting together the long-promised *QRPp Handbook*. The rig "delivered" as usual, and I still am "in love" with it! Seems that it has created quite a bit of interest among readers. I was even offered a genuine "Gold Record" (the kind outfits get for hit records topping the one-million mark) for the 3 × 5. Fortunately, the person understood why I didn't want to part with it. There have been quite a few inquiries as to the availability of commercially produced p.c. boards for the project, but at this point, I am unaware of anyone undertaking such an effort. I will be pleased to list any sources for commercially produced boards in a future column, should some outfit volunteer to undertake production.

Operating Reports

It has been about ten years since *The Milliwatt* appeared as the lonely champion of QRPp and eventually grew to circulate among all states and about 40 foreign countries. QRPp has now become a significant factor in world-wide amateur radio operation, and it is almost impossible to tune across one of the ham bands for several minutes without hearing someone call or sign "QRP." At this point, organized QRP activity is being pursued in several countries, including the U.S., England, Holland, Italy, Germany, Scandinavia, and more recently, Australia and Brazil. From VK6JS comes the following report:

"QRP is alive and progressing well down-under in VK land! Although we were enthusiastic QRP'ers for some years, reading your monthly feature regularly last year sparked an urge to get something serious started along these lines here in Australia. Finally, in early December 1979 we decided to get stuck into it. A cross-sectional check through the mail among VK-amateurs returned a surprising number of consenting replies to our inquiry on the feasibility of a 'Club-type' operation...which proves that QRP'ers are lurking all around...it's just a matter of setting up a turkey shoot!!

"So, it appeared that we had an open door and founded the "VK CW QRPp Club," effective 0000Z, January 1, 1980. By this time, of course, we had gone through the inevitable turmoil of formulating 'Rules for Operating' and, more importantly, incorporating some simple formula for Club point scoring to give our fellows some tangible proof for their efforts. As you will note in the Club rules enclosures, the formula for determining membership points is : No. points equals the square root of the distance divided by the square of the output power, for a given contact. We got some good publicity through *Amateur Radio Action* magazine through the kind assistance of Alan Shawsmith, VK4SS, and a subsequent article in *Amateur Radio*, the official journal of the Wireless Institute of Australia, gave our membership list another boost. We are still within the realm of 'little acorns' at this stage, however, for we can only boast of a total of 27 members (as of May 1980). But as the saying goes, 'big Oaks' are on their way judging from the number of inquiries being received at a fairly steady rate. The main outcome, to our satisfaction, is the fact that the seed has been sown and we have great expectations on future progress."

The Club rules indicate that a *power output of 5 watts* is the QRP limit, and membership in the Club is awarded upon submission of log data for two bonafide QRP contacts scored as per the above formula. The Club is intended to promote activity in the CQ QRP mode in Australia, and as a result, DX contacts do not qualify for the Club roster scores. I have been impressed with the VK approach in this respect. Hopefully, activity will grow because of this approach. I thank Jack, VK6JS, for relaying the information, and perhaps some Australian readers of *CQ* who are unaware of the VK CQ QRPp Club will learn of it here. Inquiries to: VK6JS, VK CQ QRPp Club, 59 Collova Way, Watleup, 6166, West Australia. The membership certificate is shown in this column.

In July 1980, we received the following information from PY2TU: "I have been a *CQ* subscriber since 1977 and I appreciate your QRP section very much. I wait for it every month and read it with great pleasure. I now offer you information to add to your previous column listing QRP clubs and activities found in the March 1980 issue. There now is a little (but very important to us) QRP group in Brazil. It is the *GQRP-Grupo QRP* (QRP Group). Its address is P.O. Box 700 - 28600 Nova Friburgo, RJ, Brasil. It was created January 10, 1978 by some Brazilian amateurs, led by PY1LG (Lev) and PY1MHQ (Rhony), both of whom are totally devoted to low power operation. *GQRP* is a peculiar club because there are no dues. It is only necessary to send a personal QSL with QRP transmitter specifications as an application, and the applicant becomes a member of the club and receives a nice certificate. *GQRP* allows low power operation at the 10 watt input/5 watt output level. One goal sought by *GQRP* is not to have a great number of members, but just to encourage low power operation in Brazil. Another goal is to encourage homebrew construction of amateur rigs as constant training for Brazilian amateurs. Since February 1980, the *GQRP* has had a column in *Electronic Popular*, a Brazilian magazine devoted 80% to amateur radio. The column is entitled 'Noticiaria QRP' (QRP News). Since April, I have been coordinating this QRP column with the help of PY1LG, PY1MHQ, PY1AFA (Gil, the editor of *EP*) and other QRP operators. Official QRP activities are practically non-existent in Brazil at this time. There is only the *GPCW Test* (7 MHz only) at the end of September with a QRP section limited to 10 watts. In the 1979 test, 12 QRP operators participated out of a total of 190 entrants. The top scoring QRP entrant used only 4 watts and ranked 35th in the listing. It seems to me that the *GQRP* and the QRP News in *EP* must attempt to increase QRP activity here, introducing other amateurs to participate in the challenge offered by QRP operation. Also, the club offers no awards, although its members are working

toward awards offered elsewhere. I enclose the circuit of my new homebrew transmitter for your information. I assembled it in May 1980, and at this time (July 1980), I have 22 ARRL countries worked, although the transmitter is crystal controlled. I am using plug-in coils. This fine QRP rig runs 5 watts on 80-40 meters, and about 3 watts on 20 meters, using a 7 MHz crystal. On 15, input is 2 watts, and 750 mw on 10 meters. The 22 countries were worked on 15 and 10 meters only. My favorite QRG is 21.006 MHz with the 7.002 MHz xtal. I hope to have worked more countries by the time I write again." We all thank Paulo Roberto Moser, PY2TU (PO Box 8268, 01000 Sao Paulo, Brazil) for the report on new activities in Brazil.

Then, from IØSKK comes this appeal for help for his promotion of activity in Italy: "I am the CW and QRP manager for the Italian Amateur Radio group. It is difficult to find your magazine here, so I have read very few of your articles. At any rate, I am writing to you for a little help. I write for the magazine of the ARI (Ital. Am. Rad. Association), and I need news and information to include in my writing. Would you please note in your QRP article that I need news, articles, transmitter and receiver circuits, antenna comments, news about awards, etc., for publication here in Italy. I would like to receive information from the U.S.A., and I hope your article can help. Now, some news about me. I have worked QRP since 1975, when I received the call IØSKK. At first, I used a tube transmitter with v.f.o. and a power of 2 watts on 20 meters. Then I moved up to a v.f.o. transmitter with an input of about 10 watts (6V6, EL34 tubes), and now I only operate on 7 MHz with a homebrew crystal controlled transmitter with a power of about 1 watt. I'm building a v.f.o. transmitter for 14 MHz with about 2 watts, solid state. I also am active as an s.w.l. (IØ55048) and I love contesting. Antennas are an inverted Vee for 14 MHz and an inverted 'L' for 7 MHz. That is the story for now. I hope your readers can send the above information and articles about QRP." So, gang, drop a line to IØSKK if you'd like to help him promote QRP. I suspect that our European readers will be helpful as much as possible. To: Alessandro Antucci, IØSKK, via Boccanegra, 8, 00162, Rome, ITALY.

Fall propagation should have the lower bands popping up by the time this appears. The Michigan QRP Club Net operates every Tuesday evening at 9 p.m. local time (seasonal, EST, EDT), Sundays on 7.270 at 0830 (EST, EDT, seasonal), Saturdays 7.060, 1 p.m. (EST, EDT). The last two net times coincide with the QRP ARCI net's times. Also, *the MI QRP Club is sponsoring an annual QRP Contest* in conjunction with the AGCW-DL QRP Contest, Winter session. For 1981, the contest will take place the third weekend in January: January 17, 1500Z, to January 18, 1500Z. Operation limited to c.w., 160-10 meters. The exchange is : RST, QSO number, power output. Each station is competing within his own state, province, or country, in three categories: (1) One watt or less power output; (2) five watts or less output; (3) Over five watts output power. Scoring is simple: one point per contact. A single station may be worked on each band. Certificates will be awarded to the highest scoring station in each state, province, or country (as per above categories). Log info with entry must include: full log data, equipment used, and output power; enter by March 1, 1981. Include s.a.s.e. for results, which will also be published in this column.

Well, gang, that's the space for this month. Good QRP'ing and 73.

Ade, WØRSP

a monthly feature by
GEORGE JACOBS, W3ASK

Propagation

THE SCIENCE OF PREDICTING RADIO CONDITIONS

The year 1980 is certain to go down in radio history as one of the best years for propagation conditions on the h.f. amateur bands.

The Swiss Federal Observatory at Zurich reports a monthly mean sunspot number of 135.4 for August 1980. This results in a provisional *smoothed sunspot number* of 163 centered on February 1980. The sunspot cycle is measured by the level of smoothed sunspot number.

It appears certain now that the present sunspot cycle, the 21st recorded since the invention of the telescope, reached its peak during December 1979 with a smoothed count of 165, thus making it the second highest cycle in recorded history. The most intense solar cycle reached a peak of 201 during March 1958!

The year 1980 began with a smoothed sunspot count of 164, and is estimated to decline to approximately 140 by year's end. This places 1980 among the very few years in which exceptionally intense solar activity occurred. Propagation conditions on the h.f. bands were correspondingly good during 1980, having been exceeded only during the record breaking years of 1957-59.

While solar activity is expected to decline steadily, but slowly, during 1981, the new year looks like another exceptionally good one for propagation conditions on the h.f. amateur bands.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for December 1980

	Expected Signal Quality			
Propagation Index	(4)	(3)	(2)	(1)
Above Normal: 1, 10, 21, 28	A	A	B	C
High Normal: 6, 8-9, 11, 15, 20, 22-23, 26-27	A	B	C	C-D
Low Normal: 2, 5, 7, 12-14, 16-17, 19, 24-25, 29	B	C	C-D	D-E
Below Normal: 3-4, 18, 30-31	C	C-D	D	E
Disturbed: None	C-E	D-E	E	E

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

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

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

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

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be excellent (A) on Dec. 1st, fair (C) on the 2nd, fair-to-poor (C-D) on the 3rd and 4th, etc.

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

December Band Openings

Continuing high solar activity coupled with seasonally peak ionization levels in the northern hemisphere should result in generally good-to-excellent DX propagation conditions on all h.f. bands.

Excellent *daytime* DX openings to all areas of the world should be possible on the *10, 15* and *20* meter bands. Also expect exceptional conditions on the *6* meter band, with peak conditions likely towards Europe, Africa and in a generally easterly direction an hour or two before Noon, towards Central and South America and the Caribbean area from an hour or two before, to about an hour after, Noon, and towards the Pacific, Australasia and the Far East during the late afternoon and into the sunset period. The best days to look for DX openings on *6* meters are those expected to be HIGH or ABOVE NORMAL.

From *sundown* to *Midnight,* look for DX openings towards the south and west on both *15* and *20* meters, and to most other areas of the world on *40* and *80* meters. Fairly good DX openings on the *160* meter band should be possible from the eastern half of the country towards the north, east and south.

From *Midnight* to *sunrise,* the best DX bands should be *40* and *80* meters, with openings also possible to many areas of the world on *20* and *160* meters.

DX propagation conditions on the *160* meter band are usually at their seasonal peak during December. The band should open towards Europe and in an easterly direction beginning about 8 p.m. in all time zones, and continuing until 3 a.m. in the EST zone, 1 a.m. in CST, Midnight in MST and 11 p.m. in PST. These openings favor locations in the eastern half of the USA. Openings towards the south, particularly to Central America, the Caribbean area and the northern countries of South America, should be possible from about 10 p.m. to 3 a.m. in all time zones. Openings towards the Pacific, Australasia and the Far East will favor stations in the western half of the country, but it may be worth the time to check for these openings in other areas as well between 4 a.m. and local sunrise.

Remember the old rule that applies to *160* meter DX openings, and to *40* and *80* meters as well: optimum conditions occur about the time that the sun begins to *rise* at the *easternmost* terminal of the path.

For *short-skip* openings during December try the *80* and *40* meter bands during the day for paths less than 250 miles, and *80* and *160* meters at night over these distances. For openings between 250 and 750 miles, *40* meters should be best during the day, and both *80* and *160* meters at night. Between 750 and 1300 miles, try *20* during the day, *40* and *80* meters from sunset to Midnight, and *80* meters later in the evening and until sunrise. Try *40* meters again for about an hour or so after sunrise. For openings between 1300 and 2300 miles, it should be a toss-up between *20* and *15* meters during the day, with *10* meters running close behind. Try *20* and *40* meters from sundown to Midnight, then check *40* and *80* meters until sunrise. Try *40* meters again for an hour or so after sunrise.

This month's column contains *DX Propagation Charts* valid through mid-February. *Short-Skip Propagation Charts* for December appeared in last month's column.

V.h.f. Ionospheric Openings

The best times to check for worldwide *6* meter openings on this

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band have been given earlier in this column. They are also indicated by ** in the *DX Propagation Charts*. The combination of high solar activity and seasonally high ionization in the F-2 layer may produce some good DX openings on *6* meters this month. A secondary seasonal peak in sporadic-E ionization should also result in some short-skip openings on this band between distances of approximately 800 and 1300 miles.

There is considerably less likelihood for *6* meter trans-equatorial (TE) openings during December, but some should be possible between the southern tier states and countries deep in South America. The best time to check for TE openings is during the evening hours between 8 and 11 p.m.

Quite a bit of meteor shower activity is expected this month, and this should result in improved conditions for meteor-scatter type openings on the v.h.f. bands for distances up to approximately 1,000 miles. The *Geminids*, a major meteor shower, should begin on December 12 and last for about three days. Maximum intensity is expected at about 5 p.m. EST on December 13, with an estimated meteor rate of about one a minute. The *Ursids*, a considerably less intense shower, is expected to take place on December 21 and 22. It should peak at approximately 2 a.m. EST on December 22, with a meteor rate of approximately 15 an hour.

Auroral displays often increase during December, and are most likely to occur when h.f. conditions are BELOW NORMAL or DISTURBED. Check the "Last Minute Forecast" at the beginning of this column for those days during December that are expected to be in these categories. On these days there is a good possibility for short-skip auroral type propagation to take place on the v.h.f. bands for distances up to approximately 1,000 miles.

The Editor of this column would like to take this opportunity to extend his warmest wishes for a Merry Christmas and a very Happy New Year and holiday season.

December 15, 1980-February 15, 1981
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	10/6 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	07-08 (1) 08-09 (2) 09-13 (4) 13-14 (2) 14-15 (1) 09-11 (1)**	06-07 (1) 07-08 (2) 08-14 (4) 14-15 (2) 15-16 (1)	03-06 (2) 06-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-13 (3) 13-16 (4) 16-18 (3) 18-21 (2) 21-23 (1) 23-01 (2) 01-03 (3)	14-16 (1) 16-17 (2) 17-19 (3) 19-02 (4) 02-03 (3) 03-04 (2) 04-05 (1) 17-19 (1)* 19-20 (2)* 20-02 (3)* 02-03 (2)* 03-04 (1)*
Northern Europe & European USSR	07-08 (1) 08-09 (3) 09-10 (4) 10-11 (2) 11-12 (1) 08-10 (1)**	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-14 (2) 14-16 (3) 16-18 (4) 18-20 (3) 20-23 (2) 23-02 (1)	17-19 (1) 19-01 (2) 01-03 (1) 19-02 (1)*
Eastern Mediterranean & Middle East	07-08 (1) 08-09 (3) 09-11 (4) 11-12 (3) 12-13 (2) 13-14 (1) 09-11 (1)**	07-08 (1) 08-09 (2) 09-11 (4) 11-14 (3) 14-15 (2) 15-16 (1)	07-10 (1) 10-13 (2) 13-16 (3) 16-18 (4) 18-22 (3) 22-01 (2) 01-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-02 (1) 20-00 (1)*
Western Africa	07-08 (1) 08-09 (2) 09-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 08-10 (1)**	05-06 (1) 06-08 (2) 08-14 (3) 14-19 (4) 19-20 (3) 20-22 (2) 22-23 (1)	03-04 (3) 04-06 (2) 06-13 (1) 13-15 (2) 15-17 (3) 17-00 (4) 00-01 (3) 01-03 (2)	18-20 (1) 20-23 (2) 23-01 (3) 01-03 (2) 03-04 (1) 22-03 (1)*
Eastern & Central Africa	08-09 (1) 09-11 (2) 11-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1) 08-10 (1)**	06-08 (1) 08-12 (2) 12-14 (3) 14-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	01-04 (2) 04-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-17 (3) 17-23 (4) 23-01 (3)	18-21 (1) 21-23 (2) 23-01 (1) 21-00 (1)*
Southern Africa	07-08 (1) 08-11 (3) 11-14 (4) 14-15 (3) 15-16 (2) 16-17 (1) 08-10 (1)**	06-08 (1) 08-11 (2) 11-13 (3) 13-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	06-08 (1) 12-14 (1) 14-15 (2) 15-17 (3) 17-20 (4) 20-00 (3) 00-02 (2) 02-04 (1)	18-19 (1) 19-22 (2) 22-00 (1) 19-22 (1)*
Central & South Asia	08-09 (1) 09-10 (2) 10-11 (1) 17-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 17-19 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 17-19 (1) 22-23 (1) 23-00 (2) 00-01 (1)	06-08 (1) 18-20 (1)
Southeast Asia	09-11 (1) 11-14 (2) 14-15 (1) 18-19 (1) 19-20 (2) 20-21 (1)	09-10 (1) 10-12 (2) 12-13 (1) 18-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-21 (2) 21-23 (1)	05-07 (1) 17-19 (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.

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. Time shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M. etc. Appropriate *standard* time is used, *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 8 hours in PST Zone, 7 hours in MST Zone, 6 hours in CST Zone, and 5 hours in EST Zone. For example, 13 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 04 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.

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

Time Zones: CST & MST (24-Hour Time)
CENTRAL USA TO:

	10/6 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	07-08 (1) 08-09 (3) 09-11 (4) 11-12)2) 12-13 (1) 08-10 (1)**	06-07 (1) 07-08 (2) 08-12 (4) 12-13 (2) 13-14 (1)	02-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-13 (3) 13-15 (4) 15-17 (3) 17-19 (2) 19-23 (1) 23-02 (2)	15-17 (1) 17-18 (1) 18-01 (3) 01-02 (2) 02-03 (1) 17-20 (1)* 20-01 (2)* 01-02 (1)*
Northern & Central Europe & European USSR	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-11 (3) 11-12 (2) 12-13 (1)	04-07 (1) 07-09 (3) 09-13 (2) 13-15 (3) 15-16 (4) 16-18 (3) 18-20 (2) 20-22 (1) 22-01 (2) 01-02 (1)	17-19 (1) 19-22 (2) 22-01 (1) 19-00 (1)*
Eastern Mediter-ranean & Middle East	08-09 (1) 09-10 (2) 10-11 (3) 11-12 (2) 12-13 (1)	07-08 (1) 08-10 (3) 10-11 (4) 11-12 (2) 12-13 (1)	07-10 (1) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-21 (1) 21-23 (2) 23-01 (1)	18-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
Western Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-14 (4) 14-16 (3) 15-17 (2) 17-18 (1) 09-11 (1)*	06-08 (1) 08-10 (2) 10-14 (3) 14-17 (4) 17-18 (3) 18-20 (2) 20-21 (1)	06-13 (1) 13-15 (2) 15-17 (3) 17-21 (4) 21-23 (3) 23-01 (2) 01-03 (1) 03-06 (2)	18-20 (1) 20-23 (2) 23-02 (1) 20-23 (1)*
Eastern & Central Africa	07-08 (1) 08-09 (2) 09-13 (3) 13-14 (4) 14-15 (3) 15-16 (2) 16-17 (1) 10-12 (1)**	06-08 (1) 08-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	07-14 (1) 14-16 (2) 16-17 (3) 17-20 (4) 20-22 (3) 22-00 (2) 00-02 (1)	19-00 (1) 20-22 (1)*
Southern Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (4) 13-14 (3) 14-15 (2) 15-16 (1) 08-10 (1)**	07-09 (1) 09-11 (2) 11-12 (3) 12-15 (4) 15-17 (3) 17-18 (2) 18-19 (1)	06-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-22 (3) 22-01 (2) 01-03 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Central & South Asia	08-09 (1) 09-10 (2) 10-11 (1) 18-19 (1) 19-20 (2) 20-21 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-02 (1)	06-08 (1) 18-20 (1)
Southeast Asia	09-10 (1) 10-13 (2) 13-14 (1) 16-17 (1) 17-19 (3) 19-20 (2) 20-21 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-14 (1) 16-18 (1) 18-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-10 (3) 10-12 (2) 12-14 (1) 16-18 (1) 18-20 (2) 20-21 (3) 21-22 (2) 22-23 (1)	04-07 (1) 17-19 (1)
Far East	15-16 (1) 16-17 (2) 17-19 (4) 19-20 (2) 20-21 (1) 17-19 (1)*	08-10 (1) 15-16 (1) 16-17 (2) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	02-03 (2) 03-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 15-18 (1) 18-20 (2) 20-22 (3)	02-03 (1) 03-07 (2) 07-09 (1) 03-07 (1)*
South Pacific & New Zealand	09-11 (1) 11-14 (2) 14-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 16-18 (1)**	07-09 (1) 09-11 (2) 11-13 (3) 13-16 (2) 16-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-23 (1)	10-17 (1) 17-19 (2) 19-20 (3) 20-00 (4) 00-04 (3) 04-06 (2) 06-07 (3) 07-08 (4) 08-09 (3) 09-10 (2)	23-01 (1) 01-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 00-02 (1)* 02-07 (2)* 07-08 (1)*
Australasia	08-09 (1) 09-11 (2) 11-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1) 17-19 (1)**	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (2) 11-13 (1) 13-17 (2) 17-19 (3) 19-21 (4) 21-22 (2) 22-23 (1)	04-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-15 (1) 15-17 (2) 17-20 (1) 20-23 (2) 23-04 (3)	02-04 (1) 04-07 (2) 07-09 (1) 03-06 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (3) 09-11 (4) 11-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 09-11 (1)**	06-07 (1) 07-08 (3) 08-11 (4) 11-13 (3) 13-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	06-07 (3) 07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-23 (4) 23-02 (3) 02-06 (2)	17-18 (1) 18-19 (2) 19-21 (3) 21-04 (4) 04-05 (2) 05-07 (1) 19-20 (1)* 20-22 (2)* 22-01 (3)* 01-02 (2)* 02-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-08 (2) 08-10 (4) 10-11 (3) 11-13 (2) 13-14 (3) 14-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 09-11 (1)**	06-07 (1) 07-08 (3) 08-10 (4) 10-— (3) 11-13 (2) 13-15 (3) 15-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	02-06 (2) 06-07 (3) 07-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-02 (3)	19-21 (1) 21-04 (2) 04-06 (1) 21-05 (1)*
McMurdo Sound, Antarctica	08-10 (1)	06-08 (1) 08-10 (2) 10-12 (1) 15-17 (1) 17-18 (2) 18-22 (3) 22-23 (2) 23-00 (1)	16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-06 (1) 06-08 (2) 08-09 (1)	23-05 (1)

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

	10/6 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (4) 11-12 (2) 12-13 (1)	05-06 (1) 06-09 (2) 09-12 (3) 12-14 (4) 14-15 (3) 15-17 (2) 17-19 (1) 22-01 (2)	18-20 (1) 21-00 (2) 00-01 (1) 19-23 (1)*
Central & Northern Europe & European USSR	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	05-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-14 (1) 14-16 (3) 16-18 (2) 18-21 (1) 21-00 (2)	18-20 (1) 20-23 (2) 23-00 (1) 19-22 (1)*
Eastern Mediter-ranean & Middle East	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-10 (2) 10-14 (1) 14-16 (3) 16-17 (2) 17-20 (1) 20-23 (2)	07-09 (1) 18-22 (1)
Western Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (4) 13-15 (3) 15-16 (2) 16-17 (1) 09-11 (1)**	06-07 (1) 07-08 (2) 08-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-22 (3) 22-00 (2) 00-02 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Eastern & Central Africa	07-08 (1) 08-10 (2) 10-13 (3) 13-14 (2) 14-15 (1) 09-11 (1)**	06-08 (1) 08-12 (2) 12-15 (3) 15-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-21 (3) 21-23 (2) 23-00 (1)	18-22 (1) 07-09 (1)
Southern Africa	07-08 (1) 08-10 (3) 10-12 (4) 12-13 (3) 13-14 (2) 14-15 (1) 08-10 (1)**	07-09 (1) 09-12 (2) 12-13 (3) 13-15 (4) 15-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (3) 16-18 (4) 18-20 (3) 20-00 (2) 00-02 (1)	18-19 (1) 19-20 (2) 20-21 (1) 18-19 (1)*
Central & South Asia	06-09 (1) 17-18 (1) 18-19 (3) 19-20 (1)	06-09 (1) 16-17 (1) 17-19 (3) 19-20 (2) 20-21 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-17 (1) 17-18 (2) 18-19 (3) 19-21 (2) 21-23 (1)	04-09 (1) 17-19 (1)
Southeast Asia	08-09 (1) 09-11 (2) 11-12 (1) 14-15 (1) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 15-17 (1)**	07-08 (1) 08-10 (3) 10-11 (2) 11-14 (1) 14-15 (2) 15-18 (3) 18-20 (2) 20-21 (3) 21-22 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1) 15-17 (1) 19-20 (1) 20-22 (2) 22-00 (1)	02-04 (1) 04-07 (2) 07-08 (1) 04-06 (1)*
Far East	13-14 (1) 14-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 15-18 (1)**	12-14 (1) 14-15 (3) 15-17 (2) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	00-06 (2) 06-08 (3) 08-09 (2) 09-12 (1) 12-18 (2) 18-21 (4) 21-22 (3) 22-00 (2)	00-01 (1) 01-04 (2) 04-07 (3) 07-08 (1) 01-05 (1)* 05-06 (2)* 06-07 (1)*
South Pacific & New Zealand	09-10 (1) 10-11 (2) 11-13 (4) 13-16 (3) 16-19 (4) 19-20 (2) 20-21 (1) 15-18 (1)**	07-08 (1) 08-09 (2) 09-11 (4) 11-15 (2) 15-17 (3) 17-22 (4) 22-23 (3) 23-00 (2) 00-01 (1)	04-07 (1) 07-09 (4) 09-10 (3) 10-11 (2) 11-18 (1) 18-19 (2) 19-20 (3) 20-00 (4) 00-02 (3) 02-04 (2)	21-22 (1) 22-00 (2) 00-07 (3) 07-08 (2) 08-09 (1) 22-00 (1)* 00-06 (2)* 06-07 (1)*
Australasia	10-13 (1) 13-15 (2) 15-16 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1) 17-19 (1)**	08-09 (1) 09-11 (3) 11-12 (2) 12-14 (3) 14-15 (2) 15-17 (1) 17-19 (2) 19-21 (4) 21-22 (2) 22-23 (1)	06-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-14 (1) 18-20 (1) 20-21 (2) 21-23 (3) 23-01 (4) 01-03 (3) 03-04 (2) 04-06 (1)	01-03 (1) 03-04 (2) 04-07 (3) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Carribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (3) 09-10 (4) 10-12 (3) 12-15 (4) 15-16 (3) 16-17 (2) 17-18 (1) 08-10 (1)**	06-07 (1) 07-08 (3) 08-10 (4) 10-13 (3) 13-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-08 (4) 08-10 (3) 10-13 (2) 13-15 (3) 15-22 (4) 22-00 (3) 00-06 (2)	17-18 (1) 18-19 (2) 19-20 (3) 20-04 (4) 04-05 (2) 05-06 (1) 19-20 (1)* 20-22 (2)* 22-00 (3)* 00-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-08 (2) 08-09 (4) 09-10 (3) 10-12 (2) 12-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 08-11 (1)**	06-07 (1) 07-08 (3) 08-09 (4) 09-11 (3) 11-13 (2) 13-15 (3) 15-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	05-06 (2) 06-07 (3) 07-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-01 (3) 01-03 (2) 03-05 (1)	19-20 (1) 20-22 (2) 22-00 (1) 00-04 (2) 04-05 (1) 20-03 (1)*
McMurdo Sound, Antarctica	07-08 (1) 08-09 (2) 09-10 (1) 19-20 (1) 20-21)2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-20 (2) 20-22 (3) 22-01 (2) 01-02 (2)	16-18 (1) 18-20 (2) 20-03 (3) 03-04 (2) 04-05 (1) 06-07 (1) 07-08 (2) 08-10 (1)	00-05 (1)

CQ DX Tip

—In any pile-up, give your call twice, then listen. —*W4MB*

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10-Meter FM For The Radio Amateur
by Dave Ingram, K4TWJ
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The world's only complete directory of international broadcasting and TV stations—the established, authoritative guide endorsed by the world's leading broadcasting organizations. A comprehensive listing of short-, medium-, and long-wave stations revised and updated to reflect actual conditions. Also includes special features on listening gear, how to adapt older receivers for use today, and DX club activities. 560 pages, paperback, $14.95. Order #B097.

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Federal Frequency Directory: 2-420 MHz Inclusive
by Robert B. Grove
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a monthly feature by
FRANK ANZALONE, W1WY

Contest Calendar

NEWS/VIEWS OF ON-THE-AIR COMPETITION

A new Trophy has been added to the 1980 C.W. section of our World Wide DX Contest. For the U.S.A.—Multi-Operator, Single Transmitter category. This one is being donated by Douglas Zwiebel, WB2VYA, a member of the Contest Working Committee.

While on the subject of Contest Trophies, there are several contest winners still waiting for their awards, but through no fault of ours. In a couple of cases the plaques were returned to us as not being claimed at the address taken from their logs.

Following is a list of past winners we are trying to locate.

1977 C.W. - ZS6WW, Oliver Sweningsen.

1976 Phone - 4Z4HF, Opr. Yossi Cohen.

1975 Phone - EP2SN, Norman Styer.

1974 C.W. - A9XU, Owen Jackson.

1973 Phone - VU2DK, Zal Kabraji.

1970 Phone - VS6DR, Philip Wight.

If you know the present QTH of any of the above please contact me so that we can make the necessary arrangements to have their awards forwarded to them. Also any other winners prior to 1977 who have not received their awards should contact me.

For the past several years we have received many requests for a 160 Meter Phone Contest, but we have hesitated organizing one because of the limited facilities on the Top Band. However, with the anticipated phasing out of Loran, which should result in the expansion of the 160 band, we decided to schedule a phone contest and be prepared for any future changes in the band structure.

We are cognizant of the fact that another organization ran a 160 Phone contest last year, but our readers have expressed a desire to see one using our format.

So note the dates, last week-end of February, 27th, 28th & March 1st, with the same rules used in the c.w. section these many years. They will be given in detail next month.

Don McClenon, N4IN will be the Director for both sections of the contest.

73 for now, Frank, W1WY

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

Dec. 5-7	ARRL 160 Meter Contest
Dec. 6-7	Telco. Pioneers QSO Pty.
†Dec. 6-7	Spanish Phone Contest
Dec. 6-8	Connecticut QSO Party
Dec. 13-14	Spanish C.W. Contest
†Dec. 13-14	Hungarian DX Contest
Dec. 13-14	ARRL 10 Meter Contest
Dec. 20-21	"Christmas" Expedition
Dec. 28	Canada Contest
Jan. 10-11	Hunting Lions Contest
Jan. 17-18	Inter. 160 Meter Phone
Jan. 17-19	ARCI QRP SSB Contest
Jan. 23-25	**CQ WW 160 CW Contest**
Jn/Fb 31-1	French C.W. Contest
Jan. 25-26	Classic Radio Exchange
Feb. 7-8	TWO Land QSO Party
Feb. 7-8	RSGB 7 MHz Phone
Feb. 14-15	QCWA C.W. QSO Party
Feb. 14-15	YL-OM Phone Contest
Fb/Mr 28-1	French Phone Contest
Feb. 21-22	ARRL C.W. DX Contest
Fb/Mr 27-1	**CQ WW 160 Phone**
Fb/Mr 28-1	RSGB 7 MHz C.W.
Fb/Mr 28-1	YL-OM C.W. Contest
Mar. 7-8	ARRL Phone DX Contest
Mar. 14-15	QCWA Phone QSO Party
Mar. 28-29	**CQ WW WPX SSB**

†Not Official

Telephone Pioneers QSO Party

Starts: 1900Z Sat., December 6
Ends: 0500Z Mon., December 8

This is the 16th annual party organized by the Telephone Pioneers. This year's party is being sponsored by the John D. Burlie Chapter #89 of Columbus, Ohio.

Members may be contacted on each band and each mode if they are in different chapters, however only one contact is permitted between stations in the same chapter.

Exchange: RS(T), QSO no. and chapter name and number (ITPA chapters name only).

Frequencies: Phone—3965, 7275, 14295, 21365, 28675, 50.1-50.25, 144.275-145.5, 146.52. C.W.—3565, 7065, 14065, 21065, 28065. Novice—3725, 7125, 21125, 28125.

Awards: Certificates to the highest scoring chapter, top scoring Pioneer Club station, and individual Pioneers and Pioneer LIfe Members.

Logs sheets may be obtained from your Radio Club Coordinator or Administrator.

This year logs go to: John D. Burlie Chapter #89, Att: Ted Phelps, W8TP, c/o Western Electric, Dept. 45160, 6200 East Broad Street, Columbus, Ohio 43213. Mailing deadline is January 12, 1980.

Spanish DX Contest

Phone: Dec 6-7. C.W.: 13-14
Starts: 2000 GMT Saturday
Ends: 2000 GMT Sunday

It's the world working the Espanoles, with separate weekends for phone and c.w. Only single operator operation is permitted, all bands 3.5 through 28 MHz.

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

Scoring: Contacts between EA stations and the following prefixes are worth 3 points. DU, CE, CM/CO, CP, CX, HC, HI, HK, HP, HR, KP4, LU, OA, PY, TG, TI, XE, YN, YS, YV, ZP or equivalent prefixes.

Between EA and all other non-Hispano and non-European countries 2 points.

Between EA and Europeans 1 point (WAE boundries).

Multiplier: For EA, each DXCC country worked on each band. All others use EA call districts worked on each band.

Final Score: Total QSO points from all bands times the multiplier from each band.

Awards: Gold, Silver and Bronze medals to the first 3 places, phone and c.w., in Spain and to overseas winners. Certificates to first place winners in each country. A minimum of 100 points required to qualify.

Include a summary sheet with your log showing the scoring and other pertinent information, the usual signed declaration that rules and regulations have been observed, and your name and address in Block Letters.

Your entry must be postmarked no later than February 15th to: U. R. E. International Contest, P.O. Box 220, Madrid, Spain.

ARRL 160 C.W. Contest

Starts: 220 GMT Fri. December 5
Ends: 1600 GMT Sun. December 7

This is the 11th year for this activity organized by the ARRL. Activity will be between state-side stations, VE's and also DX. DX to DX however does not count.

Exchange: RST and your ARRL section or country if it's a DX station.

Scoring: Contacts between stations in ARRL sections count 2 points, with other areas 5 points. The multiplier is determined by the number of ARRL sections worked (74 possible) plus VE8 and each DX country.

Awards: Certificates to top scorers in each section and each DX country.

Please keep the DX Window (1825-1830) clear of state-side and VE operation. That's where you will find the DX stations calling. They will be listening 1800-1805 or on a frequency they specify. Look for KH6's at the top of the band 1990-2000. They will be listening down at the low end.

Don't overlook the 1830-1850 portion of the band; activity there is usually much lighter than the bottom 25 kHz. (Check U.S. 160 Regs. for availability and restrictions.)

The usual grounds for disqualification—violation of rules, excessive duplicate contacts, etc.—will prevail. A large s.a.s.e. to ARRL will get you the necessary forms to make log keeping easier.

All entries must be postmarked no later than Dec. 29th and go to: ARRL Communications Dept., 160 Contest, 225 Main St., Newington, Conn. 06111.

Connecticut QSO Party

Starts: 2000Z Sat. December 6
Ends: 0200Z Mon. December 8
Off Period: 0500Z-1200Z Sun. Dec. 7

The Candlewood A.R.C. is again sponsoring this party. Their club station, W1QI, will be on the air operating c.w. on odd hours and s.s.b. on even hours.

The same station may be worked on each band and mode for QSO points, mobiles in each county change. Oscar contacts considered a separate mode.

Novices should identify by /N as part of their call. Mobiles should also identify their county of operation.

Exchange: QSO no., RS(T) and QTH. County for Conn. stations, ARRL section for others.

Scoring: One point per QSO, 2 points if it's with a Novice, 3 points for Oscar contacts, and 5 points if it's with W1QI.

Multiplier: ARRL sections for Conn. Out-of-state stations use Conn. counties (max. of 8).

Final Score: Total QSO points times ARRL sections worked for Conn., and Conn. counties for others.

DX stations may be worked for QSO points but counted only *once* for a multiplier.

Frequencies: C.W.—40 kHz up from bottom of each band. S.S.B.—3927, 7250, 14295, 21370, 28540. Novice—3725, 7125, 21125, 28125.

Awards: Certificates to top scorers in each Conn. county and each ARRL section. Also the "Worked All Connecticut Counties" certificate to each station contacting all 8 Conn. counties.

Include a large s.a.s.e. for a copy of the results and mail your log by January 2nd to CARA, Att: Steve Grouse, KA1ECL, 3 Queens Court, Danbury, CT 06810.

ARRL 10 Meter Contest

Starts: 0000 GMT Sat. December 13
Ends: 2359 GMT Sun. December 14

This the 8th annual 10 meter contest organized by the ARRL has become very popular especially with the improvement in propagation.

It's a worldwide activity in which DX

S.A.R.T.G. 1979 RTTY Results

North America

W3EKT	295,800
K8NN	223,975
W7DPW	145,530
W4CQI	139,995
WA2OQO	90,475
WA6CQW	46,690
W3FV	37,440
W6IWO	30,975
K6WZ	19,530
W4YZ	17,710
W3KV	10,680
W3JF	9,900
K8UFW	3,315
W8TCO	560
VE4BF	86,060
VE2AXO	72,090
VE2QO	59,500
VE7DOC	13,200
VE2GV	6,545

Multi Opr.

K5ZOH	79,195
KF4W/KB4HF	72,240

W3EKT was 2nd World High behind I3FUE.

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stations are permitted to work other DX. You are not limited to working W/Ks and VEs only.

The same station may be worked once on phone and again on c.w. No cross mode however. And a maximum of 36 hours operating time is permitted out of the 48 hour contest period.

Exchange: Stations in the 50 U.S. states and Canada send RS(T) and their state or province. Others (including KP4, KV4, etc.) will send RS(T) and a consecutive contact number starting with 001. Stations not land-based will send RS(T) and their ITU region.

Scoring: Each completed QSO is worth 2 points, 4 points if it's with a Novice or Technician. The multiplier is determined by the US states, VE call areas, DXCC countries and ITU regions worked (as sent by non-land-based stations). (U.S. and Canada not counted as a country.)

Activity will take place in that portion of the 10 meter band normally used for c.w. and for phone operation. Oscar contacts also permitted.

Awards: Certificates to the highest scoring single operator station in each ARRL section, VE call area and DX country. Multi-operator, Novice and Tech. awards will be issued depending on entries received from respective areas, also for non-land-based stations.

As for all ARRL activities, it is recommended that you send a large s.a.s.e. for appropriate log forms and instruction sheets.

Mailing deadline for logs is Jan. 15th to: ARRL Communications Dept., 10 Meter Contest, 225 Main St., Newington, Conn. 06111.

Hungarian C.W. Contest

Starts: 1600 GMT Sat. December 13
Ends: 1600 GMT Sun. December 14

It's the world working the HA's on all bands 3.5. through 28 MHz on c.w. only.

Operation will be in three classes: Single operator, single band and all band, and multi-operator all band. (Club stations are considered as multi-operator.)

Exchange: RST plus a contact number starting with 001. In addition the HA's will send two letters to identify their county. (BA, BP, BE, BO, CS, FE, GY, HA, HE, KO, NO, PE, SA, SO, SZ, TO, VA, VE, ZA. Total of 20 on each band.)

Scoring: One point for each HA contact. And a multiplier of one for each different county worked on each band. (Same station may be worked once on each band for QSO and multiplier credit.)

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

Awards: Certificates to the first place winners in each class in each country.

Include a summary sheet with your entry including the usual signed declaration. Send within six weeks from the end of the contest to: Radio

SAC 1979 Contest Results
North America

C.W.

*W1YN	41,790
W1AQE	5,618
W1OPJ	1,914
K1KI	1,288
SM0COP/W1	220
WA1FCN	220
*K2SX	3,240
W2KHT	3,081
*W3ARK	18,172
K3VW	5,376
WA3DMH	4,277
*AK4Q	6,336
K4RZ	5,069
WA4OML	4,888
N4TO	3,645
WA4QMQ	3,132
K2EKM/4	1,500
W4YN	836
W4DGX	132
*K5BDX	714
*W6UA	2,754
K6NA	1,265
N6JM	120
N6AA	1
*VE7ZZ/W7	338
*N8II	39,655
W8EAO	817
*AA8S	400
*K9BG	7,480
W9SS	1,600
W9QWM	672
*W0WP	10,530
*VE1BNN	6,084

Phone

*KA1EP	12,118
WA1ORP	1,680
SM0COP	608
*N2CW	13,350
W2FCR	3,003
HI3DJP/W2	2,442
W2JGR	1,848
*AC3Q	8,060
LA4LN/W3	5,406
WA3DMH	4,680
*K4RZ	12,337
WA4QMQ	5,871
WD4ARY	2,639
W4KMS	2,223
WA4BCN	1,029
WD4CZD	798
AK4T	192
KB5DK	64
*W6UA	4,004
N6AA	3,690
K6YRA	2,378
*KB8JF	5,202
K8CFU	4,841
*W9SS	11,360
K9ECE	2,280
*WA0TKJ	5,208
WD0HMF	437
*VC3GCO	11,109
VE1BNN	792
VE3KFD	42
VE2WA	36
*J6LGL	726
*VP2ML	12,210

*Certificate Winners
W1YN - Plaque Winner
N2CW - Plaque Winner

Amateur League of Budapest, P.O. Box 2, H-1553, Budapest, Hungary.

"Christmas Expedition"

1700 to 0200Z Sat., December 20/21
1400 to 2000Z Sun., December 21

The Southwest Volusia A.R.C. of New Smyrna Beach, Fla. will conduct an expedition to Ft. Christmas, Florida and put this popular spot on the air during the Holiday Season.

The small village of Christmas located between Orlando and Titusville was named after Ft. Christmas, which was built during the second Seminole War during December 1837.

The post office is famous for its "Christmas Fla." cancellation on mail during the Christmas Season.

Activity will be on 7250, 14300 and 21400 s.s.b., and 7125 and 21130 for Novices.

A message center will be set up to handle Christmas messages for visitors to the Fort.

All contacts will be honored with a special QSL card with the "Christmas Fla." cancellation. A large s.a.s.e. (size #10) should be included with all QSL's. (As a suggestion, why not use a Christmas stamp?)

Send your QSL requests to: William C. Kennedy, KA4BIW, 1510 Orange Tree Drive, Edgewater, Fla. 32032.

Canada Contest

0001 to 2359Z Sun., December 28

Again sponsored by the Canadian Amateur Radio Federation, this contest follows the same pattern as the Canada Day Contest last July.

Activity will be on all bands, 2 through 160 meters, phone and c.w. Single operator, single and all band, multi-operator all band only.

The same station may be worked on each band and each mode for QSO and multiplier credit.

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

Scoring: 10 points for each contact with Canada, 1 point if with others, and 10 bonus points for each contact with any CARF official news station using the suffix TCA or VCA.

Multiplier: Number of VE provinces/territories worked on each band and each mode (12 prov./terr. × 8 bands × 2 modes for a maximum of 192 possible.)

Contacts with stations outside of Canada count for QSO points but no multiplier; VE1's are requested to identify their province.

Frequencies: Phone—1810, 3770, 3900, 7070, 7230, 14150, 14300, 21200, 21400, 28500, 50100, 146520. C.W.—1810, 3525, 7025, 14025, 21025, 28025, 50100, 144100. Try phone on even hours, c.w. on odd hours.

Awards: A Trophy to the overall single operator winner. Certificates to the top scorers in each category, in each VE province/territory, U.S. call area, and DX country. And also to the highest score from a Canadian non-Advanced amateur.

Include a summary sheet showing all the scoring and also a dupe sheet with your log. Mailing deadline is January 15th 1981 to: Canadian Amateur Radio Federation, 203-1946 York Avenue, Vancouver, BC, Canada V6J 1E3. Include a large s.a.s.e. for a copy of the results.

VK/ZL/O 1979 Contest Results
North America

Phone

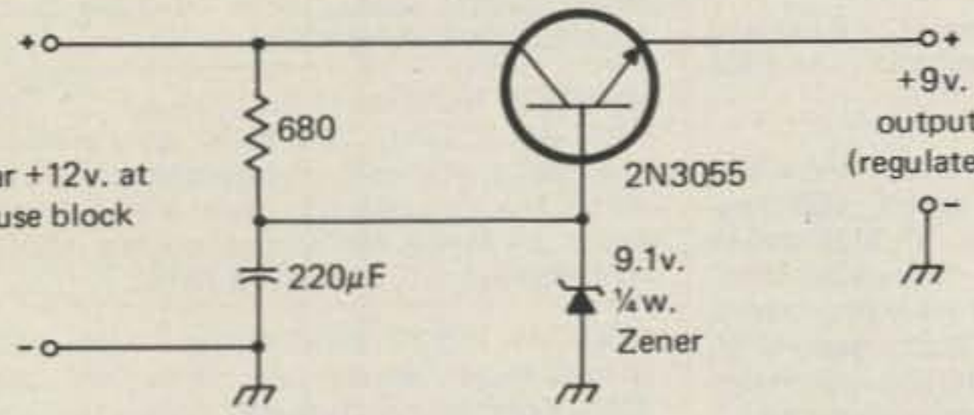
K0CL	20,300
K3TW	18,722
WA0TKJ	10,881
K6BPY	10,620
KB8JF	6,630
K4KUZ	5,238
K0SVL	4,764
W5OB	3,480
N7XX	3,420
W7LGG	3,014
WD5DUD	2,090
K9GM	1,926
W9QWM	1,444
AE5Y	1,425
WA4QMQ	1,027
W3CM	1,001
N2LT	948
W1YOU	870
N3RL	740
K1MEM	680
K4BAI	590
N6NNV	304
WB4WHE	72
W2UL	56
WA3DMH	48
VC3GCO	9,290
VE7VT	3,332
VE2WA	590

C.W.

W7IR	12,588
K0FX	8,576
W1EVT	6,765
W5OB	4,644
W8UVZ	4,125
K3TW	3,822
N2LT	2,706
WA4OML	1,547
K1MEM	1,022
W7LGG	1,008
AE5Y	624
WA4QMQ	320
WA3DMH	224
N4QN	182
W8EAO	154
W1PWK	96
W0BMM	55
W2UL	24
KL7HBK	532
VE2AEJ/3	408
VO1AW	128
VE3JKC	30
VP2ML	888

CRANIUM QUERIES

BY MARTIN BRADLEY WEINSTEIN, WB8LBV
c/o CQ



Here's What Was Wrong

No, it wasn't a "DC amplifier-type regulator." It was a power transistor clamped into permanent saturation—a nice switch, but a lousy regulator. This series pass configuration works much better, and the '3055 is a real champ.

Ham Shop

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NEED HELP for your Novice or General Ticket? Recorded Audio-visual Theory Instruction. No electronic background required. Free information. Amateur License, P.O. Box 6015, Norfolk, Virginia 23508.

LINEAR AMPLIFIER PLANBOOK, Thirteen Complete Transistor Amplifiers from 2-400 MHz, 15-1000 watts, 92 pages $11.95 plus $1.50 Shp. MC/VISA. A.P. Systems, Box 263CQ, Newport, R.I. 02840, tel. 401-846-5627.

FOR SALE: Electronic equipment. For a list and prices, send an S.A.S.E. to Klaus, WB9YBM, 8502 Oketo, Niles, IL 60648.

RTTY FOR SALE: Model 28KSR, M28 stand-alone TD, M28 receive-only typing reperf, M28 keyboard typing reperf, M28 triple TD, M28 underdome typing reperf, M28 motorized paper winder, answerback, auto CR-LF kit for M28 printers. Model 33 and 35 machines. Gears, gearshifts, parts and supplies for all Teletype machines. Send SASE for list and prices. Lawrence T. Pfleger, K9WJB, 2600 S. 14th Street, St. Cloud, MN 56301.

INTEGRATED CIRCUITS TTL, CMOS, LINEAR many hard to find "S" and "LS" types, resistors, capacitors, diodes, IC sockets and more. Send for free catalog. WESTLAND ELECTRONICS, 34245 FORD RD., WESTLAND, MI 48185. (313) 7280650.

WANTED: Hallicrafters R47 or R48A Speaker to match SX-117 Receiver. Garry Cameron, VE7DZR, 3528 11th Avenue, Port Alberni B.C. V9Y 4Y7.

FREE SAMPLE Ham Radio Insider Newsletter! Send large SASE. W5YI; Box #10101-C; Dallas, Texas 75207.

BUILD YOUR OWN STATION DESK! Easy!! Plans-$3. M.E. Gustoff, RR#1 Box-37, Manito, IL 61546.

QSL CARDS: 500/$10. 400-illustration catalogue, free! Bowman, 743 Harvard, St. Louis, MO 63130.

GOV'T SURPLUS EQUIPMENT, Parts and Tubes. Catalog 50¢. G & G RADIO, 47 Warren St., New York, NY 10007; (212) 267-4605.

TR7/DR7 modification information for transmitter coverage of WARC-MARS (transmit complete from 1.5-30 MHz). Color photo and description of modification. Takes minutes, no circuit board removal. $20.00. Gene DeFoe, WA7SRI, Box 211, Shoshoni, Wyoming 82649.

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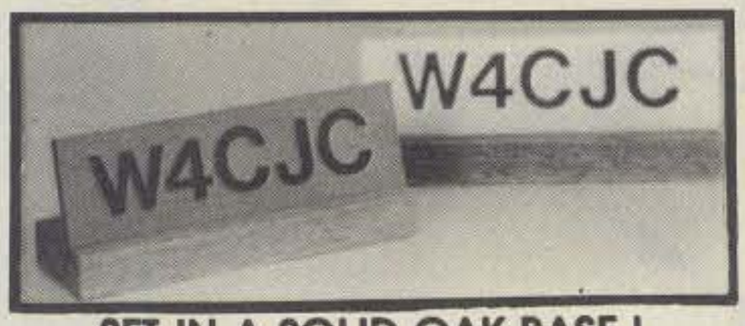

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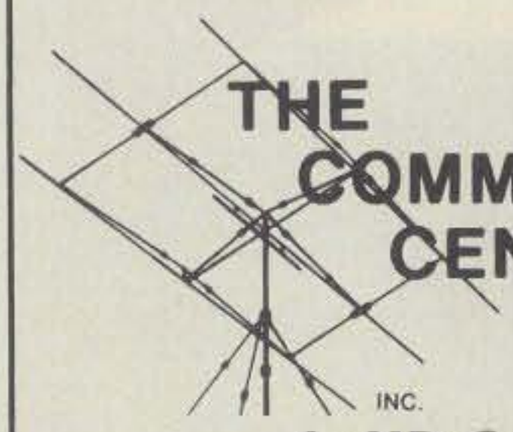

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